CORRECTING THE RBOCS' EMPIRICAL ANALYSES OF THE LINKAGE BETWEEN UNE-P AND INVESTMENT

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INTRODUCTION

In connection with their reply comments in the Triennial Review Proceeding, BellSouth, SBC and Verizon (collectively "the RBOCs") submitted a document prepared by unidentified authors and entitled "UNE-P and Investment" (hereinafter "UNE-P Report"). That document purports to show that continued availability of the platform of unbundled network elements ("UNE-P") reduces the incentive of competitive carriers ("CLECs") to invest in local networks.

The analysis presented in this paper shows the RBOCs' conclusion to be in error for two independent reasons. First, the "data" the RBOCs adduce for the purposes of their analysis appear to be made up out of whole cloth to achieve a pre-determined result. But even if these self-prepared data were accurate, the numerical and graphical manipulations that the RBOC authors apply to these "data" are inconsistent with reasonable analytic and statistical technique. When the RBOCs' specially developed data are replaced by the attested data that the industry has reported to the Commission concerning the extent of local competition, and when appropriate analytical techniques are applied to these data, the RBOCs' conclusions that the availability of UNE-P inhibits CLEC investment are shown to be false.

The Data Used In the UNE-P Report Are Fundamentally Flawed. Nearly all of the calculations performed by the RBOCs rely on a data set that the RBOCs appear to have produced specially for this proceeding. This would not, by itself, be inappropriate if these special-purpose data were accurate and consistent with the local competition data that are reported to the Commission both by the incumbent carriers ("ILECs") and CLECs, and are attested to by officers of these companies. But the data relied upon by the RBOCs are neither accurate nor consistent with verified Commission data. Rather, the data that the RBOCs have prepared for their advocacy are both inaccurate and censored – with the effect of generally overstating CLEC facilities deployment, understating CLEC reliance on facilities leased from the ILECs, misstating the dates of CLEC facilities deployment, and simply discarding data observations whose values do not prove the desired point.

The Analytical Approach Used In The UNE-P Report Is Unsound. The stated purpose of the RBOCs' analysis is to prove that UNE-P has a demonstrable, detrimental effect upon CLEC decisions to invest in local network facilities. Meaningful results,

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however, cannot be achieved using the RBOCs' methods for comparison. A straight-forward and accurate technique would be to divide the state data into two discrete sets of states – a set with high UNE-P penetration and a set with low UNE-P penetration. By applying the appropriate statistical tests to the facilities-deployment statistics derived separately from each of these data sets, the RBOC could, in theory, support their conclusion, but *only* if the facilities-deployment statistics from the low penetration UNE-P data are *significantly* greater in magnitude than the equivalent statistics from the high UNE-P penetration data set.[2] In particular, facilities-deployment statistics that *do not differ significantly* between the two data sets provide *no* statistical support for the RBOC-advocated policy of "encouraging" CLEC facilities deployment by inhibiting CLEC use of UNE-P.[3]

When this statistically sound approach is employed, rather than uncontrolled regressions and ranking of states on meaningless parameters performed by the RBOCs, the uniform conclusion is that the availability of UNE-P cannot be shown to have a detrimental impact on CLEC investment. The RBOC advocacy thus not only fails due to flaws in the underlying data, but the RBOC hypothesis – that UNE-P is detrimental to CLEC facilities investment – is refuted when examined using reliable data and rigorous analytical techniques.[4]

Conclusions. The UNE-P Report's public policy recommendations are based on flawed data and inappropriate analytic techniques. When those shortcomings are corrected, the support for the RBOCs' claims vanishes. Indeed, in many instances, properly conducted, the RBOCs' analysis supports conclusions that are the opposite of those reached by the authors of the UNE-P Report. In particular, a properly supported and revised analysis shows: (1) UNE-P does not detract from CLEC facilities-based line penetration or discourage cable-based telephony; (2) UNE-P does not reduce – and may in fact increase – the intensity of CLEC switch deployment per access line; (3) AT&T's comparison of its experience in New York and California, which shows that the

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[2] Note that this assumes there are no other controlling variables that differ systematically in their influence on each of the data sets.

[3] Mathematical statistics is the science of discerning whether variations between data sets are the result of systematic differences, or simply from chance. Statistics from two data sets (e.g., their means, their variances, etc.) are said to differ in a *statistically significant* manner only if, based on the characteristics of the data sets, the difference is large enough so that it is unlikely to be just a chance occurrence. *See* Alexander M. Mood, Franklin Graybill and Duane C. Boes, *Introduction to the Theory of Statistics, 3rd ed.*, McGraw-Hill, 1974, pp. 401-402.

[4] In contrast to the simplistic and inapposite comparisons made in the UNE-P Report, AT&T has recently submitted in this docket a rigorous econometric analysis of RBOC investment incentives. *See* Robert Willig, John Bigelow, William Lehr, and Stephen Levinson, *Stimulating Investment and the Telecommunications Act of 1996* (Oct. 11, 2002). That study unambiguously rejects the RBOCs' hypothesis that the availability of UNE-P deters investment in local networks. The study further provides strong empirical support for the opposite hypothesis – that the availability of UNE-P enhances the incentives of the RBOCs to invest in local networks. A similar positive and statistically significant relation was shown between AT&T's use of leased ILEC facilities and its own local facilities deployments in the Reply Declaration filed by Richard N. Clarke dated July 17, 2002 in this proceeding.

availability of UNE-P facilitates deployment of switches by AT&T, is fully supported; and (4) UNE-P does not reduce and may instead increase RBOC investment.

ANALYSIS

I. THE DATA USED BY THE RBOCS IN THE UNE-P REPORT ARE FLAWED AND CANNOT BE RELIED UPON

A. The RBOC Data Significantly Overstate The Extent Of CLEC Facilities Deployment

Because the purpose of the RBOC paper is to demonstrate that the availability of UNE-P deters CLEC facilities deployment, it is vital that CLEC facilities deployment be accurately measured. The RBOCs, however, adduce a series for CLEC facilities deployment that is substantially overstated. Their general method for developing this key series is to use CLEC E911 listings to represent the total number of lines terminated on CLEC-owned switches. From this figure, they then subtract the number of lines purchased as UNEs from the ILEC. They assume that the residual is the number of lines served by the CLECs' own facilities.

This process is severely flawed. First, E911 listings (assuming they are measured accurately) can only provide an upper bound for the number of lines terminating on CLEC switches. As outlined in the Lancaster-Morganstern Reply Declaration filed by AT&T in this proceeding, using E911 databases to estimate CLEC line counts is inaccurate for many reasons. Because AT&T (and, presumably other CLECs) do not know which ported telephone numbers unique facilities numbers and which are only DID numbers, AT&T routinely loads *all* its ported customers' telephone numbers into the E911 database to ensure that the database includes all lines that are necessary for prompt emergency response. This practice results in the E911 database including a substantially larger number of telephone numbers than the actual facilities needed to provide the service.[5] Area code overlays can also cause CLEC lines to be overstated, because in such circumstances CLECs often load numbers from *both* area codes into the E911 database to ensure emergency response.[6] Further, ILECs and CLECs follow a wide variety of methods when submitting numbers to E911 databases, and as a result the E911 databases do not provide a more accurate count of CLEC lines than the Commission's Form 477 information, in which all parties follow the same methodology and directly report counts

[5] *See* AT&T Reply Comments, Lancaster-Morganstern Reply Dec. ¶ 12. AT&T's network engineering standards allow for up to 500 DID telephone numbers for each T-1 facility purchased by a customer. AT&T may not load all DID numbers when a customer uses telephone numbers from a block of numbers assigned to AT&T (rather than ported) because AT&T has specific information on which numbers are only DID.

[6] *See id.*¶ 13.

of local service voice grade ("VGEs") equivalents provided using various serving technologies (*e.g.*, resale, UNEs, etc.).[7]

Second, the number of lines that the RBOCs claim that CLECs purchased as UNEs is a severe understatement of the number of CLEC lines that actually rely on ILEC facilities. This is because the unavailability of unbundled loops (due to inefficient and expensive "hot cut" procedures and charges, costs of collocation and/or backhaul, or the outright refusal by many ILECs to sell loops out of a UNE tariff) has forced CLECs to use lines purchased out of special access tariffs as a substitute for unbundled loops. Indeed, the number of CLEC local lines provisioned via special access nearly equals the number of CLEC lines provisioned as UNEs. Thus, by subtracting only the number of CLEC lines provisioned as UNEs from the gross E911 figure, the resulting difference continues to include all CLEC lines provisioned over special access – and is a severe overstatement of the number of CLEC lines provisioned strictly over their own facilities.

Specifically, the RBOCs' April 4, 2002 "UNE Fact Report," which is the basis for the data used in the UNE-P Report, asserts there are 12.5M CLEC-provided loops (*i.e.*, 911 listings less total unbundled loops). This document also states that CLECs employ 3 million analog, 72,000 DS1 and 140 DS3 UNE loops. These preceding RBOC figures equate to 4.8 million VGEs assuming 100% utilization of high capacity loops, or 3.9 million VGE at 50% utilization.[8] Using these figures, the RBOCs conclude that CLECs connect between 16.4 million and 17.3 million VGEs to their own local switches.[9]

But there is no excuse for using these RBOC-hypothesized figures because better data are readily available. Table 1 of the Commission's July 2002 *Local Competition Report* shows that there are a total of 19,653,441 CLEC retail local VGE lines. Table 4 of that report further shows that, for the same period, the ILECs supplied 4.0 million lines to CLECs under resale tariffs, 5.8 million lines under UNE-P tariffs, and 3.6 million lines as stand-alone unbundled loops. Subtracting the resold and UNE-P lines (which are clearly *not* provided over CLEC-owned facilities) leaves a total of only 9.9M CLEC lines that could *possibly* connect to CLEC switches. This figure includes unbundled loops, all loop connectivity obtained as special access, and self-provisioned loops.[10]

The reasonableness of this estimate is confirmed by other Commission data. Table 3 of the July 2002 *Local Competition Report* shows that the CLECs use 6.1M self-provisioned and special access-based lines (on a VGE basis). This report also shows that

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[7] *See id.* ¶ 10.

[8] The calculation is: 3,000,000 analog loops * (1 VGE/analog loop) + [72,000 DS1 loops * (24 VGE/DS1 loop) + 140 DS3 loops * (672 VGE/DS3 loop)] * (utilization).

[9] Although the RBOCs give both of these numbers equal prominence, 50% capacity for line utilization is much more realistic than 100% utilization. Thus, the smaller figure would be much more appropriate even if the RBOCs' data were otherwise correct, which they are not.

[10] Subtracting the 3.6M UNE-L lines from the 9.9M lines that could possibly be served through CLEC facilities, the result is a total of 6.3M VGE of self-provisioned *and* special access-based lines.

CLECs purchased 9.322M VGE lines as UNEs, but this figure includes both lines provided via UNE-P as well as standalone unbundled loops. The relevant statistic, however, is the number of unbundled loops, because the RBOCs are seeking to measure the number of lines served by the CLECs' own facilities. Fortunately, the *Local Competition Report* provides data that allows one to "back out" the number of unbundled loops. Specifically, that report provides the ratio of the number of unbundled loops to total number of UNE-based lines, as reported by the ILECs.[11] Thus, multiplying the 9.322M figure by this ratio (3.680/9.461) shows that CLECs purchase 3.6M unbundled loops on a VGE basis. When this 3.6M VGE unbundled loop figure is added to the 6.3M VGEs of self-provisioned and special access, the result is that CLECs employ 9.7 M "facilities-based" lines on a VGE basis.

Thus, the certified data show – from two different perspectives – that CLEC facilities-based connections are only in the range of 9.7 to 9.9M VGEs, *not* the 16.4 to 17.3M VGEs the RBOCs assert – an overstatement in the range of 66% to 78%. Given this substantial flaw in the data foundation for the RBOCs' analyses, none the RBOCs' conclusions based on those data can be given any weight.

B. The RBOC Data Are Highly Inaccurate In Identifying At Least AT&T's Local Network Switching Facilities And In-Local-Service Dates

As described in greater detail below, the RBOCs also attempt to develop a relationship between UNE-P availability and CLEC facilities deployment. The accuracy of such a relationship, of course, is dependent upon accurate data. In this context, that means it is vital that the CLEC facilities identified by the RBOCs be local facilities, and it is also vital their deployment dates are accurate.

Appendix B of the RBOC report lists the switches the RBOCs claim are AT&T local switches, along with a claimed in-service date. The data compiled by the RBOCs for New York and California are set forth below in Table 1:

[11] *See Local Competition Report*, Table 4.

RBOC-Claimed AT&T Local Switch Deployments

Year	NY	CA
2001	1	1
2000	1	9
1999	6	5
prior to 1999	9	19

Table 1

These data have severe flaws. First, these numbers substantially overstate the number of local switches AT&T has in these states. The reason for this is because the RBOCs included many AT&T 4E switches[12] that are predominantly long distance tandem switches[13] and that were installed long before UNE-P became available in these states. But even for the switches that should be appropriately included, the RBOC data do not accurately portray the in-service date in many instances. Removing the long distance switches and correcting the in-service dates for the local switches results in the following, correct switch deployment matrix.[14]

[12] Although AT&T deployed core long distance switches other than 4Es in California and New York in 1999, 2000, and 2001, those switches were operated by the core AT&T network unit, not the AT&T local unit. This is because 4E technology has not been available for new switch installations of any type since 1999.

[13] These Class 4 switches may have some ability to handle certain types of outbound local calling for high volume business customers that deploy sophisticated customer premises equipment, but are fundamentally core long distance switches. These 4E switches account for more than half of the switches the RBOCs have attributed to AT&T in California and New York. Considering the 4E switches to be local switches also skews the in-service date, because nearly all of the 4E switches in California and New York were installed before 1999.

[14] The accuracy of the in-service dates for AT&T's switches has been confirmed by the relevant AT&T local network engineers.

Correct AT&T Local Switch Deployments

Year	NY	CA
2001	1	3
2000	6	5
1999	4	0
prior to 1999	4	7

Table 2

II. USE OF VERIFIED DATA AND APPROPRIATE ANALYTICAL TECHNIQUES FAILS TO SHOW UNE-P DETERS FACILITIES-BASED COMPETITION

Based on their self-prepared, flawed data, the RBOCs develop a series of figures that purport to show that UNE-P has inhibited CLEC facilities-based entry. Of course, to the extent the RBOCs' data are flawed, the conclusions that they seek to derive from that data are likewise flawed. In fact, as explained below, once the RBOCs' unverified data are replaced with verified industry data and appropriate comparative methodologies are employed, the results fail to substantiate the RBOCs' assertions that UNE-P deters investment by facility-based CLECs.

A. UNE-P Report Figure 1 (Claiming UNE-P Deters Facility-Based Competition)

Figure 1 of the UNE-P Report purports to compare CLEC facilities-based lines per 1,000 BOC access lines to CLEC UNE-P lines per 1,000 BOC access lines and concludes that there is less facilities-based competition in states where there is more use of UNE-P by CLECs. First, as we have explained above, the "facilities-based" line count developed by the RBOCs is severely overstated. Without reliable data, the analysis that they perform cannot be given any weight. And notably, the RBOCs' analysis censors even its own data by selecting observations only from states where total CLEC lines (facilities and non-facilities based) are claimed to represent more than 10% of the total BOC access lines. As a result, the analysis excludes nearly half of the data points available in the RBOC-created data series. Indeed, the UNE-P Report expressly notes (in footnote 5) that when all data points are included, the RBOC analysis shows *no statistically significant correlation between UNE-P and facilities-based lines.*

This admission is astounding. "Results" that occur only when a data set is censored to remove inconvenient observations are simply *not methodologically sound* results. Moreover, because there are no appropriate error distributions to apply to such series, no level of statistical confidence can be calculated and assigned.[15] Instead,

[15] The ordinary least squares regression inference techniques employed in the RBOC analysis assume that the data represent random drawings from the underlying population. To the extent these data have been (continued . . .)

"results" generated by engineered data sets are nothing more than assertions; they are not statistically-based conclusions.[16]

As shown below in Figure 1, re-running the RBOCs' analysis with *complete* sets of *correct* data further confirms that the RBOCs' analysis provides incorrect results. Specifically, Table 6 of the FCC's *Local Competition Report* lists the count of lines by ILEC and CLEC, except where publication may jeopardize confidentiality (*e.g.*, Alaska and Arkansas). Table 8 of that same report also shows the number of "CLEC-owned" lines by state. UNE-P and RBOC line counts are available as a result of the FOIA request for access to RBOC 477 data made by PACE.[17] Notably, recalculating the RBOCs' analysis using these data makes it apparent that the RBOCs could only produce the conclusions they sought to reach in their Figure 1 by *excluding* a *major* portion of their data.[18]

(. . . continued)
systematically selected pursuant to some non-random rule (*e.g.*, all selected observations are from states with greater than 10% CLEC penetration), this assumption of randomness is violated and the "statistics" produced are no longer useful.

[16] The authors of the UNE-P Report attempt to deflect the import of their full data set analysis by claiming that because no significant relationship is found between UNE-P and facilities deployment, there is no support for a positive correlation between these two measures. Although that is certainly true, this admission certainly provides *no* support to the central public policy position that the RBOCs are taking in this proceeding – that UNE-P should be *restricted*, even where CLECs would be impaired without it, in order to provide incentives for greater facilities deployment. Statistically insignificant relationships suggest that there will be *no* incentive effect from any such restriction.

[17] Implicit in this approach is the assumption that UNE-P is provided exclusively by the RBOCs. The end of year 2001 Form 477 reports for the RBOCs shows that they provide 5.66M of the 5.78M (or 97.9%) of all the UNE-P lines reported to the Commission. *See* Table 4, July 2002 *Local Competition Report.* This small variation cannot materially affect the results of our analysis.

[18] This analysis also provides further confirmation that the RBOC calculated "facility-based" CLEC line counts resulting from the use of the "E911 methodology" are grossly overstated. Overall, the numbers derived from the most recent FCC local competition data (July 2002) show that the facility-based line count is inflated, on average, by 74%.

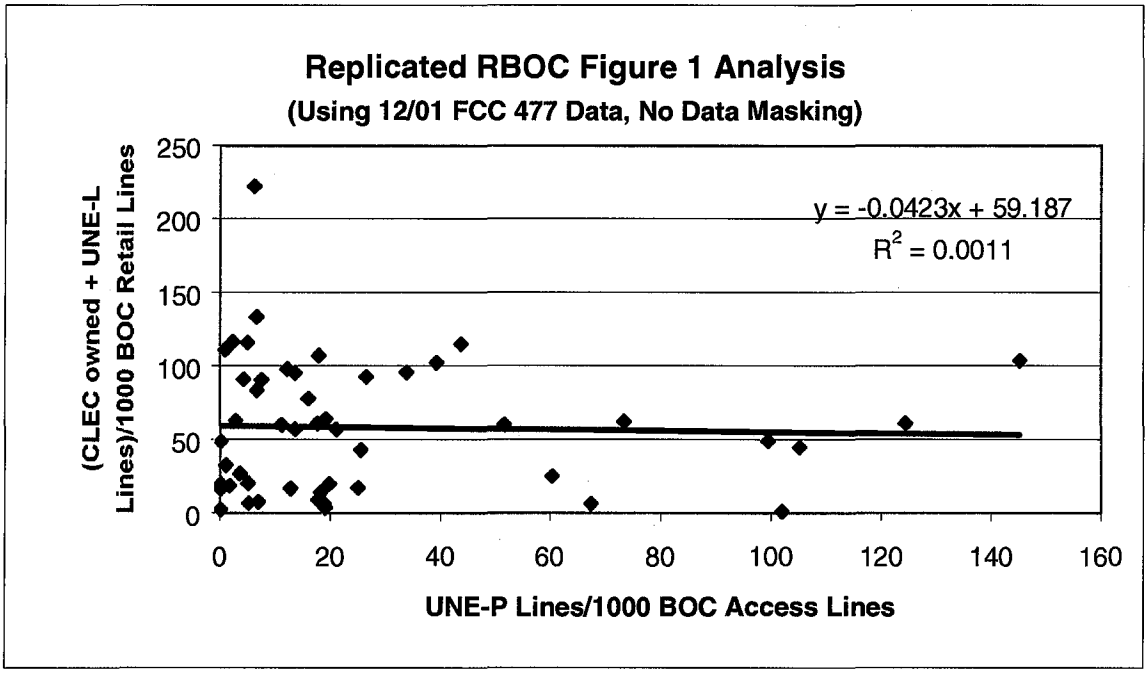

Figure 1

The differences between the uncensored regression using the correct data and a regression of the same data, but eliminating the states the RBOCs did, are striking. First, the magnitude of the coefficient on UNE-P/1000 BOC access lines (*i.e.*, the relationship between UNE-P and CLEC facilities deployment) drops by a factor of *ten* (-0.0423 vs. –0.4205). And second, this relationship is devoid of any statistical significance (t-statistic of –0.2231 vs. –2.088).[19] Thus, this statistical analysis shows that using the RBOCs' relationship model, when correct data for all the states is reflected, there is *no* meaningful correlation between the use of UNE-P and "facilities-based" lines in a state.[20] Indeed, the

[19] t-statistics are used to measure the difference between two sample means. *See* Mood, Graybill and Boes, *op. cit.*, pp. 432-435. Here, this statistic is employed to test whether the regression coefficient of –0.2231 is significantly different from zero. Because this regression has 47 degrees of freedom, the p-value of this t-statistic is 0.824. This means that there is an 82.4% chance that there is *no* systematic relationship in these data between CLEC UNE-P use and facilities-deployment. In general, statisticians require there to be less than a 5% chance of no systematic relationship before they feel confident in concluding that a true relationship may exist.

[20] Note that AT&T in no way endorses the simplistic relationship model proposed by the RBOCs. A proper model would control for other influences on these variables. For more appropriate analyses, *see* Robert Willig, John Bigelow, William Lehr, and Stephen Levinson, *Stimulating Investment and the Telecommunications Act of 1996* (Oct. 11, 2002), filed in an *ex parte* letter from Joan Marsh of AT&T dated October 11, 2002 and the Reply Declaration filed by Richard N. Clarke dated July 17, 2002 in this proceeding.

low R-square in the regression indicates that variations in UNE-P lines across states explains practically *none* of the variation in CLEC facilities lines across states.[21]

In any event, better approaches to relating CLEC facilities investment and UNE-P also show that UNE-P creates no material disincentives to CLEC investment. One way to measure such investment is to track the number of switch-based CLECs operating within the RBOC territory in a state. Figure 2 below shows the regression curve relating the total number of lines in each state and the total number of switched-based CLECs serving the state.

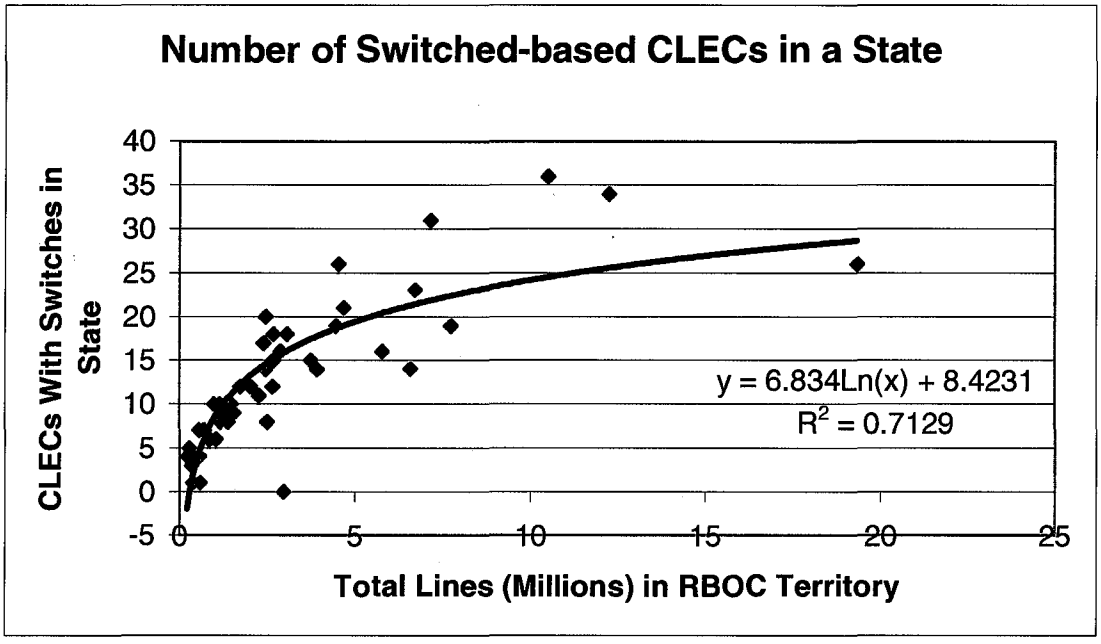

Figure 2

Figure 2 first demonstrates the common sense proposition that the greater the number lines in a territory, the more switched-based CLECs will seek to serve the territory. The logarithmic regressed relationship also indicates that as a state market gets further subdivided among competitors, the market becomes less attractive (or less able to support) the same rate of expansion in the number of service providers. For example, when size of the addressable market doubles from 5M to 10M, the predicted number of switched-based CLECs does not double but instead grows from about 19 to 24 (about a 25% increase).

The question, then, is whether or not greater penetration of UNE-P suppresses the number of CLECs deploying their own switches to serve markets of equivalent size. To assess this possibility, the data set used for the analysis shown in Figure 3 was divided into states with above-average UNE-P penetration (based on a weighted national

[21] R-square measures the proportion of the total variation (up and down) in the dependent variable (CLEC facilities lines) that is explained by the regression equation – which is based on CLEC UNE-P lines. *See* Edwin Mansfield, *Statistics for Business and Economics, 2nd ed.* Norton: 1983, pp. 471-473.

average), and states with below-average penetration. Each data segment was then separately regressed and their coefficients compared to see if switch-based CLEC entry is enhanced or deterred by greater UNE-P penetration.

The resulting best-fit lines are very similar; and statistically it cannot be concluded that they differ in significant fashion.[22] But what is clear from this figure is that everything else equal, there are *more* switch-based CLECs in states with *higher* than average UNE-P penetrations than in equivalent size states with lower than average UNE-P penetrations. Critically, these regressions shows there is no quantitative support for the RBOC hypothesis that UNE-P suppresses market entry by facility-based CLECs (*i.e.*, CLECs deploying one or more switches in a state).

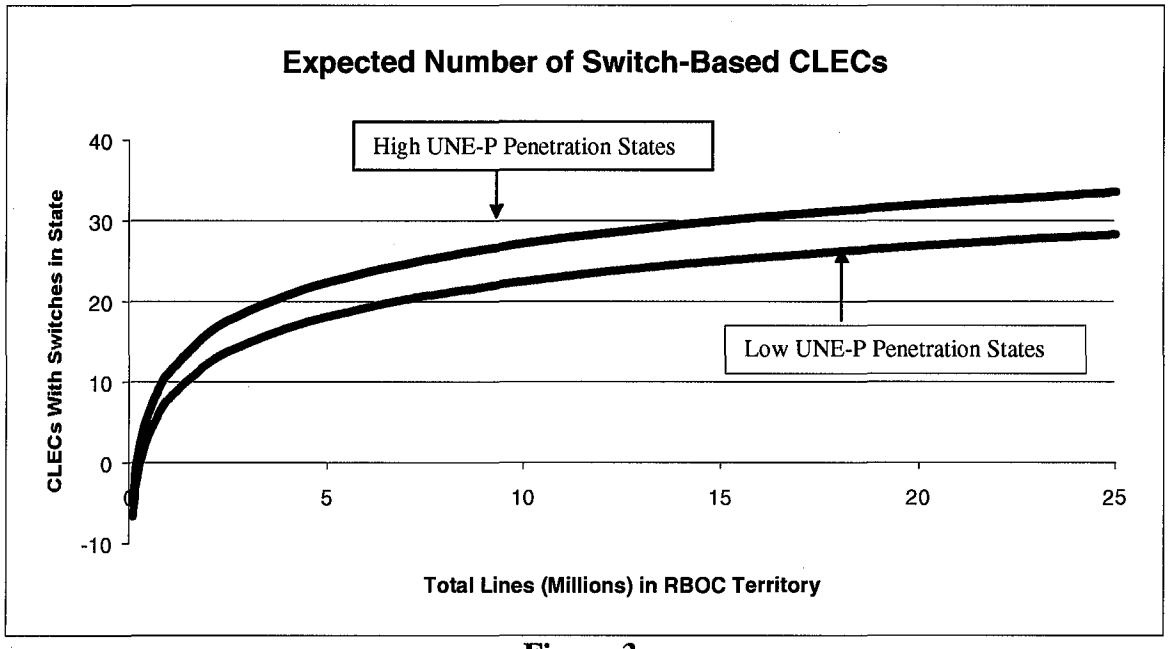

Figure 3

B. UNE-P Report Figures 2 and 5 (Claiming UNE-P Deters Facilities-Based Residential Competition).

Figure 2 of the UNE-P Report seeks to support the assertion that UNE-P discourages residential facilities-based facility competition. It attempts to do so by comparing CLEC residential facilities-based lines (presumably based on residential E911 listings) to CLEC UNE-P lines, with each expressed as a percentage of BOC switched access lines. This analysis again appears to use censored data, and not only is faulty on its own terms, but it fails to demonstrate the existence of any relationship between the

[22] Although the high penetration UNE-P states' regressed equation indicates more extensive CLEC entry, the slope and the intercept for the high penetration equation is indistinguishable from the slope and intercept of the low penetration states at a 95% level of confidence. But just as these particular data do not prove that UNE-P is correlated with higher CLEC facility-based market entry, they also demonstrate that it is not correct that UNE-P discourages entry.

two types of entry, *i.e.*, that facilities entry is less in states where there is UNE-P based competition. In fact, when the censor is lifted and all states are included in the analysis, facilities penetration is not significantly different in the states with high versus low UNE-P penetration. Thus, these data cannot demonstrate any linkage between the two variables.

As a threshold matter, there is no reasonable foundation for the RBOCs to use their own total "switched access" line counts as the basis for normalizing the comparative data on UNE-P and facilities penetration. The RBOCs acknowledge that the most significant source of facilities-based residential competition has come from cable companies.[23] But such cable-based competition is directed almost exclusively at residential consumers and, in only very limited instances, at small businesses. Thus, normalizing based on total switch access lines introduces biases because the proportion of residential to total switched lines varies widely from state to state.[24] The skewing resulting from this normalization could have been avoided had the RBOCs relied on their own certified Form 477 data that reports directly their counts of UNE-P lines employed for residential and small business, as well as their counts of total residential and small business switched lines.

It is also curious that Figure 2 shows only 15 states with facility-based residential competition.[25] As noted, the RBOCs have acknowledged that residential facilities-based competition is predominantly supplied by cable companies. The RBOC analysis, however, completely fails to take into account other significant factors underlying a cable provider's decision as to whether to provide telephony services, including among other things, whether its plant is upgraded and can support telephony, the costs for necessary upgrades and the need to deploy a customer service and a billing infrastructure for telephony.

Most fundamentally, however, the analysis underlying Figure 2 of the UNE-P Report fails to address the basic question – whether facilities/cable telephony penetration is *lower* in states where UNE-P penetration is *higher.* This is necessary to determine whether there is, in fact, an actual statistical correlation between the two types of competition. If the RBOCs' assertions are true – that cable-based competition addresses the same customers as does the UNE-P based offer – then one would expect to see a

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[23] *See* UNE-P Report at 4: "Most facility-based residential competition is provided through cable telephony (and to an increasing degree through wireless)."

[24] For example, using ARMIS Table 43-01 data for 2001, if the sum of RBOC rows 2100 (Residential Lifeline Access Lines) and 2110 (Residential non-Lifeline Access Lines) are compared to row 2150 (Total Billable Access Lines) by state, the percentage residential lines varies from a low of 33% (in the District of Columbia) to a high of 76% (in Tennessee). The same is generally true for the 15 areas selected for use in RBOC Figure 2.

[25] It is unclear whether this display of only 15 states is because the RBOCs believe these states represent the complete universe of where facilities-based residential competition exists, whether the data set is limited by the frailties of the RBOC E911 approach, or whether these states provided data that was most convenient to the RBOC result.

materially lower UNE-P penetration rate in states where cable alternatives exist than where they do not.[26] When this analysis is performed, the RBOC argument falls apart.

Again, the Commission's own Form 477 data can be employed to support this analysis. In this instance, the count of UNE-P lines is directly reported in RBOC Form 477 reports and as is the count or Residence and Small Business retail lines.[27] If, as the RBOC conclusions imply, UNE-P and cable-based telephony services cannibalize each other's customer base, then the UNE-P penetration should be significantly lower in states with cable penetration compared to those where no cable penetration exists. The results are shown below in Table 3:

Facilities/UNE-P Residential and Small Business Penetration Comparison

	15 states identified by RBOCs as having facilities-based residential entry	**Remaining 34 states** (presumably without facilities-based residential entry)	**P-value of t-statistic for equality of means** (one tail)
Percent of lines served on UNE-P	3.5%	3.8%	42.7%

Table 3

Applying a t-test for equality of means allows us to test the null hypothesis that UNE-P is penetration is no different in states having facilities-based residential entry compared to those where facilities-based entry does not exist. As seen by the 42.7% p-value for the t-test statistic, the degree of UNE-P penetration is not statistically different in states where facilities-based entry is present versus where it is not. Thus, there is no basis to conclude that greater UNE-P penetration deters facilities-based entry such as cable telephony.[28]

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[26] Ideally, the corollary comparison should be made to test whether cable penetration rates are lower in high UNE-P penetration states compared to low UNE-P penetration state. Unfortunately, such information requires cable penetration rates by states which is not publicly available. Performing this analysis using the limited AT&T internal data showed negligible difference in the cable penetration rates for high UNE-P compared to low UNE-P penetration states..

[27] The implicit assumption is that UNE-P is residential is predominantly employed to serve residential and small business customers. This is a clearly reasonable assumption given that the Commission limited unbundled switching to only those locations using three or fewer lines. The data submitted on the RBOC Form 477 reports confirm this. For the states where the RBOC provided a Residence & Small Business breakout of UNE-P (accounting for 80% or all UNE-P lines of the RBOCs), 85% were employed to serve residential and small business customers.

[28] A p-value of 42.7% is tantamount to absolutely no statistical difference between these two means. Statisticians generally demand p-values to be 5% or less before they would have adequate confidence to conclude that the one UNE-P penetration mean differs from the other.

In Figure 5 of their UNE-P Report, the RBOCs compare UNE-P and cable telephony availability in California and in New York, and attempt to infer that the reason why cable telephony is provided to 480,000 residential customers in California is because UNE-P is not practically available in California (serving only 25,000 lines) – and the reason why there are only 170,000 cable telephony subscribers in New York is because there are 1.6M lines served on UNE-P in that state. But an examination of the facts shows this diagram provides no basis for such an inference.

First, it is statistically inappropriate for the RBOCs to look at a specific pair of states, and then infer that their specific relationship should apply to the entire industry. This is especially the case when, as explained in Table 3 above, the RBOCs' *overall data* do not support a conclusion that UNE-P inhibits the availability of cable telephony. By similar token, the statistical conclusions for the general market displayed in Table 3 will not necessarily be evinced in each and every individual state. When individual states are examined, a wide variety of influences can uniquely interplay to generate a particular business outcome – that may differ from the overall mean. For example, not all cable companies have an equal commitment to cable telephony and their service areas, even for those that are committed to cable telephony, service areas vary by state. Beyond this other factors, such as significant differences in UNE-P rates between states (which affect CLEC entry decisions) and significant differences in the telephony-readiness of the cable providers in the two states may also influence the decision as to whether or not a particular competitive strategy is prudent for those states. Unless these variables (and other relevant variables) are tightly controlled between the two states being compared – and there is no indication in the UNE-P Report that this has been done – the conclusions drawn are speculative as to cause-and-effect and totally unreliable for projection to other situations.

For these reasons, the UNE-P Report's conclusions have no value. AT&T and Cox are the only two cable companies that have made significant commitments to deploying cable telephony infrastructure.[29] Had the RBOC analysis investigated the potential impact of this uncontrolled variable for California and New York, it would have been obvious that AT&T and Cox have substantial cable footprints in California, but very little in New York.[30] Accordingly, the fact that there is relatively little residential facilities-based service in New York can hardly be a surprise, and cannot be attributed to the availability of UNE-P in that state, but rather substantially to the fact that AT&T and Cox have no significant cable footprint there.

[29] Based upon recent financial reports for the end of 2001, these two companies represent 2M of the reported 2.2M cable-based VGEs reported by the Commission in its Local Competition report for the end of 2001.

[30] The 2001 Cox 10-K identifies Cox's 15 largest "clusters" that account for 74% of Cox's customers. Two are in California (Orange County and San Diego) and none are in New York. Likewise, AT&T has no cable properties in New York.

C. UNE-P Report Figures 3 & 4 (Claiming AT&T's Comparison Of Its New York To California Experience Is Faulty)

In its initial comments in this proceeding, AT&T's submitted data showing that, on both an actual and normalized basis, it had deployed more switches in New York than in California – even though its UNE-P presence in New York was substantial and its UNE-P presence in California was minimal.[31] The UNE-P Report seeks to create the impression that AT&T's data are not useful because AT&T does not distinguish between its investments before 1999 and after. The RBOCs claim this distinction is significant because it was only after 1999 that UNE-P use became widespread in New York. The RBOCs then assert that when the relevant time period (1999 to present) is considered, AT&T deployed more switches in California than in New York (see Table 1).

As we have explained earlier, the RBOCs' analysis of these switch deployments is based on flawed data – misclassifying long distance switches as local, and incorrectly listing their in-service dates. Table 4, below, reproduces the correct switch deployment data we showed in Table 2 above, and adjusts those data for California so that it reports California switch counts on an "apples-to-apples" basis to the smaller state of New York.

AT&T Local Switch Deployments

Year	California	California Normalized[32]	New York
2001	3	1.7	1
2000	5	2.8	6
1999	0	0.0	4
prior to 1999	7	3.9	4

Table 4

As can be seen from the above table, on a normalized count basis from 1999 through 2001, AT&T activated only 4.5 local switches in California while activating 11

[31] Because California is a state with about 75% more switched access lines than New York, it is to be expected that CLECs may deploy more switches in California than in New York. Thus, it is vital that California switch counts be normalized to reflect the different sizes of the states if these California counts are to be compared directly with New York counts.

[32] This normalized column is developed by multiplying the raw count of California switches by the ratio of switched access lines in New York to that in California. Table 6 of the most recent *Local Competition Report* (July 2002) lists 24.8M end user switched access lines for California and 13.6M for New York. Thus, for comparative purposes, the raw California switch counts must be multiplied by 0.5484 for comparison to New York (13.6/24.8).

in New York.[33] Indeed, even if the "UNE-P is widespread" period in New York is truncated to the 2000-2001 time frame, AT&T still added 50% more switches in New York than in California during this more recent period (7 vs. 4.5). In any event, even though it is statistically improper to infer on the basis of this two-state analysis that greater UNE-P development results in greater CLEC switch deployments, this two-state comparison certainly lends no support the RBOCs' hypothesis that the effect is the reverse.

D. UNE-P Report Figure 6 (Claiming UNE-P Does Not Promote Facility-Based Business Competition)

Figure 6 of the UNE-P Report seeks to give the impression that facilities-based competition for business customers has been inhibited by the availability of UNE-P. Again, the RBOCs are wrong.

As a threshold matter, the number of "facility-based" lines reflected in RBOC Figure 6 is grossly overstated for both New York and California. In particular, the RBOCs assert that CLECs serve 1.5M lines in New York and 1.6M lines in California using their own switches. These figures are not credible.

The only means available for a CLEC to use its own switch are to connect to customers via unbundled loops, self-provisioned loops, or special access. These later two categories are reported, in combination, on Table 8 of the *Local Competition Report*. For the end of 2001, the figures were 681,678 for New York and 909,861 for California. Subtracting from those numbers the "actual" *residential* facilities-based line counts asserted by the RBOCs (107,000 VGEs for New York and 480,000 VGEs for California),[34] shows that CLECs serve 574,678 VGE business lines using their own or special access facilities in New York and 429,861 VGE business lines using their own or special access facilities in California. Thus, there are 33% more CLEC owned or special access facilities serving business customers in New York than in California.

To calculate the total number of CLEC "switch-based" lines, it is then necessary to identify and add in the number of lines served via unbundled loops. Verizon's end of year Form 477 Report to the Commission declared that, on a VGE basis, it provided 336,267 unbundled loops in New York and 61,226 unbundled loops (for GTE areas) in California, while SBC reported 451,319 unbundled loops for California. Adding these numbers to the number of lines CLECs self-provide or purchase as special access to serve business customers, gives the total "facilities-based" business lines. Thus, in total, CLECs serve 910,945 VGE business lines using their own switches in New York, while they serve just 942,400 VGE business lines in California – even though California is 75 percent larger than New York in terms of lines. Not only do these figures refute the RBOCs' claims based on the relative prevalence of "facilities-based" business lines in

[33] Even on a raw count basis, AT&T activated more switches in New York than in California (11 vs. 8) in the 1999 and later period.

[34] *See* UNE-P Report, Figure 5.

New York and California, but they also show that the RBOCs' claim that CLECs have 1.5M "facilities-based" business lines in New York and 1.6M "facilities-based" business lines in California is incorrect.[35]

In sum, the fact that New York has a sizeable number of UNE-P lines employed for business customers is not proof that UNE-P deters facility-based investment. Rather, because New York has about the same number of "facilities-based" lines as California despite the fact it has less than 55 percent of the number of switched access lines as California shows that UNE-P can serve as a meaningful competitive tool when the operational and economic impairments related to hot cuts and the need to extend voice-grade customer loops to CLEC switches make UNE-L impractical.

E. UNE-P Report Figure 7 (Claiming New York Ranks Low In Normalized Switch Deployment)

In Figure 7 of the UNE-P Report, the RBOCs present data that purport to show that high UNE-P penetration in New York has inhibited CLEC switch deployment there. However, the analysis underlying this claim suffers from two primary flaws. First, the normalization is faulty and second, it rests on the unjustified assumption that UNE-P is the primary factor causing the highlighted relationship.[36]

In fact, all that Figure 7 shows is the recognized fact that fewer switches per 10 million lines are needed to serve customers located in a densely populated urban states (such as New York), than in low density rural states (such as Nebraska). This is because higher lines densities allow the RBOCs to use fewer, larger switches to serve more customers. Indeed, the RBOCs' own ARMIS data show that this situation to be the norm for the RBOCs' networks.[37] Accordingly, any analysis of the effect of UNE-P on competition that relies solely on the number of switches in an area without controlling for this essential fact will create misleading results. The following graph (Figure 4) ranks each state by normalizing the number of RBOC switches reported for the state by the total number of switched access lines the RBOC reports for the same state. Both data series are from the RBOCs' 2001 ARMIS 43-08 reports.

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[35] *See id.*, at 9

[36] Again, the RBOCs' selection of data from one state out of 48 provides no statistical basis for industry-wide inferences. Furthermore, certain of the RBOCs' data on CLEC switch deployment seems inaccurate, *e.g.*, no CLEC switches are stated to exist in Colorado.

[37] A further problem with the RBOCs' analysis is that it appears that the RBOCs' normalization process included all CLEC switches deployed in a state in the numerator, but the divisor included only the number of *RBOC* switched access lines in the state. Accordingly, CLEC switches deployed in non-RBOC territories – such as Tampa, Los Angeles, Dallas suburbs and Las Vegas – were included but all the lines served in those territories were excluded. Fortunately, the RBOCs provide data permitting identification of the CLEC switches deployed in RBOC territory and ARMIS data provides the corresponding switched access line counts. *See* UNE-P Report, Appendix B (in which CLEC switch deployment is represented by state and BOC Region). Switched access lines are reported by the RBOCs in ARMIS 43-08. Correcting this error, as is done below, permits a more appropriate basis for analysis.

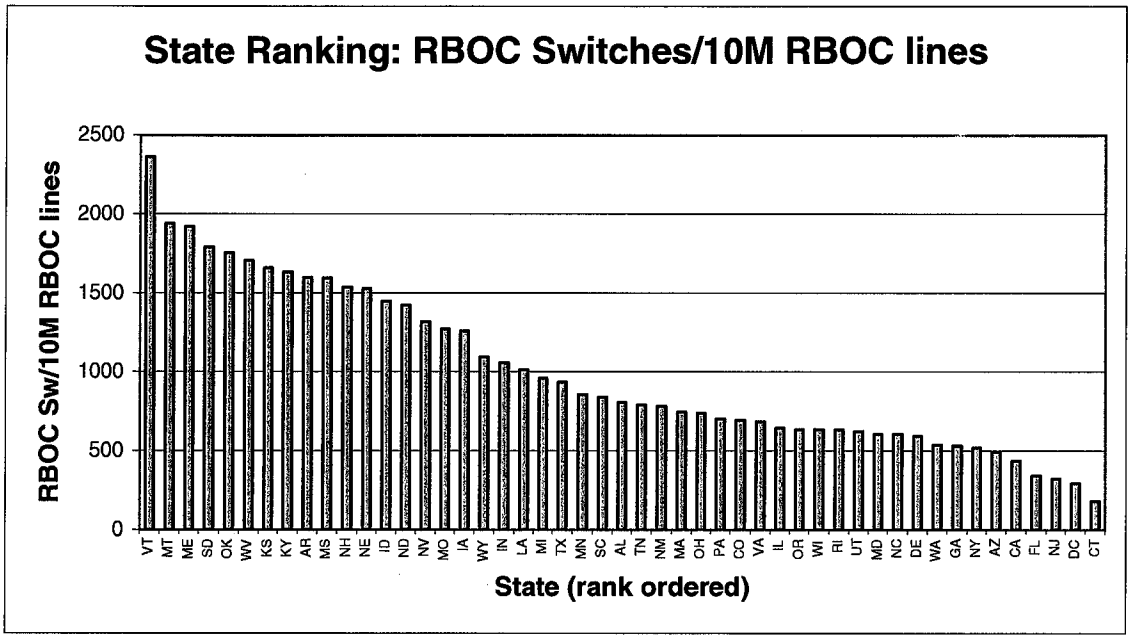

Figure 4

If the RBOCs' claim that UNE-P discourages investment were correct, CLEC switch deployment per 10M lines should rank significantly lower than the RBOC rank on the same measure in states with a high UNE-P penetration, and should be significantly higher than the RBOC rank in states with low UNE-P penetration.[38]

This is a testable hypothesis. Table 5 below, shows the average number of CLEC switches/10M lines deployed in RBOC territory in a state, divided by the number of RBOC switches/10M lines deployed in the same state. As can be seen, even though UNE-P penetration is 755% higher in high UNE-P states than low UNE-P states, CLEC switch deployment intensity is only 15% less (relative to CLEC/RBOC switch deployment of 1.03 versus 1.21). But even this 15% figure is not statistically significant. The p-value for a t-test of equality between 1.03 and 1.21 is 22.1% – again, well higher than the 5% threshold required for statistical significance. Thus, there is no statistical evidence that the CLEC switch deployments (normalized by the BOC switch deployments) are appreciably lower in states with high UNE-P penetration.

[38] The assumption is that the RBOC ordinal ranking reflects the effects of geography and population upon the number and size of switches. Accordingly, once states are ranked based upon the CLEC switches/10M lines, if a state's CLEC ranking is higher than state's rank based on RBOC switches/10M lines, then CLEC switch deployment in the state is more intensive than RBOC switch deployment.

Development of UNE-P in a state	UNE-P penetration	CLEC sw/10M divided by RBOC sw/10M
Above national weighted average UNE-P penetration	8.3%	1.03
Below national weighted average UNE-P penetration	1.1%	1.21

Table 5

F. RBOC Figure 8 (Claiming UNE-P Penetration Is Inversely Correlated With Facility-Based Line Penetration)

In Figure 8 of the UNE-P Report, the RBOCs purport to provide statistics that show that "most" states with high-facilities-based penetration have low UNE-P usage. This "conclusion" appears to be based on a hodgepodge idiosyncratic observations by the the UNE-P Report's authors' (*e.g.*, "all nine states that have proportionately more facilities-based lines than New York also have much lower volumes," "six states in the former Bell Atlantic region have more facilities-based residential competition than New York," "while WorldCom has decided to provide residential UNE-P in both Masschusetts and Pennsylvania, AT&T has declined to do so"). Such snippets do not provide evidence that allow for statistically sound conclusions. If the RBOC claims regarding UNE-P disincentives had any credibility, the penetration of facility-based lines should be lower in states with high UNE-P penetration and vice versa. Table 6 below, however, shows that there is no such relationship.

First, any statistically based conclusions must be predicated on accurate data. These RBOC analyses, however, appear to be based on same inaccurate data for CLEC facilities deployments that the UNE-P Report's authors have used throughout their work. Second, using all available accurate data (*i.e.*, not just data selected according to idiosyncratic principles, such as "the six states in the former Bell Atlantic region"), a statistically testable hypothesis must be formulated, such as "facilities-based CLEC entry is higher in states with less UNE-P entry." Table 6 below, compares the penetration rates for facility-based CLEC lines[39] in the highest UNE-P penetration states (*i.e.*, the states with UNE-P penetration at or above the national weighted average penetration) versus in low UNE-P penetration states. This table again demonstrates that there is no evidence that the facility-based line penetration rate is appreciably less in states with high UNE-P

[39] Facility-based penetration has been calculated using the CLEC lines reported on Table 6 of the *Local Competition Report* and then subtracting the resold lines listed on Table 8 and the UNE-P lines reported by the RBOC for the state. If no data regarding resold lines was supplied in Table 8, but data were supplied in Table 6, then the default procedure was to subtract the RBOC reported resold lines unless the result was negative. The approach by necessity eliminated 15 states, because of the lack of a value for total CLEC lines on Table 8, and one additional state could not be used because of a resulting negative value. Thus, the results for 32 states were compared.

penetration. And from a statistical standpoint, the RBOC hypothesis that facilities-based line penetration rate are less in states with high UNE-P penetration compared to states with a low UNE-P penetration has a p-value of only 46.9% – well higher than the general statistical threshold of 5% needed not to reject the hypothesis. Thus, when subjected to correct statistical technique, the musings of the RBOC UNE-P Report are shown to be completely unfounded.

Development of UNE-P in a state	UNE-P penetration	Facilities-based penetration
Above national weighted average UNE-P penetration	8.3%	5.7%
Below national weighted average UNE-P penetration	1.1%	5.8%

Table 6

G. UNE-P Report Figure 9 (Claiming ILEC Investment Does Not Increase as UNE-P Increases)

Finally, the RBOCs purport to offer a regression study showing that ILEC investment does not increase as UNE-P increases.[40] As an initial matter, it is puzzling as to why the RBOCs should advance this claim. It is the RBOCs who are advocating that CLEC access to UNE-P should be withdrawn so that they will be encouraged to increase their facilities deployments. But this regression, on its face, says that there would be *no* such incentive effect on ILECs. Rather, it shows that the availability (or denial) of UNE-P is at best *neutral* as to ILEC investment incentives.

In all events, even this RBOC analysis is flawed. As explained in great detail in the white paper recently submitted by AT&T entitled, *Stimulating Investment and the Telecommunications Act of 1996*, the RBOCs violated basic econometric principles in performing this regression. First, the RBOCs appeared to have used net plant (rather than change in net plant) as the dependent variable. This is crucial because the relevant issue is how the availability of UNEs affects *investment*. Investment is indicated by *changes* in net plant, rather than the simple level of net plant. Second, the RBOCs failed to include controls for other significant factors that could be reasonably expected to influence the relationship between ILEC capital per line and the proportion of lines served by CLECs using UNE-P. In particular, there are no controls for demand factors, the underlying cost of telecommunications infrastructure, or the effects of regulation. As a matter of basic econometrics, the omission of such highly relevant variables means that the estimates obtained are biased and unreliable. Finally, as explained above, the data relied upon for this analysis are incomplete and severely flawed. In contrast, the rigorous econometric

[40] *See* UNE-P Report, Figure 9.

analysis conducted by Professor Willig *et al.*, using correct data, demonstrates that a reductions in UNE rates corresponds with statistically significant increases in ILEC investment.

CONCLUSIONS

As with prior anonymous RBOC filings, in place of verified data the UNE-P Report uses self-prepared data that are riddled with errors, censored and/or biased. In addition, it subjects these "data" to questionable comparative techniques and draws conclusions without applying any standard statistical tests.

When the RBOCs' claims are reviewed utilizing reliable data and properly executed and verified analysis, these claims are shown to be baseless – and, indeed, often a directly opposite conclusion is warranted. In particular, a proper analysis shows:

- UNE-P does not detract from CLEC facilities-based line penetration or discourage cable-based telephony;
- UNE-P does not reduce – and may in fact increase – the intensity of CLEC switch deployment per access line;
- AT&T's comparison of its experience in New York and California is fully accurate and is not contradicted by the RBOCs' efforts to examine the experience of the balance of the industry;
- UNE-P does not reduce, and may instead increase RBOC investment.

Thus, the inescapable conclusion of these empirically based statistical analyses is that UNE-P is not detrimental to CLEC and RBOC investment incentives.