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November 7, 2002

Ex Parte – Via Electronic Filing

Ms. Marlene Dortch, Secretary
Federal Communications Commission
The Portals
445 12th Street, S.W.
Washington, D.C. 20554

Re: *CC Docket No. 01-338*

Dear Ms. Dortch:

Attached for inclusion in the record of this proceeding is a letter to Mr. William Maher from Robert A. Curtis, President of Z-Tel Network Services, and Thomas M. Koutsky, Vice President, Law and Public Policy.

Sincerely,

/s/

Christopher J. Wright

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November 7, 2002

Ex Parte

Mr. William Maher
Chief, Wireline Competition Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: Empirical Evidence on Impact of Unbundling and UNE-P Obligations on Facilities Investment, CC Docket Nos. 01-338, 96-98, 98-147

Dear Mr. Maher,

At a news conference last month, you stated that in the pending *UNE Triennial Review* proceeding, what "guides the bureau's analysis are the facts. To the extent that parties can prove or disprove causal relationships, that's the most important thing."[1] Your statement echoes the Commission's request in the *Triennial Review NPRM* for comment as to whether any causal relationship exists between the availability of unbundling and the deployment of network facilities. Empirical measurement of causal relationships between unbundling and facilities deployment also was mentioned by the *USTA* court, where that court indicated that the best method by which to assess such relationships is "multiple regression analyses."[2] Z-Tel Communications, Inc. ("Z-Tel") has provided a number of such studies in the record that show the competition and

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1 *See* "Maher Outlines Wireline Competition Bureau Agenda," *TR Daily*, October 4, 2002.

2 *United States Telecom Association v.* FCC, 290 F.3d 415, 425 (D.C. Cir. 2002). In discussing the "incentive effects" of unbundling, the D.C. Circuit in *USTA* noted that "multiple regression analyses" are important in making a "precise assessment" of these effects. The D.C. Circuit noted that the record in CC Docket No. 96-98, the *UNE Remand Order*, "appears silent" on the issue. *Id.* In this proceeding, the record is not silent and is replete with such multiple regression analyses – by Z-Tel.

investment benefits of unbundling generally and unbundled switching and UNE-P specifically.

Relationships between the various unbundling requirements and vertically-integrated entry by CLECs are, in the end, empirical questions. While the rhetoric flows freely regarding "causal relationships" between unbundling, investment and competitive entry, Commission policy must be guided by sound empirical research. The goal of empirical research is summarized by econometrician Jeffrey Wooldridge:

> The goal of most empirical studies in economics and other social sciences is to determine whether a change in one variable, say *w*, causes a change in another variable, say *y*. … The notion of ceteris paribus – that is, holding all other (relevant) factors fixed – is at the crux of establishing a causal relationship. Simply finding that two variables are correlated is rarely enough to conclude that a change in one variable causes a change in other.[3]

Professor Wooldridge's statement has particular importance for the *Triennial Review*. While the record in CC Docket 01-338 is replete with multiple regression analyses filed by CLECs examining the effects of unbundling on competition and the extent of vertical-integration among CLECs (i.e., facilities-based entry), the record also contains numerous Bell company anecdotes and spurious correlations. The Commission should take care to distinguish analysis from anecdote in making its decision.

Throughout the Commission's review, Z-Tel has endeavored to provide solid, empirical evidence addressing the most significant economic relationships for unbundling policy. On October 4, 2002, Z-Tel presented you with a compilation of eight economic and econometric studies using multiple regression techniques that show that unbundling generally, and in some cases UNE-P specifically, promotes competition and facilities-based entry.[4] A list of those papers, along with short descriptions, is contained in Attachment A to this letter. An additional, new study by Drs. Beard, Ekelund, and Ford on impairment generally (and, empirically, with respect to unbundled switching) is attached at Attachment B to this letter.

Z-Tel's empirical research on the relationship between unbundling and competition began last year with Z-Tel Public Policy Papers Nos. 3 and 4 (revised to respond to Bell critics in Attachment C), which show that where access to unbundled local switching and UNE-P is unrestricted, residential and small business consumers

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[3] Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, MIT Press (2002). The Commission has cited this econometrics text in the recent *Hughes/Echostar Merger Hearing Order*.

[4] Letter from Christopher J. Wright to Marlene H. Dortch, Secretary, FCC, in CC Dockets Nos. 01-338, 96-98, and 98-147 (Oct. 4, 2002) ("Oct. 4 *ex parte*").

enjoy more competitive choice *and* CLEC deployment of switching facilities increases. When it comes to empirical analysis, Z-Tel has constantly upped the bar, and some of this empirical research is already starting to appear in academic economic journals.[5]

Z-Tel has also responded in detail to irrelevant arguments offered by the Bell companies. For example, when the Bell companies raised the issue about whether UNE-P rates were sufficient to cover their current "costs" – an issue not noticed by the FCC in the *Triennial Review* NPRM and generally irrelevant with regard to TELRIC-compliance and the overarching question as to the availability of unbundled switching and UNE-P – Z-Tel nevertheless provided an analysis of the *real* revenues BOCs receive by wholesaling the platform, based upon Z-Tel's experience as a UNE-P provider in 46 states. Z-Tel showed clearly that UNE-P prices are not (on average) "below cost," even when cost is measured as Bell company current or embedded cost. A recent public statement by SBC Chief Financial Officer Randall Stephenson confirms that result. Mr. Stephenson stated that UNE-P pricing of $20 to $21 per month presented "a pretty rational model" in Texas (where UNE-P is available statewide without restriction pursuant to Texas state law), where "you have good, vibrant competition and it's not at such a level where we cannot earn money or are disincented to invest."[6] In 41 of its 46 states, Z-Tel pays the incumbent more than $20 per month per line.

In contrast to the serious efforts of Z-Tel and a number of noted academics, the Bell companies have not submitted to the record in CC Docket No. 01-338 a single multiple regression analysis of the effects of unbundling on competition and facilities deployment by CLECs. Nor have the Bell companies provided any meaningful rebuttal, and in most cases they have not provided any rebuttal at all, to the studies filed by Z-Tel.[7] The purpose of this letter is to show the failures of the Bell companies in this regard. As a result, to the extent the Commission examines whether unbundled local switching and UNE-P facilitate or deter facilities-based investment, the record is clear: all the empirical evidence shows that a positive causal relationship between

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[5] *See* Oct. 4 *ex parte*, Robert B. Ekelund Jr. and George S. Ford, "Preliminary Evidence on the Demand for Unbundled Elements in Telephony," Atlantic Economic Journal, Vol. 30 (forthcoming December 2002) and Robert B. Ekelund Jr. and George S. Ford, "Innovation, Investment, and Unbundling: An Empirical Update," Yale Journal on Regulation (forthcoming, Sprint 2003).

[6] *See* Attachment D. Mr. Stephenson's statements contradict the shallow, non-empirical analysis presented by the Bell companies (including SBC) in this proceeding claiming that unbundled switching and UNE-P provided a dis-incentive for them to invest in their own network. *See, e.g.*, SBC 10/24/02 *ex parte* at 2 (stating, without support, that UNE-P "undercuts investment and is financially unsustainable for ILECs"). The FCC should weigh the statements of SBC's CFO against the unsubstantiated claims of SBC's lobbyists.

[7] While the Bell Companies have thus far largely ignored the wealth of empirical research provided by Z-Tel (presumably because of their inability to effectively rebut the work), the Commission does not have that luxury. Administrative law requires the Commission to consider and respond to "all significant comments" in the record. *See, e.g., ACLU v. FCC*, 823 F.2d 1554, 1581 (D.C. Cir. 1987).

UNE-P and facilities investment is present (other things constant), and there is not one shred of empirical evidence in the record to suggest otherwise.

A. The Bell Company Empirical "Evidence" on the Relationship between Unbundling and Vertically-Integrated, Facilities-Based Entry

When the comments, *ex partes*, and trade-press spin all are dissected, the Bell companies' empirical evidence on the relationship between UNE-P unbundling and facilities investment relies on only a few spurious correlation studies. These documents include an (unsigned) working paper called "UNE-P and Investment" (which was subsequently updated in the UNE Rebuttal Report 2002, filed on October 23, 2002), an affidavit by the Bell companies' consulting firm NERA ("NERA Reply Study"), a study by Haring *et al* (attached to the Qwest Reply), and a study by economist Harold Ware (attached to the Kahn/Tardiff Reply Affidavit filed by Verizon).[8] As best Z-Tel can tell, these four works provide the basis for Bell company statements in *ex partes* (made without citation) that unbundled local switching and UNE-P "dis-incent" facilities-based investment.[9]

There is one common characteristic of all of these Bell studies – they *are entirely devoid of multiple regression analyses*, which the D.C. Circuit in *USTA* said would be the most probative evidence of the impact on facilities investment caused by unbundling.

The Bell company studies instead contain nothing more than anecdotes, descriptive statistics (averages, counts of things, etc.), and a few correlation/trendline analyses that, according to standard econometric practice, are "rarely enough to conclude that a change in one variable causes a change in other."[10] The weakness of correlation analysis, known to anyone even marginally familiar with econometric analysis, is sufficient to dismiss the Bell Company "evidence" as meaningless. That said, even these elementary correlation analyses are flawed.

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[8] A paper by Professor Dale Lehman and FCC employee James Eisner was cited in SBC's opening comments, but was not submitted to the record. It is important to note that this paper was co-written by an SBC consultant, Dale Lehman and his co-author, an FCC employee who utilized preferential access to confidential government information, notably, CLEC market-share data that the FCC requires CLECs to file pursuant to FCC Form 477. Z-Tel's Chief Economist George S. Ford thoroughly rebutted the Lehman/Eisner study in his Reply testimony (attached to Z-Tel's Reply Comments), which showed that the findings of the Lehman/Eisner study are theoretically implausible and driven entirely by a single outlier (the state of New York).

[9] *See, e.g.*, Letter from Jay Bennett, SBC, to Marlene H. Dortch, Secretary, FCC, in CC Docket Nos. 01-338, 96-98, and 98-147 at 2 (Oct. 24, 2002); Letter from William Barr, Verizon, to Chairman Powell, FCC, in CC Docket Nos. 91-338, 96-98, and 98-147 (Oct. 16, 2002) (Verizon Oct. 16 *ex parte*).

[10] Note 3, *supra*.

B. "UNE-P and Investment": An Incomplete and Spurious Correlation Study

In Reply Comments, SBC and BellSouth filed a study called "UNE-P and Investment" that contains the most sophisticated empirical analysis offered by the Bell Companies yet – a (cross-sectional) trendline analysis computed between two variables (E911 entries and UNE-P lines, both divided by Bell access lines in the state) using Microsoft Excel (at Figure 1).[11] The output chart of this analysis serves as a leitmotiv for Bell company arguments that UNE-P discourages facilities-based CLEC entry.[12]

The analysis in this unsigned study is no more informative than a simple correlation coefficient, which reveals little to nothing about the underlying economic relationships between two variables because, unlike a multiple regression analysis, other relevant factors are not held constant.[13] Further, the correlation is computed using only 26 observations (states), which equals about half the number of observations available (i.e., states). Certainly, any claim that national telecommunications competition policy should be based on simple correlations computed by reference to 26 states is ridiculous. The study's authors threw out states that had more than 38.5 million Bell company access lines.

In a footnote, the UNE-P and Investment study explains that a number of states were excluded from the analysis because including them resulted in "a close to 1:1 correlation between the[] two variables" that led to a "statistically insignificant correlation." In other words, including more states in the analysis would have shown no significant correlation between facilities-based entry and UNE-P penetration. In order to get a significant negative correlation, the authors had to limit the sample size by removing data that was inconsistent with the desired result.[14] In other words, if *all* the data is examined, the statistical relationship the Bell companies want to see does not exist – even using their own data and statistical methods.[15]

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[11] The "UNE-P and Investment" study is Attachment A to the SBC Reply and Attachment 4 to the BellSouth Reply. The study was updated in the UNE Fact Reply 2002, filed jointly by Verizon, SBC, BellSouth and Qwest on October 23, 2002. Letter from Dee May, Verizon, to Marlene H. Dortch, Secretary, FCC, in CC Docket Nos. 01-338, 96-98, and 98-147 (Oct. 23, 2002). That update is rebutted in section C of this letter, below.

[12] *See* Letter from W. Scott Randolph, Verizon, to Marlene H. Dortch, Secretary, FCC, in CC Docket Nos. 01-338, 96-98, and 98-147 at 10 (Oct. 9, 2002).

[13] The signs of the estimated coefficient in a univariate regression and the simple correlation coefficients are always the same. Because the authors are only concerned with the sign of the coefficient, the univariate regression performed in the study provides no more information than would the correlation coefficient.

[14] A statistically insignificant result implies that the hypothesis of "no relationship" cannot be rejected.

[15] The authors at footnote 5 attempt to explain the exclusion of these states by noting that in these states CLEC lines represent less than 10% of BOC lines, and that " given the relatively small volumes

There are numerous other reasons to question the reported relationship in the UNE-P and Investment report, even ignoring the limited sample chosen by the unidentified authors to produce the desired result. First, the authors of UNE-P and Investment correlated the "market share" of UNE-P and facilities-based entry in 26 states with the market share calculation based on division of CLEC lines by Bell company switched access lines in a state. While this adjustment may seem innocuous at first, it is not. The definition of "market share" in this case leads to a purely spurious correlation between the two variables.

Let us explain. If one simply correlated the *number* of UNE-P lines and the number of CLEC facilities-based lines in the 26 states, one would find that as the number of UNE-P lines increases, the number of CLEC facilities-based lines (i.e., E911 entries) increases as well. The correlation is positive (the simple correlation coefficient, r, is 0.47).[16] Thus, states with more UNE-P lines also have more CLEC facilities-based lines. This result is not surprising, since we expect to have more of both in California than in South Dakota. Market size, obviously, is an important factor in the analysis. To adjust for market size, the unidentified authors divided the number of UNE-P lines and the number of facilities-based lines by the number of Bell switched access lines in a state. Dividing both series by access lines turns the positive correlation coefficient between UNE-P and facilities-based lines into a negative correlation (r = -0.47, according to Z-Tel's estimate using the data reported in the UNE-P and Investment report).[17]

Analyzing the data in this way does not help the reader understand whether UNE-P entry "dis-incents" facilities-based entry. Instead, adjusting the data in this way merely indicates that UNE-P penetration is larger in larger markets while CLEC facilities-based penetration is larger in smaller markets. The negative coefficient does

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involved, is not meaningful as a statistical matter." This is false. First, every econometrician knows that more data is better than less; econometricians almost never throw out data. Second, in the same footnote, the authors themselves acknowledge that these states are "meaningful as a statistical matter" in that the statistical significance of the correlation is changed by the inclusion of these states. Third, states with more than 38.5 million access lines (about one-third of Bell Company access lines) are excluded from the analysis.

16 The simple correlation coefficient measures the linear association between two variables, and has the following values: a) the coefficient is –1 if two variables are perfectly, negatively correlated (when one goes up, the other always goes down; b) the coefficient is +1 if two variables are perfectly, positively correlated (when one goes up, the other always goes up); and c) the coefficient is 0 when the two variables have no relationship at all. Intermediate values (Between –1 and +1) suggest the degree of the linear relationship. If two variables are related in a non-linear fashion, the correlation coefficient has dubious merit.

17 The authors do not report the correlation coefficient, but the sign of the correlation coefficient is identical to that of the least squares slope coefficient reported in the document.

not measure a causal relationship between the two modes of competitive entry. This observation in no way shows that CLECs "substitute" UNE-P for facilities-based entry and in no way shows that CLECs "substitute" UNE-P for facilities-based entry in any state. [18]

This fact is illustrated by a simple numerical example. Consider two markets, the first with 100 access lines and the second with 120 access lines (the latter thus with 20% more). Say there are 10 facilities-based lines and 10 UNE-P lines in the smaller market, and 11 facilities lines (10% more) and 13 UNE-P lines (30% more) in the larger market. Obviously, there is positive correlation between the number of lines across markets (both increase from the smaller to the larger market). But, when you compare "penetration rates," the correlation becomes negative (facilities share falls from 10% to 9.2% whereas UNE-P share rises from 10% to 10.8%). Clearly, one cannot interpret this data to suggest that the presence of UNE-P has somehow "suppressed" the level of facilities-based lines in either state.

The UNE-P and Investment study suffers from a host of other econometric flaws. Most notably, it is void of multiple regression analysis. As stated above, the central purpose of econometrics is to analyze causal relationships between two factors by holding all other factors constant. This "ceteris paribus" analysis is done by including those other factors (or proxies for them) as additional regressors.[19] The authors hold nothing constant, but simply run a regression of the success of one mode of competitive entry on another. Econometrically, the relationship estimated using this model is meaningless. Both omitted variables bias (not including variables in the model that influence facilities-based entry) and simultaneity bias (if vertically-integrated entry is a function of UNE-P, then it is equally likely that UNE-P entry is a function of vertically-integrated entry) mean that one cannot simply regress one form of entry on the other and obtain meaningful results.[20]

One obviously critical variable omitted from the analysis is the price CLECs pay for unbundled elements in a state. That factor has a substantial impact on the "make-

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[18] The proportional relationship between CLEC lines and Bell access lines can be estimated by regressing the natural log of CLEC lines on the natural log of Bell switched access lines. If the estimated coefficient exceeds (is less than) 1.00, then the change is more than (less than) proportionate to access lines. For UNE-P, the coefficient is 1.12 and for E911 entries the coefficient is 0.98, which confirms the spurious nature of the correlation purportedly demonstrated by the UNE-P and Investment Study. These estimated coefficients are based on the same 26 observations used by the unidentified authors.

[19] Z-Tel's econometric studies do this. In analyzing switch deployment in MSAs or states, Z-Tel's studies hold constant, for example, market size, density, income, prices, etc.

[20] This failure is due to the inability to control for simultaneity bias and the simple inability to separate the obvious impact that the price of UNE-P access may have on the results.

or-buy" decision the authors ostensibly examine.[21] The study also does not analyze market density, even though the Bells claim that facilities-based entry "target[s] high density areas."[22] Comparing the overall market share of facilities-based entry between states without regard to market density can certainly lead to skewed results. For example, the authors regard the chances of facilities-based competition in Delaware (pop. 783,600) to be essentially the same as South Dakota (pop. 754,844), despite the fact that Delaware's population density is over 400 per square mile while South Dakota's is less than 10 per square mile.

Because it fails to consider these and other factors (like median household income) that *obviously* impact whether a CLEC constructs facilities, the UNE-P and Investment Study provides little insight as to whether UNE-P is, in any way, hampering facilities-based entry.

In fact, the negative correlation reported in the study can be interpreted in a manner that supports the widespread availability of UNE-P. A negative correlation between facilities-based entry and UNE-P would be observed if facilities-based entry to serve medium and large businesses were feasible in some markets (densely populated, low-cost markets) but not in others.[23] Where facilities-based entry into these markets is feasible, it might be rational to surmise that such entry would occur and UNE-P entry to serve those markets would be more limited. But in markets not conducive to facilities-based entry (for instance, a state that does not have an effective building access or right-of-way policy – two key barriers to entry identified by facilities-based CLECs repeatedly), one should expect little facilities-based entry and, commensurately, much more UNE-P for those markets. If so, there would be a negative correlation between UNE-P market share and facilities-based entry market share – but that relationship simply indicates that there are *more* impediments to facilities-based entry in certain states than in other states, such as building access policies, municipal rights-of-way issues, taxes and franchise fees, etc. *Because the study's authors only present a simplistic correlation model, it is impossible to distinguish the hypothesis that facilities-based entry displaces UNE-P entry from the Bell-sponsored hypothesis that UNE-P entry displaces facilities-based entry*.[24]

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[21] In footnote 7, the authors recognize the key role pricing plays on entry, but the authors make no attempt to regress on UNE-P prices – even though these prices are publicly-available data. In contrast, Z-Tel's studies (most notably, Beard, Ford and Koutsky) do take into account UNE prices.

[22] UNE Rebuttal Report at 6.

[23] This logic is explicit in the unbundled switching restriction established in the UNE Remand Order.

[24] This is, of course, why "multiple regression analyses" are a superior method of analysis. Given that *all* of the multivariate analyses in the record supports the hypothesis that UNE-P promotes (and does not displace or hinder) facilities-based entry, it would be contrary to reason for the Commission to reject Z-Tel's alternative interpretation of the UNE-P and Investment correlation analysis.

Another severe problem with the UNE-P and Investment Study is that it treats all CLEC lines the same. The study fails to distinguish between CLEC entry into the "mass-market" or "traditional wireline" market from CLEC entry into the large business enterprise or special access markets.[25] In this sense, the study cannot be utilized to support the kind of "granular," market-by-market analysis that the *USTA* decision requires. In fact, the study tries to draw conclusions about competitive entry in the analog, mass-market on the basis of whether CLECs are providing high-capacity, special access DS1, DS3 and OCx circuits to large businesses. Plainly, the analog mass market is not "in the same market" as Internet connections to office buildings. This failure in granularity is lethal to the study's relevance, because the Commission cannot draw *any* conclusions from it to show what impact UNE-P may be having on CLEC facilities-deployment to serve the mass market.

The UNE-P and Investment Study also evaluates the relationship between Bell company investment (per line) and UNE-P penetration with a cross-section trend analysis. Underlying this comparison is the assumption that nothing affects cumulative Bell company investment other than UNE-P penetration – an utterly absurd assumption. That said, the Bell companies use this result to argue that UNE-P impairs their "incentive to invest."

However, the limited sample used in the analysis seems to have had a potent influence on the results. In the figure below, a scatter plot of ILEC investment per line (generated from ARMIS data filed by the Bells) and UNE-P penetration for 46 states are presented (with a linear trend). The relationship is positive, and a univariate regression indicates that the relationship is statistically significant at better than the 1% significance level.[26] Thus, using the same methodology as the UNE-P and Investment Study, the relationship between UNE-P and Bell company investment is found to be positive. In other words, Bell companies actually invest *more* in their network where UNE-P penetration is higher. This finding supports those summarized in the Declaration of Dr. Willig.

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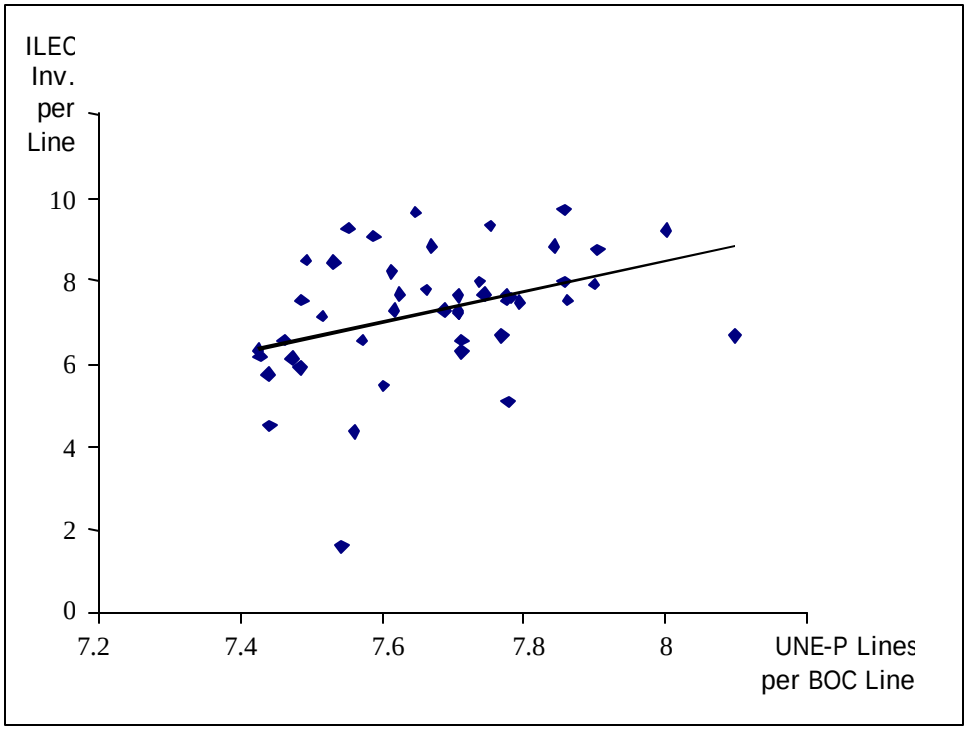
[25] Even Verizon, one of the sponsors of the study, agrees that the Commission needs to analyze competitive entry into these markets separately to satisfy *USTA*. *See* Verizon Oct. 16 *ex parte*.

[26] Both the scatter plot and regression are based on logarithmic transformation of the two series. The comparable R-squares for the log and linear regressions are 0.12 and 0.06, so the log form fits the data better by an order of two. The estimated coefficient on the UNE-P penetration is 0.039 and the t-statistic is 2.70.



There is a simple reason why this might be the case: where they face competition, the Bell companies are forced to respond. One method of responding is to increase service quality and network investment. On October 28, 2002, in a NARUC field hearing before FCC Commissioners Martin and Abernathy, the chairs of the Texas and Michigan state commissions made this precise point, and argued that after UNE-P competition was introduced in their states, the service quality from the Bell company improved significantly.

Importantly, it is not our position that simple correlation analysis such as that presented in the figure has any real meaning. Nevertheless, if the Commission considers such analysis worthwhile, then the "evidence" contained in the UNE-P and Investment Report is plainly contradicted by this Z-Tel analysis, which is methodologically identical but more complete.

C. The Analysis in the UNE Rebuttal Report Shares the Same Flaws as the "UNE-P and Investment" Study

The Bell companies update the correlation analysis contained in the UNE-P and Investment study in the "UNE Rebuttal Report 2002," which was filed by Verizon on behalf of all the Bells on October 23, 2002. The results are nearly identical to those reported in the UNE-P and Investment Study – and Z-Tel's criticisms of this study are essentially the same as well.

The UNE Rebuttal Report still excludes states from analysis that do not support the Bell companies' desired result. While the update expands the sample size from 26 observations to 37, the UNE Rebuttal Report clearly states that when *all* states are analyzed, there is a "statistically insignificant correlation" between facilities-based and UNE-P entry (p. 29). We are unaware of any statistical procedure that calls for the exclusion of data for no other reason than it produces a result that the researcher does not like. Since the FCC is writing national rules, it clearly should focus on studies that include *as many states as possible.*[27]

Like the 26-observation sample used in the UNE-P and Investment study, the negative correlation between the ratio of E911 entries to Bell switched access lines and the ratio of UNE-P lines to Bell switched access lines reported in the USTA Rebuttal Report is spurious.[28] Again, the negative correlation is produced by taking advantage of the proportionality relationships between E911 entries and UNE-P lines to BOC access lines. It is the relationship between CLEC lines and Bell switched access lines that produces the negative correlation, not the relationship between facilities-based and UNE-P entry. Further, as mentioned previously, it is impossible to determine by the correlation analysis whether UNE-P entry is displacing facilities-based entry, or whether facilities-based entry is displacing UNE-P entry.

The UNE Rebuttal Report itself provides evidence as to the econometric problems with this ostensibly "empirical" analysis. For example, the Report hypothesizes that CLEC entry in the market was staged – that "CLEC facilities came first" and that "most of the competitive facilities … emerged well before any significant levels of UNE-P competition developed. (p. 5)." If that is the case, then the correlation analysis should take into account or analyze timing. Despite this claim, the correlation analysis in the Report makes no adjustment for the timing of entry. In addition, the UNE Rebuttal Report states plainly, with examples, that facilities-based entry occurs primarily in the "high-density areas," but the correlation analysis fails to account for density. In contrast, the econometric paper by Drs. Ford and Pelcovits include two measures of density in their evaluation of UNE rates on facilities-based entry.[29] Additionally, the UNE Rebuttal Report suggests that facilities-based entry occurs with less frequency in states where UNE-P rates are low (p. 6), yet the correlation analysis takes no account of UNE-P rates. To list a number of factors that influence the variable of interest and then to exclude them from a regression analysis runs directly contrary to the core theory of econometric analysis.

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[27] Of course, limitations on data availability may reduce legitimately the sample size evaluated.

[28] For the updated data, it is E911 entries that grows more than and UNE-P lines less than proportionately to access lines.

[29] Oct. 4 *ex parte*, George S. Ford and Michael D. Pelcovits, *Unbundling and Facilities-Based Entry by CLECs: Two Empirical Tests* (www.telepolicy.com).

The rest of the "empirical analysis" in UNE Rebuttal Report, like its predecessor the UNE Fact Report 2002, consists of nothing more than anecdotes. For example, the UNE Rebuttal Report claims that "[t]here is extensive facilities-based competition." This conclusion is supported by the claim that there are 3 million residential facilities-based lines in operation. The Report stretches the meaning of "extensive" here, given that there are about 111 million residential lines in the United States. A market share of less than 3% can hardly be described as "extensive" entry. Moreover, as Z-Tel has shown in this proceeding, only about 1/10 of 1 percent of that mass-market entry is by CLECs that collocate in ILEC end offices and purchase unbundled loops – the firm structure that the Bells argue that the government should force Z-Tel to adopt. In reality, this alternative has been neither successful nor "extensive."

Further, the very facilities-based entrants the UNE Rebuttal Report lists have claimed in their financial documents that they have completed their network build out and have restricted their entry to the most densely populated markets.[30] Despite this focused entry strategy, the profitability of such ventures remains uncertain. Building facilities is not an important indicator of competition or the viability of such entry – it is at best only an indicator that at some point in time companies attempted such a strategy. Only the **profitable** building of facilities is relevant. To this point, the plethora of bankruptcies of entrants that began with this strategy and the retrenchment of other entrants that considered this method of entry speaks volumes.

The most peculiar aspect of the UNE Rebuttal Report and Bell company advocacy is their fixation with the number of CLEC switches (an anecdote). While the Bells want the Commission to believe that the existence of 1,300 CLEC switches is evidence that CLECs are not impaired with respect to switching, the fact that these switches are not being used to provide analog voice services to any significant degree (as shown by Z-Tel in its reply comments) actually is compelling proof that the CLECs are impaired in the provision of such services over their own switches. The Bell Companies acknowledge that switches are "sunk" investment (UNE Fact Report 2002, p. B-1), implying that the use of such facilities is free. But if this switching is "free," then why do CLECs with switches deployed choose to pay about $10 per line per month (in New York) for unbundled switching?

The answer is obvious. There are other factors – the manual hot cut process and its associated non-recurring charge, for example – that raise the full economic cost of self-provisioned switching above $10. Thus, the focus should not be on the number of switches deployed, but on the factors making such switches worthless in the provision of analog voice services.[31] Z-Tel provided this evidence in its opening comments, when

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30 *See, e.g.,* RCN SEC Form 10-K (2001).

31 Even if it were possible to eliminate the factors that prohibit the profitable self-supply of switching, we must question the value of directing (via regulation) scare capital to the duplication of the

it discussed how these factors caused it to abandon a switch deployment plan that it had already begun in New York City. The barrier for Z-Tel was not whether switches were available for purchase – the barrier was the inability to convert Z-Tel's over 100,000-line, mass-market customer base onto that switch, given the cost and delays of the manual hot-cut process.

What matters for unbundling analysis is *not* whether a piece of telephone equipment can be bought on eBay. If that were the extent of the analysis, even unbundled loops would not pass the test – *see* Attachment E. What matters is whether that equipment or elements are available in a manner that is useful to serve mass-market customers. A loop is valuable to a mass-market entrant not because of the commodity value of copper but because loops are *ubiquitously connected* to homes and businesses. And the ILEC's switch is valuable to a mass-market entrant because it is connected to *all* of those ubiquitous loops – service can be provided in the mechanized method necessary to serve the mass-market profitably.

D. The Ware Study Actually Supports Z-Tel's Results

In its Reply Comments, Verizon attached a study by NERA consultant Harold Ware.[32] The Ware Study consists primarily of tables compiled through anecdotes and fails to include even simple correlation analysis in the form of regression or correlation coefficients. Nor does the Ware Study provide any "granular," market-specific analysis of the sort that the *USTA* decision requires the Commission to undertake.[33] Moreover, although it does not provide any serious empirical analysis of relationships between the variables of interest (other things constant or otherwise), the reported anecdotes of the Ware Study actually do not support the contentions of the Bells in this proceeding regarding UNE-P and switch deployment by CLECs.

The Ware anecdotes in fact support Z-Tel's hypothesis that higher use of UNE-P by CLECs results in more (not less) CLEC switch deployment.[34] Ware divides CLECs into three groups – CLECs that do not use UNE-P (CLECs with fewer than 25 UNE-P

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existing switching network, particularly when more socially valuable investments are available. A DMS500 or 5E is functionally equivalent whether owned and operated by a CLEC or ILEC – there is no inherent social value to having two identical switches each serving half the market when one would do the job.

[32] Verizon Reply Comments, Attachment B, Appendix 1.

[33] Even Verizon, one of the sponsors of the Ware study, agrees that the Commission needs to analyze competitive entry into these markets separately to satisfy *USTA*. *See* Verizon Oct. 16 *ex parte*.

[34] This conclusion is consistent with the hypothesis that CLECs utilize UNE-P to support future migration strategies or to round out switch-based, special access or high-cap product lines – entry strategies that Birch, ITC^Deltacom, and NewSouth have outlined in their comments and *ex partes* in this proceeding.

lines); CLECs that are "small UNE-P" users (fewer than 1000 lines in a state, but more than 25 lines); and large UNEP users (more than 1,000 UNE-P lines). Ware's anecdotes show that for CLECs that *utilize* UNE-P, there is clearly a positive relationship between the number of UNE-P lines operated by a CLEC and switches deployed by that CLEC.[35]

As shown in the table below (reproduced from the Ware Study), CLECs that use large quantities of UNE-P deployed *300% more switching* in the last two-years than CLECs with more limited use of UNE-P, and infinitely more switches in the prior two-year period. In other words, as the number of UNE-P subscribers increases for a CLEC, that CLEC *becomes more likely to deploy (or have deployed) switching capacity*. Ware's E911 listing data affirms the positive relationship between UNE-P and facilities-based supply (also illustrated in the table).[36] Far from showing a "dis-incentive" to invest in switching, the Ware study actually shows a positive relationship between UNE-P use and switch deployment.[37]

Ware Study and the Relationship Between UNE-P Use and Switch Deployment by CLECs

	Low UNE-P Use	High UNE-P Use
Switches Deployed (12/97 to 12/99)	0	10
Switches Deployed (12/99 to 12/01)	1	4
E911 Listings Added (12/00 through 2/02)	0	114,739

Perhaps it is no surprise that the other Bell companies do not routinely cite Mr. Ware's analysis in their repeated diatribes against UNE-P in this proceeding. Mr. Ware's own anecdotes disprove his client's point.

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35 This result stands in contrast to Bell company arguments that CLECs that use UNE-P do not deploy their own facilities. *See, e.g.*, Barr Oct. 16 letter at 17 ("there is no evidence whatsoever" that CLECs that use UNE-P are "transitioning customers to their own facilities").

36 At least to the extent that such anecdotes have any meaning at all.

37 What drives Ware to reach the opposite conclusion is his inclusion in the analysis of UNE-P those CLECs that are "using their own switches exclusively or predominantly to serve business customers." But the Commission must analyze the competitive dynamic in the analog mass-market. Including switch-based CLECs that "predominantly" serve "business customers" in the correlation analysis makes no sense and is contrary to sound economic practice. Indeed, including large-business, special-access oriented CLECs in the analysis distorts the very purpose of the Commission's task, which is to determine whether UNE-P dis-incents deployment of switches by CLECs that seek to serve mass-market residential and small business consumers.

E. The SPR/Haring et al Study on the Impact of UNE-P on ILEC Investment

Attached to Qwest's Reply Comments is what purports to be an empirical analysis of the impact of unbundled local switching and UNE-P upon ILEC investment in their local plant. This study also fails to meet the standards of rigorous econometric analysis.

In opening comments, Professor Robert Willig, on behalf of AT&T, conducted a detailed econometric analysis of the relationship between UNE competition and ILEC investment. Dr. Willig's findings indicate that ILEC investment increases as UNE rates decline, which is contrary to the assertions of the Bell companies. The Bell companies have devoted substantial resources to rebutting the Willig study. But the Strategic Policy Research ("SPR") rebuttal included in Qwest's Reply Comments is theoretically and empirically flawed.

First, SPR claims, "unbundling requirements inherently reduce ILEC profitability and thereby make all ILEC investments less attractive (p. 1)." This statement is false for several reasons. First, unbundling must reduce ILEC profitability overall to "make all ILEC investments less attractive," and SPR provides no evidence that this is the case. Second, unbundling can lead to pricing flexibility for the ILEC, and the increased profits from the flexibility can offset any lost profits from unbundling. Third, it is not the sale of unbundled elements that affects the profits of the ILEC as much as it is the loss of the retail consumer. Thus, investment may increase if such investment can be used to make customers less likely to churn, or to keep lost retail customers on the network under a wholesale arrangement with a CLEC. Not all facilities of the ILEC are required to be unbundled (e.g., voicemail), so there may be opportunities for investment in technologies that give the ILEC an advantage over its retail rivals.

SPR describes Dr. Willig's theory that unbundling may promote investment as "completely implausible (p. 9)." In the same paragraph, however, SPR avers that the "higher the UNE price, the more profit the ILEC makes on sales of UNEs (p. 9)," a statement which is entirely invalid as a theoretical matter. Higher prices do not, as SPR asserts, imply higher profits.[38] For example, an increase in the price of an item may lead to large reductions in the quantity of the item purchased. If so, then higher prices actually reduce profits. It is difficult to take seriously a criticism of Dr. Willig's theory when the basis for such criticism is itself inconsistent with economic theory.

What is most peculiar about SPR's arguments, and those of the Bell Companies generally, is the claim that forcing CLECs to build their own networks will enable the

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[38] The profit maximizing price is generally a function of marginal cost and the firm's own-price elasticity of demand.

ILECs to invest more. In fact, as demand is moved off the ILEC network onto CLEC networks, network investment by the ILECs must decline, since historical investment was based on serving 100% of telecommunications demand. The more CLEC facilities-based entry there is, the less ILEC investment in facilities is required.

Finally, we turn to the issue of the econometric analysis of SPR. Although SPR's econometric evaluation is seriously deficient, it is, by far, the most sophisticated analysis submitted into the record by the Bell Companies: its mere inclusion of more than one explanatory variable places it head and shoulders above the rest. Nevertheless, it is not difficult to demonstrate its weaknesses. For example, SPR multiplies "total loops to scale the variable, comparable to other variables in the model" so that a "$1 per-month increase has the same overall dollar impact on ILEC investment in Nevada as in New York (p. 12)." But the interaction of UNE price and BOC lines is not just an innocent adjustment to the model to improve the interpretation of the results. The interaction of the two variables affects the relationships among variables and influences the estimated coefficients and t-statistics. In addition, interpreting a $1 change in the loop price in a consistent manner across states is probably better accomplished by using a semilog model rather than an interaction of variables that can substantially alter the estimates of the regression.[39] If SPR's Model 3 is estimated in semilog form, the following regression equation is estimated:

$$\ln(\text{RBOC Net Plant}) = 20.97 + 0.017\times(\text{RBOC Loops}) - 0.035\times(\text{Zone 1 Loop Rate}),$$

with all variables statistically significant at the 10% level or better. This regression indicates, as Dr. Willig claims, that lower loop prices lead to greater investment (i.e., the sign on the loop rate variable is negative). This is the opposite of the result found by SPR, despite the fact the regression is estimated using SPR's data. We do not claim that our regression is necessarily more accurate than SPR's, but we include this discussion to point out that SPR's analysis is not robust, in that the model produces conflicting results with only minor modifications to specification. This fact is unsurprising, given that such a simplistic econometric model probably does not capture complex investments decisions very well. Consequently, the Commission cannot rely on the SPR analysis in its determinations, nor can SPR's findings be construed as rebutting those of Dr. Willig.

[39] The semilog model is estimated by taking the natural log of the dependent variable, but using the levels of the explanatory variables. The coefficient is interpreted as the percentage change in the dependent variable given a one-unit change in the explanatory variable.

F. The NERA Reply Testimony Does not Rebut Z-Tel Public Policy Papers Nos. 3 and 4.

While much of Z-Tel's theoretical and empirical analysis is unrebutted by the Bells, Z-Tel's Policy Papers No. 3 and 4 were addressed in the NERA Reply Testimony, Attachment 1 to the BellSouth Reply. Those criticisms are easily dismissed.

NERA's lead argument criticizing the Policy Papers relates to nothing more than a "typographical error" (p. 48) in a citation in one of the footnotes. Z-Tel apologizes and has corrected that inadvertent error. But the error had absolutely no impact on the econometric analysis of the paper or the conclusions therein.

NERA's second critique is as pedestrian as the first. Specifically, NERA quibbles with the method in which Z-Tel's Policy Paper No. 3 calculates the average value of CLEC penetration into the residential and small business market. The Z-Tel paper reports the average relevant to its empirical analysis. Specifically, Z-Tel reports the average of the CLEC market shares in each state, rather than computing the average across all states as NERA suggests. In any event, quibbling about how to calculate an average has no bearing on the results of the study. If Z-Tel reported the average computed as NERA suggests, the econometric results would remain the same.

Moving on through the NERA "rebuttal," it soon becomes clear that NERA's analysts could use a geography lesson. NERA criticizes Z-Tel's Policy Papers No. 3 and 4 by stating that Z-Tel reports on the FCC's current switching restriction's impact only for 27, and not all, states. But that is because the Top 50 MSAs are located in only 27 states; reporting zero values for states where the restriction does not apply is irrelevant. NERA also notes its deep concern about Z-Tel's inclusion of Connecticut in the list of affected states, opining that the state "has no MSA in the top 50 (p. 51)." According to the FCC's *UNE Remand Order* and FCC Rule 51.319, however, Hartford, Connecticut is MSA No. 49. NERA also criticizes Z-Tel's exclusion of Hawaii from its analysis (p. 52). Excluding Hawaii and Alaska from empirical research on telecommunications is not unique to Z-Tel (indeed, NERA excludes both states and 22 others in its own "UNE-P and Investment" analysis). Z-Tel's papers excluded Hawaii because the state is not served by a Bell operating company, and, to Z-Tel's knowledge, UNE-P is not even available in Hawaii on a commercial basis.

There is more. In footnote 100, NERA argues that Z-Tel's model is flawed because the results show a negative relationship between switch deployment (on a per-line basis) and the number of access lines in a market. NERA claims that this result implies that "the number of CLEC switches deployed is inversely related to market size." That is not the case. The model measures as a dependent variable the number of switches *per access line* – as a result, the negative coefficient means that there is less switching capacity per access line in larger markets than in smaller markets. That result

is not surprising, given that switches have relatively fixed capacity, so one CLEC switch in Savannah, Georgia brings to the market more capacity per access line than one CLEC switch in New York City. But this unsurprising fact does not mean that there is no positive correlation between the sheer number of CLEC switches and overall market size; indeed, there is.[40]

NERA also questions the usefulness of the variable Z-Tel uses in the studies to measure the portion of the market where the unbundled switching restriction applies. This variable, called RESTRICT in the Papers, measures the percent of population in the top fifty MSAs in which the FCC's three-line restriction applies. It is important to note that the *purpose* of these papers was to analyze whether the FCC restriction on ULS had any bearing upon the level of competitive entry (Policy Paper No. 3) and the level of CLEC switch deployment (Policy Paper No. 4). The papers utilized the fact that the FCC's restriction on ULS only applied in certain states to determine whether competition or facilities-based entry varied between those states where CLECs had fewer legal rights to enter the market than other states. In other words, analyzing the real-world results of the FCC's 1999 attempt to limit UNE-P entry can determine whether that limitation has harmed consumers and facilities-based entry. Z-Tel's papers show that the current FCC restriction has harmed consumers and facilities-based entry. To make this analysis, the papers by definition had to devise a RESTRICT variable.

NERA proposes no alternative proxy for the FCC's 1999 restriction. As shown by Z-Tel Policy Paper 4 and subsequent paper by Beard, Ford and Koutsky (unrebutted by the Bells), the RESTRICT variable is a reasonably good proxy for assessing the impact of the restriction.

NERA further argues that Z-Tel's results are faulty because they may only reflect that by 1999, "CLECs had already placed most of the switches they needed in the top 50 MSAs (which they entered first) and that they were now concentrating on switch placements to serve less densely populated areas (p. 56)." First, NERA's alternative hypothesis – that CLECs were "done" deploying switches in large cities by 1999 – is pure, unsubstantiated conjecture. Z-Tel did not even begin to provide service until the Summer of 1999, and it is not the only CLEC to be born after 1999. Moreover, Z-Tel recognized the potential for this type of alternative hypothesis and performed an empirical test of it; this alternative hypothesis was rejected by the data (the test appeared in Z-Tel Policy Paper 4, so NERA was fully aware of it).

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[40] For example, say there are two markets, one with 1,000 access lines and another with 10 access lines (the numbers are small to keep the math simple). If one switch is deployed in the smaller market, then there are 0.1 switches per line. To match that number, there would need to be 100 switches in the larger market.

More importantly, if it is the case, as NERA suggests, that CLECs were "done" deploying "the switches they needed" by 1999, what purpose would restricting access to unbundled switching serve? If NERA's hypothesis were true, the FCC could ban unbundled local switching and **there would be no more switch-deployment by CLECs regardless.** Conversely, the FCC could mandate unrestricted access to ULS in these markets and **it would not result in any less CLEC switch deployment**.[41] Further, there is no sufficient wholesale market for unbundled switching in any Top 50 MSA. Thus, even though CLECs may have placed all the "capacity they needed" in the Top 50 MSAs (according to NERA) to serve their own customers, there remains no adequate wholesale market alternative. Thus, CLECs that have not deployed switches continue to be impaired and have no adequate source for switching other than the Bell Company.

NERA further criticizes Z-Tel's analysis of the switching restriction by noting, "there has been no significant attempt by the RBOCs to exercise [the switching carve-out] in their eligible MSAs."[42] Z-Tel's experience has been to the contrary. Z-Tel's interconnection agreements with the Bells clearly express the top 50 MSA "carve-out." Z-Tel's agreements with BellSouth – the sponsor of the NERA Reply – specifically spell out this restriction and the implications for Z-Tel if it were to try to order unbundled switching beyond the restriction. Furthermore, even if the BOCs would not force compliance with the carve-out, the fact remains that the restriction is on the books and CLECs thus have no choice but to take the exclusion into account when making entry and investment decisions. NERA's paradoxical criticism does not undermine Z-Tel's key point: the presence of the exclusion (whether enforced or not) has suppressed residential and small business entry and has suppressed CLEC switch deployment in restricted states.[43] That point remains unrebutted.

Finally, NERA suggests that Z-Tel's empirical model has no "structural foundation." This contention is particularly odd given the feeble "empirical" efforts by NERA and the UNE-P and Investment study, which have neither theoretical nor empirical "structural foundations." The criticism is also incorrect. The two papers do indeed have a sound "structural foundation," which is spelled out in the subsequent

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[41] Z-Tel also notes that, if true, NERA's hypothesis provides an alternative explanation for the results of the Ware study that is attached to the NERA affidavit. In particular, Ware argues that CLECs slow deployment of switches as UNE-P penetration increases. Ware's results would also be explained by conjecture that at a certain point, once CLECs have deployed "the switches they needed" to serve the market, they stop – regardless of UNE-P penetration. The internal contradiction demonstrates again the folly of relying upon anecdotes and simple correlation studies.

[42] NERA Reply Affidavit at 51.

[43] Z-Tel Policy Paper No. 4 and Beard, Ford, and Koutsky (2002).

academic papers by Beard, Ford and Koutsky (2002) and Beard, Ekelund and Ford (2002).[44]

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In the *Triennial Review NPRM*, the Commission directly asked parties to provide evidence of causation or relationships between unbundling and facilities-based deployment. Z-Tel has provided a mountain of evidence showing that ULS and UNE-P promote facilities-based deployment by CLECs. Bell company critiques range from the ridiculous (such as not understanding U.S. geography or critiquing Z-Tel's Blue Booking) to the haughty (arguing that Z-Tel's comparative analysis of the FCC's 1999 restriction is invalid because the Bells may have ignored the rule).

The economic evidence submitted by the Bell companies is entirely unreliable. Contrasted to Z-Tel's sophisticated, multivariate studies, the UNE-P and Investment Study, the UNE Rebuttal Report update, the Ware Study, and the SPR analysis amount to little more than simplistic correlation studies or grossly flawed theoretical analysis. It is basic econometrics that correlation analyses cannot be utilized by the Commission to reach conclusions about cause and effect.

So, what is the status of the record on this key question? Would prohibiting or limiting UNE-P access result in more CLECs adopting the more-costly facilities-based entry strategy? The unrebutted econometric evidence in the record shows that prohibiting or limiting UNE-P access will have no such effect. In fact, it is more likely that the overall level of competition will decrease markedly – and may even disappear for the analog mass-market. This result, of course, would be very good for the Bells, and therefore is precisely what policymakers should expect Bell companies to advocate.[45]

In your October 4 press conference, you said the "most important thing" was evidence of "causal relationships." Z-Tel has presented a substantial body of such evidence, much of it in the form of multiple regression analyses favored by the D.C. Circuit. The Bell companies, in contrast, have merely presented simple correlation studies and have failed to rebut Z-Tel's evidence. There is no basis in the record of this proceeding for a conclusion that restricting the availability of unbundled switching or the platform of network elements will lead to additional deployment of facilities.

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[44] *See* Oct. 4 *ex parte*. Providing sophisticated econometric analysis in a policy paper is sufficiently taxing to most readers, much less detailed mathematical models of economic theory. The mathematical theories were restricted to related academic papers.

[45] *See* Oct. 4 *ex parte*, Phoenix Center Policy Paper No. 15, *A Fix in the Hen House: An Evaluation of Bell Company Proposals to Eliminate their Monopoly Position in Local Telecommunications Markets* (Sept. 2002).

Sincerely,

/s/
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Z-Tel Communications, Inc.

/s/
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cc: Christopher Libertelli
Mathew Brill
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Daniel Gonzalez
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ATTACHMENT A

Empirical Papers on UNE Competition

What Determines Wholesale Prices for Network Elements in Telephony? An Econometric Evaluation, George Ford and Randy Beard (Auburn University), PHOENIX CENTER POLICY PAPER NO. 16 (September 2002).

> The BOCs' claim that state commissions have failed to base element rates on forward-looking cost (as required by the FCC's TELRIC standard) is evaluated econometrically. In contrast to the BOCs' assertions, forward-looking economic cost is the primary determinant of wholesale prices for network elements. Retail prices play no direct role in determining wholesale prices for UNEs. However, the state commissions have, according to the statistical model, set wholesale prices above forward-looking costs to provide the BOCs about half of their existing retail margins. While so, forward-looking costs are, by far, the more important determinant of wholesale prices for UNEs. Mr. Seidenberg was wrong – the state commissions 'do get it.'

Unbundling and Facilities-Based Entry by CLECs: Two Empirical Tests, by George S. Ford, Ph.D. and Michael D. Pelcovits, Ph.D. (former MCI Chief Economist, now with the consulting firm MICRA).

> The number of lines served on CLEC-only facilities (i.e., pure facilities based) is positively related to market size and market density, and negatively related to the price of unbundled loops and unbundled switching. In an alternative test, the authors find that RCN's entry is negatively related to the price of unbundled loops. Thus, there is no evidence that there is more facilities-based entry where UNE rates are higher. In fact, the opposite is true.

Make-or-Buy? Unbundled Elements as Substitutes for Competitive Facilities in the Local Exchange Network, Randy Beard (Auburn University) and George Ford, PHOENIX CENTER POLICY PAPER NO. 14 (September 2002).

> The amount of CLEC entry using unbundled elements is highly sensitive to the price for such elements. A 10% increase in the price of an unbundled loop or switching reduces CLEC lines by more than 10% (i.e., the demand for UNEs is *elastic*). The cross-price elasticity between loops purchased with and without switching is zero. Thus, UNE-Platform does not reduce the demand for UNE-Loop (as the BOCs claim). From an antitrust perspective, the findings in this paper indicate that UNE-Loop and UNE-Platform service different markets. The paper also includes a statistical test of impairment with respect to switching, and finds that impairment exists.

Facilities-Based Entry in Local Telecommunications: An Empirical Investigation, Randy Beard, George Ford, and Tom Koutsky.

> This paper shows, using econometrics, that the deployment of end-office switching by CLECs is not attenuated in markets where unbundled switching prices are low. Instead, CLEC deployment of switches is actually higher in markets with low switching rates. A theoretical model explains the possible relationships between deployment and unbundling, and the theory provides no unambiguous conclusions (low switching rates may increase or decrease CLEC switch deployment). Thus, the issue is plainly empirical. The empirics show that low switching rates increase deployment.

Preliminary Evidence on the Demand for Unbundled Elements, Robert Ekelund, Jr. and George Ford (forthcoming in *Atlantic Economic Journal*, December 2002).

> This paper estimates the demand elasticity for UNE-Platform. The paper finds that a 10% increase in the price of UNE-P elements reduces quantity of UNE-P sold by 27%. Thus, it is little surprise that the BOCs are now attacking the price of UNE-P elements, as well as availability.

Why ADCO? Why Now? An Economic Exploration of Industry Structure for the "Last Mile" in Local Telecommunications Markets, Randy Beard, George Ford, and Larry Spiwak (published in the Federal Communications Bar Journal, 2002).

> This paper explains why the "transition to facilities" argument is meritless. The supply-side economics of local telecommunications prohibits a large number of facilities-based competitors. This is not true on the retail side. Much like the current long-distance markets, where about 900 retailers are serviced over about 5 nationwide fiber networks, industry structure in the local market must bifurcate into a retail and wholesale segment for real competition to exist. Unbundling allows CLECs to acquire market share, which then serves as a non-ILEC demand for local exchange network. Without unbundling, there is not demand for alternative networks – consumers don't demand network, carriers do. Without available and effective demand, the costs of constructing local network can never be recovered – as is evident in the collapse of the segment of CLEC industry which adopted a "built it and they will come" business plan. The prudent path, made possible by unbundling, to "build it after they come."

A Fox in the Hen House: An Evaluation of Bell Company Proposals to Eliminate their Monopoly Position in Local Telecommunications Markets, PHOENIX CENTER POLICY PAPER NO. 15 (September 2002).

> Between UNE-P, UNE-L, and full facilities-based entry, the BOCs' revenues are greatest with UNE-P. The other forms of entry leave BOC network stranded. Why then, do the BOCs prefer facilities-based competition? The answer is obvious. While the BOCs may lose more profit on a per-line basis from facilities-based entry, there is considerably less of it. By slowing competitive growth to a trickle, the total loss in margin is trivial. UNE-P, alternately, allows for the rapid growth of competition, and while BOC margin loss is less, the total margin loss is greater.

ATTACHMENT B

Pursuing Competition In Local Telephony: The Law and Economics of Unbundling And Impairment

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I. Introduction

Conflict between the intent of Congress in the 1996 Telecommunications Act, interpretations of vital portions of the 1996 Act by the Federal Communications Commission ("FCC") and federal court decisions have created a critical impasse in providing increased consumer welfare in local telephony.[1] A central problem relates to the mandated access to unbundled network elements ("UNEs") that incumbent local exchange carriers ("ILECs") must provide to rivals pursuant to Section 251 of the 1996 Act[2] and the sunk costs of entry into local markets, that is, to the inherent wholesale supplier/retail competitor economic conflict between ILECs and competitive local exchange carriers ("CLECs").

The guidance of Congress appears clear, at least on the face of the matter. Section 251(d)(2)(B) of the 1996 Telecommunications Act requires the FCC in determining what network elements should be made available to consider, at a minimum, whether "the failure to provide access to such network elements would *impair* the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer."[3] The FCC has, on two occasions, attempted to apply an "impairment standard" in developing its unbundling

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[1] Lawrence J. Spiwak, *The Telecoms Twilight Zone: Navigating the Legal Morass Among the Supreme Court, the D.C. Circuit and the Federal Communications Commission*, PHOENIX CENTER POLICY PAPER SERIES NO. 13 (August 2002) (http://www.phoenix-center.org/pcpp/PCPP13Final.pdf).

[2] 47 U.S.C. § 251.

[3] 47 U.S.C. § 251(d)(2)(B) (emphasis supplied). The Telecommunications Act also contains a "necessary standard" in § 251(d)(2)(A) -- that is, providing access to any "proprietary" network element must be necessary for the requesting carrier to provide service. In practice, the necessary standard is rarely relevant.

policies but the courts have remanded both those attempts.[4] This problem – a defining one from the perspective of the ultimate provision of competitive retail telephony – stems from the fact that, whereas the plain language of Congress suggests a straightforward definition, the FCC has failed to specify or define "impairment" in a useful, analytical way.[5]

The purpose of this paper is threefold. In Section II, the implications of the unbundling provisions of the 1996 Telecommunications Act on industry structure for local telecommunications market is discussed. Section III includes an analytical statement of the 1996 Act's impairment standard that draws primarily from the text of the 1996 Act and recent court decisions. In Section IV, theoretical and empirical models designed to test for impairment (as it related to unbundled switching) are described, and the results of the empirical analysis summarized. Concluding comments finish the paper.

II. Wholesale-Retail Bifurcation of the Telecommunications Market

The Telecommunications Act of 1996 is an ingenious piece of legislation, incorporating specific mandates that address the underlying economics of the local exchange market into its pro-competition framework[6] for the purpose of "uprooting the monopolies" presently serving that market.[7] For most of the history of telephone service, the local exchange market has been believed to be a natural monopoly and has been treated as such by regulators.[8] Today, it is

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[4] *AT&T Corp. v. Iowa Utils. Bd.*, 525 U.S. 366 (1999) ("*Iowa*"); *United States Telecom Association et al. v. FCC*, 290 F.3d 415 (D.C. Cir. 2002) ("*USTA*").

[5] *Iowa, id.* at 389 ("[T]he Commission' s assumption that any increase in cost (or decrease in quality) imposed by denial of a network element renders access to that element 'necessary,' and causes the failure to provide that element to 'impair' the entrant' s ability to furnish its desired services is simply not in accord with the ordinary and fair meaning of those terms"); *USTA. id. at* at 438 ("[A]dding the adjective 'material' contributes nothing of any analytical or qualitative characters that would fulfill the Court's demand for a standard 'rationally related to the goals of the 1996 Act'").

[6] *VerizonTel. Cos. v. FCC*, 535 U.S. ___, 122 S.Ct. 1646, 1661 (2002). ("*Verizon*") at 1661 (describing "novel rate setting designed to give aspiring competitors every possible incentive to enter local retail telephone markets, short of confiscating the incumbents' property").

[7] *Id.* at 1660.

[8] For example, as the Supreme Court noted in *Verizon*, the 1982 Consent Decree that divested AT&T of its LECs did nothing to increase competition in local exchange telecommunications service (including loop, switching, and transport), which was thought to be a natural monopoly at the time. *See, e.g., id.* at 1654.

possible for competition to exist in *some* geographic and product segments of the local exchange market.[9] The unbundling provisions promote competition by addressing the most important factors that impede competitive entry: a) the sunk cost of deploying local exchange facilities and bringing such facilities to operational efficiency; b) pervasive economies of scale, scope, and density; and c) other first-mover advantages possessed by the incumbents.[10]

Industrial economics indicates that equilibrium industry structure is driven fundamentally by market size and the sunk costs of entry.[11] The larger is the market per dollar of sunk entry costs, or, equivalently, the smaller are sunk costs per dollar of market expenditures, the less concentrated is industry structure. Promoting competition by attenuating the influence of sunk costs on market structure lies at the very core of the Telecommunications Act of 1996 and, in particular, the unbundling mandates of the 1996 Act.[12] By allowing entrants to lease elements of the local exchange, the 1996 Act allows firm to enter that market more freely and to sustain that entry by avoiding the entry deterring sunk investments otherwise required to provide service. As the economics of entry implies, reducing sunk investments allows for more entry, thereby improving the equilibrium industry structure in the provision of retail telephone services (*i.e.*, "uprooting the monopolies"). The unbundling provisions are more

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[9] Commenting on implementation of the 1996 1996 Act, Chairman Powell recently observed, "We correctly believed these markets didn't need to be natural monopolies and they could be competitive," Yochi J. Dreazen, *FCC, Faced with Telecom Crisis, Could Let a Bell Buy Worldcom*, WALL STREET JOURNAL (July 15, 2002). Powell qualified these remarks by noting that "I think we tended to over-exaggerate how quickly and how dramatically it could become competitive."

[10] *Id.* at 1684 ("The 1996 Act, however, proceeds on the understanding that incumbent monopolists and contending competitors are unequal."). The 1996 Act's unbundling mandates were not restricted solely to offset entry barriers related to sunk costs, but offered entrants access to the incumbent's network for any reason that would impair the ability of the entrant to provide service. *See* 47 U.S.C. § 251(d)(2)(B). Also *see* T. Randolph Beard, George S. Ford, and Lawrence W. Spiwak, *Why ADCo? Why Now? An Economic Exploration into the Future of Industry Structure in Local Telecommunications Markets*, 54 FED. COMM. L. J. 421-59 (2002) (hereinafter "*Beard, Ford, and Spiwak 2002*").

[11] *See*, e.g., John Sutton, SUNK COST AND MARKET STRUCTURE (1991), Ch. 3.

[12] Policies designed to promote competition in markets that have traditionally been characterized by natural monopoly or high concentration must address either market size or sunk costs (or other entry barriers), and, in most cases, sunk cost is more readily affected by policy. As Elizabeth Bailey argued, "The single most important element in the design of public policy for monopoly should be the design of arrangements which render benign the exercise of power associated with operating sunk facilities" (E.E. Bailey, *Contestability and the Deign of Regulatory and Antitrust Policy*, AMERICAN ECONOMIC REVIEW Vol. 71, at 178-183 (May 1981).

important now than ever, as financing for CLECs has all but dried up completely.[13]

Consistency with the 1996 Act requires the FCC to consider how its policies, extant and prospective, affect market size and sunk entry costs (along with other practical entry barriers).[14] Successful implementation of the 1996 Act by the FCC requires the reduction of sunk costs (and entry barriers generally) and the expansion of the potential market available to entrants whenever feasible. Conversely, limiting market size or increasing sunk costs reduces entry, thereby reducing competition and extending the need to regulate local exchange services. Limited access to unbundled elements in arbitrarily defined geographic and product markets unambiguously reduces market size (*e.g.*, top 50 MSAs, more than 3 access lines, etc.), and such policies should be avoided since they limit competition.[15] Requiring competitors to self-provide critical inputs where production requires sunk investments further rigs the system against competitive entry, denying consumers the benefits of competition and thwarting Congressional intent of "eliminating the monopolies" in the local exchange markets.[16]

A. Reorganizing Markets into Wholesale and Retail Components

The unbundling provisions of the Telecommunications Act of 1996 have, in practical effect, split the vertically integrated local exchange industry into retail

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[13] *See*, e.g., *Experts Say Investors Might Not Fund Facilities-Based Competition*, Telecommunications Reports Daily (October 7, 2002) (Financial markets are reluctant to pump more money into the sector, and the Commission may be powerless to jump-start investment).

[14] *Iowa*, *supra* n. 2 at 388 (rationally related to the goals of the 1996 Act); *Verizon*, *supra* n. 6 at 1685 (meant to remove practical barriers to competitive entry into local-exchange markets).

[15] In *In re Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Third Report and Order and Fourth Further Notice of Proposed Rulemaking*, FCC No. 99–238, 15 FCC Rcd 3696 (rel. Nov. 5, 1999) ("*UNE Remand Order*"), the FCC restricted access to unbundled local switching for locations with more than three access lines located in the most dense portions of the largest fifty metropolitan statistical areas (MSAs). A recent study by Beard, Ford, and Koutsky (2002) finds that this restriction reduced the deployment of switching equipment in the restricted areas, contrary to the intent of the restriction (*Facilities-Based Entry in Local Telecommunications: An Empirical Investigation*, Unpublished Manuscript, www.telepolicy.com). Z-Tel Policy Paper No. 3 includes an empirical analysis that estimates the switching restriction reduced competitive entry by 36% (*Does Unbundling Really Discourage Facilities Based Entry? An Econometric Examination of the Unbundled Switching Restriction*, February 2002, www.ztel.com and www.telepolicy.com).

[16] *Verizon*, *supra* n. 6 at 1661.

and wholesale segments.[17] Vertical integration is not prohibited, but neither is it required.[18] By freeing the retail telecommunications and value-added (such as information services) segments of the local exchange from the enormous sunk costs of the wholesale telecommunications segment, unbundling directly promotes competition in retail services, increasing consumer welfare.

Differentiation of retail and wholesale segments of the local exchange market mirrors the current market structure in the interexchange industry. In 2001, more than 900 firms sold retail long distance services, including the Regional Bell Companies (who today rely on market-based unbundled access to interexchange facilities to provide long distance service).[19] All of these retail services were supported by only seven nationwide long distance networks (and some more regional networks).[20] Given that the sunk cost per dollar of market potential in the local exchange market(s) is less favorable to multiple firm supply than in interexchange industry (where traffic is aggregated), an equilibrium industry configuration with numerous CLECs relying exclusively on their own facilities to provide service is improbable.[21] High concentration in the wholesale segment is perhaps inevitable, but monopoly is not.[22]

B. SUNK COST AND THE FEASIBILITY OF VERTICAL DISINTEGRATION

The economic and financial infeasibility of all CLECs deploying their own facilities does not suggest that facilities-based competition in the wholesale segment is impossible. Indeed, the risk of entry at the wholesale level is

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[17] *Id.* at 1661–62 ("Congress aim[ed] to … reorganize markets." "[W]holesale markets for companies engaged in resale, leasing, or interconnection of facilities cannot be created without addressing rates." "The Act…favor[ed]…novel rate setting designed to give aspiring competitors every possible incentive to enter local retail telephone markets.").

[18] This fact also is supported by general antitrust law. *See, e.g., Fishman v. Estate of Wirtz*, 807 F.2d 520 (7th Cir. 1986); and DAVID L. KASERMAN & JOHN W. MAYO, GOVERNMENT AND BUSINESS (1995), Ch. 9.

[19] FCC *Trends in Telephone Service*, Table 10-4 (May 2002).

[20] *Resellers Rate Wholesale Carriers*, PHONE + MAGAZINE (September 4, 2000).

[21] *See* Philip Areeda and Herbert Hovenkamp, ANTITRUST LAW (1997) at p. 175 (¶ 772a) (whether or not local "hard-wired" telephone service is best delivered by a monopoly, it would be unwise to allow that monopoly to obstruct free competition in long distance services or telephone instruments, where competition is clearly possible) Beard, Ford, and Spiwak (2002), *supra* n. 10 *passim*.

[22] *Id.*

attenuated by the presence of the non-incumbent demand for network infrastructure held by entrants using unbundled elements in the retail segment. Until CLECs have substantial numbers of retail customers, there is effectively no demand for competitive telecommunications facilities. End users do not directly demand facilities; retail telecommunications carriers do. Thus, generating effective demand for facilities by promoting retail competition stimulates entry in the wholesale segment of the local exchange.[23]

Given the likelihood that very few firms can exist in equilibrium in the wholesale segment, this non-incumbent demand for facilities, held by numerous retail competitors, can be consolidated by one or a few a wholesale entrants. More simply, the derived demand for facilities of *any particular* CLEC likely will not be sufficient to warrant duplication of costly network facilities. However, the consolidation of the derived demands of *multiple* CLECs may be sufficiently large to justify the sunk investments by allowing the wholesaler to quickly and assuredly realize minimum efficient scale. Further, the ability to establish long-term contracts with extant demand reduces the lag between the occurrence of sunk investments and the realization of revenues, thereby facilitating entry into the wholesale market by reducing risk.[24]

The interexchange telecommunications industry is a good example of the relationship between retail competition and wholesale entry. While long-distance retailers AT&T, MCI, and Sprint operate their own interexchange networks, the other operators of nationwide interexchange networks (Qwest, Williams, Global Crossing) do not have a significant retail presence. [25] All of the recently deployed nationwide interexchange networks were deployed by (essentially) non-retail operations to provide data transport and wholesale interexchange services. In 2000, some 800 retailers provided long distance services over about 7 nationwide networks.[26]

Unbundling, therefore, promotes the evolution of competition in the wholesale local exchange market by targeting the source of industry concentration: the risk accompanying sunk entry costs and other entry barriers.

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[23] *See id;* T. R. Beard, D. L. Kaserman, and J. W. Mayo (1998), *The Role of Resale Entry in Promoting Local Exchange Competition*, TELECOMMUNICATIONS POLICY, Vol. 22, No. 4/5, pp. 315-326.

[24] *See id.*

[25] *See* Beard, Ford, and Spiwak (2002), *supra* n. 10; *Statistical Trends in Telephony* (229 IXCs and 576 resellers), Table 10.4 (May 2002).

[26] *Id.*

Entrants in the retail segment, however, are not necessarily the same firm or firms that enter the wholesale segment.[27] Vertical integration of retail competitors into the wholesale market has and may continue to occur on a limited basis, but likely will be restricted to specific (product and / or geographic) markets where the entry conditions are suitable. For these reasons, the whole question of how and under what conditions unbundling should occur is critical to providing retail competition in local telephony. But prior to the determination of what is unbundled and where, clear principles of impairment must be established.

III. Unbundling and the Impairment Standard

Besides the network elements that must be unbundled as a requirement of Section 271 of the 1996 Act, Section 251(d)(2)(B) of the 1996 Telecommunications Act specifically requires the FCC in determining what network elements should be made available to consider, at a minimum, whether "the failure to provide access to such network elements would impair the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer."[28] The plain language of this section indicates at least three components of an impairment standard, including: 1) impairment is *carrier specific*; 2) impairment is detected in the relative output of the requesting carrier with and without access to the element; and 3) impairment includes some notion of *significance* and should be non-transitory. Each component is discussed in turn.

A. Carrier Specific Nature of Impairment

The plain language of §251(d)(2)(b) indicates that the impairment standard is *carrier specific*, describing "*the* telecommunications carrier" and the services "*it* seeks to offer." In fact, given the different business plans (including target markets), financial resources, and retail products of the various CLECs, it is difficult to imagine how impairment could not be carrier specific. The Supreme Court recognized the carrier specific nature of the impairment standard, observing that:

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[27] As with long distance, vertical integration into the downstream retail market by upstream wholesalers is possible. As scale or density economies become more prevalent, vertical integration can inhibit the success of a firm supplying the wholesale markets. See *id.*

[28] 47 U.S.C. § 251(d)(2)(B).

- "[i]f *a* requesting carrier wants access to additional elements, *it* may petition the state FCC, which can make other elements available on a case-by-case basis;"[29]

- "[t]he 1996 Act…requir[es]…that incumbents provide access to 'any' requesting carrier;"[30]

- "[C]ompetition as to 'unshared' elements may, in many cases, only be possible if incumbents simultaneously share with entrants some costly-to-duplicate elements jointly necessary to provide a desired telecommunications service. Such is the reality faced by the hundreds of smaller entrants (without the resources of a large competitive carrier such as AT&T or Worldcom [sic]) seeking to gain toeholds in local-exchange markets;"[31] and

- "a policy promoting lower lease prices for expensive facilities unlikely to be duplicated reduces barriers to entry (particularly for smaller competitors).[32]

Clearly, the Court recognized that the condition of impairment may vary among CLECs, and further observed that financial "resources" and basic "inefficiency" may be legitimate sources of such variation.[33] The carrier-specific nature of impairment is echoed throughout section 251(c) and also in section 257 of the 1996 Act. The FCC recognized that impairment is a carrier-specific phenomenon in the *UNE Remand Order*.[34]

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[29] *Iowa, supra* n. 2 at 388 (emphasis added).

[30] *Id*. at 392.

[31] *Verizon, supra* n. 6 at 1672

[32] *Id* at 1668.

[33] *Id* at 1672, *but c.f.* Judge Antonin Scalia's Opinion in *Iowa, supra* n. __ at 387-88, where Justice Scalia argued that the Section 251(d)(2) of the Telecommunications Act does not mean that the FCC has unlimited authority to order unbundling. While incumbents would favor the "essential facilities doctrine" (established in an early railroad case, *Terminal Railroad Association v. U. S.* 1912) as a boundary, the Court did not invoke it in *Iowa,* and for good reason – the doctrine is wholly inapposite to the issue at hand. *See* Spiwak (2002), *supra* n. 1 at 24-30.

[34] *See UNE Remand Order, supra* n. 15 at ¶ 53. While carrier-specific, the FCC's analysis also noted that the administrative costs of a case-by-case analysis may be prohibitively expensive. *See id.* (¶ 54). If the business plans and financial conditions of a group of carriers are sufficiently homogenous, the carriers possibly can be grouped for an impairment analysis without violating

B. OUTPUT-BASED NATURE OF IMPAIRMENT

A second component of impairment is that it is *output based* for a specific carrier. That is, impairment is satisfied if a lack of access to an element impairs the ability of the requesting carrier "*to provide the services it seeks to offer*." Clearly, to impair the "ability to provide…service" is best detected in the difference in quantity of service provided (i.e., output) with and without access to the unbundled element.[35]

In its criticism of the FCC's first effort to define impairment, which was a cost-based standard, the Supreme Court observed the output-based nature of impairment:

> [T]he FCC's assumption that *any* increase in cost (or decrease in quality) imposed by denial of a network element renders access to that element "necessary," and causes the failure to provide that element to "impair" the entrant's ability to furnish its desired services is simply not in accord with the ordinary and fair meaning of those terms.[36]

The Court did recognize, however, that "In a world of perfect competition … the FCC's total equating of increased cost (or decreased quality) with "necessity and "impairment" might be reasonable."[37] Clearly, the Supreme Court is linking impairment to the output of the requesting carrier. Indeed, in a world of perfect competition or Bertrand-style oligopolistic competition with homogeneous products, any cost disadvantage translates into zero output for the high cost firm.[38] As competition moves away from textbook models of intense price

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carrier specificity. The administrative costs also imply that impairment analysis is perhaps better left to the state regulatory commission.

[35] *Iowa, supra* n. 2 at 375 (emphasis added). The FCC's failure to specify impairment in terms of output is the source of most of its judicial trouble with the standard. In the *UNE Remand Order*, *supra* n. 15 at 3705, the FCC appeared to adopt an output standard (focusing on timeliness, ubiquity, etc.), , but failed to directly specify the standard in terms of output. Once the output distinction is made clear, the impairment analysis becomes considerably easier to describe and implement.

[36] *Iowa,supra* n. 2 at 389-90.

[37] *Id.* at 390.

[38] Firms choose price in Bertrand competition, quantities in Cournot competition. If products are homogeneous, Bertrand competition renders the competitive equilibrium (price equals marginal cost) with only two firms. With product differentiation, the differences in Bertrand and Cournot outcomes are less divergent. See, e.g., James Friedman, OLIGOPOLY THEORY (1983).

competition, as the Court recognized, cost disadvantages are not so punishing to the output of rival firms.[39] For example, in Cournot-style oligopolistic competition, firms with different levels of marginal cost can co-exist, although low-cost firms have higher output levels.[40] By linking cost changes to output by reference to the intensity of price competition, the Court clearly observed that output was the relevant index of impairment, and rebuked the FCC for not incorporating this fact into their impairment analysis.

The Supreme Court decision in *Verizon v. FCC* further supports the output component of impairment. In that decision, the Court describes a "reasonable reading" of the unbundling and interconnection provisions of the 1996 Act (*i.e.*, section 251(c)) is that they are "meant to remove practical barriers to competitive entry into local-exchange markets."[41] Under an output-based test for impairment, any "practical barrier[] to … entry"[42] will reveal itself in the reduced output of the entrant. These "practical barriers" include the more traditional, economic concept of *barriers to entry*, as well as any other factor that attenuates competitive entry in a practical sense, such as access to financial resources and the relative inefficiency of entrants.[43] Indeed, any factor that attenuates competitive entry impedes the attainment of the 1996 Act's fundamental goals, including: "uprooting the monopolies…reorganiz[ing]

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[39] *Iowa, supra* n. 15 at 390 ("In a world of perfect competition, in which all carriers are providing their service at marginal cost, the Commission' s total equating of increased cost (or decreased quality) with 'necessity' and 'impairment' might be reasonable; but it has not established the existence of such an ideal world").

[40] Stephen Martin, ADVANCED INDUSTRIAL ECONOMICS (1993), at 19-21 ("In equilibrium the lower-cost firm enjoys greater sales."). Cournot competition assumes that rival firms select their chosen level of output and the market price is such that the entire industry output is sold. Industry output and price approach the competitive level as the number of firms increase.

[41] *Verizon*, supra n. 6 at 1685.

[42] *Id.*

[43] Barriers to entry relate to the ease or difficulty of entry. Joe Bain defined entry barriers as "advantages which established firms in an industry have over established entrant firms." George Stigler, similarly, defines entry barriers as "a cost of producing (at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry." von Weizsacker adds to the Stiglerian definition the requirement that the barrier lead to a suboptimal allocation of resources. *See* MARTIN, *supra* n. 40 at 5-7, 172-191; *In re Implementation of Section 19 of the Cable Television Consumer Protection & Competition Act of 1992; Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, First Report*, 9 FCC Rcd 7442 (1994), at App. H: Economic Concepts for Assessing the Extent of Competition in Video Programming Distribution Markets.

markets…[and] giv[ing] aspiring competitors every possible incentive to enter local retail telephone markets."[44]

Because impairment is an output-based standard, the FCC's focus on cost-differences in the *UNE Remand Order* was lacking, given that it failed to provide some direct link between cost and output.[45] Thus, it is important to establish some theoretical relationship of output to cost because cost differences will often be the focus of attention in a *practical* analysis of impairment. Such an exercise has been performed before; it is not repeated here.[46] Nevertheless, it is worth observing that output is very sensitive to cost changes even under competitive interactions much less severe than perfect competition (e.g., Cournot competition).

C. THE SIGNIFICANCE COMPONENT

Impairment focuses on the reduction in output experienced by an individual carrier if the carrier is not given access to an unbundled element. But how much of a reduction does the 1996 Act allow before impairment is deemed to exist? Because the dictionary definition of "impair" is "to damage or make worse by or as if by diminishing in some material respect," it seems reasonable that to constitute a statutorily cognizable impairment, there must be a small, but significant and non-transitory decrease in the requesting carrier's output.[47] 1996 Act offers no guidance on what "significant" is, but it seems sensible that

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[44] *Verizon, supra* n. 6 at 1660-61.

[45] Section 251 of the Telecommunications Act also instruct the FCC to consider whether "access to such network elements as are proprietary in nature is necessary" and whether "the failure to provide access to such network elements would impair the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer" (251(d)(2)). According to Jerry A. Hausman and J. Gregory Sidak, in *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, YALE LAW JOURNAL, (December 1999) at 436, "neither 251(d)(2) not any other section of the Telecommunications Act of 1996 defines "proprietary" for purposes of the ILEC's duty to unbundled network elements. In practice, the "necessary" standard of 251(d)(2) may ultimately prove to have less frequent application than the "impair" standard if under whatever legal definition is adopted, an ILEC is deemed to have few or no network elements that are 'proprietary in nature'."

[46] See Z-Tel Policy Paper No. 5 (*Some Thoughts on Impairment: An Economic Analysis of the Impairment Standard of the 1996 Telecommunications Act*, April 2002, www.z-tel.com and www.telepolicy.com) and Rebuttal Testimony of George S. Ford on Behalf of Z-Tel Communications, CC Docket No. 01-338 (July 17, 2002).

[47] *See* Merriam-Webster Dictionary Online (www.m-w.com).

significance be "rationally related to the goals of the Act,"[48] which include the promotion of competition ("uprooting the monopolies") and deregulation.[49] The reduction in output also should not be a transitory disability, but one that cannot be quickly and easily overcome.[50]

In *Verizon v. FCC*, the Supreme Court observed that the 1996 Act was "designed to give aspiring competitors every possible incentive to enter local retail telephone markets."[51] Given that the Court stated that even small price increases of an unbundled element may reduce incentives to enter local retail telephone markets, small degrees of impairment necessarily must be significant.[52]

D. An Analytical Statement of the Impairment Condition

The legal intent of impairment, as we have established above, is an output standard to which "significance" is a necessary part. To be useful, these requirements must be developed into a conceptual framework around which issues may be identified and analyzed in empirical terms. In order to provide analytical specificity to the impairment condition, consider the following simply model. Let Q^U be the quantity of services sold by the CLEC when it has access to the unbundled element, and let Q^F represent the quantity of services sold without access to the unbundled element. Services sold with the unbundled element (Q^U) may contain services provided with and without the element in

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[48] *Iowa, supra* n. 2 at 388.

[49] In writing for the Majority in *Iowa, supra* n. 2 at 391-92, Justice Scalia entertained the element of significance in the context of impairment. Obviously not every diminution in quality or increase in cost significantly impairs an entrant and its return on investment.

[50] The concept of a more permanent, non-transitory change is consistent with the joint Department of Justice-Federal Trade Commission1992 Horizontal Merger Guidelines s 3.0, 57 Fed. Reg. 41,552 (1992).

[51] *Verizon, supra* n. 6 at 1661.

[52] *Id.* at 1672 ("[T]he difference between such a higher rate and the TELRIC rate could be the difference that keeps a potential competitor from entering the market."); *id.* at 1675 ("[H]igh lease rates for these elements would be the rates most likely to deter market entry."). It is certainly possible to conclude that a significant difference is something perhaps akin to the 5-10% price increase of merger analysis. Econometric studies indicate that the own-price elasticities of demand for unbundled elements are in the elastic region of demand. See, e.g., Robert B. Ekelund Jr. and George S. Ford, *Preliminary Estimates of the Demand for Unbundled Network Elements in Telephony*, Atlantic Economic Journal (Forthcoming December 2002) (estimating own-price elasticity of demand for unbundled element combinations to be –2.7).

question, but services sold without the element (Q^F) are provided solely without the element.[53] For now, let the significance component be a particular percentage reduction (m) in the quantity of service sold that is "significant."

Consistent with the discussion above, the impairment standard is satisfied for firm i if the following is true:

$$Q_i^U - Q_i^F > mQ_i^U, \tag{1}$$

where the condition simply states that impairment exists if the reduction in the quantity of service sold ($Q^U - Q^F$) exceeds a significant reduction in service sold (mQ^U) when the unbundled element is taken away. For example, say that a 10% reduction in the quantity of service sold is significant (m = 0.10). With access to the unbundled element, CLEC i sells 100 units. Without access to the element, alternately, CLEC i sells only 30 units. Because 70 units (100 - 30) exceeds 10 units (0.10·100), the impairment condition is satisfied. In this example, if the CLEC output falls by more (less) than 10 units, the impairment condition is (is not) satisfied. Equation (2) is a simple, direct analytical re-statement of section 251(d)(2)(B). Obviously, the difference in CLEC output across the two regimes is a function of a number of factors, including the cost differences of self-provisioning the element and the availability of elements from a competitive wholesale provider.[54]

This analytical statement suggests a straightforward empirical test of impairment for which multiple regression and other statistical procedures may prove useful. In general, the analysis proceeds as follows. Let Q be the output of a "requesting carrier," and this output is a function of the availability (or price) of some network element (i.e., $Q(A)$, where A is zero if the element is unavailable).[55] A finding of impairment is supported if reductions in availability (or increases in price of the element above cost), reduce output by an amount sufficiently large to qualify as "significant" [i.e., $Q(A) - Q(0) > mQ_E(A)$].

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[53] The quantity of service provided using the unbundled element (Q^U) is that quantity provided at "cost[-based]" rates and on "non-discriminatory" terms and conditions, consistent with section 252(d). Today, prices are based on total long-run incremental cost ("TELRIC"), and the Supreme Court recently upheld that pricing standard in *Verizon* as being the most reasonable interpretation of the 1996 Act's requirements among proffered alternatives, *see supra* n. 6 at 1668-79.

[54] *Iowa, supra* n. 2 at 389.

[55] Prices are relevant to impairment because price is just another index of availability (at some price, the effective demand is zero).

1. *Geographic Markets and Time*

It may be the case that the impairment test described by Equation (2) renders different results across geographic and product markets.[56] While not stated explicitly in §251(d)(2)(B), it is perhaps reasonable to incorporate a geographic/product component into the condition, particularly in light of the recent *USTA v. FCC* decision.[57] Further, output must be measured at some specific point in time or over some time interval. Thus, the impairment standard for firm *i* in market *g* is

$$Q^{U}_{i,g,t} - Q^{F}_{i,g,t} > mQ^{U}_{i,g,t}, \tag{2}$$

where the quantities are measured in period *t*. Consideration of impairment over some time interval ensures that a reduction in output that is merely transitory does not constitute impairment. However, a reduction in output is not transitory if there is a permanent lag, which reduces output permanently below the levels that would exist in the absence of the condition that creates the lag. This is consistent with prior FCC interpretations of impairment. Geographic differences in impairment were considered with respect to unbundled switching in the FCC's *UNE Remand Order*.[58] While the switching restriction of that *Order* has been detrimental to competition and facilities deployment, the restriction was useful in that it did generate some variation across markets in element availability so the effects of unbundling or the lack thereof could be measured empirically.[59] In that same *Order*, the FCC also considered "timeliness" as a relevant factor for impairment, which enters the analysis via *t*.[60]

Using our analytical form, section 251(d)(2)(B) can be rewritten as "the failure to provide access to such network elements would [reduce] the [output] in time *t* of the telecommunications carrier [*i*] seeking access [in market *g* by *m* percent]." This analytical restatement of the impairment standard of the 1996 Act exactly

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[56] A granular, geographic-specific analysis of impairment was called for in *United Sates Telecom Association v. FCC*, 290 F.3d 415 (D.C. Cir. 2002).

[57] *Id.*

[58] *See UNE Remand Order*, *supra* n. 15 at 3804-32 (¶¶ 241-99).

[59] *See* Z-TEL Policy Papers No. 3, *supra* n. 15, and No. 4 (*Does Unbundling Really Discourage Facilities-Based Entry? An Econometric Examination of the Unbundled Local Switching Restriction*, February 2002, available at www.z-tel.com and www.telepolicy.com) and Beard, Ford, and Koutsky (2002), *supra* n. 15.

[60] *UNE Remand Order*, *supra* n. 15 at 3704-09.

reflects the plain language of the 1996 Act and the apparent intent of Congress as interpreted by the Supreme Court. In practical terms, the final impairment condition (Equation 2) can be stated as a question: "Without access to the unbundled element, will the requesting carriers output in market *g* fall by more than *m* percent over some relevant time period?"

2. *The Specific Causes of Impairment*

The decline in the CLEC's output related to a lack of access to an unbundled element is a consequence of the inability to find an adequate substitute for the element.[61] In cases where a perfect substitute for the UNE can be self-supplied or purchased from a third-party, then the output of the CLEC would not be expected to fall so that $Q^U = Q^F$. Thus, an important fact relevant to the determination of impairment is the measurement of the *substitution effect* between a UNE and alternative sources of supply. In measuring this substitution effect, it is vital to measure the full cost of alternative sources of supply. For example, with respect to unbundled local switching, the manual intervention required to physically move an unbundled loop from the ILEC's switch to a CLEC's colocation prohibits both self- and third-party supply of the switching element.[62]

Related to the substitution effect is the output effect. If perfect substitutes for the UNE are unavailable, then the output of the CLEC will decline without access to the UNE. Depending on the relative full costs of self- or third-party supplied elements to the UNE, this *output effect* may be large or small. A non-zero output effect implies $Q^U > Q^F$, and the question of impairment becomes relevant. Obviously, there is a direct relationship between the substitution effect and the output effect. If perfect substitutes for the UNE are readily available, then the substitution effect is large and the output effect is small. Alternately, if good substitutes are unavailable, the substitution effect is small and the output

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[61] *Iowa, supra* n. 2 at 391-92, where the Majority held that Section 251(d)(2):

> requires the Commission to determine on a rational basis *which* network elements must be made available, taking into account the objectives of the Act and giving some substance to the "necessary" and "impair" requirements. The latter is not achieved by disregarding entirely the availability of elements outside the network ….

(Emphasis in original.)

[62] *See* Z-Tel Comments and Reply Comments in CC Docket No. 01-338 (May 5, 2002 and July 17, 2002); also see Comments of the New York State Public Service Commission in CC Docket No. 01-338 (May 5, 2002).

effect is large. Empirical measurements of the substitution and output effects are, consequently, important to the evaluation of impairment.

3. Caveat

The purpose of defining analytically the impairment standard is not necessarily to produce some formula that actually can be calculated directly.[63] Rather, the purpose of the analysis is to create a conceptual framework for considering impairment so that relevant empirical and theoretical questions may be posed and answered. The use of an analytical approach to impairment – assists in providing a framework for evaluating the many empirical questions that are extremely important for competition policy in local telecommunications markets. Given the ambiguity of economic theory on many of the policy-relevant issues (e.g., unbundling and its effect on investment), the need for quality empirical analysis to guide policy cannot be understated.[64]

IV. A Theoretical and Empirical Model of Impairment

Just described are two important empirical relationships relevant to the determination of impairment -- the substitution and output effects. These two effects can be described in more detail with a simple theoretical model that captures the essence of competition resulting from the unbundling provisions of the 1996 Act. Consider a scenario where there are two firms, 1 and 2 (i.e., the ILEC and CLEC), producing a homogeneous output produced with a fixed proportion technology (i.e., each unit of output requires one unit of input, e.g., loops and switching). The end-user outputs of the two firms are q_1 and q_2, and the industry equilibrium price is $p(q_1 + q_2)$. Firms act as Cournot competitors, choosing their respective outputs simultaneously and selling at the market-clearing price.

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[63] The current lack of experience and information implies that in many cases an impairment analysis will require a plethora of rough guesses and empirical extrapolation. This reality is unproblematic, however, since regulatory agencies frequently operate under such conditions and constraints. Merger analysis under the Merger Guidelines is one example of decisions based on theoretical conjecture and available empirical evidence. Importantly, the Texas Public Service FCC recently performed an impairment analysis entirely consistent with the impairment condition of Equation (3) (see Arbitration Award, *Petition of MCIMetro*, Texas PUC Docket No. 24542 (May 1, 2002)).

[64] The theoretical ambiguity of the relationship between unbundling and CLEC investment is illustrated by Beard, Ford, and Koutsky (2002), *supra* n. 15.

Firm 1 (the ILEC) self-supplies all of its own inputs to produce its output. Firm 2 (the CLEC) may either self-supply inputs at cost $c(x)$, lease units of input (the UNE) from its rival firm 1 at regulated price r, or both (the latter being the most interesting case).[65] Units of input purchased by firm 2 from firm 1 equal $(q_2 - x)$. When firm 1 sells a unit of x to firm 2, it incurs a cost of w per unit sold, whereas units sold to consumers require cost k per unit.[66] Because firm 2 can either make or buy the input, firm 2 must select both its output q_2 and how much of its input to make or buy. Assume, for present purposes, that self-supplied and leased inputs are identical in all respects (i.e., perfect substitutes).[67]

The profit functions of the two firms are

$$\pi_1 = pq_1 + (q_2 - x)(r - w) - kq_1 \text{, and} \tag{3}$$

$$\pi_2 = pq_2 - c(x) - r(q_2 - x)\,. \tag{4}$$

The first-order conditions for the profit functions are conventional, except firm 2 has the additional condition for the choice of x: $c'(x) - r = 0$. By equating the marginal costs of each firm to the common marginal revenue, the equilibrium output levels q_1^* and q_2^* are found.

The additional first order condition of firm 2 yields the demand for x that is $x^*(r)$. This first order condition implies that firm 2 makes x until the marginal cost of x equals r, and then buys the remaining units of x (up to q_2) at price r. In the case where firm 2 makes and buys its inputs, the firm's marginal cost at equilibrium is always r, regardless of how many units of input are self-supplied at equilibrium (x^*) as long as self-supplied units are less than firm 2's output ($x^* < q_2$).

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[65] For an interior solution, assume c' > 0 and c'' > 0. The second condition is true for any firm in the short run.

[66] For an illustration of the differences between retail and wholesale costs, see Letter to FCC Chairman Michael Powell from Robert Curtis and Thomas Koutsky, Z-Tel Communications, Inc. (Sept. 23, 2002) and T. Randolph Beard and George S. Ford, *What Determines Wholesale Prices for Network Elements in Telephony? An Econometric Evaluation*, PHOENIX CENTER POLICY PAPER NO. 16 (September 2002) (http://www.phoenix-center.org/pcpp/PCPP16.pdf) (estimating cost differences of about $5-6 per line, per month).

[67] This is a heroic assumption, and one that would call for less, not more, unbundling.

The fact that firm 2's marginal cost equals r is theoretically significant. Because firm 2's marginal cost is equal to r (in the case where some units of x are purchased), the effect of an increase in r on the output of firm 2 is consistent with the conventional result in Cournot competition: *a Cournot firm with higher marginal costs produces less output than its low-cost rivals*. Thus, an increase in the input price r reduces the output of firm 2. This effect is the "output effect," reflecting the effect of changes in r on the output q_2 ($\partial q_2 / \partial r < 0$). But, as the price r rises, firm 2 substitutes self-supply for input purchases. This effect is the "substitution effect," reflecting the increase in the amount of x "made" as the price of x increases [$\partial x / \partial r > 0$].

Importantly, in an equilibrium where units of x (the UNE) are purchased, *the output effect is always negative* – an increase in the price of r (the price of the UNE) reduces the output of firm 2 (the CLEC) because it increases the marginal cost of firm 2. Thus, any claim that increases in the price or the reduction in the availability of "used" UNEs will not effect the output of CLECs should be viewed with skepticism. The remaining empirical question is, therefore, is the *substitution effect* large enough to make the *output effect* so small that it is insignificant and transitory (i.e., less than m percent in time period t). Econometric estimates of the size of the two effects, obviously, are very useful to such an evaluation.

A. Empirical Evidence

The most successful, fastest growing, most geographically ubiquitous model of competitive entry in the local exchange markets today is the UNE-Platform. The UNE-Platform is the combination of unbundling loop, switching, and transport.[68] In effect, the UNE-Platform allows the CLEC to provide traditional local exchange telecommunications services as if it were the ILEC, and it allows the CLEC to integrate its own technology and software with the ILEC's network.

The success of the UNE-Platform has made it the ILECs' prime target for elimination under the impairment standard, with a focus on eliminating the switching element of the UNE combination.[69] It is sensible, therefore, to consider

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[68] All components of the UNE Platform must be unbundled under Section 271 of the 1996 Act. Nevertheless, the ILECs continue to call for the elimination of unbundling obligations for unbundled switching under 251(d)(2)(B). See Comments and Reply Comments of Z-Tel Communications, CC Docket No. 01-338, supra n. 62.

[69] Eliminating switching as an element would require CLECs to deploy their own switching equipment, including the complementary colocation and transport facilities. Approximately 40

empirically the substitution and output effects as they relate to unbundled loops purchased with and without unbundled switching. Unbundled loops must be combined with switching to provide local exchange service. As in the theoretical model, switching is either self-provisioned by the CLEC or purchased on an unbundled basis from the ILEC. In the context of the theoretical model, self-provisioned switching is indicated as x, whereas the quantity of unbundled switching purchased is $q_2 - x$. Total CLEC output (using unbundled loops) is q_2. We only have aggregate data, so the aggregate is treated as representative of firm 2. If impairment is found to exist for the aggregate of CLECs, then it plainly exists for some components of the aggregate.

Unbundled switching is "available" in all states. Thus, we must treat availability in terms of price. The theoretical model evaluates impairment in terms of an increase in r (or price of unbundled switching for these empirics). Accordingly, to estimate the output and substitution effects, we estimate the following ordinary demand equations:

$$\ln(x) = \alpha_0 + \alpha_1 \ln r + \sum_{j=3}^{n} \alpha_j \mathrm{Z} + \varepsilon_L \tag{5}$$

$$\ln(q_2 - x) = \beta_0 + \beta_1 \ln r + \sum_{j=3}^{n} \beta_j \mathrm{Z} + \varepsilon_S \tag{6}$$

where r is the price for unbundled switching, the vector **Z** represents n other demand-relevant factors that influence the demand for loops of both types, and ε_L and ε_S are well-behaved econometric error terms that measure the unobserved determinates of loop demand. All variables are measured at the state level, and only the Bell Companies are represented in the sample.[70] Descriptive statistics and variable descriptions and sources are provided in Table 1.

1. *Substitution and Output Effects*

The price of unbundled switching r is included in both demand equations. The substitution effect, or $\partial x / \partial r$, is measured by coefficient α_1 in Equation (5).

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percent of CLEC deployed switching equipment is in bankruptcy. See Rebuttal Testimony of George S. Ford on Behalf of Z-Tel Communications, CC Docket No. 01-338 (July 17, 2002).

[70] For all practical purposes, only the Bell Companies have made been make to effectively unbundle their network at prices that provide an opportunity for competitive entry.

Due to the log-log specification of the model, the estimated coefficient α_1 measures the substitution effect in elasticity form, or the percentage change in output x given a percentage change in price r. In the theoretical model, the substitution effect indicated that $\partial x / \partial r > 0$ (as r rises, less of x is purchased and more of x is "made") and, by implication, $\partial(q_2 - x) / \partial r < 0$ (the demand for switching slopes downward). The own-price elasticity of demand for switching is measured by the coefficient β_1.

The output effect measures the influence of price r on the total output of the firm (q_2), so this effect is computed using coefficients α_1 and β_1 in Equations (5, 6). Specifically, the output effect is calculated as

$$\partial q_2 / \partial r = \alpha_1 (x/q_2) + \beta_1 (1 - x/q_2), \tag{7}$$

which is simply a weighed average of the two coefficients α_1 and β_1. The theoretical model suggests that the output effect is negative. The size of the output effect measures impairment. Observe that the output effect is equal to the difference of the reduction in the quantity of x "made" and the quantity of x "bought."

2. *Other Variables*

Other variables in the demand equation (making up the vector **Z**) include the price for unbundled loops (P_L). Clearly, higher prices for loops raise the cost of the CLEC and, consequently, should reduce the quantity demanded of both modes of competitive entry. Because the estimated demand curves are derived demands (demand for inputs, not the final output), the total demand for the final good (local service), measured as the total local service revenues of the Bell Company in the state (*SIZE*), is included as a regressor.[71] A priori expectations are that demand is positively related to market size.

Both the New York and Texas public service FCCs have exhibited leadership in promoting competition, and competitor penetration in these two states is considerably higher than average.[72] Thus, a dummy variable that equals one for New York and Texas (*DNYTX*), zero otherwise, is included in the model. New

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[71] See P.R.G. Layard and A.A. Walters, MICROECONOMIC THEORY (1978), Ch. 5.

[72] The loop penetration rates (total loops divided by total access lines) in New York and Texas are much higher than average (about 19% for these two states to the average of 5% for the others), and this difference is statistically significant (t statistic = 7.56).

York and Texas are the leaders in promoting competition via unbundled elements, so positive signs are expected on *DNYTX*.

The Bells' ability to provide long distance telecommunications service may influence demand, so we include a dummy variable for states in which the Bell Companies have received 271 approval (*D271*). [73]Both New York and Texas have 271 approval, so the 271 dummy variable measures the influence of 271 approval absent the leadership effect of these two states. No a priori expectation is made about 271 status (*D271*), and it is important to keep in mind that the dummy variable *D271* measures the effect of 271 approval once the "leadership effect" of New York and Texas (both 271 approved states) is taken into account.

A dummy variable indicating states with high non-recurring charges (*DNRC*), and the percent of the state's population density (*METPOP*), are both included as additional regressors.[74] The variable *METPOP* is measured as the percent of a state's population living in metropolitan areas. Non-recurring charges are sunk costs and, consequently, deter entry, so a negative sign on *DNRC* is expected. Population density (*METPOP*) may be positively affect demand for unbundled loops purchased without switching due to density economies for self-supplied switching, but no a priori expectation is made with respect to the variable's effect on loop-switching combinations.[75]

Finally, since the data used was collected in June and December of 2001, a dummy variable indicating the "as of" date of the data (*DSAMPLE*) is included as a regressor. A positive (negative) and statistically significant coefficient indicates that, on average, demand increased (decreased) over the six-month period between June 2001 and December 2001.

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[73] While most ILECs are subject to the Telecommunication Act's unbundling provisions, the Bell companies, as a result of the 271 process, have different incentives to comply. Section 271 of the 1996 Act would allow Bell companies to offer long distance services in their regions if they comply with a competitive checklist.

[74] For every unbundled loop or loop-switching combination leased from the incumbent LEC, the CLEC must pay the ILEC a non-recurring charge ("NRC") to cover the labor costs of the migration (ordering and provisioning). A high NRC is defined to be an NRC (for the UNE-Platform, migrating customers rather than new installations) exceeding $50.

[75] *UNE Remand Order*, *supra* n. 15 at ¶¶ 279-283.

B. EMPIRICAL RESULTS

The two equations are estimated (as a system) by weighted least squares.[76] Results are summarized in Table 2. Due to limitations on the availability of data for prices and quantities, the final sample consists of 134 system observations, or 67 (balanced) observations for each equation. The R^2 of Equation (5) is about 0.85 and Equation (6) is 0.66, indicating that a large amount (85% and 66%) of the variation of loop demand of both types is explained by the regressions. Cross sectional data often has low R^2s, so the results are very good with respect to goodness of fit.[77]

Econometric specification errors such as omitted variables, endogenous explanatory variables, errors in measurement, and an incorrect functional form can each cause least-squares estimates to be biased, inconsistent, and inefficient.[78] The RESET test is a rather general test of specification error, and is capable of detecting all of the specification problems listed above (Ramsey 1969), but the test is particularly sensitive to omitted variables and incorrect functional form.[79] The null hypothesis for RESET is 'no specification error,' so specification error is indicated if the null-hypothesis is rejected. The RESET F-statistics are provided in Table 2, and neither test statistic is statistically significant even at the 10% level, so there is no evidence of specification error (*i.e.*, null-hypothesis of "no specification error" cannot be rejected at standard significance levels). Accordingly, we can be reasonably certain that our model does not suffer from these important specification errors.

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[76] By estimating as a system using weighted least squares, the estimates are more efficient relative to ordinary least squares estimates of the individual equations because the procedure increasesthe degrees of freedom and corrects for heteroskedastic disturbances. *See* Robert Pindyck, and Daniel L. Rubinfield, ECONOMETRIC MODELS & ECONOMIC FORECASTS (3rd ed. 1991). Because there are no cross-equation restrictions, the estimated parameters are identical to single-equation ordinary least squares estimation. However, the standard errors of the two procedures are not the same.

[77] A. H. Studenmund, USING ECONOMETRICS (1992) at p. 47.

[78] This class of error violates the least squares assumption of a null mean for the theoretical disturbance vector. The RESET Test is valid only for least-squares regressions. Ramsey's RESET Test is performed by including as regressors the powers of the predicted values of the regression. The joint significance of these additional regressors is evaluated, and the null hypothesis of "no specification error" is rejected if the RESET F-Statistic exceeds the critical value (*i.e.*, the test of the joint restriction that all of the additional coefficients equal zero is statistically significant).

[79] See, e.g., J. Ramsey and R. Gilbert, *A Monte Carlo Study of Some Small Sample Properties of Tests for Specification Error,* JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, Vol. 67, 198-86, 1972.

Heteroskedasticity exists when the error term (ε) does not have constant variance. The consequence of heteroscedastic disturbances is inefficient estimates, implying the standard errors are too large and, consequently, the t-statistics are too small. The White test fails to reject the null-hypothesis of homoscedastic disturbances, so heteroscedasticity is not influencing the reported t-statistics.

1. *Estimates of the Substitution and Output Effects*

As previously mentioned, the substitution effect is measured by the coefficient α_1 (= $\partial x / \partial r$). From the econometric model, it is not possible to reject the hypothesis that *the substitution effect is zero*. While the estimated coefficient is positive (0.12), the estimated coefficient is not statistically different from zero (the t-statistic is only 0.29). As the price of unbundled switching rises, CLECs do not deploy more switching facilities or purchase switching from third-party suppliers. Given a zero substitution effect, the effect of higher unbundled switching prices is only reflected in the output effect.

Equation (7) shows the calculation for the output effect. Using the estimated coefficients and the sample average value for x / q_2 (= 0.50), the output effect is 0.44. So, a 10% increase in the switching price reduces CLEC aggregate output (using unbundled loops) by 4.4%. This output effect (elasticity) is statistically different from zero at better than the 1% significance level (χ^2 = 8.27).[80]

It is worth observing that the own-price elasticity of demand for unbundled switching is about –1.00 (measured as β_1), which indicates that a 10% change in price produces a 10% change in quantity demanded for loop-switching combinations (i.e., the UNE-Platform). The estimated elasticity is statistically significant at better than the 1% level (t statistic –3.79). Because UNE-Platform accounts for half of unbundled loops, the total output effect is smaller than the reduction of output for the UNE-Platform alone.

If a 10% increase in the price of unbundled switching reduces CLEC output by 4.4%, then it is clear that the removal altogether of unbundled switching will substantially reduce CLEC output. The empirical evidence, assuming the significance component of impairment is not arbitrarily large, supports impairment with respect to unbundled switching. Assuming the estimated

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[80] This joint test of significance is distributed χ^2 with *m* degrees of freedom (where *m* is the number of constraints). See Adrian C. Darnell, A DICTIONARY OF ECONOMETRICS (1994).

elasticities are valid for large price increases, a doubling of switching charges essentially cuts CLEC total output using unbundled loops in half.

2. *Other Variables*

Given the model specification, the own-price elasticities of demand for loops are estimated. As expected, the demand curves for unbundled loops of both types slope downward, with an elasticity of about -1.7 for both x and (q_2 – x). Both elasticities are in the elastic region of demand, indicating that quantity demanded responds more than proportionately to any given percentage change in price. A 10% increase in the loop price will decrease quantity demanded for each type of loop by about 17%. We cannot reject the hypothesis that the two elasticities are equal using the Wald Test ($\chi^2 = 0.05$).[81] Thus, our estimates suggest that it is reasonable to conclude that an increase or decrease in the loop rate for unbundled elements has an equivalent effect on all forms of loop purchases, and that the percentage quantity response of both quantities will exceed the percentage price change.

The effects of prices on the total quantity of competitive services provided using unbundled loops can be computed from the estimated coefficients of the demand equations. In fact, the own-price demand elasticity for total loops (q_2) is simply the weighted average of the two elasticities measured by α_2 and β_2, because in our sample, x / q_2 is approximately equal to 0.50. The simple average of the two own-price elasticities is –1.7, and this value measures the total, own-price elasticity of demand for unbundled loops of both types. Across loops of all types, a 10% increase in the price of an unbundled loop alone will decrease the quantity of loops sold by about 17%, all else being equal.

While the point estimates of the elasticities of demand for loops and switching (Eq. 6) are different, it is not possible to reject the hypothesis that a $1 increase in the price of either the loop or switching has an equal effect on quantity. This result is sensible, since for loop-switching combinations both elements are purchased jointly. The Wald test on the equality restriction has the statistic $\chi^2 = 1.17$, so the null hypothesis of equality (a $1 change renders an identical reduction in quantity) cannot be rejected.

Market size (*SIZE*), which measures total expenditures for local service, increases the demand for loops of both types. The coefficients are less than 1.00,

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[81] *Id.*

so the increase in demand is less than proportionate to the increase in market size.[82] New York and Texas, two leading states in the promotion of competition in local exchange markets, have a higher demand for loops leased with and without unbundled switching, and these effects are statistically significant, though statistical significance is much higher in Equation (6). Once the higher demand levels in New York and Texas are taken into account, approval for Bell Company entry into long distance under Section 271 of the 1996 Act (*D271*) is not an important determinant of the demand for loop-switching combinations (Eq. 6). With respect to the demand for loops purchased without switching (Eq. 5), Section 271 approval negatively affects demand, and this result is statistically significant (t statistic = -1.99).[83] High non-recurring charges reduce demand for both types of loops (*DNRC*), and both estimated coefficients are statistically significance at better than the 10% level. Population density (*METPOP*) increases the demand for loops purchased without switching, but has no statistically significant effect on the demand for loop-switching combinations.

VI. Conclusions

A central problem in the establishment of competition in local telephony has been the mechanism through which entry might be achieved. Congress – through the 1996 Telecommunications Act – offered guidance to the FCC by creating standards on which unbundling of critical elements by ILECs could take place. Chief among the principles regulating unbundling by ILECs is the potential impairment of entrants seeking to provide services to local demanders. The "impairment standard" as identified by the FCC has, however, lacked specificity to be accepted by the courts.

This paper surveys the impairment standard of Section 251(d)(2)(B) of the Telecommunications Act of 1996 and its content as it has been interpreted by both the FCC and the Courts. The Congressional standard relating to unbundling clearly pointed to its impact on each CLEC's output, and relevant Court decisions have repeatedly upheld this view. We develop a formal theoretical model of impairment that relates element availability to CLEC output. This theoretical model is then subjected to empirical tests.

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[82] Statistically, we cannot reject the hypothesis that the coefficients on *SIZE* are equal across equations.

[83] Both Verizon in New York and SBC in Texas have 271 authority. All the FCC 271 Orders are available at www.fcc.gov/Bureaus/Common_Carrier/in-region_applications/.

From the theory, it is shown that impairment is evaluated by estimating an output effect – the reduction in a CLEC's output when an element is made less available – and a substitution effect. The substitution effect measures the shift from unbundled elements to self-supply (or third-party supply) given a change in wholesale price. For unbundled switching, the empirical model revealed a sizable and statistically significant output effect: a 10 percent increase in switching price reduces CLEC output by 4.4 percent. The substitution effect, or the shift in inputs "made" from those "bought," is found to be zero. These estimates, made possible with the model developed in this paper, reveal the necessity for establishing standards for unbundling and, ultimately, for competitive entry in local telephony.

Table 1. Variable Definitions, Sources, and Descriptive Statistics

Name	Description	Mean	St. Dev.	Source
x	Quantity of unbundled loops sold on a standalone basis.	84,469	103,695	(1)
$q_2 - x$	Quantity of unbundled loops sold with unbundled switching.	148,580	359,948	(1)
q_2	Total unbundled loops sold: $Q_L + Q_S$.	233,049	419,107	(1)
x/q_2	Share of standalone unbundled loops to total loops.	0.502	…	…
P_L	Index of average price of an unbundled loop (mean-centered index).	1.00	0.30	(2)
r	Index of average price for unbundled switching (i.e., non-loop costs, indexed by average loop price).	0.915	0.45	(2)
SIZE	Size of the market measured as average monthly retail rate for local services multiplied by total access lines.	113M	107M	(1, 3)
DNYTX	Dummy variable that equals 1 if state is New York or Texas, 0 otherwise.	0.060	…	…
D271	Dummy variable for states granted 271 approval by the FCC: New York, Texas, Oklahoma, Kansas, Arkansas, Missouri, Massachusetts, and Pennsylvania.	0.179	…	…
DNRC	Dummy variable that equals 1 for states with loop-switching non-recurring charges exceeding $50.	0.045	…	(2)
METPOP	Percent of state population living in metropolitan areas.	0.715	…	(4)
DSAMPLE	Dummy variable that equals 1 for data as of Dec. 2001, 0 for data as of June 2001.	0.537	…	…

(1) FCC Data acquired by Freedom of Information Act request made by the PACE coalition.
(2) Provided by Z-Tel Communications.
(3) Gregg (2001).
(4) www.census.gov.

Table 2. Summary of Regression Results

Variable	Equation (5)	Equation (6)
Constant (α_0, β_0)	2.126 (2.39)*	6.108 (3.72)*
r (α_1, β_1)	-1.627 (-5.57)*	1.763 (-3.27)*
P_L (α_2, β_2)	0.118 (0.83)	0.995 (-3.79)*
SIZE (α_3, β_3)	0.555 (6.00)*	0.389 (2.27)*
DNYTX (α_4, β_4)	0.557 (1.65)**	2.563 (4.11)*
D271 (α_5, β_5)	-0.420 (-2.05)*	0.411 (1.09)
DNRC (α_6, β_6)	-0.792 (2.14)*	-1.451 (2.12)*
METPOP (α_7, β_7)	2.939 (-5.82)*	-0.657 (-0.70)
DSAMPLE (α_8, β_8)	0.274 (2.14)*	0.142 (0.60)
R^2	0.85	0.66
RESET F	0.78	1.19

* Statistically-significant at the 5% level or better.
** Statistically-significant at the 10% level or better.

ATTACHMENT C

An Empirical Exploration of the Unbundled Local Switching Restriction

Z-Tel Public Policy Paper No. 3
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(***Original Version: November 2001***)

An Empirical Exploration of the Unbundled Local Switching Restriction*

Abstract: In this paper, we examine empirically the impact of the ULS restriction on the realization of competition for residential and small business consumers in the United States. Econometric analyses suggest that the ULS restriction reduces both the absolute and relative level of competition for residential and small business telecommunications consumers. Our estimates indicate that the ULS restriction has reduced CLEC market share of residential and small business customers by an average of 36%.

I. Introduction

Nearly six years after the passage of the Telecommunications Act of 1996 and two years after the FCC's *UNE Remand Order*, competition for mass-market, residential and small business customers remains elusive in many, if not most, states. In the *UNE Remand Order*, the FCC ordered access to unbundled local switching ("ULS") in order foster competition for these mass-market consumers, but the FCC simultaneously placed a significant restriction on the availability of ULS in the Top 50 metropolitan statistical areas ("MSAs").

This Z-Tel Public Policy Paper shows that where the availability of ULS is restricted, there is substantially *less* competition for residential and small business customers. In fact, an empirical examination of the FCC's own data shows that residential and small business customers benefit from significantly *more* competitive entry in regions where the ULS restriction does not apply than in regions where the restriction applies.

These results undermine the fundamental rationale for the FCC's rule. Nearly two years have passed since the *UNE Remand Order*, and entry strategies based on the patchwork availability of ULS have had sufficient opportunity to develop. The FCC's rationale for the restriction was that entry via "self-provisioning" of switching could occur in the restricted areas as robustly and timely as entry by means of ULS. This empirical analysis shows that not to be

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* This policy paper was originally released in November of 2001. After helpful comments and suggestions by numerous parties, the statistical analysis was updated and the changes to this analysis are reflected in this paper.

the case: competition for residential and small business customers in states where the restriction applies lags behind competition in areas where ULS is unrestricted. In short, residential and small business consumers in restricted areas face considerably less competition and are still waiting for choices.

II. Background on the Unbundled Local Switching Restriction

Unbundled local switching is a key component of the UNE-Platform, which new entrants utilize to provide competitive local service to mass-market, residential and small business customers. In the *UNE Remand Order*, the Federal Communications Commission ("FCC") reiterated its position that CLEC access to unbundled local switching ("ULS") is necessary to bring competition to the mass market. Specifically, the FCC concluded, "that, in general, lack of access to unbundled local switching materially raises entry costs, delays broad-based entry, and limits the scope and quality of the new entrant's service offerings."[1] Primary motivators for the FCC decision include the desire "to encourage the rapid introduction of competition in *all* markets, including residential and small business markets";[2] to allow CLECs "to serve the *greatest number* of customers";[3] and "to benefit *all* Americans by opening *all* telecommunications markets to competition."[4]

But despite those findings, the FCC restricted access to unbundled local switching under certain conditions. Specifically, the FCC chose to remove the unbundled switching obligations of the ILECs for customers with more than three switched access lines in the densest portions (density zone 1) of the fifty largest Metropolitan Statistical Areas ("MSA"), as long as the ILEC provided access to enhanced extended links ("EELs") in these areas. The rationale for this exclusion was that in these regions, sufficient alternatives to ILEC-provided switching (namely, self-provisioning of switching) existed so that entrants could serve in a "timely" manner residential and small business consumers at levels of comparable scale and scope as access to unbundled local switching would allow.

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[1] In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, THIRD REPORT AND ORDER AND FOURTH FURTHER NOTICE OF PROPOSED RULEMAKING, CC Docket No. 96-98, ¶253 (rel. Nov. 5, 1999) ("*UNE Remand Order*").

[2] *Id.* at ¶9 (emphasis added).

[3] *Id.* at ¶10 (emphasis added).

[4] *Id.* at ¶2 (emphasis added).

This Z-Tel Public Policy Paper evaluates empirically the effect of the ULS restriction on the extent of competition in the residential and small business markets and finds that the restriction is hampering competitive entry. We first consider the impact of the switching restriction on the share of residential and small business consumers served by CLECs. Using CLEC market share statistics supplied by the FCC, we find that the absolute level of competition for residential and small business customers is lower in states where the switching restriction applies to large portions of the state population. Thus, the econometric analysis suggests that the switching restriction reduces the overall level of competition for residential and small business telecommunications consumers.

Second, we evaluate empirically the effect of the switching restriction on the level of CLEC entry in the residential and small business consumer group relative to larger telecommunications consumers. Because the size of the residential and small business markets vary by state, it is sensible to account for this variation in measuring the intensity of CLEC entry into the residential and small business market.[5] Our regression analysis, using FCC and Census data, indicates that the switching restriction reduces the relative level of competition for residential and small business consumers.

III. Empirical Analysis

The empirical analysis to test the incumbent hypothesis is straightforward. Data from publicly available sources are utilized and empirical models are generated to test whether the ULS restriction plays any role in the level of CLEC market share in a state. Our approach differs from existing analysis on the ULS restriction. Specifically, we employ econometric methods to evaluate any systematic effects of the ULS restriction on competition. Earlier "studies" of the ULS restriction have used, at best, anecdotal evidence, and most consist of little more than public policy propaganda and rhetoric.

The FCC's *Local Competition Report* (Tables 6 and 8) provides CLEC and ILEC access lines by state and the percentage of CLEC and ILEC lines serving

[5] For example, if 50% of CLEC lines serve residential and small business consumers, this share has a very different meaning if 80% of the total lines in the market serve residential and small business consumers versus 30% of the total lines. In the former case, CLECs appear to pursue residential and small business consumers with less intensity than in the latter.

residential and small business customers.[6] The *Local Competition Report* also provides the total number of lines in the state. Data on these variables is provided for 35 states. The U.S. Census Bureau's website (www.census.gov) provides median household income and population data for these 35 states. The percentage of the state's population residing in the fifty largest MSAs where the ULS restriction applies also is computed from Census data.

It is important to note that because of proactive actions by many States, the FCC's ULS restriction is not applicable in all of the fifty largest MSAs. For example, in Texas, the "T2A" interconnection agreement assured unrestricted access to ULS.

The variables employed in the empirical analyses include:

CLECSHR	Market Share of CLECs for residential and small business consumers;
TARGET	Percentage of CLEC lines serving residential and small business customers divided by percentage of state lines serving residential and small business customers;
LINES	Total access lines in the state serving residential and small business customers;
CITYPOP	Population of state living in city centers of metropolitan areas;
INC	Median household income in the state;
RESTRICT	Percentage of state population in restricted, Top 50 markets.

The variable *CLECSHR* measures the absolute level of competition in the state for residential and small business consumers. *TARGET* captures the intensity with which CLECs target residential and small business consumers relative to other, larger consumers. This variable exceeds (is below) 1.00 if the CLECs have a greater (smaller) percentage of residential and small business customers than the market as a whole. To illustrate the meaning of the variable *TARGET*, consider a state where the share of residential and small business lines is 60%. If CLECs acquire customers in a random fashion or target all consumers

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[6] Federal Communications Commission, Common Carrier Bureau, Industry Analysis Division, *Local Telephone Competition: Status as of December 31, 2001* (May 2001) ("*Local Competition Report*").

equally, then the expected percent of residential and small business lines is 60% (the market's distribution of such lines). If the CLEC's share of residential and small business lines is 20%, alternately, then CLECs are pursuing larger customers more aggressively. If 80% of CLEC lines are serving residential and small business consumers, then the CLECs are targeting the residential and small business consumers with greater intensity than larger customers.

1. THE ULS RESTRICTION AND THE LEVEL OF COMPETITION

This section describes the empirical test designed to measure the impact of the ULS restriction on CLEC market share of residential and small business customers (*CLECSHR*). The absolute level of competition for residential and small business customers in a state is defined as the percent of residential and small business access lines in a state served by CLECs.[7] The level of competition is specified as a function of state market size in terms of residential and small business access lines, household income, and the ULS restriction. The econometric equation therefore is:

$$CLECSHR = \alpha_0 + \alpha_1 RESTRICT + \alpha_2 LINES + \alpha_3 INC + \alpha_4 CITYPOP + \varepsilon \qquad (1)$$

where the α's are the estimated coefficients and ε is the econometric disturbance term. If CLECs favor markets with greater telecommunications demand, more densely populated markets, and large household incomes, then the signs of the estimated coefficients on *LINES*, *CITYPOP*, and *INC* should be positive (α_2, α_3, $\alpha_4 > 0$). A positive sign on *RESTRICT* indicates that the ULS restriction is conducive to competitive choice for residential and small business consumers. Alternately, if the ULS restriction limits opportunities for competitive entry for residential and small business customers, a negative relationship between the restriction and CLEC market share is expected. Because the ULS restriction is designed to limit the opportunities for competitive entry by UNE-P CLECs, our a priori expectation is that the sign on *RESTRICT* will be negative.

[7] This is the "mass market" market definition that the FCC utilized in the *UNE Remand Order* regarding ULS.

Equation (1) is estimated by Ordinary Least Squares (OLS) and the Minimum Chi-Square (MCS) methods.[8] The Minimum Chi-Square Method is essentially a weighted least-squares technique, where the weight is the inverse of the square root of the variance of the dependent variable.[9] This weighting scheme corrects for the heteroscedastic errors (theoretically) endemic to models with dependent variables expressed in percentage terms (i.e., dependent variables that are based on grouped data). Importantly, this heteroscedasticity leads only to inefficient estimates (the t-statistics are too low), not biased estimates. The Minimum Chi-Square technique did improve the efficiency of the estimated coefficients.[10]

Table 1. Results

Variable	Equation (1): *CLECSHR*	Mean [St. Dev.]
Constant	-0.24	…
	(-6.48)[a,b]	
LINES	1.10E-09	3,874,127
	(0.94)	(3,758,247)
CITYPOP	0.08	0.29
	(2.56)[a,b]	(0.156)
INC	2.24E-06	42435
	(2.59)[a,b]	(5,977)
RESTRICT	-0.04	0.34
	(1.70)[a,b]	(0.25)
CLECSHR	…	0.036
		(0.03)

[a] Statistically Significant at 10% level or better with OLS.
[b] Statistically Significant at 5% level or better with MCS.

The marginal effects from the OLS estimates of Equation (1) are provided in Table 1.[11] All of the explanatory variables except *LINES* are statistically significant at the 10% level using OLS and 5% level using MCS. The fit of the regression is good for cross-sectional data (the R^2 is 0.29 for the untransformed data and 0.86 for the weighted data). For the OLS regression, the F-statistic of the Ramsey RESET test is 1.34, which is not

[8] Jack Johnston and John DiNardo, *Econometric Methods*, 4th ed., McGraw-Hill: New York (1997), pp. 433-4.

[9] For the linear specification, the variance for state j is $p_j(1 - p_j) / n_j$, and for the semilog specification the variance for state j is $(1 - p_j) / n_j p_j$, where p_j is the dependent variable and n_j the denominator of p_j (in this case, the state total of residential and business access lines).

[10] The White test suggests that the null hypothesis of homoscedastic errors cannot be rejected (F = 0.32, Probability level 0.95).[10]

[11] The marginal effects are computed from a semi-logarithmic regression model. The RESET test indicated that the semilog specification was preferred to the simple linear specification. The marginal effects are computed by multiplying the estimated coefficients by the mean of *CLECSHR* (0.036). The linear model performed similarly to the semilog model, and the coefficient on *RESTRICT* was –0.07 (with t-statistic of 1.86). The Minimum Chi Square method for the linear specification did not materially influence the estimated coefficients, but, as in the semilog case, reduced the estimated t-statistics. In the linear model, all variables were statistically significant at the 10% level or better. However, for the linear model, the null-hypothesis of the RESET test was easily rejected.

statistically significant at standard levels. RESET is a rather general test for specification errors related to omitted variables, incorrect functional form, and correlations between the explanatory variable and the error (e.g., caused by endogenous variables).[12] The insignificant RESET F-statistic indicates our model does not suffer from these major types of specification error.

Not surprisingly, the regression model indicates that CLEC market share is higher in larger, more densely populated markets with relatively high median household incomes: the signs on *LINES*, *CITYPOP*, and *INC* are all positive. Both *CITYPOP* and *INC* are statistically significant at the 10% level or better, but *LINES* is not.

The negative and statistically significant coefficient on *RESTRICT* indicates that *the ULS restriction reduces competition for residential and small business consumers.* The coefficient on *RESTRICT* indicates that a 10 percentage point increase in the percent of population living in the restricted markets reduces, on average, the CLEC market share for residential and small business customers by 10%.[13] In other words, the larger the restricted market, the more impact the restriction has on CLEC market share.

Table 2. Increase in Competition for Residential and Small Business Customers from Removing ULS Restriction

State	Percent Increase in Competition	State	Percent Increase in Competition
AZ	47%	MN	45%
CA	38%	MO	42%
CO	38%	NJ	38%
CT	29%	NC	28%
DC	63%	OH	29%
FL	39%	OR	37%
GA	39%	PA	42%
IL	51%	SC	3%
IN	23%	TN	19%
KS	22%	UT	45%
LA	26%	VA	19%
MD	35%	WA	36%
MA	44%	WI	24%
MI	36%	Avg	36%

The econometric model (Equation 1) can be used to estimate the increases in CLEC market shares if the ULS restriction is eliminated. For each relevant state, Table 2 summarizes the increase in the percentage of residential and small business lines served by CLECs if the ULS restriction is eliminated. The increased level of competition for residential and small business customers

[12] James Ramsey (1969) "Tests for Specification Errors in Classical Linear Least Squares Regression Analysis," *Journal of the Royal Statistical Society*, Series B, Vol. 31, pp. 350–371. While able to detect a wide array of specification errors, the RESET test only indicates specification error is present. The RESET test provides no guidance as to the particular source of the specification error.

[13] The impact is calculated using $\exp(-1 \cdot 0.10) - 1$, where –1.00 is the estimated coefficient β_1 from the semi-log model.

ranges from 3% in South Carolina to 63% in the District of Columbia. On average, eliminating the ULS restriction increases CLEC market share by 36% in states where the ULS restriction is relevant.[14]

2. The ULS Restriction and the Intensity of Competition for Residential and Small Business Customers

The econometric results above indicate that the ULS restriction reduces the absolute level of competition for residential and small business consumers. It is also important to understand the impact the ULS restriction may have on the *intensity* of CLEC competition for residential and small business customers. In this second model, we evaluate the intensity with which CLECs target the residential and small business markets within a state by examining the share of CLEC access lines serving residential and small business lines in a state relative to the total share of the residential and small business access lines in the state (*TARGET*).

This second model is similar to the first, except the dependent variable has changed:

$$TARGET = \beta_0 + \beta_1 RESTRICT + \beta_2 LINES + \beta_3 INC + \beta_4 CITYPOP + \varepsilon \qquad (2)$$

where the β's are the estimated coefficients and ε is the econometric disturbance term. Also, Equation (2) can be estimated with ordinary least squares. Our expectation is that CLECs target markets with larger, more densely populated markets with larger incomes (β_2, β_3, $\beta_4 > 0$). If the coefficient on *RESTRICT* is positive ($\beta_1 > 0$), then the ULS restriction promotes competition for residential and small business customers. If the coefficient is negative ($\beta_1 < 0$), however, then the restriction reduces competition in the residential and small business markets, directing CLECs to pursue alternative business plan. Given that the restriction precludes entry by particular CLECs, the a priori expectation is that the restriction will reduce competition for residential and small business market customers.

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[14] The average of *RESTRICT* and *CLECSHR* for all states where the restriction applies are 0.45 and 0.03. The marginal effect is computed using [exp($\beta_1 \cdot \Delta RESTRICT$)-1], or exp(-1·0.45)-1 = 0.36, or 36%.

The results from the estimation of Equation (2) are provided in Table 2. All of the explanatory variables, except for *LINES* and the constant term, are statistically significant at the 5% level or better (OLS). The fit of the regression is good for cross-sectional data with an R^2 of 0.26. The hypothesis of no specification error cannot be rejected: the F-Test from the Ramsey RESET test is 0.28, which is not statistically significant. The White test suggests that the null hypothesis of homoscedastic errors cannot be rejected.[15]

As with the absolute level of competition evaluated in the previous section, the *TARGET* regression model indicates that CLECs target residential and small business customers more intensely in larger, more densely populated states with relatively high median household incomes. The negative and statistically significant coefficient on *RESTRICT* again indicates that the ULS restriction reduces competition for residential and small business customers. The z-statistic on *RESTRICT* is 2.64, having a probability level lower than 0.01. The coefficient on *RESTRICT* indicates that a 10 percentage point increase in the percent of population living in the restricted markets reduces, on average, the CLEC's pursuit of residential and small business customers by 11%. If the ULS restriction were removed, the proportion of CLEC lines serving residential and small business customers would increase by about 53 percent or 21 percentage points.[16]

Table 3. Results

Variable	Equation (1): *TARGET*	Mean [St. Dev.]
Constant	-0.49	…
	(1.22)	
LINES	6.07E-09	3,874,127
	(0.61)	(3,758,247)
CITYPOP	0.59	0.29
	(2.17)*	(0.156)
INC	1.88E-05	42435
	(2.58)*	(5,977)
RESTRICT	-0.47	0.34
	(2.64)*	(0.25)
TARGET	…	0.45
		(0.23)

* Statistically significant at the 5% level or better.

IV. Conclusions

The FCC's unbundling policy should be properly focused upon advancing the introduction of competition for all consumers, including mass-market residential and small business customers. In the *UNE Remand Order*, the FCC ordered unlimited access to unbundled local switching in many regions but placed substantial restrictions on ULS in the top 50 MSAs. The FCC's rationale

[15] The F-Statistic for the White test is 0.66, having a probability level of 0.72.

[16] For states where the restriction applies, the average value of *TARGET* is 0.396.

was that in large cities, CLECs could serve the entire mass market as intensely without access to ULS as CLECs could serve with access to ULS.

Our empirical analysis suggests that the FCC's policy of favoring one type of competition over another in those larger markets is in fact harming residential and small business consumers in those areas. Consumers in states where there is unrestricted availability of ULS enjoy a considerably more robustly competitive environment than their compatriots in restricted states. Business-focused, downtown CLECs are not serving mass-market, residential and small business consumers in states where the ULS restriction applies to the same extent that UNE-Platform and other entrants serve mass-market consumers in unrestricted areas.

Those harmed by the ULS restriction are residential and small businesses in states where the restriction applies. Even conservative estimates regarding the potential cost savings mass-market consumers would enjoy from competition indicates that millions of dollars of consumer welfare are being sacrificed by operation of this industrial policy. The empirical evidence shows that contrary to the FCC's conclusion in November 1999, entry by means of self-supplied switches (for residential and small business customers) is simply not as robust and timely as entry by means of unbundled local switching. The empirical evidence shows that CLECs of all types that seek to provide service to residential and small business customers are most definitely impaired in their entry efforts by the ULS restriction.

Addendum (March 12, 2002):

In February 2002, the Federal Communications Commission released an updated version of their *Local Competition Report* (*Local Telephone Competition: Status as of June 30, 2001*, February 2002, Industry Analysis Division). This report provided updated data on the competition variables used in this policy paper (both *CLECSHR* and *TARGET*). In this Addendum to Policy Paper 3, we incorporate this new data into our analysis and re-estimate the regressions in Policy Paper 3 (eqs. 1 and 2). Using our most recent specification of the *RESTRICT* variable, the results of these regressions are provided in Table A-1 below. The original sample contained 35 observations, of which one was lost in the new dataset (data for two additional states was added to the new data, but for consistency these states are left out of the sample). Thus, the current dataset employed for these regressions contains 34 observations (68 total sample). As shown in Table A-1, the results are similar using the different datasets.

In an alternative specification of the model, we use observations from both Competition Reports, thus increasing sample size. By adding a dummy variable indicating the observation is from February 2002 (*DFEB*), we can test for a statistically significant difference in *RESTRICT* using the full dataset. The results from this regression are provided in Table A-2. The regression results indicated that *RESTRICT* does not have a statistically different effect between datasets for the *CLECSHR* regression. For neither regression is the interaction term statistically significant at the 10% level.

Table A-1. Comparative Regression Results

CLECSHR Regressions

Variable	Original Data	New Data	Average of New and Original Data
Constant	-0.101 (2.29)[a]	-0.091 (1.43)	-0.096 (1.88)[b]
LINES	1.86E-09 (1.37)	1.92E-09 (0.98)	1.89E-09 (1.21)
CITYPOP	0.107 (3.02)[a]	0.120 (2.35)[a]	0.113 (2.78)[a]
INC	2.91E-06 (2.81)[a]	2.86E-06 (1.91)[b]	2.89E-06 (2.42)[a]
RESTRICT	-0.066 (2.99)[a]	-0.070 (2.16)[a]	-0.068 (2.65)[a]
R^2	0.38	0.25	0.33

TARGET Regressions

Variable	Original Data	New Data	Average of New and Original Data
Constant	-0.647 (2.38)[a]	-0.613 (2.02)[a]	-0.630 (2.32)[a]
LINES	7.99E-09 (0.96)	7.28E-09 (0.78)	7.64E-09 (0.92)
CITYPOP	0.644 (2.96)[a]	0.469 (1.93)[b]	0.557 (2.56)[a]
INC	2.36E-05 (3.70)[a]	2.41E-05 (3.38)[a]	2.38E-05 (3.75)[a]
RESTRICT	-0.401 (2.93)[a]	-0.259 (1.70)[b]	-0.330 (2.42)[a]
R^2	0.41	0.33	0.39

T-statistics in parenthesis.
[a] Statistically significant at the 5% level.
[b] Statistically significant at the 10% level.

Table A-2. Alternative Specification

(Obs. = 68)

CLECSHR Regressions		
Variable	*CLECSHR*	*TARGET*
Constant	-0.096 (2.55)[a]	-0.630 (3.18)[a]
LINES	1.89E-09 (1.63)	7.64E-09 (1.26)
CITYPOP	0.114 (3.75)[a]	0.556 (3.51)[a]
INC	2.89E-06 (3.26)[a]	2.38E-05 (5.14)[a]
RESTRICT	-0.077 (3.65)[a]	-0.398 (3.61)[a]
DFEB[b]*RESTRICT*	-0.018 (0.99)	0.136 (1.43)
R^2	0.30	0.37

T-statistics in parenthesis.
[a] Statistically significant at the 5% level.
[b] Statistically significant at the 10% level.

The Z-Tel Public Policy Paper Series is designed to arm policymakers and the public with a rigorous set of analytical tools and analyses regarding the development of local telecommunications competition. For more information, contact any of the following members of Z-Tel's Strategic Policy Department.

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Does Unbundling *Really* Discourage Facilities-Based Entry?

An Econometric Examination of the Unbundled Switching Restriction

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February 2002

Does Unbundling *Really* Discourage Facilities-Based Entry?

An Econometric Examination of the Unbundled Switching Restriction

Abstract: In this paper, we examine empirically the impact of the FCC's unbundled local switching restriction on the deployment of CLEC local switching facilities across the United States. Econometric analyses suggest – contrary to the intent of the restriction -- that the restriction reduces the level of CLEC switch deployment in restricted markets. Our estimates indicate that the FCC's switching restriction has reduced CLEC switch deployment by 19%. Combined with earlier studies showing that the switching restriction reduces the overall level of competition in residential and small business markets by 36%, these findings indicate the switching restriction is detrimental to the goal of competition (of any sort) in local exchange markets.

I. Introduction

The flavor-of-the-month in FCC telecom policymaking appears to be the goal of promoting "facilities-based entry" – which the FCC seemingly interprets to include only competitive entrants that own and operate their own local circuit switch.[1] Indeed, in its pending *UNE Triennial Review Notice*, the FCC has indicated that its quest for this particular form of "facilities-based entry" will be a core component of decision regarding the national minimum list of unbundled network elements.

Incumbent local exchange carriers routinely argue that unbundling requirements provide a disincentive for competitive carriers to deploy network facilities.[2] That

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[1] *See, e.g., In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, et al.*, CC Docket Nos. 01-138, 96-98, and 98-147, Notice of Proposed Rulemaking, FCC 01-316 at paras. 3, 22-30 (rel. Dec. 20, 2001) ("*UNE Triennial Review Notice*"). Interestingly, this new FCC proposal seems contrary to FCC Section 271 precedent (urged upon the FCC by Bell operating companies applicants) that a "facilities-based competitor" under Section 271(c)(1)(A) includes entrants that purchase unbundled local switching and, in particular, carriers that provide local service by means of the UNE Platform.

[2] For example, Verizon recently argued before the FCC that "[t]he Commission should act now to eliminate, or at a minimum significantly limit, the obligation to provide unbundled local switching. . . . The continued availability of unbundled local switching under these circumstances serves to undermine and discourage investment in competing facilities by all providers. . . " Letter from Thomas J. Tauke and Michael E. Glover, Verizon, to Chairman Powell, FCC, Oct. 19, 2001, filed in FCC CC Docket No. 96-98 ("Verizon Letter"). For a complete rebuttal to In that letter, *see*

argument is, however, eminently testable through econometric analysis – although incumbents generally do not move beyond their rhetoric to sophisticated study.

Indeed, the *UNE Remand Order*[3] provides a textbook framework for analyzing whether the availability of UNEs disincents CLEC deployment of network facilities. In particular, in that proceeding, the FCC restricted access by CLECs to unbundled local switching in the largest 50 MSAs (Density Zone 1) to serve customers with more than three telephone lines. The federal restriction precludes entrants from using the UNE Platform – the combination of unbundled loops, switching and transport – to serve giant swaths of access lines in those MSAs.

If the incumbent unbundling-is-a-disincentive-to-deploy hypothesis were true, one would expect that restricting access to unbundled switching *would not adversely affect competitive entry* and would *actually promote* switch deployment by CLECs in those Top 50 MSAs. Z-Tel Public Policy Paper No. 3 utilized econometric techniques to evaluate the former concern but showed that the restriction on unbundled local switching has resulted in *substantially less competition* for residential and small business customers in states where the restriction applied. On average, the switching restriction reduced competitive entry for these customers by 54% in effected states.

This Z-Tel Public Policy Paper No. 4 addresses the latter concern and shows that the FCC's restriction has not resulted in greater switch deployment by CLECs. Indeed, this Public Policy Paper No. 4 shows that there is *the restriction has reduced CLEC switch deployment in affected states by 19%***.** Specifically, this paper utilizes an econometric model to evaluate the deployment of switching equipment by CLECs in the period following the effective date of the *UNE Remand Order* (April 2000).

In short, the FCC policy of restricting unbundled access to local switching has foisted the worst of both worlds upon states and consumers – where the

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Letter from Robert A. Curtis and Thomas M. Koutsky, Z-Tel, to Chairman Powell, FCC, Dec. 5, 2001, filed in FCC CC Docket No. 96-98.

[3] *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, 15 FCC Rcd 3696 (1999) ("*UNE Remand Order*").

restriction applies, there is less competition for residential and small business consumers and there are fewer CLEC-owned local switches.

II. Statistical Framework

The empirical analysis of this policy paper focuses primarily on CLEC local switch deployment between April 2000 to October 2001: the period immediately following the implementation of the restriction. In alternative regressions, however, we also will consider CLEC local switch deployment between January 1999 and April 2000. For the empirical model, we view CLEC local switch deployment as a function of market size (*SIZE*), market density (*DENSE*), and the presence or absence of the unbundled switching restriction. Market size (*SIZE*) is measured as local exchange service expenditures in the state.[4] Market density (*DENSE*) is measured as the number of access lines per square mile.

Two approaches are used to capture the effects of the switching restriction. First, the variable *RESTRICT* measures the percent of state population living in a top 50 MSA where the switching restriction applies.[5] For this specification of the restriction, the number of CLEC local switches deployed (per access line) during the period for which the restriction applies, *N*, can be written as the least squares regression

$$\ln(N) = \beta_0 + \beta 1 \cdot \ln(SIZE) + \beta_2 \cdot \ln(DENSE) + \beta_3 \cdot RESTRICT + \varepsilon \qquad (1)$$

where the βs are the estimated coefficients and ε is the econometric disturbance term. The impact of the switching restriction on CLEC local switch deployment is measured by the estimated coefficient β_3. If β_3 is positive, then the restriction increased CLEC switch deployment in the restricted markets. Alternately, if β_3 is negative, then the restriction reduced CLEC switch

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[4] This variable is constructed by multiplying billable access lines by average revenue per line. Average revenue per line data is provided by *State-by-State Telephone Revenues and Universal Service Data*, Federal Communications Commission, April 2001, Table 5.

[5] New York's local tariff and Texas's "T2A" interconnection agreement effectively superceded the FCC's switching restriction in those states during this period. Although the restriction no longer applies in Illinois because of recent state law, the FCC's restriction applied during the time period evaluated here.

deployment. Of course, the restriction may have no effect on switch deployment ($\beta_3 = 0$).

In an alternative specification of the restriction, two variables are employed. The first variable measures the percent of a state's population living in the top 50 MSA (*TOP50*), regardless of whether the restriction applies. A dummy variable that equals one for states with top 50 markets where the restriction does not apply is the second variable (*D*) capturing the influence of the switching restriction.[6] For this specification of the restriction, the least squares regression is

$$\ln(N) = \alpha_0 + \alpha_1 \cdot \ln(SIZE) + \alpha_2 \cdot \ln(DENSE) + \alpha_3 \cdot TOP50 + \alpha_4 \times D \times TOP50 + \varepsilon \quad (2)$$

where the α's are the estimated coefficients and ε is the econometric disturbance term. This alternate specification of the model allows us to measure the impact of the restriction in restricted *and unrestricted* markets (i.e., states) with top 50 MSAs. In markets with top 50 MSAs and the switching restriction, the coefficient α_3 measures the impact of the switching restriction on switch deployment. If α_3 is positive, then the restriction increased CLEC switch deployment in the restricted markets. Alternately, if α_3 is negative, then the restriction reduced CLEC switch deployment. Finally, the restriction may have no effect on switch deployment ($\alpha_3 = 0$).

In markets with top 50 MSAs but no switching restriction, the impact of the restriction is measured by ($\alpha_3 + \alpha_4$). If α_4 is positive (negative), then the markets with unrestricted top 50 MSAs have more (less) CLEC switch deployment than markets with restricted top 50 MSAs. If a joint test of statistical significance indicates that ($\alpha_3 + \alpha_4$) = 0, then the econometric model confirms that having a top 50 MSA in a market is relevant only when the restriction applies to that market.

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[6] The variable *D* has values of 1 for New York and Texas, 0 otherwise.

1. DATA

The dependent variable of the regression is defined as the number of CLEC local switches (per access line) in each state deployed between April 2000 and October 2001, or January 1999 and April 2000. The Local Exchange Routing Guide ("LERG") is used to count CLEC local switches per state.[7] Bell Company total billable access lines are provided by ARMIS Form 43-04 (year 2000; www.fcc.gov/ccb/armis). Data on squares miles (land area only) in each state is provided by the Census Bureau's *Statistical Abstract of the United States* (year 2000, www.census.gov).

The variables *SHARE* and *RESTRICT*, which account for the presence of the ULS restriction, are defined as the percentage of the state's population residing in a top 50 MSA and a restricted top 50 MSA, respectively.[8] Population data is provided by the Census Bureau.[9] The final dataset consisted of the 48 observations (i.e., the 48 contiguous states).

2. RESULTS

The results from the least squares regressions are provided in Table 1. White's standard errors are used to compute the t-statistics. Equations (1) and (2) are estimated for CLEC switches deployed between April 2000 and October 2001. Model (1) and Model (2) summarize the results of these regressions. While the switching restriction did not apply during the January 1999 to April 2000 period, we estimate the same regressions using a dependent variable constructed during the pre-restriction time period. These alternate regressions are estimated to confirm that the effect of the *RESTRICT* and *SHARE* variables are zero during this period. If statistically significant impacts were found on these variables during the period for which the restriction did not apply, then it is possible that our variables are measuring factors other than the switching restriction. These

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[7] The LERG is queried for CATEORGY of CLEC, CAP, or L_RESELLER, a COC_TYPE of "EOC," and with non-null values in the "NPA" and "NXX" fields. Not all of these switches are Class V end-office switches.

[8] The difference between *SHARE* and *RESTRICT* is that the share of top 50 MSA population in New York and Texas in included in *SHARE*, but not in *RESTRICT*. Mathematically, *RESTRICT* is equal to $D \cdot SHARE$.

[9] In the few cases where a MSA covers more than one state, the population is divided between the states using the share of populations in the major cities of the MSA.

additional regressions, the results of which are summarized as Model (3) and (4), serve only the purpose of validating the variables chosen to measure of the restriction.

Table 1. Regression Results

Dependent Variable (ln*N*)

	Model 1	Model 2	Model 3	Model 4	Descriptive Statistics
	4/00 to 10/01	4/00 to 10/01	1/99 to 4/00	1/99 to 4/00	Mean (St. Dev)
Constant	-7.56 (-3.01)*	-6.91 (-2.33)*	-6.87 (-4.61)*	-6.99 (-4.06)*	…
ln(*SIZE*)	-0.20 (-1.33)	-0.24 (-1.34)	-0.23 (-2.67)*	-0.22 (-2.17)*	1.11E+08 (1.21E+08)
ln(*DENSE*)	0.02 (0.20)	0.024 (0.27)	-0.07 (0.99)	-0.07 (-0.98)	40.26 (61.98)
RESTRICT	-0.77 (2.29)*	…	-0.41 (1.19)	…	0.263 (0.263)
TOP50	…	-0.66 (1.76)*	…	-0.44 (-1.15)	0.278 (0.26)
D×TOP50	…	1.58 (1.67)*	…	0.26 (0.35)	0.04+ (0.20)
R-Square	0.18	0.18	0.32	0.32	
Obs.	48	48	48	48	48

* Statistically significant at the 10% level or better.
+ Mean and Standard Deviation for the variable *D* only.

During the period April 2000 to October 2001, we find statistically significant evidence that the FCC switching restriction reduced the deployment of CLEC local switches. Measured at the sample mean, estimates of Equation (1) indicate that eliminating the switching restriction would increase switch deployment by 19%.[10] State-specific impacts of the switching restriction are provided in Table 2. The *RESTRICT* variable had no effect on CLEC switch deployment during the January 1999 to April 2000 time period, as expected. We are more confident that

[10] The marginal effect is computed as [(exp($\beta_3 \cdot$*RESTRICT*)-1)], or [(exp(-0.77·0.263)-1)]. This specification of the marginal effect is used to measure the marginal effect of discrete changes in the explanatory variable on the dependent variable. See George S. Ford and John D. Jackson, *Interpreting Variables in Semi-logarithmic Equations*, Unpublished Manuscript, Auburn University (1995).

our measure of the restriction (*RESTRICT*) is not capturing the influence of other factors on switch deployment.

Estimates of Equation (2) confirm this negative relationship between the switching restriction and CLEC switch deployment (Model 2). The sign of α_3 is negative and statistically significant during the April 2000 to October 2001 time period. At the sample mean, the estimates indicate that removing the switching restriction would increase CLEC switch deployment by 17%. This estimated impact is comparable to the 19% average effect from Equation (1) / Model (1).

Furthermore, α_4 is a positive and statistically significant coefficient. A test of joint significance on ($\alpha_3 + \alpha_4$) does not allow us to reject the null hypothesis that the sum of the two coefficients equals zero. In other words, in markets with top 50 MSAs where the restriction does not apply, there is no relationship between population in the top 50 MSAs and switch deployment. This results is encouraging, in that it confirms that our measures of the restriction, including *RESTRICT*, are indeed capturing the effects of the switching restriction and not other factors. The percent of population in the top 50 MSAs is relevant to switch deployment only in restricted markets.

As expected, there is no relationship between our measures of the switching restriction and switch deployment prior to the implementation of the FCC's restriction. Model 4 has statistically insignificant coefficients on both *TOP50* and *D·TOP50*. Again, the reasonableness of our measures of the switching restriction is confirmed.

Table 2 shows that if unbundled local switching were not restricted in the listed states, *there would be 19% more CLEC switch deployment in those states***,** other factors being equal. A state like Illinois, which recently implemented unlimited access to unbundled local switching pursuant to a state statute, should see a large increase (about 42%) in the levels of facilities-based switch deployment and CLEC penetration in residential and small business markets as a consequence of that action.[11]

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[11] Indeed, Z-Tel is now offering a small business product in the state of Illinois, in direct response to the legislation eliminating the switching restriction.

Table 2. Increase in CLEC Switch Deployment (per access line) from Removing ULS Restriction

[Based on Equation (1), Model (1)]

State	Percent Increase in CLEC Switch Deployment	State	Percent Increase in CLEC Switch Deployment
AZ	38%	MN	37%
CA	31%	MO	34%
CO	31%	NJ	31%
CT	24%	NC	22%
DC	54%	OH	23%
FL	32%	OR	30%
GA	32%	PA	35%
IL	42%	SC	2%
IN	18%	TN	15%
KS	18%	UT	37%
LA	21%	VA	15%
MD	28%	WA	30%
MA	36%	WI	19%
MI	29%	Avg	19%

The negative relationship between switch deployment and entry restrictions on CLECs is unsurprising. Because restricting access to unbundled local switching prevents entrants from massing customer bases that they may then seek to migrate to another network, one would expect that all other factors equal, there would be less CLEC facilities overall where the restriction applied. An analogy could be drawn to long-distance competition – if MCI was not able to build sufficient customer base and cash flow by means of reselling services over AT&T's network, would it ever have been able to finance and construct its own long-distance network? Yet this is what the FCC's restriction asks CLECs to do, and in the local telecom arena where the competitive entry conditions are far less favorable than in the long distance industry. It is little wonder that this FCC policy has failed.

Additionally, the fact that CLEC switch deployment is directly and positively correlated with unbundled switching availability strongly indicates that "a rising tide of competition raises all boats." All CLECs – even those that deploy switches only to serve large business customers with intensive bandwidth

needs[12] – benefit when there is a robust and competitive entry at all levels of the market. CLECs that focus on building fiber networks that they wholesale to CLECs that focus on retail services benefit when those retail CLECs do well – and UNE Platform may be a critical component of that retail CLEC's strategy. Also, when a CLEC focused upon mass-market services takes out television or radio advertising, the *entire* market is educated about the availability of competitive choice. In a number of ways, one CLEC's success is a *public good* shared by other CLECs.[13] The successes and failures of one affect the many.

III. Conclusion: Favoring One Form of Entry Over Another Fails

The results of Z-Tel Public Policy Papers Nos. 3 and 4 should cause policymakers that wish to put in place "granular" or market-by-market unbundling rules to take pause. Like other attempts at industrial policy, it is highly likely that a governmental agency – particularly a federal agency that cannot have complete, close-to-the-ground knowledge of actual market conditions in various cities and towns across the country – will end up with a policy that causes more harm than good.

In particular, Z-Tel Public Policy Papers Nos. 3 and 4 debunk the FCC's logic contained in the *UNE Remand Order* that limited access to unbundled local switching in certain areas of certain cities promotes local switch deployment. This research directly refutes the "substitution scenario" behind this policy – the FCC's assumption that without the ability to purchase unbundled switching, CLECs would be able to self-provide their own switching in a sufficiently timely manner. In fact, the evidence shows that without the ability to purchase

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[12] Pursuant to Section 251(d)(2), in "determining what network elements should be available" to entrants, the FCC "shall consider" whether the failure to provide access to such element would impair the ability of an entrant "to provide the services that it seeks to offer." 47 U.S.C. 251(d)(2). Under this standard, the fact that a switch may be deployed by an entrant to serve one market (such as large business users with bandwidth-intensive means) is irrelevant to any determination as to whether denial of access to unbundled switching would impair entrants in the ability to serve mass market customers that purchase analog dialtone service.

[13] Likewise, CLEC failures have had a negative effect on all CLECs, particularly those that leave customers stranded.

unbundled switching, CLECs are less likely to enter the market at all, even with their own switch or otherwise.[14]

In the end, the FCC restriction has resulted in the "worst of both worlds." Restricting access to unbundled switching has directly harmed mass-market residential and small business consumers in the affected states, because they enjoy less competitive entry than their compatriots in other states. In addition, the restriction has caused there to be *19% less* CLEC switch deployment in those states, all other things being equal.

Clearly, if the purpose of the FCC's policy was to foster a competitive market *and* promote facilities-based (switch) deployment by CLECs, the limitation on access to unbundled local switching in the Top 50 MSAs has failed. Similar proposals to limit the availability of other unbundled network elements in addition to switching (such as interoffice transport) must take into account this devastating public policy failure.

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[14] This evidence is *directly contrary* to the recent, unsupported assertion by Verizon that "requiring incumbents to unbundled local switches where competitors have already deployed their own switches undermines those competitors' ability to compete." Verizon Letter at 4. The evidence shows exactly the opposite: *restricting* access to unbundled local switching has resulted in *less entry overall* and *less switch deployment* by CLECs.

The Z-Tel Public Policy Paper Series is designed to arm policymakers and the public with a rigorous set of analytical tools and analyses regarding the development of local telecommunications competition. For more information, contact any of the following members of Z-Tel's Strategic Policy Department.

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Other Z-Tel Public Policy Papers

Putting the Cart before the Horse: The History and Future of the UNE Platform, Z-Tel Public Policy Paper No. 1 (February 2001)

The TELRIC Test: Determining the "Zone of Reasonableness" for UNE Rates, Z-Tel Public Policy Paper No. 2 (November 2001)

An Empirical Exploration of the Unbundled Local Switching Restriction, Z-Tel Public Policy Paper No. 3 (rev. February 2002)

Does Unbundling *Really* Discourage Facilities-Based Entry? An Econometric Examination of the Unbundled Switching Restriction, Z-Tel Public Policy Paper No. 4 (February 2002)

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ATTACHMENT D

Statement of Randall Stephenson
BAS 32nd Annual Investment Conference, San Francisco, California, September 23-26, 2002.

Everyone, thank you very much for joining us this morning for the SBC Corp. presentation. My name is David Barden, the wireline telecom analyst at Bank of America Securities, and I am very pleased to have with us today the CFO of SBC, Randall Stephenson, who has been in the post since August of 2001.

You know, SBC is the largest RBOC —with 60 million lines—is playing, as you know, a very large role in the regulatory debate which surrounds the telecommunications industry today, and they have got a very loud voice on that and Randall has been very straightforward in talking to people about SBC's views. The company has an 80 billion dollar market cap and extraordinarily low leverage. They will be a player in the ongoing consolidation and strategic outlook for the industry as a whole, and as a 60 percent owner of Cingular, one of the largest wireless players in the industry, they also have a very large say in how the wireless industry continues to develop. I know you are all here to learn a lot more about those topics and without further ado, I would like to introduce Randall Stephenson. Thanks Randall.

Randall Stephenson: Thank you David. I refuse to say 'can you hear me now' or 'do this', either one. It's good to be here. Can you hear me?

It's good to be here and talk to you a little bit about SBC this afternoon, and I want to do a couple of things. First of all, I know a lot of you aren't familiar with SBC, so I'll give you a little bit of perspective quickly on our business and what it is we do and who we are, talk to you about the industry—there's a lot going on in this industry right now -- and then quickly move to your questions and answers. So, I hope to do this in a way that is balanced, not overly pessimistic, and not quite as optimistic as what we saw during the 90's. So with that, I'll move on.

As you are looking at the Safe Harbor Rules here, let me just kind of give you a perspective on what we are seeing right now. To be frank, in the short run, it's tough; the going is very tough right now. We have a tough economy we're operating in, competition is proving to be pretty tough. Competition is being driven largely by this UNEP – ah, platform -- that the FCC put in place, where our wholesale customers are buying services below our cost. It's being driven by a lot of bankruptcies and turmoil in the marketplace, largely, that being WorldCom—we're all familiar with that situation. So in the short run, it's a difficult situation. I would tell you though, longer term looking out, the fundamentals of the industry are still good, the fundamentals are fine. I think Telecom will continue to grow as we move out. I think SBC is going to be positioned very well as the industry moves forward to do well. From a financial stability perspective, our balance sheet is second to none right now; our scale is second to none. So I think you'll see SBC do quite well as we move forward in this industry. Right now, we are working through a transition in this industry—it's going to be a difficult transition, so what we are doing is trying to make sure we are accomplishing those things that ensure that as we come out of this transition we are stronger than when we went into it, and I'll show you some numbers that I think will help you an appreciation for that.

Just to give you appreciation for SBC, we have four segments basically that we operate in. We have a wireline segment—that's our largest segment, represents about 41 billion dollars in revenue. That also represents about 75 percent of our revenue base. We also have Cingular wireless, which is our wireless segment. We own 60 percent of Cingular wireless along with BellSouth, that represents about 15 percent of our pro forma revenues. We have a very large and a very successful directory business, it does quite well, about 4 ½ billion dollars of revenue, and then we have a number of international holdings: Mexico, Europe, South Africa is predominantly where those are concentrated.

When you talk about what we are trying to accomplish and what our objectives are, I tell you our priorities are very straightforward right now. First of all, I would start at the top right-hand side of that graph and say in this environment, the balance sheet is absolutely everything. In that regard, we are working very aggressively to control costs, both on the operating expense side as well as the capital expense side. I've been in this business twenty years and I would tell you I have never seen a more intense focus on costs in this business than what I am seeing right now at SBC. The implication of that cost discipline is that in our business it does throw off a lot of cash when you're disciplined here on the capital and expense side, and the business is throwing off a lot of cash. We are going to throw off just in excess of 3 billion dollars of free cash flow after dividends this year. The result of all of that is I would tell you we are the best capitalized telecom business in the world. Our balance sheet is second to none right now, and that's the implication of this strategy we are pursuing in the short run. In the long run, we have got to get the top line moving. The industry is stagnant right now, and we are doing a lot to make sure that the top of the line does get to moving again, particularly in the areas like data, long distance, DSL, and then putting those all together and then bundling them with the access line, and really trying to change the churn characteristics of the industry.

And then finally our third objective right now—and you've heard a lot about it, we've been very vocal about this—is we've got to fix this UNEP platform that the FCC has put in place. This is a regulatory regime, a regulatory environment, that is siphoning away any incentive to invest in this industry, and we'll talk more about that as we move through this.

As I said, when you compare us to our peers in this industry from just a pure financial position, we are second to none. We are a very, very well-capitalized telecom company. As a result, maintaining our balance sheet has been a very consistent theme and objective for us. To keep a balance sheet in check in this environment, you've got to be real aggressive on costs. You see a couple of graphics up here. The one on the left is our operating expense performance over the last few quarters. What you see is that we have had negative year-over-year expense growth for the last three quarters. If you were to drill just in our largest segment, our wireline segment, we've been negative year-over-year growth for the last four quarters, so we have been operating very effectively on the cost side. This has been principally driven by force reductions—workforce reductions. I tell you, over the last three quarters, we have taken 13,000 people out of the business. By the end of this quarter, that number will grow to 16,000, and you will continue to see a focus on this area as well. As a result of this cost initiative and this cost action, we have been able to sustain margins in light of a declining top line. You could see our margins actually expanded by about 140 basis points in the fourth quarter.

We have been putting that same kind of discipline into the capital investment program. What you see here is our capital investment has been shrinking considerably. We've gone from investing 12 billion dollars back in 2000, to this year we will invest under 8 billion dollars in this business. Last quarter, our capex was about 1.7 billion; year to date, we are at about 3 ½ billion dollars, so you can see we are on trend to achieve these kind of numbers. Now if you take aggressive operating expense performance, real aggressive capex performance, what you see is a lot of cash coming out of the business. Our free cash flow before dividends this year will nearly double what we achieved last year. If you look at our free cash flow after dividends, the graphic on the right, you see that last year we were approximately break even. This year, we will throw off 3 billion dollars of cash flow after dividends. Free cash flow through the second quarter was about 1.7 billion dollars, so we are right on target to achieve these numbers.

Real question is how do we use that cash? I tell you, we've returned a lot of it to shareholders, we've purchased a lot of stock in the first half of the year, we've also increased our dividend in the first half of the year 5.4 percent. That's the largest dividend increase of anybody in our peer group. It's our largest dividend increased since 1990, actually. I tell you, we are the only

telecom that has increased its dividends every single year in the history of its corporate identity. We are also working pretty aggressively to pay down debt. In fact, if you look at next side, you can see that all of our credit metrics are improving, second quarter credit statistics all improved, our debt ratio is down by 230 basis points. We've paid our commercial paper down by 1.6 billion dollars in the second quarter. As of right now, all of our commercial paper is backed up with bank lines 100 percent. We have the highest commercial paper ratings available. Our current long-term debt ratings are AA-, and again I will reinforce that at a 13.6 times interest coverage, we have the strongest balance sheet in the industry right now. So our biggest challenge is the top line. Like I said, the industry is going through a lot right now. There's a lot of shakeout going on in this industry, and so we are really challenged on trying to get the top line moving in this industry. We're doing a lot in the areas of data, access line retention, long distance, and I want to talk about some of these initiatives real quickly.

When you look at the volatility in this industry that we've seen recently, what I like to do and what I do when I'm sitting back home in San Antonio, is I look at the top line on a sequential basis, because it's really telling where the industry is headed right now, and you got two graphics up here. On the left is our voice revenue growth on a sequential basis; on the right, it's the data transport growth on a sequential basis. Starting with the graph on the left, what you see is our voice revenues in the last quarter declined 1.1 percent. That is about the best quarter we've had on a sequential basis since last year, second quarter of '01. So we're seeing some stability and actually seeing the rate of decline slow down quite a bit. On the data side, you actually saw sequential growth in the second quarter of last year. It was up 1.6 percent. Q1 actually went negative for the first time that I can remember being with this business. This suggests there's some stability here. I think it's too early to call. We've got a lot of shakeout going on in the ISP industry. Time will tell here.

Let's break down that data growth a little bit further. Now here you see it on a year-over-year basis, and what you see is year over year, our data products were basically flat. Far left-hand graph, they were up 0.2 percent. If you pull CPE out of there—we sell a lot of data CPE (Customer Premise Equipment)—if you pull that out (it's low margin to no margin) and basically what you see is our data revenue growth was about 4 ½ percent. Then if you just look at the high-cap transport, the big pipes that we run into business and homes, those revenues grew still at a 7 ½ percent clip in the second quarter of last year. You can see the breakdown of it over here. Consumer, you could see, was growing at about an 80 percent pace—that's DSL—we're having a lot of success with DSL. If you skip down one line to the wholesale line, you see that the carriers are still buying a significant number of the large pipes into business and so forth. Those volumes are up 9.4 percent—those revenues are.

You can see what the issue is here. It's that middle line, business, including all the ISPs. The data transport products in the business segment was actually down in the second quarter of last year. Now to see what's going on with that business segment, let me just drill down for you here for just a second and show you what's going on. What I've done is taken the three largest products those business' buy that are down year over year, and looked at by segment how are these products growing? What you see is no surprise. The large and global customers—the big customers—they're down, but they're not down dramatically, they're down 5 percent. That's pretty much reflecting the economic environment that we're in. Layoffs are considerable, employee force counts are down, and so they're actually going down in terms of the number of high-cap products they're buying. Look at government, education, and medical. What you see here is they're up almost double digits still, so these products are still growing in the government realm. Medium and small business is growing at a 13 percent clip. But look at the IFPs. You got a huge shakeout going on in the ISP industry. A lot of consolidation, a lot of bankruptcies, people grooming networks, and as a result, the revenues from the ISP industry is actually down year-over-year 44 percent. We almost lost half of that revenue stream year-over-year. So our biggest challenge is the industry consolidation issue.

Now if you look at … looking forward, will the ISP shakeout end? I really don't know. Have we seen it stabilize? Not yet. But I think, you know, that will work its way out. When it does stabilize, I think we're positioned pretty well to grow this revenue stream moving forward. What you could see is, relative to our peers we have by far the largest data revenue stream of any of our peers. We also have a really good footprint in our network. We have over half the Fortune 500 located in our footprint. They're big consumers of these types of products. We have some really good relationships with all of these guys. We do have a nationwide IP backbone network. Basically what we're missing is 271 relief, long distance really, in the states of California and the Ameritech region. Once we have that, we think these products are positioned well to grow moving forward. So that's the data story. Data is an industry issue. It's an economy issue, and so we think that there will be good fundamental growth moving forward.

But when you look at the voice side, particularly the consumer side, you see an interesting trend. You got three graphics up here. These are the year-over-year, or actually the access line changes by quarter. On the left-hand side is the business segment. What you see is a real stable environment. Those access lines in this environment are shrinking 1- to 200,000 lines a quarter. Pretty stable, fairly predictable. When you look at the consumer segment you see something really interesting. The second quarter of this year, consumer retail access lines shrank by over 900,000 lines. It was a huge drop in our consumer access lines. What was the driver of that? It's real simple. Look at the right-hand graph. That's UNEP. That's these access lines that our competitors buy from us at about a 60 percent discount and sell to their customers. Those lines actually grew by about 700,000 lines. So what you see here is a shift from our retail customers to the wholesale UNEP platform. Who's using the UNEP? It's really no big surprise. It's AT&T and WorldCom. That's who's buying these products and selling to their customers. They represent in excess of 70 percent of the UNEPs that were purchased in the second quarter. Interesting if you look here on the bottom, all other carriers—other than AT&T and MCI WorldCom—actually shrank in the second quarter in terms of number of UNEPs that they had purchased. How are they using these? This is what they're using to compete in the consumer segment. So basically, they're buying our access lines at a 60 percent discount, competing in the consumer segment—it's not the business segment—to resell these. They're targeting the high-end of the customer base, those high-spend LD customers, and I suggest to you the numbers tell the story. What you see here are our highest UNEP penetration states; and as I said, it's a residential consumer play, it's not a business competition play.

The IXC strategy is pretty simple. In fact, I would suggest to you that the UNEP platform that they're mandated by the FCC is proving to be a gift to the IXCs. It's a gift in form of it allows them to compete in the local market while spending zero capital. They have some pretty good margins in this business, they have no risk in this business, but the problem that you have here is the economics don't work. I don't care how you turn it, this is not a sustainable model for this industry. You force a company over time to sell its products and services below cost, the implication and the end result of that is pretty straightforward: that company stops investing in the products and services that its providing, and that's what we think is exactly going to happen to telecom if this platform and this product isn't fixed. So just to summarize, UNEP isn't competition. This slide says that it's arbitrage. Arbitrage to get some level of subtlety and I would suggest that there's no level of subtlety in the UNEP. This is just blatant subsidization of our competitors. It's got to change, as I said there is absolutely zero incentive to invest in this business if it's not changed. What we actually see is a disincents facilities-based competition. Where you see UNEP volumes increase, you actually see facility-based competition decreases and so it's disincenting investment on all sides of the spectrum here. The concept of universal service—telephone service for everyone—is completely undermined with this type of platform, and the benefits of this, interestingly enough if you think about it, the benefits of competition flow to one place—it's the high end of the customer base. Only the high-end users are receiving the benefits of competition, so again I would suggest to you that

this is an unsustainable model; in fact, it's sustained only by the ILECs ability to absorb the margin pressure associated with this.

So how have we responded? We try to be positive in our response. We're going out to talk to all of our major regulators where this UNEP platform has been put in place; and I would tell you the reaction has been good. I think there is a good understanding of the dilemma that this industry is in if this issue is not resolved. I would suggest to you and I am fairly confident that we will see change. The FCC has a timeline in front of them of January 3rd, their tri-annual review, where they will have to deal with this issue, and I am confident that at the end of the day economics and rationality will win out here, I am very confident of that.

The other way we are responding is to work aggressively to get into long distance. In the Ameritech region where this thing is playing itself out most aggressively, we are working aggressively to get into long distance; we have a competitive product platform. California—it appears that we will be in the long distance market by the end of this year. We are working very aggressively to expand the DSL product. What we have found is where DSL penetration is high, those people with DSL are 75 percent less likely to churn, so we are working very aggressively there. We are moving very aggressive then to bundle all of these products and services, including the wireless with the wireline offering. All with the intent of trying to reduce churn and improve the economics of the business.

So before I go to Q&A, let me just take a quick minute and tell you why where we are with long distance and DSL. These are really important products for us. In long distance, we now have 5.6 million long distance lines at the end of the second quarter. We are offering the product in six states. Our interlata and international long distance revenues in the second quarter actually increased 53 percent in the second quarter. We think we'll add California by the end of December, and when we add California at that point, two-thirds of our access lines we'll be eligible to sell long distance to. DSL we're moving fast. We're continuing to accelerate. You see in Q2 here we added 213,000 DSL customers. It was our best quarter in nearly six quarters. We're doing a lot to bring the cost of this product down, they're coming down very quickly. The economics are really starting to look compelling. Pretty excited about the product. We introduced the Yahoo DSL product just last week, and their early feedback on that has been really good. The content is really good and it looks like it's going to be a real benefit to us.

Quickly on wireless. We're making a lot of progress here in terms of trying to rationalize the business model. We're trying to be disciplined here, trying to be very disciplined in how we approach the wireless market. As a result, our pursuit, our focus is on the digital contract customers, and it's very simple. The economics of the contract customer are very compelling. Churn rates are significantly lower. RPUs tend to be significantly higher. Implication is margins tend to be a lot better. You saw the results of this in the second quarter. In the second quarter, we added 619,000 contract subscribers and our RPU increased for the forth consecutive quarter in the second quarter. We're moving to an all-digital network, all of our customers are migrating to digital, we're virtually there, and what we have as a result is a good healthy business model that I think will be able to sustain good strong cash flows as the industry works through consolidation and through a lot of the transition its going through right now.

Like I said, our priorities are pretty simple. We've got some very proactive revenue strategies. At the end of the day, our key advantage is the ability to bundle all of these products and services, wireline and wireless. That's an advantage that few can duplicate—Verizon and BellSouth, perhaps. That drives down churn, helps on retention, and at the end of the day is just a more compelling cost model and a revenue model. We are being very aggressive on the cost side, about as aggressive as I have seen us. The cash flow to the business are really strong and getting stronger, and as a result, our credit profile—our credit metrics—are all improving and getting better, and we are working very aggressively to try to provide our leadership in

terms of UNEP reform, because at the end of the day the health of this industry -- not just SBC, but the health of this industry -- is dependent upon getting good UNEP reform and that is a priority for Ed Whitaker and myself, Bill Dailey, and all of us at SBC.

So I thank you for your attention and I'd be more than glad to take those questions you might have.

Question: Unintelligible
The question was, she said I talked about 900,000 drop in consumer access lines and increase in UNEP of 700,000. The math suggests there is a 200,000 dollar gap, and really, what's the makeup of that gap? It's hard to do that math. I can't be real precise with you, it's kind of soft. But I tell you, we are seeing migration to wireless without a doubt. It's not as dramatic as perhaps you might suspect, but we are seeing it. It appears to be more in the MDU community, Multiple Dwelling Units and so forth. We have done studies and we see a real high incidence in those communities of people that have displaced a wireline with wireless. That's the primary place where you see that happening, and again it's hard to put a number on it. Bbut then to give you a perspective, we really see it playing out and you can quantify it, is on the long distance side, and what you see in the long distance is wireline long distance. Back when we first had visions of going into the long distance market, is you were seeing minutes of use per customer from about like 200 minutes per customer per month. That number is now in half, down to about 100 minutes per customer. Where have those minutes gone? They didn't go away, they're on the wireless network. So you're seeing a lot of traffic move to the wireless network. Wireless minutes and use are up 40 percent year-over-year. Subscribers aren't up that high, so basically you see what happened is just more and more use is being directed to wireless. We're also seeing a lot of substitution with cable modems, and we're seeing substitution with DSL—somebody gets a DSL line and they perhaps don't need that second line, so we are seeing some disconnect there, and I tell you about half of that 200,000 gap is just plain old economy—people disconnecting the additional lines and so forth, but the other half being the other two issues we just articulated.

Question: Unintelligible
What percentage of our operating income is for pension gains? When you say pension gains, I assume you mean the income off the pension trust, and when you look at our numbers, and we got a pension trust of about 30 billion dollars, our assumed return is about 9 percent, so you know, you can do the math—about 2.7 billion. If you take all of the elements of the pension income, the pension service costs, the interest costs of the pension plan, and all your post-retirement medical—if you just take all of that and net it all out, you basically come in 2002 to about a zero number, so it's a net impact of zero. I think your question was where do I see it going forward. It's going to be a lot of pressure going forward. I think everybody with big pension trusts are going to be experiencing some pressure next year. It's hard to say right now where the market will end up. We're in the negative return territory right now. If we assume that we stay in the negative return territory this year, you know we have a positive assumption of 9 percent that's in our numbers—say it's negative six just to make the math easy. You got a 15 percent swing in pension income, 15 percent times a 30 billion dollar pension trust, and you spread that over five years, that's a big number. We're probably all going to have to take a look at our discount rates moving into next year with interest rates being as low as they've been, so that'll probably provide further pressure, so I think most people with large, well-funded pension plans are probably going to have some pressures to deal with next year, but it's hard to quantify yet.

Question: Unintelligible
I wouldn't tell you we and our competitors are all coming together with some cohesive plan that we think will be adopted, and I will tell you though, that our request is really very simple. We have not asked the FCC or any state regulator to eliminate the UNEP. That's not our priority. I don't know if that's realistic or not. What we are asking, what we are requiring, is

that the UNEP pricing be fixed. In the Ameritech states, those five states, the average discount of the UNEP is about 60 percent. That is not a viable model. It is well below cost on anybody's cost modeling assumption. If you use TELRIC pricing, if we use any pricing, you cannot get to a $14 UNE price. The fix here is to address the pricing, and that's what we're trying to get addressed, is the pricing. Not to get rid of it, just get it priced at cost.

Question: Unintelligible
Let's give you an example. Illinois, we have filed revised cost studies, actually new cost studies, under the TELRIC pricing methodology. The UNEP in the state of Illinois is about $15, roughly. Our cost studies put it over $30. That is what a TELRIC pricing methodology would give you. So, state of Texas, it's about a $20/21 UNEP. You know, the state of Texas, you have a pretty rational model. You know at $20/21, you have good, vibrant competition and it's not at such a level where we cannot earn money or are disincented to invest. But if it starts to slip below that level, you've got a model that's not sustainable.

Question: Unintelligible
Yes, we are. We have done that already. There is just so much turmoil going on in the marketplace right now, a lot of movement on industry consolidation and so forth, but it's just prudent in this environment to pay down debt and we have— *Question: Unintelligible* --
I have not given any targets. I would suggest most of our discretionary free cash flow will probably go towards paying down debt. As I mentioned, our CP balances have been dropped by 1.6 billion dollars. There's going to be a lot of cash coming in over the next couple of years through the Bell Canada disposition, Sterling, etc. That business will generate a lot of free cash flow. The emphasis will be to pay down debt. We'll probably continue to be -- you know we've got a good history in terms of dividends -- increasing dividends, and I don't think you'll see us compromise there, but most of the free cash flow will go to pay down debt.

Question: Unintelligible
It depends on where, all right, but if you assume in the Ameritech region we lose a million lines, the math's pretty simple. Average revenue per customer in the consumer segment in Ameritech is about $36, the average UNEP is about $15, so about 21 bucks times a million times 12.

Question: Unintelligible – regarding Nortel's financial condition
No, I don't think so. I'd hate to see that happen. That's kind of a logical implication of the policy that we're following right now in the United States. I mean, we're not going to invest. You're not going to see our investment go up next year. I would suspect Verizon and BellSouth would say the same thing. Probably be more downward pressure than upward pressure. If one of them were to go out of business, would that have significant implications to our operations day-to-day? No, I don't think so. It would obviously depend on what happened to them in a bankruptcy-type proceeding, you know, the 5E technology and support just went away over night? Well, yes, that would probably be significant, but I don't see that as probably being a likely scenario.

Question: Unintelligible
Well, Chairman Powell has been pretty clear that going from six to five competitors is doable. He made that statement publicly back I think in the first or second quarter. He said going from five to four gets a little more difficult, and going from four to three is maybe not—I'm not sure if I'm articulating correctly—but it's getting progressively harder, so obviously the first one in probably stands a better probability of success than the second or the third.

Question: Unintelligible
In terms of DSL—I'll take the question a couple of stages. First of all, let met talk about the economics of DSL. They're pretty compelling. If you'd asked me that question a year ago, I wouldn't have said they were overly compelling, but I feel really good about the product. I

just take our one market where we have really deep penetration levels—California, we're in excess of 10 percent penetration there. The economics look really good. We've not given any specifics in terms of the economics of DSL other than in California. Set customer acquisition costs aside once you have a customer up, the recurring margins run in excess of 40 percent, EBITDA margins, and so with the capital that you have to invest on a per-customer basis, you get to a pretty good positive NPV-type customer. Where your penetration rates get over 10 percent, churn rates come way down. Churn rates in California are about half those in Southwest and the Ameritech regions. So I look at California and say that's where the business is headed. Southwestern Bell is moving there very quickly—they're about half of California penetration rates and closing in on them fast, and they're economics are starting to look like California. So I step back from it, but it is the business I like. It's the business we want to be in, and the retentive benefits of it for an access line are so strong that it's a business we got to be in—it's a priority.

Now I go to the tri-annual review in terms of, you know, how important is that to us. I would tell you that until we get rules that put us at parity with the cable modem providers, you're not going to see us moving our footprint beyond where it is right now, though. The reason being, you know, when we have to sell this product at wholesale prices in a urban area, you can still make the economics work. Take this to a tier two or a rural market, and then start selling this product at wholesale prices, you can't make the economics work. So if the FCC were to put in place rules that would put us at parity with the cable providers, meaning, we would invest all of this money, we don't have to sell it at 40/50/60 percent discounts, then we would expand our footprint. We'd probably invest more in tier two towns and work hard to get this product moved out. Absent that, you're not going to see us investing now.

Question: Unintelligible

The question was whether I think we'll have some definite visibility in terms of what this market looks like for DSL. I haven't got a clue. You know some states are just acting on it on their own. The state of Oklahoma came out and basically said no regulations for broadband. Well guess what, we're investing there. We're going to expand the footprint in Oklahoma and that works real well, and we're petitioning a lot of other states to do that. But in terms of when we'll have just a good national framework, I don't know. I think January the FCC will act and I think their bias will be to act in a way that brings parity to the marketplace. But you said it. Will there be appeals? Probably. I don't know. I can't answer. Sorry.

Question: One more question—Maybe I'll ask it. Randall, I know that you've had some pretty eloquent things to say about kind of a five-year growth outlook for the business when you kind of normalize sort of the economic environment we're in when you normalize the uni environment. Can you kind of walk it through just to kind of close out the time here, kind of what you think the five-year outlook for the state is.

I have a hard enough time projecting right now one quarter, much less five years, but I'll kind of tell you where my head is. On the wireline side, I think the consumer market in terms of access lines because of wireless substitution and DSL substitution and so forth—I don't think you'll see access line growth in the consumer segment. I think you'll see our access line growth will continue to be negative. I think that's natural. I think though the ability to bundle DSL, long distance, and wireless together will allow us to keep RPU on a total customer basis up enough to, you know, to work towards a flat-type revenue growth forecast for the consumer segment. On the business side, I don't think you'll see access lines grow quite up to where you'll see nominal GDP growing, but I think they will continue to grow. There's no reason business access lines in a good, healthy economy should not continue to grow, and so I think we'll see good fundamental growth there and as we move into long distance that should provide some lift to the business segment, and so I always fall back on what do you think is going to happen with these high-cap data products? You know, the bread and butter, if you

will, on the business side? High margin, good growth products. I don't see any reason why those products shouldn't continue to grow in 8- to 12-percent type range moving forward. You'll never see 30 percent like we saw back in the 90's, I mean we'll never see that again, but good high single-digit growth rates ought to materialize. If you add all that up and you get some kind of good single digits on wireless, you know, you've got a, you know, a conceivable mid-single-digit type growth platform for this business. It is a cash-rich business. If we can get the UNEP platform fixed I think we got a business that can, you know, continue to grow long term, not, you know, the double-digit range, but, you know, good solid single-digit type growth.

Thanks Randall.
Thank you.

ATTACHMENT E

New 750 Box Telephone Drop Wire - Outside

Item # 1394689075

Consumer Electronics:Phones & Wireless Devices:Phones:Other

Currently	**US $49.99**	First bid	**US $49.99**
Quantity	**1**	# of bids	**0** bid history
Time left	**8 hours, 7 mins +**	Location	**Crossroads Of America**
		Country	**United States**
Started	Oct-31-02 19:43:48 PST		mail this auction to a friend
Ends	Nov-07-02 19:43:48 PST		watch this item
Seller (Rating)	**[redacted](2300)** Power Seller		
	view comments in seller's Feedback Profile | view seller's other items | ask seller a question		
High bid	--		
Payment	money order/cashiers check, personal check, or see item description for payment methods accepted.		
Shipping	Will ship to United States only. See item description for shipping charges.		
Seller Services	Revise item | Sell similar item		

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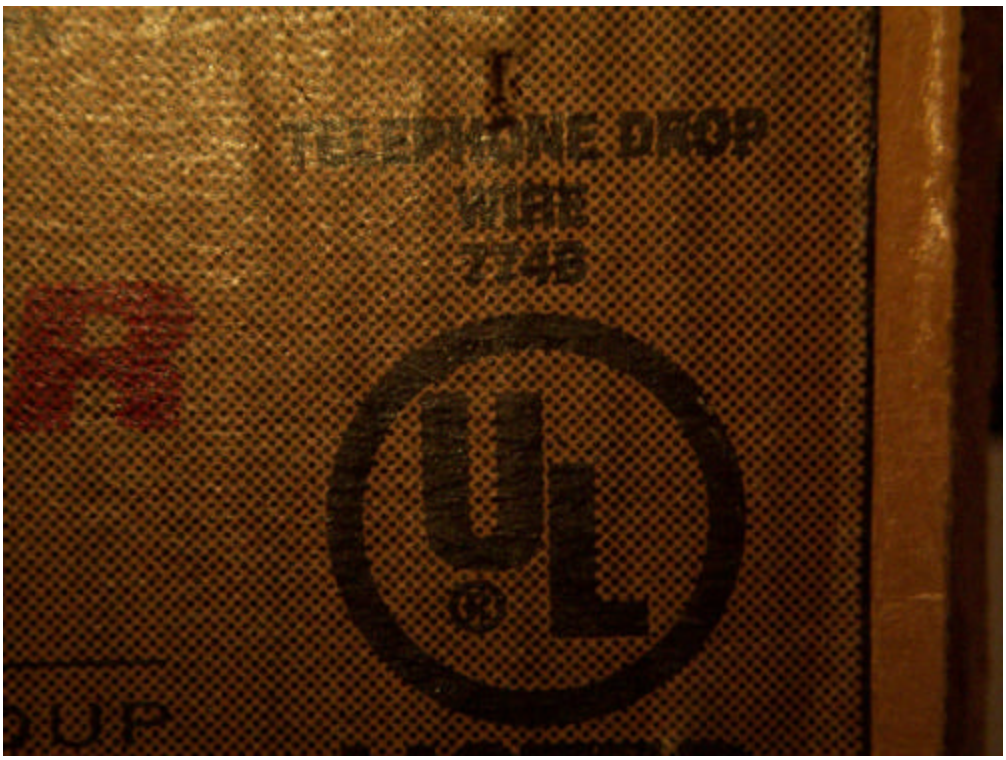

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