An Empirical Exploration of the Unbundled Local Switching Restriction

Z-Tel Public Policy Paper No. 3
Z-Tel Communications, Inc.
601 S. Harbour Island Blvd., Suite 220
Tampa, Florida 33602

February 2002
(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

---

* 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.

timely as entry by means of ULS. This empirical analysis shows that not to be 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

---

[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).

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.

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.

---

[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.

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 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

---

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

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 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

---

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.

regression, the F-statistic of the Ramsey RESET test is 1.34, which is not 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.

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 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

[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.

10%.[13] In other words, the larger the restricted market, the more impact the restriction has on CLEC market share.

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 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

---

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

[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(β_1·Δ*RESTRICT*)-1], or exp(-1·0.45)-1 = 0.36, or 36%.

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.

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]

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.

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

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

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]

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 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

---

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

and small business customers are most definitely impaired in their entry efforts by the ULS restriction.

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.

George S. Ford, Chief Economist	gford@z-tel.com
Thomas M. Koutsky, V.P., Law and Public Policy	tkoutsky@z-tel.com
Peggy Rubino, V.P., Eastern Region	prubino@z-tel.com
Ron Walters, V.P., Midwest-West Region	rwalters@z-tel.com
Richard Sampson, V.P., Qwest Region	rnsampson@z-tel.com

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)

©2001 Z-Tel Technologies, Inc. All rights reserved. Z-Tel is a registered trademark, and Z-Tel Technologies, Inc. is a trademarks of Z-Tel Technologies, Inc. All other marks are trademarks of their respective owners.

Does Unbundling *Really* Discourage Facilities-Based Entry?

An Econometric Examination of the Unbundled Switching Restriction

Z-Tel Public Policy Paper No. 4
Z-Tel Communications, Inc.
601 S. Harbour Island Blvd., Suite 220
Tampa, Florida 33602

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

---

[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

---

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

---

[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

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

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.

---

[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

---

[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 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*M*)

	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]

---

[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

---

[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.

---

[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.

George S. Ford, Chief Economist	gford@z-tel.com
Thomas M. Koutsky, V.P., Law and Public Policy	tkoutsky@z-tel.com
Peggy Rubino, V.P., Eastern Region	prubino@z-tel.com
Ron Walters, V.P., Midwest-West Region	rwalters@z-tel.com
Richard Sampson, V.P., Qwest Region	rnsampson@z-tel.com

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)

©2002 Z-Tel Technologies, Inc. All rights reserved. Z-Tel and Z-Tel Technologies, Inc. are registered trademarks of Z-Tel Technologies, Inc. All other marks are trademarks of their respective owners.