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September 23, 2014

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

Electronically Filed

Re: CC Docket No. 95-116; WC Docket No. 09-109

Dear Ms. Dortch:

I write on behalf of Neustar, Inc., to submit the attached "Analysis of Technical Report by Professor Burger," prepared by Hal J. Singer, PhD, of Economists Incorporated. In the report, Dr. Singer finds that Professor Burger's estimate of pre-transition costs are reasonable and exceed Dr. Singer's estimate, but that Professor Burger neglects the largest costs associated with a potential transition – that is, the costs of early-stage operation of the NPAC by a new LNPA. After critiquing Professor Burger's analysis, Dr. Singer finds no reason to revise downward his estimate for pre- and post-transition costs of \$719 million through the first year of the new LNPA's operations.

Pursuant to Section 1.1206 of the Commission's rules, 47 C.F.R. § 1.1206, a copy of this letter is being filed via ECFS. If you have any questions, please do not hesitate to contact me.

Sincerely,



Aaron M. Panner

Enclosure

cc: Daniel Alvarez
Nicholas Degani
Rebekah Goodheart

KELLOGG, HUBER, HANSEN, TODD, EVANS & FIGEL, P.L.L.C.

Ms. Dortch
September 23, 2014
Page 2

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Amy Bender
Julie Veach
Jonathan Sallet
Kris Monteith
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September 16, 2014

Analysis of Technical Report by Professor Burger

I have been asked by Neustar to review the technical report of Professor Eric Burger.¹ Having studied his methodology and inputs, and having compared his findings to mine² and to those of the Standish Group,³ I find there is no need to revise my original cost estimate. Indeed, for the overlapping portion of the transition costs analyzed by all three studies—namely, the *pre*-transition costs—our cost estimates are similar: \$160 million (Burger Report⁴) versus \$71 million (Singer Report⁵) versus \$160 million (Standish Group).⁶ Although Professor Burger has a

¹ Eric Burger, Issues and Analysis of a Provider Transition/or the NPAC, S2ERC TECHNICAL REPORT (July 22, 2014) [*Burger Report*]. The report was funded in part by Telcordia: “Support for this work includes funding from the S2ERC affiliate Telcordia Technologies, Inc., d/b/a iconectiv.” *Id.* at 1.

² Hal J. Singer, Estimating the Costs Associated with a Change in Local Number Portability Administration [*Singer Report*].

³ The Standish Group, Big Bang Boom (Date), *available at* blog.standishgroup.com/BigBangBoom.pdf [*Standish Report*].

⁴ *Burger Report* at 11 (“Given the published estimate of 80 unique systems deployed, and a higher estimate of \$2,000,000 per system, the most this will cost the industry is a one-time cost on the order of \$160M.”). He later offers a smaller estimate based on “36 carriers doing the testing.” *Id.* at 13.

⁵ *Singer Report* at 4 (assuming 91 unique systems). It is not clear whether the \$160 million lump-sum estimate in the Burger Report includes the systems transition; to the extent it does, then the comparable figure in my report is \$254 million. *Id.*

section heading titled “Carrier Implementation and Configuration Error Model,”⁷ he makes no attempt to estimate the *post*-transition costs; that section instead speaks to costs associated with “latent defects” in the original code. The absence of any quantification of post-transition costs in his report should not be interpreted as a zero estimate. Indeed, much of the logic in Professor Burger’s report suggests those costs could be substantial. Thus, any comparison of the *sum* of my pre-transition and post-transition costs with Professor Burger’s standalone pre-transition costs, as some would have the Commission do,⁸ is the quintessential apples-to-oranges mistake. Replacing my estimated setup and testing costs with Professor Burger’s estimate would *increase* the total cost of the transition to over \$800 million.

Brief Review of My Cost Methodology

My cost estimates were broken down into four categories: (1) setup and testing; (2) systems transition, (3) early-stage operations, and (4) unplanned outages. The largest contributors to costs are systems transition and early-stage operations. For the former, I assumed a 0.25 percent error rate when interpreting database fields; of those errors, only 19 percent were assumed to impact a customer’s service. For the latter, I assumed a mere 0.81 percent increase from ongoing error rates in porting based on Neustar’s realized diminution in its own

⁶ *Standish Report* at 10 (“This cost includes the \$2 million not including hidden costs for the 80 unique systems that will be required to migrate and integrate the new system with their applications. This totals \$160 million if everything works the first time with no delays.”).

⁷ *Burger Report* at 13 (“Even with a maximum one-time cost of \$160M, there may be latent defects post- deployment.”).

⁸ Chris Drake, *The Reality of an NPAC Transition*, iconectiv, Aug. 27, 2014 (“Accepting the incumbent’s assertion, for a moment, that there are potentially 80 unique systems to test, Dr. Burger’s report explains that this transition would cost between \$20M and \$160M to implement. This is a very far cry from \$719M.”), *available at* <http://www.iconectiv.com/insights/index.php?blgid=transition>.

errors with experience; of those errors, only 63 percent were assumed to impact a customer's service. To convert these errors into costs, I assumed \$45 of engineering time to resolve a problem (based on an Alcatel/Lucent study⁹); \$60 fully loaded customer-service cost per call (based on carrier experience); and bill credits (based on reported ARPU's pro-rated for the days with interrupted service). Importantly, I assumed that all early-stage errors are resolved by the end of the first year.¹⁰

Comparison with Burger Report

As an economist, I sought to understand how the transition would likely affect telecommunications carriers. By contrast, Professor Burger, a computer scientist, views this estimation problem as an IT process; thus, the notion of bill credits or customer-service costs to remedy ongoing errors in the local number portability administrator's (LNPA's) first year of operation is completely outside the scope of his inquiry. By solving an engineering problem of transferring a database from one vendor to another, he naturally considers his estimate complete once the IT portion of the exercise is concluded. Therefore, of the four cost categories in my study, there is no analogue in the Burger Report to early-stage operations (category three) or unplanned outages (category four); and there is no obvious analogue to the systems transition (category two).

Professor Burger never contradicts my methodology. The most significant critique is when he distinguishes the "fully specified and operational data" of

⁹ Alcatel-Lucent, *Solving the NGN Data Migration Challenge* (2007). Professor Burger tries to distinguish the NPAC transition from those reviewed in the Alcatel-Lucent paper. *Burger Report* at 11. But the only input on which I rely from that study is the cost per hour for engineering time, an input that Professor Burger does not contest.

¹⁰ Given the presence of latent errors, among other reasons, this assumption is highly conservative. *Burger Report* at 11 ("Because of the potential for latent errors, testing of any new system will be critical.").

Number Portability Administration Center (NPAC) from the circumstances of United-Continental merger,¹¹ which I offered as an illustrative example of a challenging transition. Because none of the inputs to my cost model relies on that example, whether the United-Continental merger is analogous to the NPAC transition is academic. Consistent with my approach, Professor Burger cites other transitions episodes, such as the FAA air-traffic-control modernization project (whose costs ballooned to ten times the original estimate),¹² to set the stage for his empirical work. To the extent that the NPAC transition goes as poorly as *either* of those two cases, both of our cost estimates would be too conservative.

Professor Burger and I share a similar view about the complexity of this undertaking. Indeed, he does not shy away from describing the significant complexity of certain processes associated with the NPAC transition: “Kitchenham suggests that when a module approaches a complexity of ten, that module should have extra scrutiny . . . We should not be surprised that a system such as the NPAC [with complexity of 9] would have modules that require careful development practices.”¹³ Although he can identify other telecommunications systems with greater complexity, such as modern switching systems, Professor Burger’s metric suggests the NPAC transition will be anything but straightforward.

Professor Burger’s diagnosis of the nature of the errors in the transition

¹¹ *Burger Report* at 8. Although the software may have been more complex, as Professor Burger claims, other aspects of United-Continental transition seem less complex than the NPAC transition. For example, unlike the NPAC transition, the target system was fully functional, and the transition had the benefit of being run as a central project by a single entity.

¹² *Burger Report* at 6 (“The total project was estimated to cost approximately \$2.68. However, there was a constant set of changes imposed as the project was being developed. By 1999, close to twenty years after the start of the project, only 23% of the project was completed and \$2.88 out of \$27.58 of project work was abandoned.”).

¹³ *Burger Report* at 5.

process mirrors mine: “A provider may not fully understand the customer's complete definition of a data element. They also may not fully appreciate the relationships between different data elements. Such *misunderstandings* can result in data inconsistency or even entire rework of a database schema if the relationships are quite wrong.”¹⁴ My cost model does not assume that the data itself will be transferred incorrectly; instead, it assumes a very slight percentage of the data and transaction instructions (0.25 percent) will be misinterpreted by one or more elements in the systems using the data. Indeed, the majority of my estimated costs stem from a new LNPA's lack of institutional experience managing transaction projects. Despite acknowledging that misinterpretation is the risk, Professor Burger asserts that the “*likelihood* of misinterpretation of database fields or database structure is near zero” given the “detailed specifications provided by the current NPAC [Change Management Administrator].”¹⁵ Whatever the difference between “near zero” and 0.25 percent error rate may be, Professor Burger's setup cost estimate is larger than mine (\$160 million versus \$71 million), assuming his estimate accounts for setup and testing costs only; if his estimate also accounts for systems-transition costs, then his estimate is smaller than mine (\$160 million versus \$254 million), but the difference is not economically significant.

In another area of agreement, Professor Burger stresses the importance of refined business processes in reducing errors: “In the early years of the NPAC, the industry was figuring out what it really needed, the business processes were being

¹⁴ *Burger Report* at 7 (emphasis added).

¹⁵ *Burger Report* at 14 (emphasis added).

refined on the fly, and bugs were being worked out.”¹⁶ Critically, the business processes developed by Neustar over 15 years for managing large migrations and M&As are *not transferable* to the new LNPA in the same way that a data within a database, or even a database structure, is transferable; the complexity of identifying the correct transaction process, project scheduling, and project execution to handle these transactions will have to be re-developed from scratch, which could effect just the type of reversion to the early days of LNP Professor Burger describes. It will likely take months if not years for the new LNPA to be as effective as Neustar because none of this business expertise will transfer. Yet Professor Burger never translates these business-process impediments into costs. He focuses his cost estimates instead on software changes, which while certainly important, is not the primary source of risk.

Finally, Professor Burger assumes incorrectly that the new LNPA will actually implement an exact copy of Neustar’s code. In particular, he opines that there will be no schema conversion, and that all underlying code would be identical: “In the case of the NPAC, the database schema and data model remains constant. That is, there are no conversion errors because there is no conversion.”¹⁷ To the extent that the new LNPA develops all new code from scratch, his transition errors (as well as mine) would necessarily increase significantly, rendering both our cost estimates downwardly biased.

Conclusion

The cost estimates in Professor Burger’s report and in my report are not

¹⁶ *Burger Report* at 7.

¹⁷ *Burger Report* at 14.

directly comparable. Yet in the area of overlap—pre-transition costs—our estimates are not far off. Overall, Professor Burger offers a reasonable estimate of the setup and testing costs, which exceeds my estimate of those costs. But he neglects to estimate the largest costs associated with a transition—the costs of the early-stage operations of the new LNPA. Although he acknowledges the importance of business processes in keeping post-production issues to a minimum, he ignores that experience developed by Neustar over a decade is not transferable to the new LNPA. In light of Professor Burger’s findings, there is no reason to revise downward my initial estimate of \$719 million for pre- and post-transition costs through the first year of the new LNPA’s operations.