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For more information about Versant Corporation and its products and services, please contact your local Versant office.

Versant Contacts

Versant Corporation
1 800 VERSANT info@versant.com
6539 Dumbarton Circle Fremont CA 94555 U.S.A.
+1 510 789 1500 main +1 510 789 1515 fax

Versant Ltd
info@versant.de
The Nova Building Herschel Street Slough Berkshire SL1 1XS U.K.
+44 1753 701013 main +44 1753 701255 fax

Versant GmbH
info@versant.de
Brunnenweg 7 D-64331 Weiterstadt Germany
+49 61 50 10 98 0 main +49 61 50 10 98 10 fax

Versant SarL
info@versant.fr
10 Rue Troyon 92316 Sevres Cedex France
+33 145 07 67 00 main +33 145 07 67 01 fax

Versant Pty Ltd
info@versant.com
55 Lavender Street Milsons Point Sydney NSW 2061 Australia
+612 9929 0988 main +612 9929 6989 fax

Versant Corporation website: http://www.versant.com

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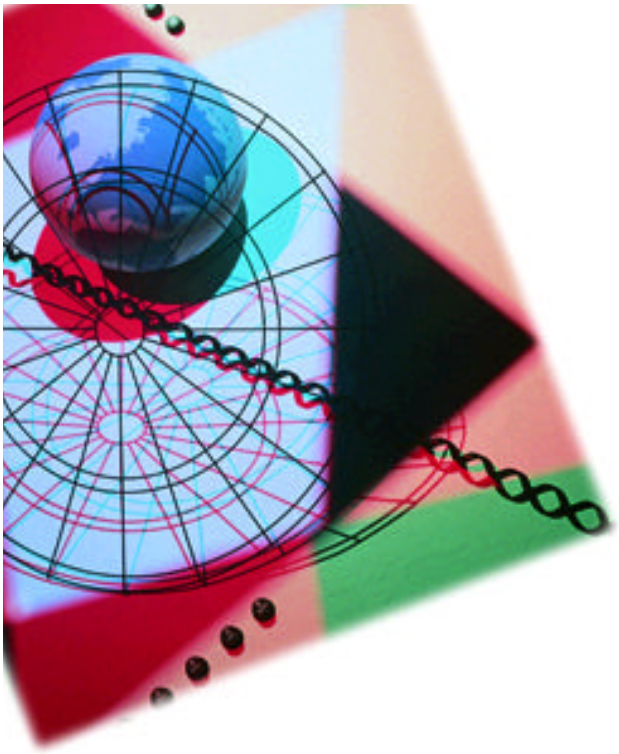

Understanding Local Number Portability: Selecting a Solution Architecture

VERSANT

White Paper

Michael J. Sydor
Principal Technologist
Versant Corporation

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Scope

This document provides an introduction to Local Number Portability (LNP), a new technology that is fundamentally changing the way telephony operators interact with each other and with their customers.

The document describes:
• the object-oriented technology behind LNP,
• the business and marketing implications of LNP, and
• the potential and likely future of LNP services.

It will help telco developers and information technology organizations appreciate the full potential of LNP and identify strategies to participate in this pivotal technology. By implication, the document also demonstrates the potential of object-oriented technologies in general in the telecommunications environment.

Note: This document represents a distillation and compilation of a wide variety of publicly available resources, without undue emphasis on any particular vendor.

Executive Overview

Local Number Portability (LNP) is a new telecommunications service that is fast becoming a “killer application” in the deregulated telecommunications environment. LNP enables customers to keep the same telephone number whenever they change:
• carriers
• physical location
• types of service

The benefit for customers is that if they subscribe to a new carrier, move to another address, or choose a new service (an ISDN line, for example), they no longer have to suffer the inconvenience and expense of having a new telephone number assigned to them; their current number literally becomes ‘portable’. The savings for business customers in terms of advertising costs and lost business alone can be considerable.

The benefit for the telecommunications industry is that LNP encourages a new kind of competition among telephony carriers. With LNP, the main obstacle for customers wishing to switch carriers is removed. While this may be considered a mixed blessing for the carriers themselves, LNP offers new opportunities for carriers to ‘delight’ customers, particularly new ones. As we shall see in this document, there are also a number of commercial and operational advantages to be gleaned from the object-oriented technology that makes LNP possible.

Already there is great demand for LNP, and regulatory authorities around the world are moving to mandate it. In the United States, LNP is a requirement of the Telecommunications Reform Act and it is expected that LNP will soon have a significant impact in Europe and Asia-Pacific. The service is scheduled to be fully available in North America within one year, and in Europe and Asia-Pacific over the next two to three years.

Challenges and opportunities for carriers

To be fully available, LNP requires a significant investment on the part of carriers. The impacts of the service are far-reaching which means that carriers must give careful consideration to their LNP strategies. The rapid delivery schedule and an increasingly competitive environment mean that any mistakes made now could be very costly.

While some carriers may fear a free-for-all in this new environment, the more flexible carriers will identify many opportunities to collect customers, purchase and resell bulk services, and establish a new market. Carriers will be truly differentiated by services and not just by access to infrastructure and equipment.

The biggest immediate challenge for carriers is that the size of the marketplace for LNP can only be estimated at this point. No one can say for sure how much infrastructure has to be in place to meet what could be either a trickle or a tidal wave of customer requests for LNP. As a result, there is a wide gulf between a minimally compliant solution and a whole-hearted embrace of the technology and its implications. The strategies employed by carriers range from:

- minimal investment and a pay-as-you-go approach, to
- deep investment and ownership of a gateway platform supporting the wholesale of services

The bigger picture

In assessing an appropriate strategy, however, carriers need to consider the wider opportunities presented by LNP technology, and the object-oriented technology that it is based upon. LNP builds upon a latent, and promising technology - the Intelligent Network (IN). This service infrastructure is layered on top of the existing SS7 network, the backbone of the modern telephony architecture. LNP is considered the 'killer app' for IN, the one application that will establish IN and enable a new generation of service capabilities to be created.

The benefit for carriers is that once carrier-to-carrier connectivity is established and open, an enterprise need only target or create a market, and borrow the infrastructure (on a fee-for-service basis) as needed. An added bonus is that once the commitment has been made to LNP, then carriers begin to see the benefits of object-oriented tools and object database management systems in the telco environment. In many cases, this then leads to the development of a whole new range of competitive operational applications.

LNP around the globe

The growth and acceptance of IN in Europe and Asia-Pacific is a reflection of these regions' deeper commitment to mobile services and related technologies, at a level that is not yet achieved in the US. Part of this has to do with their adoption of GSM as a single standard. GSM (Global System for Mobile Communications, formerly Groupe Spécial Mobile) is a European wireless standard, related to TDMS (Time Division Multiple Access), which allows multiple conversations to share a single channel.

The US, by contrast, still has a number of competing technologies to choose from. Yet LNP is still considered the path to an even wider range of customer services and a mechanism to eliminate competitive barriers between countries and service models. The growth of vendors to support the roll-out of LNP in North America

will undoubtedly influence its development in Europe and Asia-Pacific, by extending LNP expertise and by expanding the number of specialist LNP products and suppliers. This in turn will accelerate the introduction of new and innovative services throughout the industry and help eliminate ongoing problems such as convergent billing.

Several companies have already introduced products and services specifically designed to help North American carriers with the roll-out. Many of these companies have targeted a specific strategy for supporting LNP. This White Paper is designed to help carriers identify a vendor strategy that matches their own specific business and investment strategies.

Which way to turn?

We see the key to both short-term success and long-term viability as the awareness of:
• all available LNP options and their potential impacts on a carrier's business
• the need for an LNP strategy and the steps and terms under which it should be achieved
This paper provides a foundation for developing a meaningful LNP strategy.

Section 1: An Introduction to Local Number Portability

This section introduces the concepts and technology of Local Number Portability (LNP). It describes current issues in LNP and provides information that can be used to:

- develop an LNP implementation strategy, and/or
- select a solution architecture and approach to LNP

Note:If you already have a strategy and/or have selected a solution architecture, you may want to go directly to Section 2: **Implementing Number Portability.**

What is Local Number Portability?

Local Number Portability (LNP) is best described as a 'capability' that can be built into a circuit-switched network. LNP enables a phone customer to change any one or combination of their:

- service provider (SP)
- location and/or
- service type

without having to give up or change their existing telephone number. Each of these customer scenarios is considered a different type of LNP, as shown in Table 1.

Type of LNP	Characteristics
Service Provider Portability (SSP)	Subscriber retains the same number despite a change in the Service Provider
Location Portability (LP)	Subscriber retains the same number despite change in physical location
Service Portability	Subscriber retains the same number despite change in service (e.g. POTS -> ISDN)

Table 1 - Types of Local Number Portability

In each of the LNP types, the customer keeps their directory numbers and is provided with cross-carrier access to services such as billing and operator services.

Constraining the Implementation of LNP

The telecommunications industry has agreed to a separate implementation schedule for each LNP type. The schedule is constrained by the following factors:

- The first, and currently only, LNP capability to be addressed is that of Service Provider Portability. The near-term application will be to wireline systems, with wireless systems scheduled to provide LNP in 1999. The progress US Wireless carriers make towards LNP will have a direct effect on LNP in Europe, which has a dominant cellular infrastructure.
- Location Portability (LP) is intended to cover any change in geographic location (potentially international migrations). The technical difficulties of a national or global solution suggest that LP changes will initially be

limited to the same carrier.

- Service Portability (SP) is intended to cover changes of service within the same carrier. Ultimately, it is intended that SP will enable customers to subscribe to services that their current carrier may not be offering.

Regulatory Environment

Entrance to the telecommunications market for entrepreneurs is wide open, provided they address various issues of interconnection. One of these issues is Local Number Portability.

From a competitive point of view, LNP opens up opportunities for both customers and carriers. Few customers would be able to consider changing carriers frequently if they were required to change their phone number each time. Carriers are able to truly compete on service, without obstacles such as access to infrastructure and equipment. More flexible carriers can identify many opportunities to collect customers, purchase and resell bulk services, and establish new markets. The benefits of LNP for various players in the telecommunications market are summarized in Table 2.

Industry player	**Potential benefits of LNP**
Competitive Local Exchange Carriers (CLEC's), such as: Competitive Access Providers (CAP's), and Cable Companies	These companies directly benefit from increasing competition and gaining access to the ILEC customers.
Incumbent Local Exchange Carriers (ILECs), such as: RBOC's, Rural and Small City Operating Companies	These companies stand to gain access to the local market and are allowed to diversify into Cable inter-LATA and Cable markets. They will also benefit, in the long-term, from service management consolidation to potentially gaining a new market wholesaling to smaller carriers.
Inter-exchange Carriers (IXC's)	These companies stand to benefit from competition between CLECs and ILEC's, should terminating access charges be reduced.
Cellular and Personal Communications Services (PCS) Carriers	Initially positioned as a complement to Wireline services, they can now position themselves as an alternative to Wireline services.

Table 2 - Benefits of LNP for Different Service Providers

In North America, the timetable for implementing LNP has been set by the FCC. The timetable dictates that the 100 largest metropolitan areas in the United States must support LNP by the end of 1998. Compliance for Wireless carriers is deferred until 1999. Compliance with the Telecommunications Reform Act is assessed when a RBOC applies to enter the long distance market and a comprehensive checklist is achieved and verified in the current local market:

Note: Summary details of the on-going regulatory activity can be found at http://www.usta.org/reguindu.html. The Telecommunications Reform Act and other related Federal documents, can be examined at http://www.fcc.gov.

Which carriers have implemented LNP?

There are a number of ways to evaluate the commitment and progress that carriers have made towards LNP availability. For example, participation in interconnection testing with the Number Portability Administration Center (NPAC) is a significant indicator of a carrier's intention to develop LNP capability. Technically, none of the RBOC's have completely met the FCC's 14 point checklist[2], however commercial availability and consumption will ultimately signal the arrival of LNP.

To date, only two North American carriers have announced that they have LNP available. These are Bell Atlantic and Ameritech.[1]

Bell Atlantic announced that LNP service was available to the island of Manhattan in January 1998. This enables us to review what was in place in order to achieve that designation and also to review how competing companies reacted.
For more information on Bell Atlantic's announcement, see http://www.ba.com/nr/1998/Jan/19980119003.html
For information on the reaction, see: http://www.att.com/press/0198/980119.cha.html

Note: Ameritech announced that LNP service would be available to Cleveland Ohio in June 1998. For more information on the announcement, see: http://www.ameritech.com/news/releases/may_1998/15_01.html

The form of these announcements is worth noting. Each carrier, it appears, will align itself with the concept of LNP, trumpet the emerging era of competition, list the breadth of services available, detail the schedule of additional roll-outs and perhaps mention the hundreds of agreements negotiated with other carriers. It is clear that developing LNP capability is not a small, isolated undertaking. However, it also appears that carriers' perceptions of the service and its value are possibly way ahead of their customers' perceptions.

Intelligent Networking

LNP falls into a category of technologies known as 'Intelligent Networking'. An 'Intelligent Network' (IN) is a single network supporting the transfer of various data with different bandwidth requirements. The ultimate goal is for customers to have access to an enormous range of data transfer services simply by placing a telephone call. Anticipating this goal directs the technology choices being made today, as network infrastructure is re-engineered to accommodate this future.

The basic functions of IN include the creation, management and delivery of a service. LNP is viewed as the "killer-app" that will bring IN to the forefront and kick off a new era of innovation, and ultimately competition, within a myriad of telephony services. The foundation for this Intelligent Network is today's SS7 Technology.

SS7 Networking

SS7 is a high reliability, fault-tolerant data communications network that connects telephone networks throughout the world. It allows these independent telephone networks to share signaling and control information. SS7 achieves its reliability through a combination of a message-based protocol and network topology. Using messages allows a separation between the data and underlying protocol, so that different

1 As revealed by Internet searches on various news sources.
2 The most visible aspect of the TRA, the 14 point checklist identifies a series of services and intentions which must be verified in order to achieve "compliance."

protocols and message data can be accommodated. The messages in SS7 can also be of variable length. Historically, SS7 began as a method to access remote databases, and was extended to support signaling. It is the database access that LNP solutions will exploit. This is considered a non-circuit related service.

Calling Scenario

To see an example of a calling scenario based on LNP, see http://www.ported.com/midlnp.htm

Note: This example demonstrates that if one number in a block is ported, thereafter, all numbers within that block must be queried for LNP. Also note that when the SSP detects an IN event, it suspends call processing and queries the SCP for further instructions. These considerations are the root of potential performance problems that need to be addressed when implementing LNP. The number of database queries increase. Porting a single customer number requires that all other customer numbers (up to 10,000 on the switch) be examined. The response time of that query will directly impact the customer perception of how long the call takes to complete.

Specific market trends in North America

A key aspect of the North American LNP solution is the hierarchy of relationships. Lockheed-Martin, which provides the NPAC, also has responsibility for Number Administration, as well as Number Portability. This centralized resource for number information eliminates the need for each carrier to assume management responsibility, ensuring equal access to the number resources.

The larger carriers, the Regional Bell Operating Companies (RBOC), also known as the Incumbent Local Exchange Carriers (ILEC), will likely have made the investments to support connectivity with the NPAC's. The RBOC's are the primary owners of customers today, and are the ones directly targeted by the Telecommunications Reform Act.

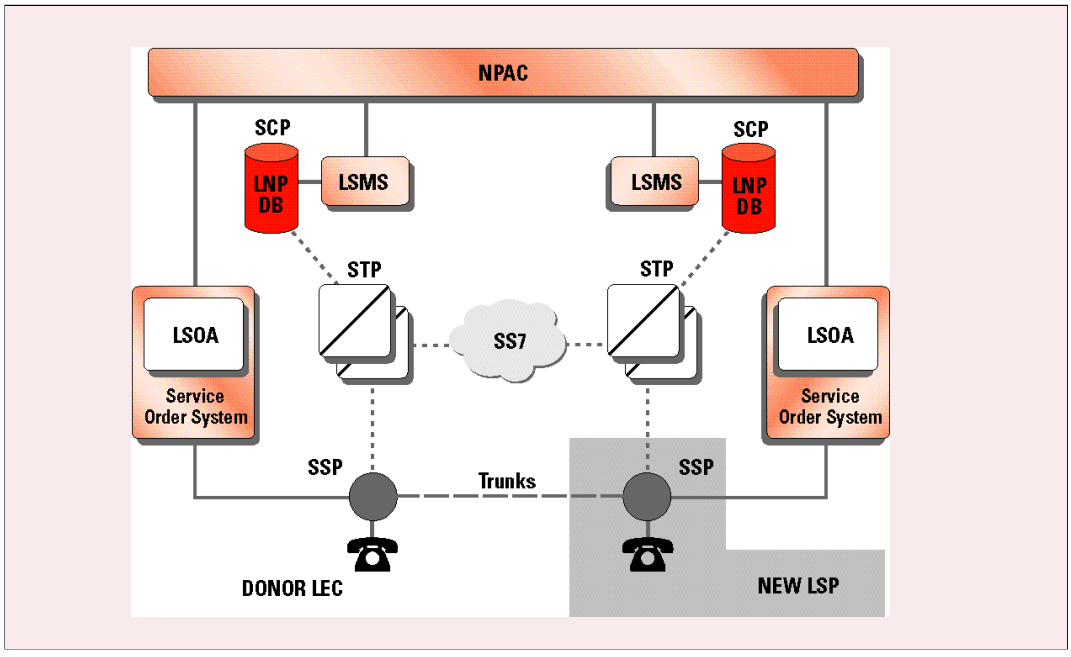


Figure 3 - Relationships of Carriers, Network Components, and LNP Systems with the NPAC

The Competitive Local Exchange Carriers (CLEC's) can subscribe to an ILEC for LNP or can undertake connectivity with the NPAC directly. The CLEC is in a position to grow their customer bases by migrating customers from the ILEC's, motivating the customer base with new or enhanced services.

The specific technique used for LNP in North America is Location Routing Number (LRN). When a number is ported from one carrier's switch to another carrier's switch, that number is assigned a new 10-digit number. This new number is what is provisioned in both carriers' systems and databases. This technique is not directly mandated by the FCC but the FCC has specifically excluded all the other suggested techniques. The advantages of LNP over the other competing technologies is discussed in section 2.

Figure 3 illustrates the various relationships among the NPAC and the necessary systems for Service Providers participating in LNP. The new LSP (Local Service Provider) in this example owns only its switch. This new LSP is outsourcing the network infrastructure (SS7) and the LSMS/LSOA functionality. There are a variety of strategies, from total outsourcing to total ownership of the systems and networks, that a Service Provider may consider.

Differences between North America and Europe/Asia

There are a number of differences between the North American initiative towards LNP, and what might be achieved, and for what motivation, in Europe and Asia. The salient points of difference include the following (Table 4):

Absence of government mandate	The FCC requires proof of LNP support and withholds access to additional services and markets. The delivery dates are December 31, 1998 for wireline and June 30, 1999 for wireless.
Greater acceptance of IN/AIN	IN/AIN is much more established in Europe.
Greater emphasis on mobile (GSM)	Support of LNP for mobile networks is another year away in the US. Europe and Asia must deal with these issues today.
Less homogeneous marketplace, greater complexity in inter-country operations	The US has a single ruling body, the FCC, for issues of licensing. No such entity is available is Europe/Asia.

Table 4 - Differences Between North America and European LNP Impacts

Section 2: Implementing Local Number Portability

This section describes the techniques, options and issues involved in implementing Local Number Portability. It provides a high level guideline for telco developers to use when defining their implementation strategy.

Techniques for Number Portability

A range of techniques can be used to implement LNP. In the USA, the FCC does not specify which technology should be used, however, Location Routing Number (LRN) is established as the de facto standard. Other techniques are as follows:

- Call Forwarding Technology (CFT). This is the earliest of all techniques introduced to the US market. CFT allows call processing to proceed as before but allows the incumbent carrier to retain control over all calls. LNP capability can be built from CFT. While this technique would be simple to implement, it would not have any real capacity, should LNP grow, and the delays and blocking would likely discourage customers from using LNP.

- Query-On-Release (QOR). Instead of doing a database query for every call, this technique limits its queries to those cases in which the call did not go through and is released. This is similar to a call to an out-of-service number. While it dramatically decreases the number of database queries, it does introduce a significant delay in routing the call and the customer may abandon the effort. This is clearly not transparent and would discourage customer interest in LNP. Please note that the FCC has specifically ruled against QOR.

- Carrier Portability Code (CPC) technique. Here, each carrier is identified by a unique 3-digit code, and for each area code that it services. The LNP database contains a customer's directory number and its current carrier. When the call is routed, the CPC code would be substituted for the area code. This could be implemented quickly, but the CPC technique would require frequent updates to the switch tables to accommodate new carriers. The LRN technique has a clear advantage in the number of implementations.

- The current front-runner for LNP is the Location Routing Number (LRN). This requires that every switch be identified by a unique 10-digit number. This is consistent with the current numbering scheme for routing calls. It uses the SS7 network and can be adapted to other network protocols, such as multi-frequency signaling. The LRN is functioning like a network address. The LNP database maintains these numbers. General system architecture choices can be separated by whether they are located on the switch as part of switch software, or off the switch as part of a separate or adjunct system.

Adding enhanced features to the switch has had reasonable success in the marketplace before the Telecommunications Reform Act. Carriers could implement new features on a switch-by-switch basis, reflecting market demand and acceptance of the new feature/service. With the competitive landscape changing, a number of shortcomings in this approach have been noticed. First, there is the large-scale cost of switch software development and maintenance. Changes in the software require extensive testing to maintain the high quality of switch offerings. This cost, and the delay in introducing new features, is

incompatible with a quickly evolving marketplace for enhanced services.

Off-switch approaches, particularly AIN, directly address this problem by decreasing the scale of the effort and distributing service responsibility. This allows for rapid, incremental development, and, without a significant single point of failure, some tolerance of implementation errors.

Guide to Selecting Number Portability Solutions

Exploiting Customer Information

Gaining access to an ILEC's OSS presents a wealth of data on customer habits and service needs. Accommodating this new information source, while at the same time meeting FCC interconnection guidelines, should be an on-going goal for any system upgrade or purchase. This likely requires additional changes in billing and customer care in order to account for the variety of services that a carrier might offer.

Key strategy considerations:

- Fundamental to achieving flexibility in billing and customer care is an information repository for the Customer Service Record (CSR).
- Having an enterprise computing infrastructure based on integrated components, rather than loosely connected stand-alone systems, allows for better market response and profitability. A side effect of wide spread OSS interconnection will be more consistent process management or work flow, on which vendors can build component-based systems.
- Expanding internal systems to accommodate LNP not only resolves ported numbers; it acts as a catalyst to re-organize your internal systems for greater flexibility in service creation and provisioning, as well as billing and marketing. In a competitively level marketplace, reselling the same systems and technology, the only differentiation (where price is equal) is with smarter, more efficient marketing, sales and customer care. These factors, as well as cost and capability, should be carefully considered.

Extension of Existing Systems

All switches are due for a software upgrade to handle LNP (LRN's), apart from what infrastructure is needed to handle the LNP database. Where to start with these upgrades is dictated by who, in a respective market, is expected to request porting, and initially, only those 100 largest metropolitan areas mandated by the Telecommunications Reform Act.

There are two approaches to providing LRN support for LNP: the SCP/STP pair, where the LNP database is attached to the SCP, and the STP modified to do LNP directly. The SCP/STP is acknowledged to have weaker performance and scalability, trading off relative ease of introducing LNP support. But this approach does not impact the infrastructure by requiring new or significantly upgraded STP's.

Switch-based Systems

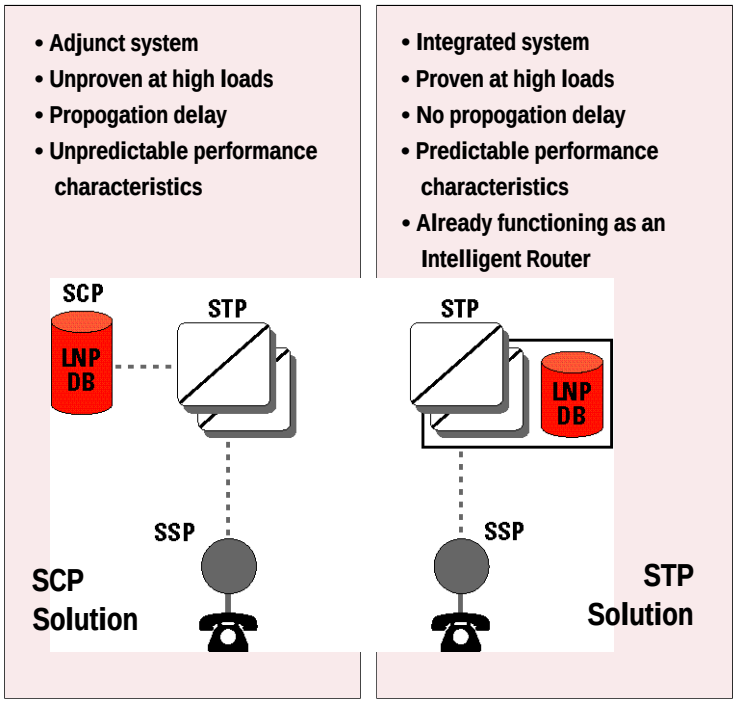
Here, the existing or legacy system is the traditional switch-centric approach to adding services. This entails a software upgrade and may also include the upgrade or introduction of an adjunct system. The major

benefits are that you leverage a significant investment in the switch, it does not require investment in the SS7 infrastructure, and it is very likely that your current switch vendor would be interested in providing your incremental functionality.

The major concerns are for scalability and reliability, distribution of processing, degradation of service through a combination of poor response time and lack of bandwidth in the SS7 network. It is generally accepted that while the STP/SCP pairing has served current services (such as call-forwarding and 800, 888) quite well, using that same solution for LNP may create performance problems.

New SS7 Infrastructure

While use of the SCP for database functions (800 service, 888, etc.) is already established, these services do not involve more than 10% of calls processed. Since LNP can potentially involve every call processed, one can question the ability of the SCP to sustain such levels of processing.



One node in the SS7 network, already supporting that load and handling every call, is the SCP. This node is normally functioning as a router. Adding a database to the node, for LNP lookups, has some interesting advantages. First, the speed of the lookup is likely to be faster, as there will be less network to traverse. Second, the responsibility to provide efficient routing is analogous to the need to find the new Service Provider who owns the ported number. This would exploit algorithms already in use. These differences are summarized in Figure 5.

Figure 5 - Traditional SCP Solution vs. STP Solution

Stand Alone Number Portability Systems

The immediate benefit of limiting the scope of LNP support is cost, and a stand-alone system reasonably integrated with your existing processes is a valuable solution. It does not address the IN/AIN performance issues and does not provide a platform for expansion into non-LNP services. This is a reasonable strategy when you have doubts about the emergence of follow-on IN/AIN services (of the order of LNP), and the pace of innovation, once ILEC OSS's are opened up.

With regards to a gateway function in support of LNP, a combination of a Local Service Management System (LSMS) and a Local Service Order Administration (LSOA) system provides complete connectivity to the NPAC in support of LNP.

The LSOA is concerned with collecting orders for Number Portability from the existing systems of the SP, then coordinating the delivery and receipt of subscriber changes with the NPAC. This is a set of higher level activities, compared with the activities of the SS7 network, with respect to ported numbers already identified in the database. With the LSOA, we are generating orders and receiving changes, which will be later handed off to the LSMS for provisioning.

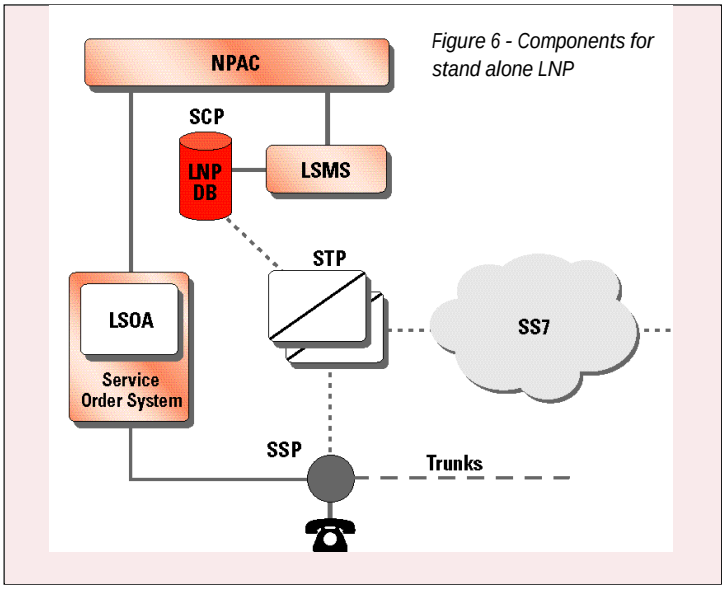


Figure 6 - Components for stand alone LNP

Details of LSOA functionality, summarized in Figure 6, can be found at:
http://www.evolving.com/numberportability/nptmn.html

Gateway Platform for Number Portability

If the delivery of LNP drives the acceptance of IN/AIN and a new age of services and capabilities begins, the stand-alone system may not be the efficient choice. Each of the new systems may require its own stand-alone support systems and this would be little more than a revisiting of the system integration problems that

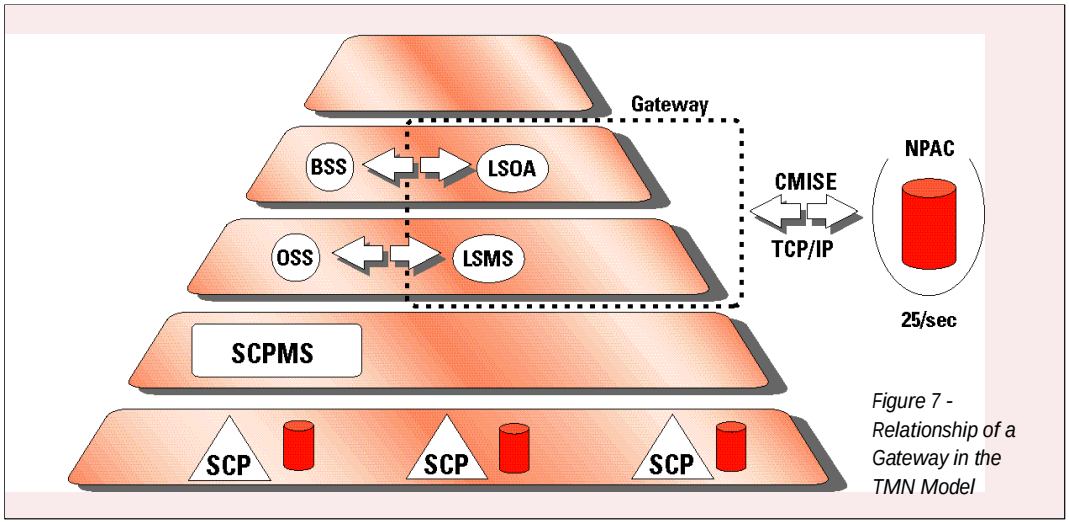


Figure 7 - Relationship of a Gateway in the TMN Model

Service Providers are trying to move away from. What is needed is a platform, on which these new applications would be installed, and a strategy to accommodate the different protocols and service models that the marketplace anticipates.

Such a foundation platform has been publicly demonstrated at the TeleManagement World Conference, April 1998, in Paris, France. It is called the Common Interconnect Gateway Platform (CIGP) and follows guidelines jointly defined through the Network Management Forum (NMF) and its member organizations. The CIGP provides a framework for multiple protocols and message formats, an architecture without limits on scalability, and a foundation of services which applications can plug into. The services include Pre-Order, Order, Trouble-Ticket, PIC/CARE – all in support of OSS interconnect and applications like LNP. The relationship of the SS7 infrastructure, stand-alone LSMS/LSOA and the NPAC, with the TMN architecture is illustrated in Figure 7. Additional details for the CIGP architecture are found in Figure 8.

Protocols

Of the four protocols listed in the Common Interconnect Gateway Platform, only CMIP and CORBA-IDL are available from those vendors that have made Gateway product announcements. The other two protocols, HTTP and EDI, are planned. Electronic Data Interchange (EDI) is actually a message format, not a protocol. EDI is envisioned as the interface for Electronic Commerce (EC) and is already established in the non-telco world (manufacturing, for example). The web protocol, HTTP, would constitute a very low cost interface into the gateway applications, and would be suitable for low-volume CLEC's.

The CMIP interface is most widely accepted, having been the primary interface on an earlier gateway solution called Electronic Bonding (EB), in support of Trouble-Tickets, PIC/CARE, etc. Working with CMIP and its underlying GDMO object models is a sophisticated undertaking, in terms of development and licensing. There is a need to have an alternative for companies who have not made the longer term investment in CMIP and GDMO.

Such an alternative is the CORBA-IDL interface. While CORBA does not directly support GDMO and the TMN model, it does provide a consistent framework for establishing associations and messaging between various applications in a standard and open fashion. This permits a larger number and variety of vendors because it blurs the line between Telco and Commercial applications; the Commercial sector already has significant resources devoted to using CORBA. This could be the common ground for an eventual merger of Commercial and Telco business processes.

Gateway

The Gateway functions appear quite generic; any reasonable product would have these features. The difference is the carrier's motivation and the situation around LNP and related future services. The first observation would be that the audit capabilities could be quite extensive. Every transaction through the platform has to be tracked and measured. It's not the same thing as just monitoring the message load - you actually have to show, for a given carrier, exactly what happened to their porting request and why it was denied or delayed, or why it failed or succeeded.

To achieve maximum flexibility at the platform level, you need to provide a convenient framework for

integrating new applications, changing existing ones, etc., all without turning the gateway off. Add to this a new generation of object-based applications, CORBA, TMN, and you find yourself in need of a technology upgrade. This is why many CIGP vendors, and many parties in LNP, have selected an object database as the core of their products. An ODBMS provides the middle-tier persistence and transaction support necessary to deliver a solution architecture that meets the NMF Guidelines, and to do so with a standards-based approach. Another unusual circumstance of supporting multiple protocols and legacy OSS's is that you need to define a common form of messaging. This is a function of the protocol translation and message normalization. Each incoming message is translated and converted into a common format or Common Information Model (CIM). This model, heavily based on object technology, is the core of the platform. It mediates between the outside world, and the legacy infrastructure, by generating sets of messages. The architecture for a Gateway Platform is summarized in Figure 8.

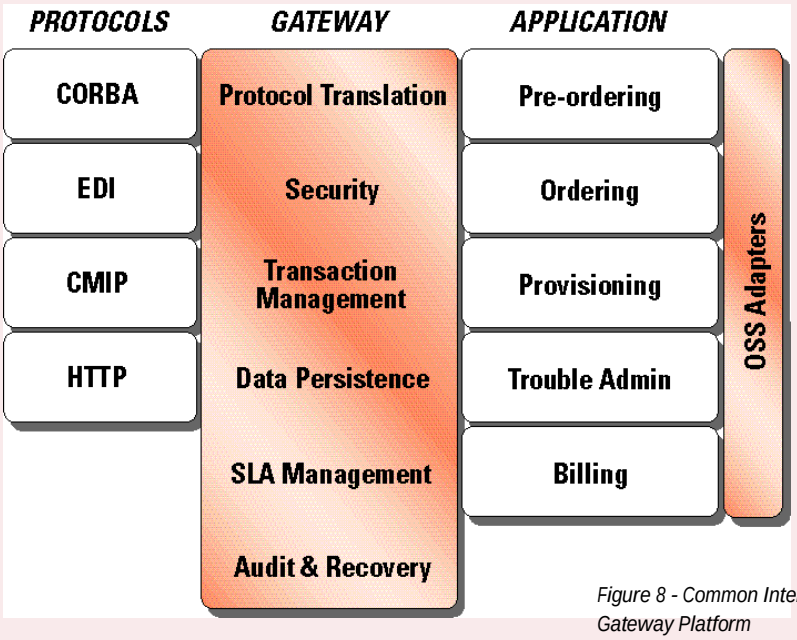


Figure 8 - Common Interconnect Gateway Platform

Potential Gateway Applications

The CIGP can support any number of applications, all sharing the same protocols, transaction support and auditing capabilities. Here is a summary of the typical applications.

Pre-Order – This allows your Customer Care representative to reserve telephone numbers, make reservations, download, examine and verify the Customer Service Record (CSR) - all while the customer is on the line.

Trouble-Ticket – This allows the Customer Care representative to collect and query the ticket, initiate line testing, and allow an update to the operator services database.

911 – Establishes the customer in the appropriate databases to support emergency calls.

NPAC – Interface for LNP, including SOA and SMS.

PIC/CARE – Primary Inter-exchange Carrier/Customer Account Record Exchange. When a customer changes long-distance, the local carrier must be informed of the customer's change of PIC. Without this, calls and billing information may not route correctly.

Scalability and Distribution

The performance characteristics of the gateway must address an unknown number and frequency of messages and resulting transactions. They must also reflect that gateway processes are complex in the mediation function, and can be of long duration – much longer than those experienced in conventional transaction processing systems.

Summary

Support of LNP represents a significant change in the internal systems of a Service Provider. It impacts the Switch, the SS7 Network, and demands a variety of systems to handle the ordering and provisioning of LNP requests. To meet this challenge, investment must be made. The scope of this investment can be debated but your competitors are acting and there will not be many iterations to get this right.

The evolution of the marketplace, in response to the Telecommunications Reform Act, marks the start of a new age of competition, business models and available services. All of these new interactions will be facilitated by a common platform that directs the ordering and provisioning process. Each Service Provider needs to assess where they want to be in the new hierarchy and choose the appropriate systems to support that business model.

Object technology will support this rapid change in systems and competition by providing the framework that enables rapid application development and deployment of robust, reliable services. An ODBMS is a commercial package that delivers the benefits of object technology to the applications supporting this new age of telecommunications. It has relevance within every system participating in LNP because it delivers scalable solutions in the timeframes that the market demands.

Links and References

Links

LNP Resource Page
http://www.t1.org/lnp/lnphom.htm

Your Number Portability Web Site
http://www.ported.com/

Local Number Portability: A Bold New World
http://www.americasnetwork.com/issues/97supplements/100197lnp/100197lnp_toc.html

Local Number Portability Turns Net Inside Out
http://www.zdnet.com/intweek/print/970324/inwk0001.html

Number Portability News and Links
http://www.net-times.com/portability/
http://nettimes.planet.net/portability/

Tutorial On Local Number Portability
http://www.webproforum.com/siemens1/

FCC Activities
http://www.usta.org/reguindu.html

References

1. “Telecom Business Opportunities”, Steve Rosenbush, Aegis Publishing Group, 1998, ISBN 1-890154-04-0
2. “Signaling System # 7”, Travis Russell, McGraw-Hill 1995, ISBN 0-07-054991-5
3. “Newton’s Telecom Dictionary 12th Edition”, Harry Newton, Flatiron Publishing 1997, ISBN 1-57820-008-3

Number Portability Solutions "Powered By Versant"

Quintessent – QConnect™ (Interconnect Gateway)

http://www.quintcom.com/

LNP, Ordering, Pre-Ordering, PIC/CARE, Trouble Administration, E911

The QConnect solution manages multiple simultaneous applications like LNP, ordering, pre-ordering, customer long-distance account administration (known as PIC/CARE) and service Trouble Administration. With those modular applications, message adapters and an editing studio, QConnect provides a complete solutions environment for performing common services like application management, business process execution, system security, data logging and system management.

DSET – LSOA, LSMS, NPAC Simulator, CMIP Toolkit

http://www.dset.com/

DSET for LNP is currently focusing on the CLEC marketplace. All six U.S. service providers (Ameritech, AT&T, MCI, MFS, Sprint and TCG) and the Administration Center have chosen DSET tools and services for the implementation of the Illinois Number Portability project.

Tekelec – STP Solution (Signal Transfer Point)

http://www.tekelec.com/

Tekelec's EAGLE STP is a high-speed packet switch that allows carriers to deliver local number portability, as well as other intelligent network features such as credit card verification, caller ID, and 800 number look-up, using Signalling System 7 (SS7) protocols.

AG Communications Systems – INgage® SOA (Service Order Administration)

http://www.agcs.com/

INgage Service Order Activation software is a cost-effective way to manage all aspects of number portability service activation.

Acronyms List

This is not intended to be an exhaustive list and is provided to help you move from the white paper to more direct sources. Please refer to Newton[3] for the complete reference to acronyms in Telecommunications.

ABS – *Alternative Billing Services*
AIN – *Advanced Intelligent Network*
BLV – *Busy Line Verification*
CLEC – *Competitive Local Exchange Carrier*
DN – *Directory Number*
EML – *Element Management Level*
FOC – *Firm Order Confirmination*
GAP – *Generic Access Parameter*
GTT – *Global Title Translation*
ILEC – *Incumbent Local Exchange Carrier*
IN – *Intelligent Network*
ISUP – *ISDN - User Part*
LLC – *Limited Liability Corporation*
LNP – *Local Number Portability*
LNPA – *LNP Adminstrator*
LRN – *Local Routing Number*
LSMS – *Local Service Management System*
LSOA – *Local Service Order Activation system*
LSP – *Local Service Provider*
LSR – *Local Service Request*
LTI – *Low Tech Interface*
NE – *Network Element*
NEL – *Network Element Layer*
NEMS – *NE Management System*
NML – *Network Management Level*
NPAC – *Numbering Plan Administration Center*
OSS – *Operations Support System*
SCP – *Service Control Point*
SML – *Service Management Level*
SMS – *Service Management System*
SOA – *Service Order Activation system*
SP – *Service Provider*
SSP – *Service Switching Point*
STP – *Signal Transfer Point*
TCAP – *Transaction Capabilities Application Part*
TMN – *Telecommunications Management Network*
TN – *Telephone Number*
TRA – *Telecommunications Reform Act*