Estimating the Costs Associated with a Change in Local Number Portability Administration

By

Hal J. Singer‡

A transition in local-number-portability administrator would likely impose significant costs on U.S. providers of voice services. According to the cost model developed here, providers would incur approximately $719 million in additional cost in the first year of such a transition. These transition costs would take the form of service credits, hands-on customer service, operations research, and additional system testing. In addition to these costs, greater service delays and errors in porting would likely cause some customers to abandon their switch to a new provider, resulting in additional lost revenue (and increased cost per sale) for the providers that are gaining the most market share from their competitors.

‡ Principal at Economists Incorporated (EI). Financial support for this paper was provided by Neustar. The views reflects those of the author only, and do not represent the views of EI. An earlier version of this paper was published by Navigant Economics. The author would like to thank Gerry Keith, who developed the cost model, Anna Koyfman, who provided general research, and Kevin Caves, who assisted with the econometric modeling.

I. INTRODUCTION

In August 2012, the Federal Communications Commission (FCC) issued a request for proposal that could lead to a change in the identity of local number portability (LNP) administrator.[1] Any transition involving the handoff from one vendor (or system) to another could encounter difficulties. By way of analogy, FairPoint's transition of its information systems from Verizon (the New England territories) created significant problems that, according to the Maine Public Utility Commission, contributed to FairPoint's subsequent bankruptcy.[2] Similarly, United Airlines encountered severe difficulties in the transition of its reservations systems from the former Continental Airlines in March 2012; despite adding 700 employees, the transition caused United's systems to be overwhelmed, and even resulted in tickets being "lost" in the new system.[3] A full seven months after transition, the system experienced its worst failure to date, a worldwide shutdown that led to cancellations and delays affecting tens of thousands of people.

Such examples show that providers of voice services in the United States ("carriers") would likely incur significant additional costs associated with the transition to a new LNP administrator. The extent of the transition-related errors and their associated costs can be modeled based on, among other things, actual database and transactions volumes, estimates of error rates, the time required to correct the errors, and wage rates.

Working with Gerry Keith,[4] I developed a model to estimate the costs to carriers associated with the transition of LNP services to another vendor. In particular, the regime change assessed here contemplates replacing the current administrator for all LNP transactions, including ports among wireless and wireline carriers. These costs would likely manifest themselves in the form of system transition, transaction processing, system outages, and testing. I conservatively assume that these transition costs are completely mitigated within one year. The model is based on transactional data provided by Neustar to estimate the transition costs.

Carriers typically issue service credits to complaining customers, and they incur customer service expenses and operations research costs when problems are escalated to managers. The extent of the transition-related errors and their associated costs are estimated based on similar experiences in the communications industry. A significant number of batch-update transactions occur because many of the fields in the portability database identify various types of add-on services and third-party providers such as caller ID vendors, which are subject to error. I estimate that Carriers would incur incremental costs of $719 million in the first year of the transition.

---

1. FCC Public Notice, Wireline Competitive Bureau Seeks Comment on Procurement Documents for the Local Number Portability (LNP) Administration, DA 12-1333A, released August 12, 2012.

2. *See* FairPoint's SEC Form 10-Q/A for the first quarter, 2009, at 3; Maine Public Utility Commission Examiner's Report, June 3, 2010, Docket No. 2010-76, Docket No. 2010-77, and Docket No. 2010-78.

3. Christopher Elliott, *A chaotic computer switch in United-Continental merge*r, CHICAGO TRIBUNE, May 1, 2012, *available at* http://www.chicagotribune.com/travel/sns-201205010000--tms--traveltrctntt-b20120501may01,0,2851270.story.

4. Gerry Keith was the former director of business research at Illinois Bell and has over 30 years of experience in the telephone industry.

II. The Cost Model

There would likely be four sources of errors encountered by carriers during the first year of transition to a new vendor: (1) systems transition (errors introduced during transition when NPAC records are propagated to the carriers); (2) transaction processing (error rates above current baseline due to lack of experience or expertise handling transactions that require customer coordination); (3) unplanned outages (increased probability of LNP service outages that would introduce long LNP porting delays) and (4) testing (testing costs between the new vendor and the carriers plus internal OSS/BSS testing). To simulate the magnitude of these errors, I used industry benchmarks from LNP regimes in transition, as well as Neustar's experience over the past decade with administrating the LNP system in the United States. The magnitude of each error category depended on the end-user experiences. For example, technical errors for features such as caller ID generate smaller costs than errors with call placement.

Each type of error described above could generate three types of incremental costs for carriers: (a) service credits (when customers demand refunds for service delays), (b) hands-on customer service (when customers place service calls), and (c) engineering costs (researching the errors and system testing). Similar to the approach in modeling errors, our approach to modeling error costs relied on industry benchmark figures, as well as Neustar's experience associated with administrating the LNP regime. Table 1 summarizes the most important assumptions relating to these errors.

Table 1: Critical Model Assumptions and Support

Assumption	*Support*
Percentage of Error associated with a simple field	These error rates are similar to those indicated by Alcatel and Lucent in their study.
Number of active fields in database	Actual count of populated fields in the NPAC database
Number of LNP transactions	Actual count of transactions
Complex error rates	Based on a factor applied to Neustar's goals for these types of transactions
Hours to fix errors	Carrier expertise
Employee pay rate	Carrier expertise
Time and cost of carrier testing	Carrier expertise
Additional Outage Times	Neustar's early experience

A. Errors Associated with Database Transition and Operation

A new LNP administrator would likely operate based on the transition of the existing database and LNP system from Neustar. Conversion problems typically arise with transitioning such a database and systems from one vendor's system to another. These problems include the misinterpretation of database fields and database structure by software or personnel. The complexity of various uses of the database and transactions can be shown by the long list in the FCC's RFP of different specifications that the LNP regime

must meet.[5] An example of such errors is the conversion of a public-telephone switched network to an IP network. Alcatel/Lucent found that 1.5 percent of the customers in an ILEC database would generate an error when converting from the public-switched telephone network to an IP network.[6] The basic error rate of one-quarter of a percent per populated field was used to model the NPACs transition to an alternate vendor. This percentage was applied against the number of telephone number records in the NPAC database.

The new LNP administrator would have to operate its system and carrier interfaces with new personnel. These personnel and programs would be relatively inexperienced with new porting requests from carriers—especially those requests involving complex changes associated with mass updates to the database (for example, to change a third-party caller ID vendor). The error rates of a new LNP administrator were partially based on Neustar's performance benchmarks for these types of transactions, while the simpler, market-generated porting transaction error rate was assumed to equal one quarter of one percent per populated field.

B. Estimating the Costs of the Errors, Outage Impacts, and Carrier Testing

The cost of each error was computed for the credit that a carrier may have to provide to the end user, the customer service time, and operations time to research and correct the error. Several factors were used to determine the impact of an error on carrier costs. For example, one factor indicates the percentage of errors that create a direct customer impact for each field, from 100 percent for porting to 0 percent for information-only fields. Other factors determined whether an error would involve a customer credit, the use of customer service time, or operations time to research and correct the error. Other factors estimated the amount of time involved and the associated cost. The model estimates only the impact for the first year of operation and conservatively assumes a declining error rate for transactions during the first year.

Historically, Neustar had higher system outage rates during its early years than in it's most recent years. When the system is down, porting is delayed, which impacts customers and carriers. The impact of this delay is computed by the number of porting transactions affected and the length of the delay using similar factors to the impact of errors, with greater relative impact as outage time increases. The carriers have a number of interfaces with the system to send and receive porting changes.

The carriers would have to test their interfaces with the new vendor to ensure that their systems interface properly as well as test all internal OSS/BSS systems that utilize NPAC data. These costs were estimated based on carrier expertise in such testing.

5. 2015 LNPA Technical Requirements Document, FCC DA 12-3333A3, released Aug. 26, 2012.
6. Alcatel-Lucent, Solving the NGN Data Migration Challenge (2007), at 2.

C. Results

The results of the model are shown in Table 2.

TABLE 2: MODEL RESULTS (COSTS IN MILLIONS)

Year One Costs ($Millions)	Service Credits	Customer Service	Engineering	Total Year 1 Transition Cost	Percent of Total Cost
Systems Transition	$14.9	$65.4	$102.5	$182.8	25.4%
Transaction Processing	$49.2	$211.6	$189.6	$450.5	62.7%
Outages/ System Unavailability	$0.3	$13.6	$0.7	$14.6	2.0%
Testing	$0.0	$0.0	$71.0	$71.0	9.9%
Total Year One Costs	**$64.5**	**$290.6**	**$363.8**	**$719.0**	**100.0%**
Percent of Total Cost	9.0%	40.4%	50.6%	100.0%	

Only a portion of these costs would be incurred by wireless carriers. Table 3 shows the decomposition of costs by carrier type.

TABLE 3: DECOMPOSITION OF COSTS BY CARRIER TYPE (COSTS IN MILLIONS)

Year One Costs ($Millions)	Service Credits	Customer Service	Engineering	Total Year 1 Transition Cost	Percent of Total Cost
Wireless Costs	$14.1	$97.1	$119.3	$230.6	32.1%
Wireline Costs	$50.4	$193.5	$244.5	$488.4	67.9%
Total	$64.5	$290.6	$363.8	$719.0	100.0%

Table 4 summarizes the impact on customers resulting from the transition.

TABLE 4: CUSTOMER IMPACT SUMMARY (END USERS IN THOUSANDS)

Error Types	Errors Broadcast to End Users	Errors Impacting End Users	End User Complaints	End User Churn (includes abandonment)	% Impacted End User Churn (includes abandonment)	Lifetime Revenue Impact ($M)
Systems Transition	2,737	1,456	1,090	19	1.3%	$38.1
Transaction Processing	6,695	5,350	3,527	140	2.6%	$326.0
Unplanned Outages	-	332	226	50	15.2%	$149.5
Total End Users	9,432	7,138	4,843	209	2.9%	$513.6

According to the model, 7.1 million end users would be impacted by a potential transition—21 percent of whom could not receive phone calls, 72 percent of whom would experience problems with service features, and seven percent of whom could not port their numbers. Additionally, there would be 4.9 million complaints in the form of customer service calls to service providers, and there would be 209,000 end users who would leave their service provider. The lifetime revenue impact to the carriers that lose the opportunity to win these customers would exceed $500 million which is incremental to the $719 million described previously.

D. Sensitivity Testing

I performed several sensitivity analyses by testing the importance of some of the major assumptions underlying the cost model. For example, assuming there were no errors introduced in the transition of the database to another vendor, the impact would be about $200 million less; assuming that any improvement in the handling of the transactions would be offset by errors that were made in the second or later years, the impact would be about $200 million more. To err on the side of conservatism, our model assumed a new vendor would rapidly come up to speed and mitigate most costs by the end of the first year. However, as the United Airlines experience suggests, no amount of preparation would suffice to rapidly mitigate these impacts, and the effects could be significant well after the first year following a transition. Some other assumptions are also highly conservative; for example, if multiple vendors were used, and if a new LNP vendor wrote new code instead of utilizing the existing code held in escrow, then costs in all categories would be significantly greater. The cost model assumes that the new administrator is technically competent and would not encounter as bad a transition as the episodes described in the executive summary.

III. Conclusion

A change in LNP administrator would likely impose significant costs on U.S. carriers. According to the cost model developed here, approximately $719 million in additional cost would accrue to U.S. carriers in the first year of such a transition. These costs would take the form of service credits, hands-on customer service, operations research, and additional system testing. In addition to these costs, greater service delays and errors in porting would likely cause some customers to abandon their switch to a new carrier, resulting in additional lost revenue (and increased cost per sale) from the providers that are gaining the most market share from their competitors.

The model developed here includes very conservative assumptions for error rates and testing costs, it assumes that all inefficiencies are resolved in the first year of the transition, and it does not account for opportunity costs. The latter impact could dwarf the direct costs of transition. Because LNP is fully embedded in core telecom infrastructure, a problematic transition to a new administrator could cause carriers to reallocate resources for many months from the advancement of strategic technology and business priorities to the remedial work of fixing and implementing more controls over the LNP process and repairing relations with consumers. Any such delays could have far-reaching impacts that are difficult to quantify.