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March 24, 2016

REDACTED – FOR PUBLIC INSPECTION

By ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: WC Docket No. 05-25; RM-10593

Dear Ms. Dortch:

AT&T and CenturyLink hereby jointly submit the attached Supplemental Reply Declaration of Mark Israel, Daniel Rubinfeld, and Glenn Woroch ("Israel-Rubinfeld-Woroch Supplemental Reply"), which responds to and rebuts the Supplemental Reply Declaration of Professor Jonathan Baker, filed on behalf of Level 3 and Windstream.[1] Consistent with the *Protective Orders*[2] in this matter, this letter and the enclosed **Public** version of the Israel-Rubinfeld-Woroch Supplemental Reply have been redacted for inclusion in the public record.

[1] *See* Supplemental Reply Declaration of Jonathan B. Baker on Market Power in the Provision of Dedicated (Special Access) Services, *Special Access Rates for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket No. 05-25, RM-10593 (Mar. 2, 2016) ("Baker Supplemental Reply").

[2] Modified Protective Order, *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, 25 FCC Rcd. 15168 (2010); Second Protective Order, *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, 25 FCC Rcd. 17725 (2010); Second Protective Order, Order and Data Collection Protective Order, *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, 29 FCC Rcd. 11657 (2014).

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Professor Baker previously filed a declaration reporting the results of regression analyses attempting to model the effect of CLEC entry in or near a building on an ILEC's retail special access prices in that building. Professor Baker claimed to have found that ILEC prices in a building decline as the number of CLECs in or near the building increase, and in his initial declaration, Professor Baker emphasized that the largest ILEC price decrease occurred only when a *third* CLEC entered the building. The CLECs' advocates seized on these "findings" to argue that the Commission should not consider competition to exist in any building with special access demand unless *three* CLECs have constructed connections to such a building.[3]

Professors Israel, Rubinfeld, and Woroch filed a reply declaration explaining in detail that Professor Baker's regression analyses suffered from so many fundamental design and data-related flaws that the Commission could not rely on them.[4] Professor Baker's Supplemental Reply Declaration offers some tepid defenses of his original submission, but as the Israel-Rubinfeld-Woroch Supplemental Reply demonstrates, those defenses do not come close to rehabilitating Professor Baker's analyses.

First, Professor Baker continues to flout basic principles of statistics in interpreting his results. As Professors Israel, Rubinfeld, and Woroch previously noted, the *majority* of the results Professor Baker chose to report are either statistically insignificant or contrary to his theory. Nonetheless, Professor Baker continues to insist that his regressions show **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]**.

[3] *See, e.g.*, Comments of XO Communications, LLC on The Further Notice of Proposed Rulemaking, *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket No. 05-25, RM-10593, at 53 (Jan. 27, 2016) ("XO Comments") ("[T]he Commission should find that the trigger for relief for DSn channel terminations requires four competitors to have already built to a location and not just be in close proximity."); Comments of Windstream Services, LLC, *Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket No. 05-25, RM-10593, at 100-01 (Jan. 27, 2016) ("Windstream Comments") ("[T]he Commission should consider deregulatory measures, such as pricing flexibility, only at individual buildings where the data show that there are at least three non-ILEC competitors with their own last-mile fiber facilities supporting dedicated services . . . . [O]nly the in-building presence of at least three non-ILEC dedicated services competitors with their own last-mile fiber facilities is sufficient to ensure that the elimination of regulation will not permit service providers to raise their rates to supracompetitive levels.").

[4] Declaration of Mark Israel, Daniel Rubinfeld and Glenn Woroch, *Special Access Rates for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket No. 05-25, RM-10593 (Feb. 19, 2016) ("Israel-Rubinfeld-Woroch Reply Decl.").

[5] Baker Supplemental Reply ¶ 5 (emphasis added).

Interpreting statistically insignificant coefficients as supporting one's hypothesis runs counter to basic statistics. The only proper interpretation of a statistically insignificant coefficient is that "the data fail to provide sufficient evidence from which to conclude that the presence of competitive providers has an effect on ILEC prices."[6] "The bottom line is that these results fall far short of the consistent pattern of negative and statistically significant coefficients that would be required for one to draw a reliable inference of an inverse relationship."[7]

Second, Professor Baker concedes that the Commission cannot draw any conclusions from the relative magnitude of the coefficients in his regressions. Indeed, as Professors Israel, Rubinfeld, and Woroch previously explained, the pattern of Professor Baker's regression coefficients "did not agree with common sense or economic theory," insofar as Professor Baker often found that the third CLEC in a building had a greater impact than the first two, that nearby CLECs had a greater impact on ILEC prices than CLECs in the same building, and that additional CLEC entry causeed CLEC prices to rise.[8] Professor Baker's response is that that the magnitude of the coefficients in each regression are not "precis[e]" and thus cannot be compared.[9] This is a damaging concession, because Professor Baker is effectively conceding that even when "a coefficient is negative, statistically significant, and large in magnitude, one cannot draw any conclusions because the magnitude of the coefficient may be inaccurate."[10] Equally important, in making this argument, Professor Baker further concedes that the CLECs that have been relying on his regressions for the proposition that effective competition requires multiple competitors have fundamentally misinterpreted his analysis.[11] On this point, Professor Baker could not be clearer: **[BEGIN HIGHLY CONFIDENTIAL]** [redacted]

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[6] Israel-Rubinfeld-Woroch Supplemental Reply ¶ 6.

[7] *Id*. ¶ 5. Professors Israel, Rubinfeld, and Woroch also explain that the methods Professor Baker uses to wrestle with the rather large standard errors of his estimates are either not a valid means of testing the robustness of the regression or in fact confirm that the results are not robust. *See id*. ¶¶ 14-20 ("It is not unusual to specify a reduced-form model of the relationship between structural competition and pricing outcomes. However, when no statistically-significant reduced-form relationship emerges, it is unlikely that there is a *causal* relationship between these variables. Given the overall lack of reliability of the regression results, one cannot draw a causal inference that a small number of competitors is an indication of the existence of market power.").

[8] *Id*. ¶¶ 8-10.

[9] Baker Supplemental Reply ¶ 7.

[10] Israel-Rubinfeld-Woroch Supplemental Reply ¶ 12.

[11] *Id*. ¶ 14 ("[W]e note that Prof. Baker's response with respect to these issues contains a highly relevant concession. He states that **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]** We agree. We note, however, that multiple CLEC commenters cite to Prof. Baker's regression precisely for the proposition that three or more CLECs are required to establish effective competition.").

[redacted] **[END HIGHLY CONFIDENTIAL]**

Third, even if Professor Baker's estimates were more statistically robust, his regressions are not asking any question of interest. The central inquiry in this proceeding is "whether the current triggers for granting Phase II pricing flexibility are closely aligned with the presence of facilities-based competition in an MSA."[13] Professor Baker, however, chose to report only the results for regression analyses that lump together Phase II, Phase I, and "no relief" MSAs, and further lump together prices for regulated *and* non-regulated services. As a result, his regressions fail to show any results specific to Phase II areas or specific to the regulated services being investigated in this proceeding. Professor Baker admits that he did run *unreported* regressions for Phase II areas, but he concedes that those regressions failed to produce statistically significant results and actually produced more *positive* coefficients, which is contrary to his hypothesis.[14] Professor Baker also states that he added dummy indicator variables for Phase II, Phase I and no relief areas. But as Professors Israel, Rubinfeld, and Woroch explain, such a change would not address the criticism as a matter of econometrics, because "the inclusion of fixed effects to account for differences in regulatory regimes does not allow for the response of ILEC pricing to competitive entry to differ by regulatory regime."[15] As to lumping together regulated and non-regulated services, Professor Baker admits that his results could be driven by price competition for *non-regulated* services, which is merely a further concession that the marketplace is competitive even in areas with no pricing flexibility relief.[16]

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[12] Baker Supplemental Reply ¶ 7; *see also id.* ¶ 7 n.12 (statement in original Baker declaration about third CLEC "lead[ing]" to the greatest ILEC price decrease **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]**).

[13] Israel-Rubinfeld-Woroch Supplemental Reply ¶ 24.

[14] *Id*. ¶ 25.

[15] *Id*. ¶ 29 ("One approach that could identify the implications of pricing flexibility would be to interact the indicators of competitive providers with indicators of regulatory treatment. However, to our knowledge, Prof. Baker has not estimated this model. As a result, his proposed 'solution' does not respond to our central point—that the relationship between number of competitors and prices almost surely varies across different competitive regimes.").

[16] Professors Israel, Rubinfeld, and Woroch note that Professor Baker also apparently ran a separate regression for "no relief" areas and purported to find ILEC price decreases. This result is especially curious, because one would not expect there to be any meaningful relationship between CLEC entry and ILEC pricing in areas governed by traditional price cap regulation in which ILECs are severely constrained in changing their prices in response to competition. As Professors Israel, Rubinfeld, and Woroch explain, any statistically significant finding of an inverse relationship in "no relief" areas is strong evidence that the entire regression is biased toward finding an inverse relationship. *Id.* ¶ 27. Professor Baker's response is that this relationship may be driven by reduced *non-regulated* services in these price cap areas.

Fourth, Professor Baker's regressions are unreliable because there are large gaps in his data that are not randomly distributed. Here, too, Professor Baker's answers are non-responsive. For example, Professors Israel, Rubinfeld, and Woroch previously explained that **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]** of all buildings in the FCC's dataset lack any billing data, which means Professor Baker cannot include those buildings in his regression estimations.[17] In his supplemental reply, Professor Baker informs us that he has run regressions using samples that have different degrees of missing data in an attempt to show that the missing pricing data do not matter. Although he (once again) does not report his results, Professor Baker assures us that he found **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]** in the regressions of these subsamples. Professor Baker's conclusions cannot be independently confirmed (because he does not provide the results), but in all events his samples are likely non-random themselves. According to Professor Baker, he estimated two regressions that included **[BEGIN HIGHLY CONFIDENTIAL]** [redacted] **[END HIGHLY CONFIDENTIAL]**

Finally, Professor Baker acknowledges, as he did in his original report, that his results are biased – a conclusion with which Professors Israel, Rubinfeld, and Woroch agree.[21] Professor Baker believes the bias is all in one direction; in essence, Professor Baker is saying "If I could get rid of all the bias in my models, my hunch is that the coefficients would be more consistently negative and significant" (even though the majority of them now are not). But Professors Israel, Rubinfeld, and Woroch previously explained that there are a number of other factors that would bias his results in the other direction, and as they emphasize again here, Professor Baker has *no grounds* in econometrics or economic theory for guessing that one effect or the other predominates.[22] All anyone can conclude at this juncture is that his results are biased and thus are not reliable. There are well-understood techniques in econometrics for attempting to correct these sources of bias (such as using instrumental variables estimation), but Professor Baker has

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[17] Israel-Rubinfeld-Woroch Reply Decl. ¶ 28.

[18] Baker Supplemental Reply ¶ 16.

[19] *Id*.

[20] Israel-Rubinfeld-Woroch Supplemental Reply ¶ 33.

[21] *Id*. ¶¶ 42-49.

[22] *Id.*; Israel-Rubinfeld-Woroch Reply Decl. ¶¶ 34-36.

not even tried to obtain reliable results by using these techniques to address the conceded bias in is estimations.[23]

For all of these reasons, the Commission could not reasonably rely on Professor Baker's regressions analyses for any purpose in this proceeding.

Sincerely,

/s/ Christopher T. Shenk
Christopher T. Shenk
Sidley Austin, LLP
Counsel for AT&T

/s/ Russell Hanser
Russell P. Hanser
Wilkinson Barker Knauer, LLP
Counsel for CenturyLink

Enclosure

cc: Christopher Koves

[23] Israel-Rubinfeld-Woroch Supplemental Reply ¶¶ 48-49.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Special Access for Price Cap Local Exchange Carriers	)	WC Docket No. 05-25
	)	
	)	
AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services	)	RM-10593

SUPPLEMENTAL DECLARATION OF

MARK ISRAEL, DANIEL RUBINFELD AND GLENN WOROCH

March 24, 2016

I. OVERVIEW

1. We have been asked by AT&T and CenturyLink to review the Supplemental Reply Declaration of Professor Jonathan Baker,[1] which purports to respond to our criticisms of the regression analysis that Prof. Baker described in his initial declaration.[2] In our previous declaration we identified numerous flaws in Prof. Baker's regression analysis that led us to conclude that the inferences he drew regarding the relationship between special access prices and the number of competitors connected to (or nearby to) a building were not valid.[3] Prof. Baker's Supplemental Reply Declaration attempts to address some of our points. However, as we explain below, his responses are not compelling and, in some cases, reveal additional deficiencies in his regression analyses that were not apparent from his initial declaration.

2. Expanding on our earlier declaration, we show in this report that the coefficients in Prof. Baker's regressions do not display the signs, magnitudes, and levels of statistical significance that would be required to establish an inverse relationship between ILEC pricing and the number of competitive providers. Moreover, we explain that the estimates reported in his original declaration are not consistent with standard models of industry equilibrium. Furthermore, the biases that Prof. Baker identified in his initial declaration have not been corrected, nor has he attempted to correct the additional sources of biases that we identified. Finally, Prof. Baker's regression analyses fail to respond to a critical policy issue in this proceeding as to whether the triggers for pricing flexibility are aligned with facilities-based competition.

3. In the end, Prof. Baker's Supplemental Reply reconfirms and strengthens our opinion that the evidence provided by his regressions does not offer a reliable guide for the reform of special access regulation. We address each of his points in the same order he raised them in his Supplemental Reply.

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[1] Supplemental Reply Declaration of Jonathan B. Baker On Market Power in the Provision of Dedicated (Special Access) Services, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Mar. 2, 2016) ("Baker Supp. Reply Decl.").

[2] The Declaration of Jonathan B. Baker on Market Power in the Provision of Dedicated (Special Access) Services, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Jan. 27, 2016) ("Baker Decl.").

[3] Declaration of Mark Israel, Daniel Rubinfeld and Glenn Woroch, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Feb. 19, 2016) ("Israel-Rubinfeld-Woroch Decl.").

II. STATISTICAL RELIABILITY OF PROF. BAKER'S REGRESSION RESULTS

4. In our earlier declaration, we demonstrated that Prof. Baker's regression results do not support an inference that ILEC prices fall as the number of competitive providers connected to, or nearby to, a building increase.[4] In his Supplemental Reply Declaration, Prof. Baker reiterates his claims that his series of regressions support the inference of an inverse relationship between ILEC prices and the number of in-building and nearby competitors using the Special Access Data Collection ("SADC").[5]

5. We are not persuaded. Recall that there are a meaningful number of positive coefficients in his various regressions, and, of course, these are counter to his conclusion. Of the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** coefficients on indicators of competitors that were reported in the econometric specifications reported by Prof. Baker, **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** are *positive*, either statistically significant, or insignificant.[6] Six of them are positive *and* statistically significant (*i.e.*, the opposite of Prof. Baker's claim of an inverse relationship). More generally, **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** do not support Prof. Baker's claim of an inverse relationship between ILEC pricing and competitor counts and prices, either because their values are not statistically different from zero, or because their values are positive. The bottom line is that these results fall far short of the consistent pattern of negative and statistically significant coefficients that would be required for one to draw a reliable inference of an inverse relationship.

6. When a coefficient is not statistically different from zero, the proper interpretation is that the data fail to provide sufficient evidence from which to conclude that the presence of competitive providers has an effect on ILEC prices. In this case, among the [**Begin Highly**

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[4] Mark Israel, Daniel Rubinfeld and Glenn Woroch, "Competitive Analysis of the FCC's Special Access Data Collection: White Paper," *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Jan. 28, 2016) ("Israel-Rubinfeld-Woroch White Paper") at ¶ 13.

[5] Prof. Baker counts as support all coefficients on competitive entry variables that are negative, whether or not they are statistically significant, plus those coefficients that are positive when they are statistically insignificant: **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

[6] Baker Decl., Table 2.

Confidential] [redacted] **[End Highly Confidential]** coefficients for in-building and nearby competitors, less than half, *i.e.*, **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** are negative and statistically significantly different from zero, meaning that the data do not demonstrate an inverse relationship.[7]

7. Ultimately, in its discussion of statistical significance, Prof. Baker's Supplemental Reply Declaration attempts to have it both ways. On one hand, he not only relies heavily on coefficients that are negative and statistically significant as evidence in support of his conclusion that there is an inverse relationship, but he goes further in interpreting negative coefficients that are statistically *insignificant* as supporting the inverse relationship. On the other hand, he gives little weight to the fact that over half of the coefficients are positive, in part by arguing that many of these coefficients are statistically *insignificant*. The proper conclusion is that those coefficients that are insignificant (whether positive or negative) and the coefficients that are positive and significant—together, the majority of his coefficients—each fail to provide evidence from which to conclude that there exists an inverse relationship between ILEC prices and the number of competitors.

III. MAGNITUDES OF PROF. BAKER'S REGRESSION COEFFICIENTS

8. As we explained in our earlier declaration, the estimated coefficients on indicators of the number of competitive providers often had values that did not make economic sense. In addition to the many positive coefficients, we pointed out that the pattern of regression coefficients did not agree with common sense or economic theory: (i) the presence of additional competitors was often not associated with lower prices,[8] (ii) nearby competitors often had a larger impact than in-building competitors,[9] and (iii) supplemental competitors often had a larger impact on prices than prior competitors.[10]

[7] Baker Decl., Table 2.
[8] Israel-Rubinfeld-Woroch Decl., ¶ 23.
[9] *Id.*, ¶ 24.
[10] *Id.*, ¶ 25.

9. Standard models of industry behavior imply that, in equilibrium, the marginal impact on price of an additional supplier in the industry diminishes with the total number of suppliers.[11] Yet, an examination of the sizes and signs of the regression coefficients on successive competitors does not confirm this pattern.[12] In fact, there is no consistent pattern, for neither signs nor sizes, in the coefficients on the second or third in-building competitor.[13] We would expect that the first in-building competitor would have the greatest impact on ILEC pricing. Yet, out of the [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]**.[14] Coefficients on the "fourth (or more) in-building provider" indicator are more stable, but since they tend to be much larger than those for the second and third entrant – sometimes by an order of magnitude—they also are not consistent with standard industry models.

10. We also pointed out in our earlier declaration that a comparison of Prof. Baker's first two regressions in his Table 2 implied that a second in-building competitive provider was correlated with *higher* prices charged by competitive providers to the detriment of special access purchasers.[15]

11. Prof. Baker appears to recognize that comparisons of the results of his 13 regressions reveal no consistent pattern. His response is that it is not appropriate to compare the results of different regressions because all are biased such that the actual magnitude of any particular

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[11] For instance, the Cournot model of industry equilibrium has the property that price falls with the each additional firm, and in the linear version of that model, the price reduction caused by an additional firm diminishes as the number of firms increases. *See, e.g.*, Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, Pearson/Addison Wesley: Boston, Fourth Edition (2005) ("The effect of additional rivals on quantity and price is initially very strong, but tapers off as the number of firms increases." (p.170)). *See* also Declaration of Stanley M. Besen and Bridger M. Mitchell (Jan. 27, 2016) ("Besen and Mitchell Decl."), ¶ 45 ("With respect to the number of competitors that are needed to discipline pricing effectively, the economic literature generally supports a finding that many competitors are required and that each additional competitor's incremental effect on price diminishes as the number of competitors increases.").

[12] Baker Decl., Table 2.

[13] We note that when the coefficient on the third in-building providers is negative and statistically significant, the size of the coefficient is small, implying a reduction in ILEC prices of [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** depending on the subsample used. *See* Baker Decl., Table 2. *Id.*

[15] Israel-Rubinfeld-Woroch Decl., footnote 17.

coefficient is unreliable and cross comparisons cannot be made.[16] We have a different viewpoint.

12. To begin, it is important to emphasize that Prof. Baker's argument concedes that even if a coefficient is negative, statistically significant, and large in magnitude, one cannot draw any conclusions because the magnitude of the coefficient may be inaccurate. Furthermore, coefficients *within* as well as *across* his regressions often yield nonsensical conclusions. For example, the first regression reported in Prof. Baker's table shows that [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]**.

13. Prof. Baker argues that rather than comparing individual coefficients across regressions one should look at cumulative or average effects: "by comparing cumulative or average effects within or across regressions, both of which are derived from summing several regression coefficients, are likely to be more reliable that inference made by comparing the magnitude of individual coefficients within or across regressions…."[17] As a statistical matter, this is not necessarily so. The validity of this statement depends on the standard errors of the marginal (cumulative or average) effects, and these are not reported by Prof. Baker. Prof. Baker has not ruled out the possibility that correlations among explanatory variables could amplify the standard errors of cumulative/average effects relative to that of individual coefficients.[18]

14. Finally, we note that Prof. Baker's response with respect to these issues contains a highly relevant concession. He states that **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** We agree. We note, however, that multiple CLEC

[16] Baker Supp. Reply Decl. ¶ 7.
[17] *Id*.
[18] A Bonferroni test of the joint hypothesis that *all three* coefficients on in-building competitors are jointly equal to zero is not rejected for [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** regressions at a 5% significance level. That same test of the joint hypothesis that *all four* coefficients on nearby competitors are jointly zero is not rejected for [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** regressions. On the Bonferroni test, see James H. Stock and Mark W. Watson, *Introduction to Econometrics*, 3rd Edition, Addison Wesley: Boston, 2011, Appendix 7.1.
[19] Baker Supp. Reply Decl. ¶ 7. In our previous declaration (*see* Israel-Rubinfeld-Woroch Decl. ¶ 62), we noted that Besen and Mitchell come to a different conclusion. They state that "We base this conclusion [that "there are fewer suppliers of special access service than are necessary for a fully competitive outcome"] on the observation that the

commenters cite to Prof. Baker's regression precisely for the proposition that three or more CLECs are required to establish effective competition.[20]

IV. TESTING FOR STATISTICAL SIGNIFICANCE

15. It is clear that Prof. Baker's coefficients are not estimated with acceptable precision from which to draw strong inferences, *i.e.,* the standard errors of his estimates are relatively large. While small sample sizes might be responsible for large standard errors, several of Prof. Baker's regressions have over one million observations, making it more likely that the lack of statistical significance indicates that, instead, there is no underlying relationship (at least of the type posited by Dr. Baker's model).[21]

16. In his initial analysis, Professor Baker relied on several different measures of the standard errors associated with his estimated regression coefficients. We reiterate here the conclusion from our earlier declaration, that using the clustered approach to the measurement of standard errors is most appropriate, and that using this approach would make more of the negative coefficients reported by Prof. Baker statistically insignificant.

17. Prof. Baker's main response is that the choice of standard error measure does not affect the "magnitude" of his coefficients. But that misses the point. As Prof. Baker concedes, the different measures of standard error affect whether the coefficients are *statistically significant*. Thus, regardless of the magnitude of the coefficients, the choice of standard error is important when determining whether one can reject the hypothesis that individual coefficients are different

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presence of more than two suppliers is necessary to achieve a competitive outcome." Besen and Mitchell Decl., ¶ 31.

[20] *See, e.g.*, Comments of XO Communications, LLC on the Further Notice of Proposed Rulemaking, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Jan. 27, 2016) at p.53 ("Therefore, the Commission should find that the trigger for relief for DSn channel terminations requires four competitors to have already built to a location and not just be in close proximity."); Comments of Windstream Services, LLC, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Jan. 27, 2016) at pp.100-101 ("…the Commission should consider deregulatory measures, such as pricing flexibility, only at individual buildings where the data show that there are at least three non-ILEC competitors with their own last-mile fiber facilities supporting dedicated services…. [O]nly the in-building presence of at least three non-ILEC dedicated services competitors with their own last-mile fiber facilities is sufficient to ensure that the elimination of regulation will not permit service providers to raise their rates to supracompetitive levels.")

[21] "As a general rule, the statistical significance of the magnitude of a regression coefficient increases as the sample size increases." Daniel L. Rubinfeld, "Reference Guide on Multiple Regression," *Reference Manual on Scientific Evidence* (Third Edition) The National Academies Press: Washington, DC, p. 318.

from zero. As Prof. Baker confirms, using the "clustered" approach makes more of his coefficients (regardless of their magnitude) statistically insignificant.

18. Prof. Baker also states that using different standard errors offered a "robustness test" for his regressions.[22] We disagree. Obtaining a more accurate estimate of standard errors does not provide a standard test of robustness of a regression model. A more appropriate test or tests would evaluate the sensitivity of the estimated coefficients to modest changes in the specification of the model. For example, one might see how the inclusion of different subsets of explanatory variables in the regressions affected the coefficients on the number of competitors. In contrast, Prof. Baker's 13 regressions all include the identical explanatory variables. As an alternative approach, we note that Prof. Baker could have excluded the nearby competitors in one regression and compared the results to the regression when those indicators were included.

19. Prof. Baker estimates his econometric model using 13 different subsamples of the data. This could serve as the basis for a test of the robustness of the results from a regression model. Notably, applied here, this robustness test shows that Prof. Baker's results are not robust. An examination of the regression results shows that the coefficients change sign and significance from one sample to the next. The implication is the full set of Dr. Baker's regressions does not provide robust support for his inference of a relationship between the number of competitors and price.

20. All of the regressions that Prof. Baker estimates are reduced-form relationships that capture the correlation between observed ILEC prices (or ILEC plus CLEC prices) and various market conditions including the presence of competitors. It is not unusual to specify a reduced-form model of the relationship between structural competition and pricing outcomes. However, when no statistically-significant reduced-form relationship emerges, it is unlikely that there is a *causal* relationship between these variables.[23] Given the overall lack of reliability of the

[22] Baker Supp. Reply Decl., ¶ 8 ("Clustering was undertaken in the alternative as a robustness test.").
[23] *See, e.g.*, Joshua D. Angrist, and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, 2008 ("if you can't see the causal relationship in the reduced form, it's probably not there." (p.213)). *See* also Joshua D. Angrist and Alan B. Krueger, "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments," *Journal of Economic Perspectives* 15.4 (2001): 69-85 ("Most importantly, if the reduced form estimates are not significantly different from zero, the presumption should be that the effect of interest is either absent or the instruments are too weak to detect it." (p.80)).

regression results, one cannot draw a causal inference that a small number of competitors is an indication of the existence of market power.

V. NEARBY RIVALS

21. In our earlier declaration, we pointed out that the regression specification was poorly suited to answering an important question: What is the effect of a nearby competitor when there are no in-building competitors present? Prof. Baker suggests that the estimated coefficients on indicators of nearby rivals capture the nearby competition when there are no/few in-building competitors because as a general rule there are no/one in-building competitors.[24]

22. Prof. Baker's reasoning is incorrect. The proper way to identify the effect of nearby competitors for any number of in-building competitors (including no in-building competitors) is to introduce a full set of interaction variables between the in-building and nearby competitors. To our knowledge, Prof. Baker has not undertaken this analysis.

23. Given a full set of interactions, the coefficients on the interactions of the indicator of zero in-building competitors with the indicators of various numbers of nearby competitors would answer the question we identified as critical to this analysis: Is nearby competition sufficient to make up for the absence of in-building competition when the latter does not occur? The frequency with which different combinations of in-building and nearby competitors occurs would not affect the estimated coefficients on indicator variables and their interactions. Exclusion of the interactions altogether, in contrast, means that the estimated competitive effect is an average over the effects that would be split out by the interactions and thus does not provide an unbiased measure of any of the relevant interaction terms.

VI. REGULATORY TREATMENT

24. A central issue in this proceeding is whether the current triggers for granting Phase II pricing flexibility are closely aligned with the presence of facilities-based competition in an MSA. To evaluate these issues, one should examine the data for Phase II areas only. In his original declaration, however, Prof. Baker reported only results from regressions that combined

[24] Baker Supp. Reply Decl., ¶ 11.

Phase I, Phase II, and no relief areas, making it impossible to draw any conclusions about competition in Phase II areas alone.

25. Prof. Baker did note that he estimated a regression using only Phase II areas, but he chose not to report those results. Prof. Baker explains that this regression produced standard errors indicating that additional coefficients were not statistically significant and that the regression actually showed a more statistically-significant *positive* relationship in Phase II areas.[25]

26. Professor Baker did purport to find a negative relationship between ILEC prices and competitors' connections (or nearby fiber) in "no relief" MSAs. We find this result perplexing: we would not expect there to be a meaningful empirical relationship between ILEC pricing and the number of competitive providers, since ILECs' ability to reduce prices for regulate services in these areas is constrained by the price cap rules.

27. In light of these possibilities, any inverse relationship that arises in the undisclosed regressions in price-cap areas should be seen as evidence that the regression specification is biased to find an inverse relationship. Prof. Baker's response is that his analysis combined regulated and unregulated services, and that the observed price declines in price-cap areas must be caused by ILEC pricing for non-regulated services. But that would suggest that the independent regressions for non-regulated services reported by Prof. Baker would show consistent and statistically significant negative coefficients.[26] As seen below, this is not the case.

28. We also note that seven of Prof. Baker's regressions involve ILEC pricing of unregulated services, *i.e.*, models (6) and (8)-(13) of Table 2. We would expect those regressions to provide a more direct estimate of the effect of competition on prices in the absence of regulatory restrictions on pricing. However, out of the [**Begin Highly Confidential]** [redacted] **[End Highly Confidential]** In one specification (ILEC retail prices for 100-500 Mbps), there are no statistically significant coefficients on competitive provider variables. In another case (ILEC retail prices for 500-1000 Mbps), the first in-building competitor caused an approximately [**Begin Highly Confidential]** [redacted]

[25] Baker Decl., ¶ 62; Baker Supp. Reply Decl. ¶ 13.
[26] *See* Baker Decl., Table 2, Models (6) and (8)-(13).

[**End Highly Confidential]** drop in prices, but the second in-building provider resulted in an approximately [**Begin Highly Confidential]** [**End Highly Confidential]** price increase, netting out to a price increase. Hence, when restricted to unregulated services, Prof. Baker's regression results become even less supportive of an inference of an inverse relationship between competition and prices.

29. Professor Baker has also pointed to regressions that include dummy indicator variables ("fixed effects") for regulatory treatment. However, because he did not report the results of the estimation we cannot replicate his analysis. We can point out, however, that the inclusion of fixed effects to account for differences in regulatory regimes does not allow for the response of ILEC pricing to competitive entry to differ by regulatory regime. Fixed effects merely account for differences in the baseline price level by regulatory treatment; they do not allow the effect of the number of competitors to vary. One approach that could identify the implications of pricing flexibility would be to interact the indicators of competitive providers with indicators of regulatory treatment. However, to our knowledge, Prof. Baker has not estimated this model. As a result, his proposed "solution" does not respond to our central point—that the relationship between number of competitors and prices almost surely varies across different competitive regimes.

VII. MISSING DATA

30. In our earlier declaration, we explained that Prof. Baker's regression analysis was unreliable because of information that was missing from the SADC on both sides of the regression equation, *i.e.*, the ILEC prices (left hand side) and the competitive facilities (right hand side). We noted that there is no evidence that data that he used were representative.[27] Prof. Baker responded by saying that "[e]mpirical tests show that this possibility is not a concern for interpreting the regressions presented in my initial declaration, as the regression results are not sensitive to the inclusion of states or providers with relatively high proportion of missing prices."[28] As explained below, we disagree with this assessment.

[27] Israel-Rubinfeld-Woroch Decl., ¶¶ 27-33.
[28] Baker Supp. Reply Decl., ¶ 16.

A. MISSING PRICING DATA

31. In our earlier declaration, we noted that because [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** of all buildings identified by the FCC are composed of one or more locations that lack billing data, we cannot create a meaningful dependent variable.[29] If these buildings occurred randomly in the complete sample, this would be less of a concern. However, we showed that the buildings were missing in a nonrandom fashion and, as a result, the estimation sample could lead to biased coefficients.

32. To address the potential for bias, Prof. Baker estimates regressions using samples that have different degrees of missing data. His goal is to show that the coefficients are robust to missing data. Estimating a regression that uses only states with less than the median fraction of missing prices, Prof. Baker stated that he found "a similar inverse relationship to the coefficients reported for the primary specification."[30] Because he does not report the estimated coefficients for these regressions or their corresponding standard errors, we are unable to judge what he means by "similar." In any case, we are concerned that the selected sample of states itself is not representative of the population of buildings.

33. In support of our view, we note that Prof. Baker and several other commenters have noted that CenturyLink's submission to the SADC was complete and therefore would be disproportionately represented in Prof. Baker's estimation samples of these new regressions.[31] It is also well known that CenturyLink's territory differs from that of other major ILECs, being more rural and more sparsely populated and with the real possibility of a different relationship between pricing and the number of competitive providers. Hence, the subset of states used in Prof. Baker's sensitivity analysis is likely non-random and his test for the effect of missing data is likely to be biased.

34. In fact, when Prof. Baker estimated his primary specification using a sample of buildings that excluded AT&T, Verizon and Frontier, leaving only CenturyLink among the major ILECs, he states that he found an even stronger inverse relationship. He concluded, "These results are

[29] Israel-Rubinfeld-Woroch Decl., ¶ 28.
[30] Baker Supp. Reply Decl., ¶ 16.
[31] *Id*., footnote 27.

inconsistent with the ILEC economists' concern that sample selection bias from missing prices would lead the reported results for the primary specification to overstate the inverse relationship between the number of rivals and price."[32] However, this analysis actually implies that the data used by Prof. Baker do not represent a random sample (if they did he would not have found a stronger relationship).

35. To be precise, we did not state that nonrandom sample selection would bias the coefficients in one direction rather than another. The size and sign of sample selectivity bias depends on the process by which observations are dropped from the sample, and we do not know the process that determined the missing observations. Nevertheless, the change in the coefficient estimates that Prof. Baker mentions when he uses a different sample provides evidence that observations were not randomly excluded, and hence, his coefficient estimates are likely biased and thus not a reliable basis for policy making.

B. MISSING RIVALS DATA

36. To estimate the number of competitive providers connected to or nearby to a building, Prof. Baker relied solely on data available in the SADC. We showed that there are two problems with this approach. First, a large number [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** of the locations in II.A.4 and II.B.3 of the SADC are not associated with a building [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** and thus could not be counted in Prof. Baker's analysis as a building connection. Second, Prof. Baker did not account for the large number of cable connections that could be identified only by supplementing the SADC with data from the National Broadband Map dataset. This means that the regression systematically understates the actual number of competitors at or near any given location.

37. Prof. Baker asserts that we erred when we stated that he failed to include cable companies in his sample.[33] We disagree. Although connections provided by cable companies did appear in his samples, he ignored certain special access connections provisioned by cable companies. In particular, Table II.A.5 of the SADC requested the route maps of the middle-mile fiber facilities

[32] Baker Supp. Reply Decl., ¶ 16.
[33] Baker Supp. Reply Decl., ¶ 17.

of cable companies, and Prof. Baker included the corresponding census blocks to his measure of potential competition. We also included those records as part of both definitions of competition offered in our White Paper.

38. Prof. Baker's regression analysis, however, fails to count the substantial number of buildings with cable fiber connections and/or with cable fiber nearby. A simple comparison of the SADC data used by Prof. Baker and the National Broadband Map ("NBM") data confirms this fact. We began by identifying the census blocks in the SADC that indicated a location served by a competitive provider according to the responses to Questions II.A.4 and II.A.5.[34] We then identified [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** additional census blocks with special access service but not in that sample which had a last-mile fiber connection as reported in the National Broadband Map. Some of these are owned by cable companies. It is our understanding that Prof. Baker does not dispute that all fiber-based facilities should be included.

39. Prof. Baker also ignores cable facilities that are fully capable of providing special access services. Cable companies' hybrid fiber-coaxial ("HFC") networks represent a substantial competitive threat in the market for special access services. As we described in our earlier declaration,[35] cable companies have leveraged their HFC networks built to deliver residential video services as an entrée into business services.[36] Prof. Baker does not include the last-mile end-user connections of those networks because they often are used to provide best-efforts internet access, and Prof. Baker has concluded that such service is not a substitute for special access. We disagree.

40. We identified [**Begin Highly Confidential]** [redacted] [**End Highly Confidential]** additional census blocks that had DOCSIS 3.0 service above and beyond the competitor locations in the SADC. These connections are almost surely provided by cable operators over their HFC networks. To put this in perspective, we found about [**Begin Highly Confidential]**

[34] To roughly approximate the sample used by Prof. Baker, we included both MSA and non-MSA markets. We dropped all records of competitor or ILEC circuits provisioned using a UNE or UCL.
[35] Israel-Rubinfeld-Woroch Decl., ¶ 54.
[36] "While TWC's network was initially built to deliver video services to residential areas, TWC has since expanded its network to reach business customers beyond residential areas." Time Warner Cable, Notice of Ex Parte Presentation, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, Mar. 3, 2016.

[**End Highly Confidential]** MSA and non-MSA census blocks in the SADC with a special access connection provided by the ILEC and/or a competitive provider. Consequently, Prof. Baker's regression sample potentially excludes nearby competition in about [**Begin Highly Confidential]** [**End Highly Confidential]** of all census blocks with special access service.

41. Best efforts internet access competes in the special access marketplace. We demonstrated in our original white paper how special access providers, both ILECs and competitive providers, were losing business to best efforts broadband access.[37] In the process of excluding cable companies' HFC networks, Prof. Baker also ignores connections over Ethernet with Service Level Agreements. These special access arrangements have experienced rapid growth in recent years.[38] These are not simple best-efforts services.

VIII. DIRECTION OF COEFFICIENT BIASES

42. In his Supplemental Reply Declaration, Prof. Baker reminds us that he listed six sources of bias in the estimation of these coefficients, and he observes that they tend to bias the estimated coefficients toward zero. He concludes that the estimated coefficients represent an "upper bound" on the size of the coefficients in which case even if they are positive the true coefficient could be negative. Prof. Baker also notes that we did not question any of the six sources of bias described in his original Declaration.[39] It is true that we do not deny that these sources of bias are possible; it is just that his list is also highly incomplete. There are many other factors that would generate bias in the opposite direction. Hence, the overall bias could easily go either way (and might vary from coefficient to coefficient).

43. As such, Prof. Baker's claim that fixing all sources of bias would necessarily cause the regression to show a greater inverse relationship is unsupported as a matter of economics or

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[37] Time Warner Cable notes that its best-efforts internet access service over DOCSIS on HFC experienced revenue growth of [**Begin Highly Confidential]** [**End Highly Confidential]** between 2014 and 2015, and that service represents [**Begin Highly Confidential]** [**End Highly Confidential]** the revenue of its dedicated internet access offering as of 2015. *Id.* at p.2.

[38] "At the end of 2015, in response to customer demands, TWC introduced SLAs for its Ethernet-over-DOCSIS service, and has since seen [**Begin Highly Confidential]** [**End Highly Confidential]**." *Id.* at p.3.

[39] Baker Supp. Reply Decl., ¶ 18.

econometrics. What we know is that the results are biased and thus unreliable for reasons listed by Prof. Baker, reasons listed by us, and surely others. The direction of the bias could go either way—with the bias corrected, the coefficients could easily become more positive. Ultimately, given their bias, no reliable inferences can be drawn from Prof. Baker's results.

44. The remainder of this section includes, among other things, examples of bias built in to Prof. Baker's regression that, if accounted for, would make the estimated coefficients less negative and indeed could be entirely consistent with the true coefficients being zero.

A. ENDOGENEITY OF ENTRY

45. In our earlier declaration, we pointed out that the number of competitors is likely correlated with determinants of ILEC pricing that are excluded from Prof. Baker's regressions such as cost of serving locations.[40] As a consequence, the estimated regression coefficients are biased in the direction of finding a negative relationship.

46. Prof. Baker suggests that his primary specification was equipped to deal with entry that was correlated with costs differences. For example, he noted that the fixed effects for census tracts included in the regressions could control for cost variation across census tracts. However, such fixed effects would also control for demand variation across census tracts. As a result, the inclusion of census tract fixed effects does not imply that any remaining unobserved heterogeneity conforms to Prof. Baker's demand side explanation rather than our cost-based alternative. Instead, the use of census tract fixed effects simply means that all results are based on within census tract variation rather than variation across different census tracts. The relevant question then becomes how uncontrolled-for within census tract heterogeneity affects his results. Cost and demand are both likely to vary at the building level and the census tract fixed effects do not address this source of bias.

47. We acknowledge that Prof. Baker's bandwidth variable could control for demand variation. However, Prof. Baker provides no reason as to why, after controlling for bandwidth, more firms will not enter where costs are lower. We expect the contrary, since these are more attractive buildings to serve. This will mean that there is a link between more competitors and

[40] Israel-Rubinfeld-Woroch Decl., ¶ 34.

lower cost/price that is not driven by competition, but rather by the fact that lower costs lead to both more competitors and lower prices.

B. INSTRUMENTAL VARIABLES ESTIMATION

48. It is important to note that Prof. Baker did not attempt to correct any of the potential sources of bias in his regression coefficients. In our earlier declaration, we pointed out that a typical technique to correct for biases of the sort that Prof. Baker identified is to utilize instrumental variables estimation. Prof. Baker dismisses our suggestion as "academic" because we did not implement the technique. Yet, it remains the case that if an econometric methodology yields biased results, then to obtain reliable estimates, one must implement a method that addresses the bias. Dr. Baker has not done so. Notably, we *could not* do so because we did not have the variables that Prof. Baker used in his regression; we were unable to recreate the price variable given the description in his original declaration.

49. Prof. Baker does describe the usefulness of an instrument for his first source of bias, customer heterogeneity.[41] Although he does not propose a specific instrument that could be measured with available data, candidate instruments are not difficult to imagine (indeed, the FCC provided a crosswalk which allows researchers to identify whether a customer was a provider or not, a cellular company, or a cable operator). A complete analysis would address the other sources of bias that we identified in our earlier declaration using instrumental variable estimation. Of course, without actually estimating such a model, it is not possible to predict with certainty the impact instrumental variable estimation would have on the signs and significance of the coefficients on counts of competitive providers. But that is a reason *not* to credit Dr. Baker's analysis. The correct fix is well known in econometrics and he has not implemented it. In the end, Prof. Baker cannot rule out the real possibility that the uncorrected results are not informative as to the true relationship between the number of competitors and price.

IX. BIDDING FOR SPECIAL ACCESS SERVICES

50. Prof. Baker challenges our observation that procurement of special access circuits often takes place through a bidding (or similar) process. He acknowledges that sometimes suppliers

[41] Baker Decl., footnote 62.

bid to supply circuits and purchasers solicit bids from special access providers.[42] However, he rejects the implication that some have drawn about bidding markets that as few as two bidders are sufficient for competitive outcomes. We did not conclude that two competitors ensure competitive outcomes based solely on the fact that special access markets are well characterized as bidding markets. Rather, we stressed that the characteristics of a bidding market simply demonstrate that historical shares are not particularly informative for special access services. What matters is each firm's ability to meet the needs of the current customer in each bidding opportunity.

51. In particular, as we explained in our earlier declaration, and as described in the Horizontal Merger Guidelines, it is important to count suppliers that are able to serve a geographic market even when they do not currently sell into that market.[43] The Guidelines stress that it is a mistake to ignore suppliers because they do not currently provide service in the geographic market. We broaden the scope to include nearby providers just as Prof. Baker does. We conclude those providers are more than potential competitors. They are actual competitors because of their commitment to the market in the form of investment in sunk facilities.

IX. CONCLUSION

52. For the reasons laid out in our reply report and here, we conclude that Prof. Baker's regression analyses fails to provide useful information about the competitiveness of the special access marketplace. In the end, the regression analysis conducted by Prof. Baker does not confirm (or deny) the presence of an inverse relationship between ILEC prices and the number of competitive providers. His results cannot be relied upon to justify changes in the Commission's regulatory treatment of special access services.

[42] Reply Declaration of Jonathan B. Baker on Market Power in the Provision of Dedicated (Special Access) Services (Feb.19, 2016) (attached to Letter from Jonathan B. Baker to Marlene H. Dortch, Secretary, FCC, *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, RM-10593 (Feb. 19, 2016), at ¶ 12.
[43] Israel-Rubinfeld-Woroch Decl., ¶ 51.

VERIFICATION

I hereby swear under penalty of perjury that, based on the best information available to me, the foregoing is true and correct.

/s/ Mark A. Israel
Mark A. Israel

Dated: March 24, 2016

VERIFICATION

I hereby swear under penalty of perjury that, based on the best information available to me, the foregoing is true and correct.

/s/ Daniel Rubinfeld
Daniel Rubinfeld

Dated: March 24, 2016

VERIFICATION

I hereby swear under penalty of perjury that, based on the best information available to me, the foregoing is true and correct.

/s/ Glenn Woroch
Glenn Woroch

Dated: March 24, 2016