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Number Portability:
Ensuring Convenience and Fostering Competition in Telecommunications

Introduction

The purpose of this paper is to identify and explore the issues, challenges, and potential solutions related to number portability in the United States, with an emphasis on service provider portability, commonly referred to as local number portability (LNP).

Number portability is a circuit-switch telecommunications network feature that enables end users to retain their telephone numbers when changing service providers, service types, and/or locations. When fully implemented nationwide by both wireline and wireless providers, portability will remove one of the most significant deterrents to changing service, providing unprecedented convenience for consumers and encouraging unrestrained competition in the telecommunications industry.

"Pursuant to the statutory requirement in Section 251 (b)(2) of the Telecommunications Act of 1996 to provide telephone Number Portability, we require all LECs to begin to implement a long-term service provider portability solution that meets our performance criteria in the 100 largest Metropolitan Statistical Areas (MSAs) no later than October 1, 1997, and to complete deployment in those MSAs by December 31, 1998, and that Number Portability must be provided in these areas by all LECs to all telecommunications carriers."

"We require all cellular, broadband PCS, and covered SMR providers to have the capability of delivering calls from their networks to ported numbers anywhere in the country by December 31, 1998, and to offer service provider portability, including the ability to support roaming, throughout their networks by June 30, 1999."

-FCC Ruling, July 2, 1996
(Docket No. 95-116)

Background

The Telecommunications Act of 1996 (TA 96) tore down most of the significant barriers to unfettered competition in telecommunications. However, the inability of end users to retain their telephone numbers when changing service providers or types could potentially dissuade consumers from making such a change, threatening to hinder industry competition and growth. Congress' addition of Section 251 (b)(2) to TA 96 addressed this obstacle by defining number portability, requiring that all carriers deploy it, and setting deadlines for implementation. FCC Docket No. 95-116 (In the Matter of Telephone Number Portability) and subsequent FCC orders and reconsiderations reinforced Congress' mandate and set the machinery in motion to implement number portability.

The actions of both Congress and the FCC enabled consumers and businesses to choose new providers, services, and locales while retaining their phone numbers, thereby fostering competition in the telecommunications industry.

To ensure standardization across platforms for all participants, the FCC instructed the North American Numbering Council (NANC) to determine which number portability method to employ. Several options were investigated. The location routing number (LRN) method was chosen because it appeared to be the most efficient and is now successfully implemented in the wireline environment. The NANC then created the Local Number Portability Working Group (LNPA-WG) and empowered it to select the appropriate technology, create standards, determine operational processes, and develop and implement a deployment strategy. To fulfill its responsibilities, the LNPA-WG was granted the authority to convene appropriate subcommittees as needed. Subcommittees created include the National Number Pooling and Slow Horse groups, as well as the Wireless Number Portability subcommittee, which defines integration issues between the wireless and the wireline industries. NeuStar was named the Number Portability Administrator and operates the Number Portability Administration Center (NPAC).

Regulators have mandated that number portability be implemented before the regional Bell operating companies (RBOCs) are allowed to offer long distance service within their regions. Conversely, interexchange carriers (IXCs) and competitive local exchange carriers (CLECs) require local number portability (LNP), also called service provider portability, to gain a competitive foothold in the local loop. This ability to enter local markets on a competitive basis is considered key to fair and open competition and is directly addressed in FCC Docket No. 95-116.

CLECs are taking advantage of opportunities created by LNP to compete with incumbent local exchange carriers (ILECs). In 1999, the local service market--the primary market identified by CLECs--represented over $109 billion in total revenue, and CLECs garnered 5.8% of that revenue, according to the FCC. This penetration is largely predicated on the ability of current ILEC customers to change service providers without changing their phone numbers. Some CLECs have reported that over 90% of their subscriber growth was directly enabled by number portability. Wireline LNP has been implemented within the top 100 MSAs in the United States, as mandated, and is gradually being adopted outside of these areas.

The FCC order also set an aggressive implementation schedule for the wireless industry. However, the Cellular Telecommunications Industry Association (CTIA), acting on behalf of the wireless community, asked for and received deadline extensions. The FCC's current mandate requires that wireless carriers, including cellular and personal communications service (PCS) carriers, implement service provider portability by November 24, 2003.

Types of Number Portability

The government has defined and mandated three basic types of number portability: service provider portability (commonly referred to as Local Number Portability), location portability, and service portability. The three types may be combined to form variations on number portability services.

Service Provider Portability

Service provider portability or Local Number Portability (the term Local Number Portability will continued to be used in referencing service provider portability), as defined in the Telecommunications Act of 1996, is the ability of end users to retain existing directory numbers at the same location as they change from one service provider to another. Historically, all directory numbers in one NPA-NXX were assigned to a single telephone switch. The incumbent had a significant advantage in retaining customers by controlling or, in effect, owning the customer's telephone number. A customer who wanted to change local service providers faced the potential costs and inconveniences of changing to a new phone number, including distributing it to family, friends, and business contacts. To facilitate competition at the local exchange, the FCC mandated that phone numbers be portable among local exchange competitors (ILECs, CLECs, cellular providers, and so on).

With the introduction of local number portability, individual directory numbers in one NPA-NXX may be moved to a different telephone switch. Therefore, the first six digits of a directory number (NPA-NXX) no longer uniquely identify the switch that serves that customer. To identify the correct switch, the concept of a location routing number (LRN) was introduced by industry experts and approved by the FCC. Each switch that hosts portable numbers will be assigned a 10-digit LRN that will be used in routing a call to that switch.

The order calls for porting only within a rate center. A rate center, or the "portability domain," is an area (usually under the jurisdiction of the state Public Utilities Commission) in which directory numbers can be ported. All LNP-capable network elements, including service switching points (SSPs), signal transfer points (STPs), and signal control points (SCPs), must maintain a list of NPA-NXXs that are considered portable.

Location Portability

Location portability, as defined in the FCC's First Report and Order, Docket No. 95-116, released July 2, 1996, is the ability of users of telecommunications services to retain existing directory numbers without impairment of quality, reliability, or convenience when moving from one physical location to another. In this case, a given telephone number could be associated with any network termination device, independent of location.

Location portability would allow customers to take their directory number when they move to a geographic location outside of the original rate center. In the Second Memorandum Opinion and Order on Reconsideration regarding FCC Docket 95-116, the FCC concluded that nothing in the Act would preclude it from mandating location portability in the future; however, no requirements have yet been designated or mandated.

Service Portability

Service portability, as defined in the FCC's First Report and Order, Docket No. 95-116, is the ability of users of telecommunications services to retain existing directory numbers without impairment of quality, reliability, or convenience when switching from one service to another service provided by the same carrier. The FCC has not addressed service portability at this time, and requirements for service portability are still undefined.

Wireline Local Number Portability (LNP) Architecture and Processes

There are many components and processes involved in a Local Number Portability system.

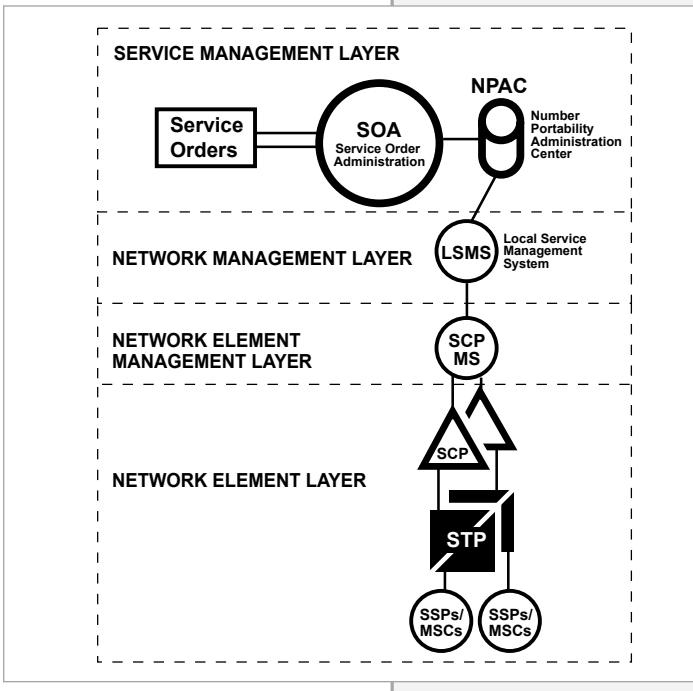
Network Elements

Architecturally, seven basic components are required to deploy local number portability (LNP):

- Service order administration (SOA)
- Number portability administration center (NPAC)
- Local service management system (LSMS)

- Service control point management system (SCP MS)
- Number portability database (NPDB)
- Signal transfer point (STP)
- Service switching point/mobile switch center (SSP/MSC)

The following figure illustrates the telecommunications management network (TMN) reference architecture for the seven LNP components.



Service Order Administration (SOA)

Service order administration (SOA) provides the functionality to interface to carriers' order and provisioning systems in order to update the NPAC for access by all other carriers. The SOA's primary functions include subscription audit request/management; data administration; data transfer to the NPAC; report generation; bulk file parse and upload; subscription tracking; legacy order entry interface; and logging. Depending on an individual service provider's requirements, the SOA may interface with multiple NPACs to allow for nationwide number portability. The carrier-to-SOA connection may be custom-designed to interface with existing carrier order entry systems. However, the SOA interface to the NPAC is a common management information service element (CMISE), providing subscription management functions as well as logging, error reporting, and alarm functions. Specific industry-approved interface requirements are contained in the NANC Functional Requirements Specifications (FRS) and Interoperable Interface Specification (IIS).

Number Portability Administration Center (NPAC)

The FCC's First Report and Order, Docket No. 95-116 describes the third-party, neutral database administration function in support of number portability. Called the number portability administration center (NPAC), this database is designed to receive information from both the incumbent and new service providers, validate the information received, and download the new routing information when an "activate" message is received indicating that the customer has been physically connected to the new service provider's network. Each ported number is a "subscription version" within NPAC that contains the new service provider's ID, the location routing number (LRN) associated with the new switch, and routing data associated with additional services the customer may request (for example, line information database (LIDB), calling name delivery (CNAM), and so on). The NPAC also maintains a record of all ported numbers and a history file of all transactions relating to the porting of a number. The NPAC provides audit functionality and the capability to retransmit subscription version information to local service management systems under certain conditions. The NPAC is not involved in real-time call processing.

The NPAC provides management, administration, oversight, and integration of NPAC operations, hardware and software development, and all maintenance-related functions. It is responsible for meeting performance standards established by the industry and providing user and technical support services and training for industry participants on an ongoing basis.

Local Service Management System (LSMS)

The local service management system (LSMS) is a fault-tolerant hardware and software platform that contains the database of information required to enable routing and call completion to ported telephone numbers. The primary functions of the LSMS are subscription management, network data management, service provider data management, error processing and notification, transaction event logging and reporting, transmission of activation/deactivation events to the network elements, and audits.

The LSMS interface with the NPAC provides real-time activation/deactivation information upon download from the NPAC and can send responses to the NPAC once a message or subscription version is processed. Similar to the SOA, the interface between the LSMS and the NPAC is CMISE and contains capabilities for event logging, security, and alarming. The LSMS is expected to mirror NPAC ported routing information and can request updates from the NPAC in a variety of ways if database synchronization is in question. Specific industry-approved interface requirements are contained in the NANC FRS and IIS.

Service Control Point Management System (SCP MS)

The service control point management system (SCP MS) provides interface services between the LSMS and the SCP. The SCP MS may or may not be physically integrated with the SCP.

Number Portability Database (NPDB)

The number portability database (NPDB) contains the routing information necessary to support number portability. The NPDB provides the LNP association between the called party and the carrier LRN, identifying the switch to which the call should be routed. The NPDB stores all ported numbers within the ported domain. Carriers can choose between two different LNP database architectures for accessing the LRN associated with a particular directory number: an integrated STP/SCP configuration or an STP with an adjunct SCP.

An LNP SCP provides the LRN for a particular directory number. The correct routing information for SCP-based services, including line information database (LIDB), calling name delivery (CNAM), custom local area signaling services (CLASS), and inter-switch voice messaging (ISVM) for a ported directory number, is determined by 10-digit global title translation (GTT), also provided in the NPDB.

The SCP is a high-transaction-oriented server that receives intelligent network (IN) and advanced intelligent network (AIN) 0.1 LNP Transactional Capabilities Application Part (TCAP) messages or Number Portability Request (NPREQ) messages from the SSPs/MSCs using the SS7 network.

As an alternative, some providers deploy an integrated STP/SCP platform, which enables high transaction rates but requires less infrastructure (links and ports).

Signal Transfer Point (STP)

The signal transfer point (STP) receives the LRN query from the SSP/MSC and routes the query to the appropriate LNP SCP. The STP returns the SCP response to the SSP/MSC.

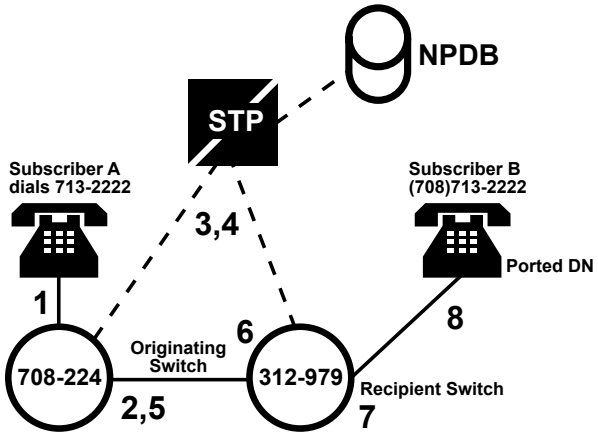
Service Switching Point (SSP)/Mobile Switch Center (MSC)

The exchange carrier owns and operates the service switching point/mobile switch center (SSP/MSC). Service switching points must be able to generate an LNP query to the SCP (via the STP network) when a call is placed to a telephone number in a ported domain. A ported domain is an MSA that has implemented number portability. A query is generated on any call to an NPA-NXX that has been marked as portable in the local exchange routing guide (LERG) and NPAC with at least one ported number.

Call Flow: Wireline to Ported Wireline Number

The following steps outline the call flow from a wireline customer to a ported wireline number.

1. A wireline customer dials a ported wireline number. The SSP queries an internal table that identifies all portable NPA-NXXs.
2. If the dialed NPA-NXX is marked as portable, the originating SSP will determine whether an SSP query should be launched. A query is not required when the following conditions exist: the called party directory number is served by the switch; the call is routed to an operator system or interexchange carrier; a number portability query was already made for the call; or the serial triggering limit is exceeded. If none of the above conditions exist, the SSP formulates and launches an SS7 TCAP query to the NPDB.
3. The originating switch receives the NPDB response and analyzes the data. The LRN is translated in the number portability routing tables and an ISUP route out of the switch is determined. The LRN is stored in the called party number (CdPN) parameter and the dialed digits are stored in the generic address parameter (GAP) of the ISUP initial address message (IAM). In addition, the forward call indicator (FCI) or number translated indicator is set to indicate a query has been performed (set to "translated number").
4. The call is routed to the recipient switch based on the LRN. The recipient switch receives and processes the contents of the IAM message and completes the call to the subscriber.
5. If, after initiating a query and analyzing the response data, the originating switch determines that the dialed number has not ported, the call is routed to a donor switch based on the original dialed digits. As with a ported telephone number, the dialed number is translated in the number portability routing tables and an ISUP route out of the switch is determined. The dialed number is stored in the CdPN parameter and the



FCI is set to indicate a query has been performed. The GAP is not included in the IAM for this scenario. The donor switch receives and processes the contents of the IAM message, digitally analyzes the dialed digits, finds the subscriber on the switch, and completes the call.

Wireless Local Number Portability (LNP) Status, Requirements, Architecture, and Processes

The initial rollout of number portability in 1997 affected only wireline carriers in the top 100 metropolitan statistical areas (MSAs), with additional rate areas implemented by request only. However, the industry and the FCC recognized that wireless subscribers call ported wireline subscribers and may eventually want to change carriers while retaining the same wireless telephone number. Therefore, the FCC considered and wrote several memorandums to address wireless portability issues:

- **First Order and Report, Docket 95-116.**

  This docket mandated that all cellular, broadband personal communications services (PCSs) and covered specialized mobile radio (SMR) providers query appropriate number portability databases to deliver calls from their networks to ported wireline telephone numbers. The first phase dictated that calls be delivered to the ported telephone number on the wireline side; the second phase required the wireless industry to provide service provider portability. The FCC's first Reconsideration Memorandum clarified that PCSs would have to provide portability in the 100 largest MSAs as well as support nationwide roaming.

- **Second Order and Report.**

  This document cited exclusions for wireless. It concluded that licensees should not be required to provide number portability if they do not compete in the market for two-way, interconnected, real-time voice services or if they provide primarily dispatch and data services. The FCC deferred a decision on geographic portability implementation in this report.

- **Third Order and Report.**

  This document covered cost recovery and query responsibility. In terms of wireline or wireless carriers query responsibility, obtaining routing information to a ported telephone number, the N-minus-one carrier (that is, the carrier immediately preceding the terminating carrier) is responsible for performing the query to an NPDB to retrieve the LRN. If involved, an interexchange carrier would typically be the N-1 carrier.

On February 9, 1999, the Wireless Telecommunications Bureau granted the wireless industry a nine-month implementation stay, as requested by the Cellular Telecommunications Industry Association (CTIA). The FCC further decided that the deadline for wireless portability implementation would be extended until November 24, 2003.

LNP Architecture and Methodology in a Wireless Environment

Although the basic infrastructure for wireless and wireline number portability is the same, wireless service providers face some unique challenges associated with service and network operations design and implementation. One significant architectural difference is that the mobile switch center (MSC) replaces the signal switching point (SSP) of the wireline model. These centers must be capabile of terminating a call to a ported telephone number. There are several ways to accomplish this, which are addressed in detail in the section on Number Portability Deployment Options. Typically, an MSC should be able to generate a NP query to an NPDB when a call is placed to a telephone number in a proted domain. A query is generated on any call to an NPA-NXX that has been designated as portable in the local exchange routing guide (LERG), the NPAC, and marked as such in the switch routing tables.

In order to implement local number portability, a wireless provider's MSC(s) must be able to process calls destined to ported subscribers. In Phase I this is strictly a wireline ported subscriber call, originating at a mobile station. This requirement expands to include wireless ported subscribers in Phase II. Whether now or later, the provider will need to provision software to recognize the specialized trigger mechanisms required for query capability. A trigger is defined and implemented in the MSC in order to launch the NPDB query to obtain necessary routing information for call completion. Wireless providers should discuss the trigger mechanism and software provided by the MSC vendor in preparation for implementation.

Based on the nature of most wireless technologies (excluding GSM), the mobile identification number (MIN) has been identical to the mobile directory number (MDN). In order to satisfy the FCC directive to support nationwide roaming (clarified in Memorandum and Order CC-95-116), wireless carriers using this identification assignment process will need to separate the two numbers.

Within the WNP framework, mobile stations will possess two types of numbers: a mobile station identifier (MSID) and a mobile directory number (MDN). The MDN will be a dialable NANP directory number (NANP format) and will be portable. The MSID will be either an IMSI and/or NANP-like MIN and will not be portable. When a customer ports, the MDN and the MSID will become separate and distinct, with the MSID being surrendered to the donor network. The ported subscriber's MDN however, will remain the same. Once the MDN and MSID are separate, each switch serving a subscriber with these parameters must be capable of recognizing these parameters as separate and distinct.

Overall, industry groups have identified supplementary hurdles to overcome, including rate center parity issues, directory listing issues, and wireline-to-wireless porting intervals and

billing issues. Currently, these issues have either been referred to or are being addressed by a variety of official industry bodies, including the FCC, Order and Billing Forum (OBF), and NANC.

In addition to the MSC switching software modifications, wireless providers must ensure that global title (GT) routing is supported from the switch. Typically, this means a routing indicator in the called party address of the service connection control part (SCCP) portion of the TCAP message. Routing to the NPDB can either be done using global title or destination point code/subsystem number. Benefits to GT routing include support of and ability to use a regionally distributed architecture as well as load balance functionality across databases and associated linksets. Previously, wireless carriers did not access "enhanced services" databases and as a result opted to not implement GT routing.

During Phase II, wireless providers must be able to port subscribers and "upload" information on numbers that either port to or from them to appropriate NPAC for access by other providers. A service order administration (SOA) system provides this necessary functionality to interface with the wireless provider's order and provision systems to update the NPAC (see Service Order Administration section on page 2).

Phase I: Call Completion in a Portable Environment

Phase I involves delivering calls to ported wireline telephone numbers. Wireless carriers capable of launching number portability request (NPREQ) messages and equipped with switch trigger capabilities may participate in this initial phase of wireless number portability (WNP). Capability is contingent upon the following requirements:

- Wireless service provider must have the location routing number (LRN) switch software upgrade implemented for call delivery.
- The mobile switch center (MSC) must be able to launch queries using global title data, i.e. launching queries to an alias point code (APC) and translation type (TT) instead of routing on a destination point code/ and subsystem number (DPC/SSN).

Phase II: Wireless Number Porting

Phase II implementation encompasses the process of porting a customer from wireless to wireless service providers, as well as the complete integration of the wireline and wireless porting process. This phase requires implementation of all the components of the NP functional architecture, which are described in the previous Wireline Architecture and Processes section and in the Intercarrier Communications Requirements and Specifications section following.

Wireless Intercarrier Communications Requirements and Specifications

Wireless intercarrier communications encompasses the standards, technologies, and processes of exchanging data among wireless service providers. The Cellular Telecommunications Industry Association (CTIA) defines the operational requirements and technical specifications for intercarrier communications regarding wireless number portability. These standards represent a consensus developed by the CTIA Numbering Advisory Working Group and apply to all commercial mobile radio service (CMRS) carriers. This includes analog advanced mobile

phone system (AMPS), time division multiple access (TDMA), code division multiple access (CDMA), and global system for mobile communications (GSM) providers (including digital specialized mobile radio (SMR) providers).

In January 1998, the CTIA sponsored a workshop on intercarrier communications, which resulted in a recommendation by the CTIA to adopt a phased approach to WNP intercarrier communications. Given the short compliance timeline (initially), in its August 1998 report on wireless number portability, the CTIA specified a modified version of the wireline local service request (LSR) for intercarrier communications for the initial phase. It suggested that the second phase eliminate the wireline LSR method from the wireless porting process and consider enhancements or alternatives enabling wireless carriers to exchange porting information through third-party communication processes.

The current wireline pre-porting process, using the LSR method, takes 24 hours for completion. However, in recognition of unique requirements of CMRS providers, experts agreed that wireless carriers should complete the entire wireless-to-wireless port within two and a half hours, of which only 30 minutes is allotted for the intercarrier communications portion. The CTIA Report defines the requirements to achieve the 30-minute interval, as recommended to the FCC by the NANC.

Call Flow: Wireless to Ported Wireline Number

The following steps outline the call flow from a wireless customer to a ported wireline number.

1. A mobile subscriber dials a wireline number that is ported. The MSC queries an internal table that identifies all portable NPA-NXXs.
2. If the NPA-NXX is marked as portable, the MSC queries the NPDB using the IS-756 number portability request (NPREQ) message containing the directory number derived from the dialed digits.
3. If the dialed number is found in the NPDB, the LRN identifying the recipient switch is returned in the response or (NPREQ) message. The routing digits (ROUTDGTS) parameter includes the LRN associated with the ported directory number.
4. The MSC selects the appropriate trunk group based upon the LRN. If the call is routed using ISUP signaling, the LRN is populated in the called party number parameter (CdPN) and the ported number translation indication (FCI) bit is set to "number translated," verifying that the LRN query has been performed.
5. The call is handed off to the appropriate network and the recipient switch terminates the call.
6. If the destination directory number has not been ported, the NPREQ response message does not contain any parameters.

Number Portability Deployment Options

The cost and effort of deploying a number portability infrastructure can prove prohibitive for carriers and may delay deployment. As number portability has evolved, a variety of deployment options, ranging from full self-deployment to complete outsourcing, have emerged. Before deciding on an approach, each carrier should evaluate the technology and maintenance costs associated with implementation and ongoing operation of the system as well as flexibility, time to market, technical expertise, and internal resources. Both wireline and wireless carriers must carefully analyze their needs, capabilities, and objectives to determine how best to deploy and manage LNP.

"N-1" Call Routing

The FCC adopted NANC's recommendation that the carrier in the call routing process immediately preceding the terminating carrier be designated the "N-1" carrier and be responsible for ensuring that the database queries are performed. If the designated "N-1" carrier in the call path has no NPDB system and has not made arrangements with another NPDB provider, the call will proceed to the original switch network without a look-up. The terminating network, upon determining that a query has not been performed, will automatically route a query to its own NP database. The terminating network is then authorized to charge the "N-1" carrier for the database query. Although passing the responsibility to another carrier is the least complicated option for a carrier, it tends to be expensive on a per-query basis and may not be the most cost-effective option, particularly as more exchanges are marked as portable. This deployment strategy only addresses call completion to ported numbers.

Interconnection Contract

Some large carriers, usually Bell operating companies (BOCs), offer full-service NP data access, switch, and transport. The originating carrier may contract for these services through the regional provider, so that any NP database query in that region will go to that BOC's database. This option also enables a carrier to pass on the responsibility of N-1 database querying, but it includes a formalized agreement and generally results in lower per-query costs. A national provider utilizing this method must negotiate and maintain numerous interconnection agreements.

Full Self-Deployment

Full self-deployment of a comprehensive number portability system involves the ownership, administration, and management of all network elements, interfaces, and processes described in the LNP Architecture and Processes section. Although full self-deployment allows a carrier to control all elements and processes, it requires significant investments. It also introduces challenges such as updating, maintaining, and upgrading software and hardware to remain competitive and ensure compliance; performing regression testing and other procedures as necessary and when required by industry standards; and training personnel or hiring consultants to implement, maintain, and administer the system.

Partial Self-Deployment

With partial self-deployment, a carrier connects to a service bureau which provides some of the equipment, connectivity, and services needed for comprehensive number portability data access. This relatively new option allows a carrier to deploy one or more of its own network elements for accessing routing data (most likely an STP and/or SCP), and directly connect these elements to the service bureau's LSMS system for a fee. This arrangement provides a completely functional number portability system while enabling the carrier to retain control over more of its network elements and processes. Partial self-deployment requires less initial capital outlay and fewer ongoing resources from the carrier than full self-deployment. This option may prove cost-effective in high-volume environments, but it requires more administration than full-service options offered by third-party providers.

Outsourcing to a Full Service Bureau

This option is similar to interconnection contracting, but it is offered by a non-carrier provider. Outsourcing to a service bureau that provides service order administration, a LSMS, and/or an NPDB platform allows carriers to share access to number portability services and resources without incurring the initial capital outlay and ongoing effort of full or partial self-deployment. Spreading the investment in infrastructure and human resources among multiple carrier customers enables the service bureau to offer attractive pricing. On a per-query basis, service bureau pricing tends to be less expensive than default routing and comparable to interconnection contracting. A full service bureau with a nationwide footprint eliminates the need to negotiate arrangements with various regional providers. The service bureau typically assumes virtually all responsibilities for provisioning, maintenance, management, and administration as supported by the service and agreed upon between the two parties. VeriSign provides a full service bureau solution for both wireline and wireless carriers. For more information please visit our web site at www.verisign.com/telecom/products.

Number Pooling

In a competitive telecommunications environment, the current method of allocating NPA-NXXs in blocks of 10,000 is wasteful and inefficient. Studies have shown that numbering resource shortages are caused in large part by the telecom industry's requirements to use one exchange code per rate center for each carrier. This requirement often results in whole blocks of telephone numbers being held by a service provider without being assigned or put into service.

To more efficiently allocate these scarce resources, the industry devised and the FCC approved a National Number Pooling plan for network resource optimization. Number pooling is the ability to share an NPA-NXX among several facilities-based carriers within the same rate center with the intent of prolonging the life of an NPA by reducing the demand for new NXXs. Number pooling allows currently unassigned blocks of numbers to be reassigned to service providers that request them and show a need. Specifically, it allows the assignment of numbers to competitive service providers in blocks of 1,000.

To promote fairness and standardization, the Industry Numbering Council (INC) has established clear guidelines (INC 99-0127-023) to direct service providers, as well as the Number Administrator, in the allocation of these resources. NeuStar currently serves as the Interim Pooling Administrator in most states where pooling activity is in progress.

The method for administering number pooling must consider the critical information that needs to be broadcast across the region to ensure effective data provisioning for call routing. To facilitate the broadcasting of "pooled" blocks and associated routing data, the location routing method, the same platform used for LNP, is used for implementation of national number pooling.

VeriSign Number Portability Solutions

VeriSign offers a comprehensive solution for Number Portability for wireline and wireless carriers. Customers may choose just the components to meet their current needs or a full solution for administration, data access and switch and transport. All services are provided as a service bureau, reducing the carrier's capital investment and resources to operate and maintain their own solution.

Data Access, Switch, and Transport

This service enables SS7 network transport routing of queries to NP databases and NP data access for call routing via location routing number (LRN) information for ported number identification. VeriSign operates its own LSMS, which has connections to all seven U.S. NPACs for up-to-date, nationwide number portability data. VeriSign also provides 10-digit global title translation for database queries, which eliminates query looping and service delays.

Service Order Administration (SOA)

The upstream component of the number portability process, VeriSign's NP SOA service provides turnkey support for service provider order entry and provisioning of ported numbers from any and all metropolitan statistical areas (MSAs) within the appropriate regional number portability administration center (NPAC). VeriSign maintains connections to all seven U.S. NPACs, representing a single point of contact for multi-regional carriers.

Conclusion

By removing one of the most significant barriers to unrestrained competition, number portability is perhaps the most exciting opportunity in the telecommunications industry since divestiture. The challenges and opportunities created by number portability, especially LNP, are enormous, with over $100 billion in local revenues at stake. The competitive carriers that are able to carefully analyze their network and administrative infrastructures, select the best NP solution for their needs, successfully deploy number portability, and exploit the new-found freedom of customer choice that number portability enables, will position themselves for success in a truly competitive environment.