**Competition and RBOC Revenues and Infrastructure Investment: The Case of**

**Arkansas, California, Texas, New York, and Illinois**

by

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## Summary

This paper quantifies how differences in regulatory rules toward competition across the states of Arkansas (AR), California (CA), Illinois (IL), New York (NY) and Texas, (TX) impact the level and rate-of-change of infrastructure modernization investment and the level and rate-of-change of various measures of average revenue for the Regional Bell Operating Company (RBOC) serving each state. AR and TX are the late adopters of pro-competition policies and CA, IL and NY are traditionally pro-competition states, with IL and NY early adopters of pro-local competition policies, and CA slightly later in its adoption of pro-local competition policies.

The results of infrastructure modernization comparisons and revenue comparisons are consistent with the view that the historically pro-competition states delivered benefits to their consumers in the form of greater accessibility to advanced telecommunications services earlier, lower average prices for the three classes of RBOC services, and lower rates of growth in these average prices.

- This study uses data on infrastructure investment and net revenues collected from annual reports by the RBOCs made to the Federal Communications Commission.
- Four classes of infrastructure modernization investment associated with the provision of advanced telecommunications services are compared: kilometers of fiber optic cable installed, Digital Stored Program Controlled (DSPC) switches, access lines and switches equipped to provide Integrated Services Digital Network (ISDN) services, and switches and access lines equipped with Signaling System 7 (SS7) capabilities.
- With a few exceptions, for all years in the sample running from 1992 to 1994, the fraction of the RBOC's network in each state containing this modern telecommunications infrastructure was significantly higher in IL, NY and CA (the states adopting competition policies early) than in AR and TX (the slower adopting states).
- By 1995, for some measures of infrastructure modernization, TX and AR caught or surpassed CA, IL or NY. In these cases, the end of 1995 penetration of the specific technology was very high in all of the RBOCs' networks.
- In the important area of digital switching, TX remained significantly behind CA, IL and NY for each of the years 1992 through 1995.
- AR and TX experienced more rapid growth over the sample period in basic local service revenues per residential access line, than CA, IL and NY. For 1995, NY and IL experienced significant drops in average revenues per residential access line relative to 1994.
- For all years, AR and TX had higher values for the average revenue per minute of network access service than CA and IL. These states also experienced slower average rates of decline in these average revenues from 1992 to 1995 than CA, IL and NY.
- Average toll network revenues per intraLATA toll call completed in TX and AR was more than twice that same value in CA for all years in sample.

## 1. Introduction

The Telecommunications Act of 1996 specifies a national framework for introducing competition into local exchange markets. Under the mandate of this Act, recent Federal Communications Commission (FCC) orders have clarified the specifies of many aspects of this process. The presence of a unified national telecommunications competition policy is new. Up until the passage of this act, state legislatures and public utilities commissions decided the extent to which competition was allowed into local exchange markets. This process led to considerable across-state variation in the amount of competition allowed into the markets served by the incumbent Regional Bell Operating Company (RBOC) serving that state.

Differences in the rules governing entry into the markets served by the RBOC interacted with the state-level regulatory process create divergent incentives for RBOC behavior across states. These divergent incentives then imply differences in the observable behavior of the RBOCs. Consequently, the purpose of this paper is to quantify how these differences in regulatory rules impact two major observable characteristics of the RBOC serving that state: the level and rate-of-change of infrastructure modernization investment and the level and rate-of-change of various measures of average per-line revenue earned by the RBOC in that state.

Our rationale for focusing on infrastructure investment is the stated goal of the Telecommunications Act of 1996 “to accelerate rapidly private sector deployment of advanced telecommunications and information technologies and services to all Americans by opening all telecommunications markets to competition...” (Telecom Act of 1996, p. 1). Consequently, the extent to which a state encouraged or discouraged competitive entry into its RBOC’s markets before the enactment of the Telecommunications Act of 1996 should affect the extent to which that RBOC engaged in the optimal amount and mix of investment in modern telecommunications infrastructure. In addition, the regulatory process faced and the manner in which competitive entry is allowed should impact the revenue stream flowing from each of the services offered by the RBOC serving that state.

Because of the increased speed and flexibility made possible by the use of digital transmission and switching technology, the network infrastructure necessary to supply the full range of telecommunications services demanded by many consumers in the near future will require digital capability throughout the local exchange company's (LEC) network. Consequently, we focus our analysis on the level of investment in the infrastructure technology necessary to provide digital network services. We also present measures of the level of investment in high-speed, high-capacity network transmission infrastructure which should enhance the quality of digital services provided over the LEC's network. The specific measures of leading edge network infrastructure which we focus on are kilometers of fiber optic cable installed, total number of Digital Stored Program Controlled (DSPC) switches, the number of access lines equipped to provide Integrated Services Digital Network (ISDN) services, and the number of switches equipped with Signaling System 7 (SS7) capabilities. All of these infrastructure measures are associated with the provision of advanced telecommunications services, such as simultaneous voice and data transmission, high-speed data transmission, video dialtone and interactive video, although fiber optic cable in a LEC's network is not necessary for it to provide these services. Digital services can be provided over copper wire local loops. In particular, the ISDN technology is designed to provide digital services to the customer premises by making use of the existing copper wire local loop.

The analysis of average per-line revenues will focus on the three major state-level revenue sources for the LEC: local phone service (business and residential), intra-Local Access and Transport Area (LATA) toll service and interLATA and intraLATA toll access service. Making these revenue measures comparable across states requires specifying a size measure for the customer base of the LEC operating in each state. Ideally, we would like a market size variable that is not affected by the differences across states in the degree of regulatory oversight faced by the RBOC or the competition policies of the state regulatory commission or legislature; otherwise the measured relationship between regulatory rules and the size-adjusted revenues across states will be confounded by the impact of these regulatory rules on the variable used to size-adjust state-level revenues. For this reason, measures such as total access lines (special and switched) or total billable access lines are inappropriate for size-adjusting revenues for our purposes, because the extent to which a state fosters competition or puts strong downward pressure on its LEC's prices should have an impact on the demand for business access lines in that state. Consequently, in the states where the regulatory process and competitive entry have led to lower average prices for these services, we would expect a larger number of business access lines to be purchased.

We would expect the number of residential access lines sold in a state to be less sensitive to these differences in competition policy across states, because a major goal of all state regulatory commissions and the FCC is universal access of all households to the local telecommunications network. All state commissions pursue this goal, regardless of their competition policies and the stringency of the regulatory oversight their LECs face. Consequently, neither of these across-state differences in regulatory rules should significantly affect the fraction of households connected to the local exchange network. However, we should note that this size measure is also subject to the same problem described in the previous paragraph, because the extent to which a state regulatory process keeps the price of basic residential service low relative to that price in other states will lead to a greater proportion of multiple-access-line households in that state. Nevertheless, this effect is likely to be of little import because of the small across-state differences in the price of basic residential service. We therefore use the total number of residential access lines in the RBOC's service area in the state as the size measure used to normalize the LEC's revenue streams to comparable magnitudes across states.

The infrastructure investment comparison combined with the average per-line revenue comparisons will allow a relative ranking of the degree to which the RBOC operating in each state made efficient use of the revenues collected from providing telecommunications services to update its networks to serve current and future customers. We then attempt to determine whether these across-state differences in infrastructure modernization and average per-line revenues can be explained by across-state differences in the extent to which pro-competition policies were implemented in each state prior to the Telecommunications Act of 1996.

For this analysis, we select three states which are historically early adopters of policies to encourage competition—California (CA), Illinois (IL) and New York (NY)—and two states which are slower to adopt policies to encourage competition—Texas (TX) and Arkansas (AR). We compare the level and rate of change of these infrastructure measures and average per-line revenue measures for the RBOCs serving these states on an annual basis for the period 1989 to 1995, when the necessary data is available, and from 1992 to 1995 for all other comparisons.

The annual reports to the Federal Communications Commission made by all LECs with annual revenues in excess of 100 million dollars are the primary source for the data used in this comparison. As part of the FCC's Automated Reporting Management Information System (ARMIS), information is collected on the financial, plant, demand and quality of service data necessary to administer various provisions of the FCC's rules. Specifically, we make use of the ARMIS 43-01, 43-07 and 43-08 reports. The 43-01 and 43-08 reports began in 1992, whereas the 43-07 reports have information back to 1989, which explains the differences in time span of availability of the various infrastructure and revenues variables. As with any large scale data collection effort, there is missing data and inconsistencies in the data. We attempted to correct these data problems by contacting the person given on the respective ARMIS report at the appropriate LEC. However, this process was not always successful, so we will note where we suspect such data problems exist.

We find that RBOC network modernization took place earlier in IL, NY and CA than in AR and TX. With a few exceptions, for the years before 1995, the penetration of the various measures of infrastructure modernization tended to be noticeably higher in CA, IL, and NY versus AR and TX, particularly for DPSC switches, SS7 switches, ISDN-capable switches, the number of access lines connected to DPSC switches, the number of access lines connected to SS7 switches, and the number access lines that are ISDN-capable. In 1995, TX and AR caught up to or surpassed one or more of the three remaining states in terms of the penetration of DPSC switches, SS7 switches and the percent of access lines connected to both of these types of switches, although, for the most part, AR and TX continue to lag CA, IL, and NY in terms of the penetration of ISDN capability throughout the network. In terms of the penetration of fiber optic cable in the RBOC's network, IL and NY each lead AR and TX, for all years from 1992 to 1995, whereas CA alternates between having the lowest and next to lowest penetration of fiber optic cable over this same time period.

Comparing the average revenues for basic local service, network access service and toll network services--the three major categories of services provided by the RBOCs--we find that AR and TX experienced more rapid growth over the sample period in basic local service revenues per residential access line than CA, NY and IL. Moreover, in 1995, the average revenue per residential access line actually fell relative to its value in 1994 in IL and NY. For all years, AR and TX had higher values for the average revenue per minute of network access service than CA and IL. These states also experienced slower average rates of decline in these average revenues from 1992 to 1995 than CA, IL and NY. Comparing the two largest states on the basis of average toll network revenues per intraLATA toll call completed for all years in the sample, we find TX's average revenue is consistently more than twice that of CA. As we discuss later, one reason for this higher average toll revenue per intraLATA toll call in TX is the larger local calling area in TX relative to CA, which implies higher costs for intraLATA toll calls in TX versus CA. These average revenue comparisons for the three categories of RBOC services are broadly consistent with that view that, except for NY, states which have historically pursued more pro-competition policies earlier tended to have lower average revenues. Without exception these historically more pro-competition states also experienced more rapid declines or less rapid increases in each of the three average revenue measures.

These results are consistent with the conclusion that the historically pro-competition states were able to more rapidly deliver tangible benefits to their telecommunications services consumers in the form of a more modern telecommunications network, lower average prices for the three classes of RBOC services and lower rates of growth in these average prices.

The remainder of this paper proceeds as follows. To provide the necessary context for the infrastructure and average per-line revenue comparisons, the next section describes the general features of each RBOC's network and service area. Section 3 then presents the results of the across-state infrastructure comparisons. Section 4 presents the average per-line revenue comparisons. Section 5 integrates these two comparisons to attempt to determine whether those states which have historically fostered competition to their RBOC were able to obtain a comparable or more modern telecommunications infrastructure relative to those states which have historically been less pro-competition in the period before January 1, 1996.

## 2. Background on the Study States

This section describes the general features of the five RBOC service areas. The states and their respective RBOCs are Arkansas, SBC Communications; California, Pacific Telesis; Illinois, Ameritech; New York, NYNEX; and Texas, SBC Communications. According to the Fall 1995 FCC periodic report entitled, "Common Carrier Competition," as of September 8, 1995, active competition in local switched-access existed in both Illinois and New York. California had enacted rules to allow competitive entry as of this date and had set July 1, 1996 as a deadline for competition to begin. Texas had made a decision to permit competition, but had set no date for it to actually begin. Finally, as of this date, Arkansas had explicitly prohibited competition in local switched-access.

Although it is difficult to provide a single quantitative measure of how pro-competition one state public utilities commission is relative to another, there are measures which seem to indicate a historically greater degree of pro-competition sentiment in CA, IL and NY than in TX and AR. The timing and extent of entry of competitive local exchange carriers is one such measure. In 1994, the Illinois Commerce Commission granted Teleport Communications Group and Metropolitan Fiber Systems the authority to provide facilities-based local exchange switched services in the Chicago area along with the previously granted authority to resell all local exchange services and to provide non-switched and resold inter-exchange services. MCI Communications was given similar authority during 1994. According to the Illinois Commerce Commission's *Annual Report on Telecommunications 1995,* by the end of 1995, seven new LECs had received Certificates to Exchange Service Authority to offer switched local exchange services. According to the December 1995, *Transition Monitoring Plan* put out by the NY State Department of Public Service, as of November 1995, 33 entities had been granted Certificates of Public Convenience and Necessity to provide intra-city point-to-point or local distribution alternatives to the incumbent LEC in NY.

Another measure of pro-competition policies is the extent to which competitive entry into other RBOC markets has been fostered. Both NY and IL have been leaders in encouraging interconnection between competitive access providers (CAPs) and local exchange companies. As noted in *The Geodesic Network II*, in May 1989, the NY Public Service Commission ordered NY Telephone to provide `comparably efficient interconnection' to competitors for intrastate special access services. This was followed by a November 1991 order requiring NY Telephone to unbundle transport and switching in its Centrex services. As the authors of *The Geodesic Network II* note, this "order allows customers to use NY Telephone loops in connection with other switching services, or to use NY Telephone Centrex switching together with CAP-supplied loops." As noted above, early on, the Illinois Commerce Commission has taken similar steps to allow CAPs to supply and resell a large number of local exchange services. *The Geodesic Network II* also notes that CA was an earlier adopter of policies requiring LECs to permit CAP interconnection with the local network. For all of the above reasons, it seems reasonable to classify CA, IL and NY as historically pro-competition states when compared to TX and AR.

Although a significant fraction of the land area of each of these states is served by independent local exchange companies, for the most part, all of the RBOCs serve geographic areas located throughout of their respective states which usually contain the largest metropolitan areas in the state. Consequently, a major determinant of the level of infrastructure investment across states is simply the land area of the state, because more kilometers of network are required to connect the same number of customers located in a larger geographic region. According to the *Statistical Abstract of the United States,* the land areas of each of the states in square miles are: Arkansas, 52,078; California, 156,299; Illinois, 55,645; New York, 47,377; and Texas, 262,017. Consequently, Texas is approximately 1.67 times California, and Texas is roughly 5 times the size of remaining three states, whereas California is approximately 3 times the size of AR, IL, and NY.

An alternative way to measure the size of these states is in terms of their population. According to the US Bureau of the Census, as of July 1, 1995, these states had the following population (in millions): AR, 2.48; CA, 31.59; IL, 11.83; NY, 18.14; and TX, 18.72. A very different picture of relative sizes of the states emerges using this measure. California is 1.69 times as large as Texas, almost exactly reversing the relative size comparison based on land area. Texas and New York are approximately the same size, and TX is 1.58 times the size of IL. By this measure AR becomes extremely small, 21 percent of IL, the next largest state.

Combining these land area figures and population figures we can compute the population density in each state as of July 1, 1995, another variable which should explain differences in network structure across states. For example, greater population density would imply more lines per kilometer of network, because the number of lines necessary to serve two network nodes a given distance apart in a densely populated area is larger than the number necessary if these same two nodes were located in a sparsely populated area. The 1995 population density figures, in persons per square mile, are: AR, 47.62; CA, 202.05; IL, 212.41; NY, 382.68; and TX, 71.48. As expected, NY is by far the most densely populated state, followed by IL and CA, whereas TX is closer to AR than to either IL or CA in terms of its population density. It should be noted that these population density figures may give very misleading views of the magnitude of the population density in each of the RBOC's service areas because the very sparsely populated regions in all of these states tend to be served by other LECs.

For the reasons given in previous section, we choose the number of residential access lines in the LEC's service area as a measure of the RBOC's market size measure. As noted earlier, this total access line measure is the one most likely to be invariant to across-state differences in regulatory policies. Table 1 gives these figures for each year and state from 1992 to 1995. This information is collected from the ARMIS 43-08 report. With the exception of 252 digital access lines in IL in 1995, all of the residential access lines given in this table for all years are analog access lines. This table also presents ratios of several other access line measures to residential access lines. For example, the 43-08 report gives the total number of switched access lines (mobile, public, business and residential, including both digital and analog lines). This is reported as Switched Access Lines (43-08) in the table. Consistent with our belief that number of business, public, or mobile access lines may depend on state regulatory polices, as well as other factors, we find persistent differences across states in the ratio of the Form 43-08 measure of switched access lines to residential access lines. The most noticeable result is the consistently larger ratio of switched access lines to the number of residential Access lines for CA and IL relative to AR and TX. For example, in 1995 TX had 1.5 Form 43-08 switched access lines per residential access line, whereas CA has 1.6 Form 43-08 switched access lines per residential access line. Assuming the number of residential access lines is a valid proxy for the number of households living in the LEC's service area across the five states, this result can be interpreted as showing that the RBOCs in the states of CA and IL have been able to sell a larger number of business access lines (the major component of total switched access lines besides residential access lines) per household than the RBOCs in the states of AR and TX. This difference is even more pronounced for the Form 43-08 measure of total access lines. The Form 43-08 total access lines figure includes all Form 43-08 switched access lines as well as all digital and analog special access lines. The RBOCs in CA and IL have managed to sell significantly more of these forms of access (which are sold primarily to business customers) per household than the RBOCs in AR and TX. For example, in 1995, the RBOC in CA had 1.9 Form 43-08 total access lines per residential access line, whereas the RBOC in TX sold 1.75 Form 43-08 total access lines per residential access line.

The ARMIS 43-07 report also collects information on the total number of access lines in service. The ratio of this measure of the number of access lines to the number of residential access lines yields similar results to the 43-08 switched access line results. The ARMIS 43-01 report collects information on the total number of billable access lines. The ratio of this measure of the number of access lines to the number of residential access lines also yields similar results to the 43-08 switched access lines results. Consequently, for all of the measures of the total number of access lines reported in this table, the RBOCs in CA and IL have provided a greater amount of business, special, public and mobile access per residential access line than AR and TX. For all four total access line per residential access line measures, the NY magnitudes are similar those in TX, but are significantly larger than the magnitude for AR for all years.

Table 1 reports two other characteristics of the service areas of the five RBOCs. The total number of Lifeline Customer Premises Terminations (Discounted Basic Local Residential Phone Service) per 1,000 residential access lines gives a measure of the incidence of sales of residential access at heavily reduced rates. Approximately one-quarter of all residential access lines in CA are sold at this discounted rate. The closest state is NY, with between one-half to one-third the number of Lifeline Customer Premises Terminations per residential access line that are sold in

CA. This information is not available for IL. On the other hand, TX and AR sell an order of magnitude fewer of these discounted residential access lines per total residential access line than does CA. This difference in the share of Lifeline Customer Premises Terminations between CA and TX and AR should be kept in mind in our discussion of net revenues in Section 4. One reason for the large number of Lifeline Customer Premises Terminations in CA relative to the others states is because CA administers its own Lifeline plan which uses only self-reported customer income and demographic data to determine the eligibility for reduced-rate local residential service.

In attempt to measure the intensity of household usage of network access services, for each state we compute the number residents per residential access line. NY has the lowest number of residents per residential access line followed by IL, CA, TX, and AR, the same relative ordering as population density. NY has close to one less person per residential access line than TX and more than one less person per residential access line than AR. This difference in persons per residential access line in AR and TX versus NY provides the following explanation for similar ratios of total access lines per residential access line in the three states given in Table 1: NY consumers are more intensive users of residential access services than TX or AR consumers.

RBOCs are multi-product firms selling three classes of products: local switched-access service, intraLATA toll service, and local network access services to inter-exchange carriers (IXCs). Differences in regulatory rules towards competition should also show up in differences in the mix of products sold by the RBOC. Table 2 bears out this point using information on annual calling volumes obtained from the ARMIS Form 43-08 reports. For each of the RBOCs, Table 2 gives the annual total number of local calls completed, the total number of intraLATA long-distance calls completed by the RBOC and the total number of interLATA-intrastate and interLATA-interstate toll calls sent to IXC carriers (outgoing calls only). The sum of these three numbers yields the Total Calls Completed given in the top panel of the table.

There are several aspects of this table worth noting. First, for all states but CA, local calls comprise more than 85% of total calls. In California, the largest this percentage ever gets is 76% in 1992. This result is most surprising for TX, which has a land area that is 1.67 times as large as that of CA. The smaller size of IL and NY, and existence of large metropolitan areas surrounding Chicago and New York City, help to explain this result for these two RBOCs. On a per-residential access line basis, TX is clearly the most intensive local call-using state, with AR, CA, and IL very similar, and NY a substantially less intensive local call-using state.

This smaller local calls share in CA is, for the most part, explained by the enormous number of intraLATA tolls calls made in CA relative to the other four states. The share of total calls which are intraLATA toll calls is never less than 10 percent in CA, whereas in IL, NY and TX, it never reaches 2 percent. One explanation for these across-state differences in the number of intraLATA toll calls is differences in the number of LATAs in each state. However, there are 11 LATAs in CA, and 17 in TX, which yields 1.54 TX LATAs for each CA LATA, slightly smaller than the ratio of the land area of TX to that of CA. Consequently, on this basis TX should not have a significantly smaller intraLATA toll call share than CA. On the other hand, IL has 12 LATAs, which is 1 more than CA, but it has less than one-third the land area of CA. Similarly, NY has 8 LATAs, which implies a substantially smaller average square miles of land area per LATA than CA. Consequently, simply because both of these states have significantly smaller square miles of land area per LATA, we would expect intraLATA toll calls to comprise a smaller share of total calls. Finally AR, has 3 LATAs (0.27 times the number in CA and is approximately one-third the size of CA in land area), yet it has half the intraLATA toll calls share of total calls that CA has. The AR share is unexpectedly low given the roughly equivalent average land area per LATA in both AR and CA. Consequently, for both TX and AR, their intraLATA toll call shares seem low relative what might be predicted based on the large average LATA land area in these states. Nevertheless, as shown in Section 4, the RBOCs in TX and AR still obtain substantial fractions of their net revenues from the provision of toll service despite these small intraLATA toll call shares.

This comparison of the service areas and aspects of the actual operation of the five RBOCs has demonstrated several differences across states which should be borne in mind during the discussion of the extent of infrastructure modernization and average revenues presented in the next and following sections.

**3. A Comparison of the Network Infrastructure Modernization Processes Across States**

This section first presents data on the level of gross capital expenditures by each RBOC for the period 1992 to 1995. These figures are normalized by various measures of the RBOC size in an attempt to make them comparable across states. Then we describe the time path of investment in fiber transmission technology, DSPC switches and access lines connected to DSPC switches, SS7 capable switches and access lines connected to SS7 switches, and ISDN-capable switches and access lines, to determine the extent to which these gross capital expenditure dollars went to network infrastructure modernization in each state.

Table 3 gives annual Gross Capital Expenditures (in nominal dollars) by each RBOC in its respective state from the ARMIS Form 43-07 for the period 1992 to 1995. Using the RBOC’s annual net revenue figure from the ARMIS Form 43-01 we can compute the portion of each dollar of RBOC net revenue spent on gross capital investment. For all years, AR has the largest gross capital expenditures per dollar of net revenues, followed by CA and TX, with IL and NY alternating (depending on the year) between having the lowest fraction of net revenues going to gross capital expenditures. On a per residential access line basis, AR undertakes the greatest amount of gross capital expenditures followed by NY, TX, CA and IL. As noted in the instructions to the Form 43-07, this gross capital expenditures figure includes many other categories besides investment in the RBOC's network or investment in network modernization. For example, land, buildings, and office equipment expenditures are included in this category, as are investments in non-digital and non-fiber optic-using network technology. Consequently, given the measures for gross capital expenditures in Table 3, we would like to determine the extent to which these dollars are going towards infrastructure modernization, rather than to these other possible uses.

Table 4 presents figures on the amount of fiber optic cable in each RBOC's network from 1992 to 1995. The Total Fiber Kilometers and Total Fiber Kilometers Equipped with Electronics (Lit) are obtained from the ARMIS Form 43-08. Total Fiber Kilometers gives the total number of kilometers of fiber strands in the RBOC's network and is computed as the number of fiber strands in each sheath times the number of associated fiber sheath kilometers summed over all fiber sheaths in the RBOC's network. The Sheath Kilometers of Fiber Cable given in the table is obtained from the ARMIS Form 43-07 data. This report also collects information on number of Copper and other transmission medium sheath kilometers in the RBOC's network. Total sheath kilometers and the fiber sheath kilometers are used to compute the fiber kilometer percentages of total kilometers given in the table. This table also reports the percentage of total digital carrier links in the RBOC's network that are fiber digital carrier links. The table also presents measures which attempt to quantify how widespread fiber optic cable is throughout the RBOC's network.

Both in terms of total fiber kilometers and fiber sheath kilometers, NY and TX have invested more than the remaining three RBOCs, although CA is close to NY in terms its investment in sheath kilometers of fiber cable, but not in its total fiber kilometers investment. The fiber strand density figures show that this result is due to the significantly higher density of fiber strands in the NY fiber sheaths versus the CA fiber sheaths. NY has deployed fiber in its network in a manner than has resulted in significantly higher proportions of lit fiber relative to the other RBOCs for the years 1993 to 1995. Although CA is a distant second, for the years 1993 to 1995, its proportion of lit fiber is noticeably higher than the remaining three states.

To quantify the penetration of fiber into the RBOC's network we use the percentage of total network sheath kilometers that is composed of fiber sheath kilometers and the percentage of total digital carrier links that are fiber digital carrier links. NY and IL consistently show the highest two percentages of fiber sheath kilometers for all years in the sample, followed by TX, with CA and AR trading-off as the lowest percentage of fiber sheath kilometers. For the fraction of digital carrier links that are fiber carrier links, a similar story emerges, with the exception that now CA has rates of penetration of fiber into digital carrier links in all years which are similar to those in NY and IL. Particularly for the years before 1995, AR and TX lag significantly behind CA, IL and NY in the penetration of fiber links in digital carrier links. Consequently, the penetration of fiber into the RBOC's network in two of the early competition adopter states—NY and IL—is greater than either TX or AR for all years in the sample, and the deployment of digital fiber carrier links is greater for CA, NY, and IL versus TX and AR for all years.

Although on the basis of both sheath and total fiber miles, TX is a large investor in fiber technology, much of this can be explained by the substantially larger land area of TX relative to the other states, rather than a greater ubiquitousness of fiber in their RBOC's network. The bottom four panels of Table 4 illustrative this point. Despite the very large land area of TX, the density of fiber *where it exists in the LEC's network* (kilometers of fiber per sheath kilometer of fiber) is dominated only by NY and is higher than in CA and IL, two states with significantly higher population densities than TX. The greater fiber density in NY can be explained by the significantly higher population density in NY versus TX. The relatively low percentage of lit fiber in TX is evidence for the view that where fiber exists in TX, it is densely installed in the RBOC's network. Given the very low population density in AR and low rate of lit fiber, a similar statement seems plausible about the density of fiber installed in this state relative to the land area its transmission network must cover.

The last three panels of Table 4 elaborate further on the point of the extensiveness of the fiber cable coverage in each RBOC's service area. Form 43-08 collects information on the local loop and interoffice facilities conduit system of each RBOC, the pipe placed in the ground (which is reusable in place) through which cables are pulled. Trench Kilometers of the Conduit System given in Table 4 is the total length in kilometers of the ditches that contain ducts. Duct Kilometers in the Conduit system is the number of ducts times the trench kilometers summed over all trenches in the RBOCs system. Dividing Duct Kilometers by Trench Kilometers gives an average number of ducts per trench in the RBOC's network. Comparing CA to TX, we can see that CA has more than three times the number of Trench Kilometers that TX has, but only a little more than twice the Duct Kilometers that TX has. This results in a higher average number of ducts per trench in TX versus CA. TX also has a uniformly larger average number of ducts per trench than NY and IL. Given the significantly larger geographic area of TX, this relatively high number of ducts per trench suggests a less extensive network in TX versus CA, IL and NY. Comparing AR to CA, IL and NY yields similar results to those for TX. We should note that one explanation for these results is that the two states with the lower population densities--TX and AR--do not require as extensive a telecommunications network as more densely populated regions such as CA, IL and NY.

Fiber optic cable in the RBOC's network enables high-speed, high-capacity data transmission. However, without the widespread deployment of the requisite modern digital switching technology, many modern telecommunications services such as ISDN cannot be supplied by the LEC's network. The presence of DPSC switches and SS7-capable switches in the LEC's network, not simply the widespread deployment of fiber optic cable, allows the provision of services such Caller ID, Call Trace, Automatic Call-back, Distinctive Ringing and Call Screening. Fiber optic cable without modern switching technology would increase network throughput and capacity, but would not allow the provision of these and other advanced telecommunications services. Consequently, infrastructure investment modernization should match fiber optic deployment with the appropriate amount of DPSC and SS7-capable switch deployment to meet customer demands for advanced telecommunications services throughout the LEC's network in the most efficient manner possible.

The ARMIS Form 43-07 collects data on the number of access lines controlled by DSPC switches, the number of DSPC switches in the network and the number DSPC local switches. Table 5 lists these variables for the years 1989 to 1995. We also report normalized values for each of these magnitudes to facilitate across-state comparisons. The percentage of access lines served by DSPC switches show that CA, IL and NY dominate TX for all years and IL and NY dominate AR for all years but 1995. For example, in 1995 only 42.72 percent of total access lines (the Form 43-07 definition) were connected to DSPC switches in TX versus 74.28 in CA, 82.15 in IL and 89.44 in NY. Similar relative results hold for the percentage of total switches that are

DSPC switches. CA, IL, and NY clearly dominate TX for all years, and these same three states dominate AR for all but 1995. The same results hold for the percentage of local switches that are DSPC switches. TX lags behind CA, IL and NY consistently for all of the years from 1989 to 1995, with AR showing similarly low percentages for all but 1995, when it barely surpasses CA.

The ARMIS Form 43-07 also collects information on access lines with SS7-317 capability and access lines with SS7-394 capability. This form also contains the number of switches with each of these SS7 capabilities and the number of local switches with these capabilities. This information is reported in Table 6. Jonathan M. Kraushaar states in his April 1995 FCC report, "Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level," that for the purposes of Form 43-07 reporting, InterLATA SS7 switches are designated SS7-394 and IntraLATA SS7 switches are designated SS7-317. These categories are not mutually exclusive, since switches that have both InterLATA and IntraLATA SS7 capability are included in both categories.

Normalizing these measures of infrastructure investment in SS7 capability by the same variables used to normalize the DSPC switch infrastructure investment yields similar across-state results for the penetration of SS7 capability to those obtained for DSPC penetration for the years before 1994. For the 1994, and more often for 1995, the penetration SS7 capability in TX and AR meets or exceeds the SS7 penetration measure for CA, NY or IL. By 1995, the penetration of SS7 capability for all of the measures is greater than 89 percent for CA, IL and NY; so that when the penetration of SS7 capability in the LEC's network in TX or AR exceeds that for one of the LECs in CA, IL or NY, it is not by a large amount. A reasonable conclusion from these results is that the current penetration of SS7 capability is high (above 89 percent on all measures) and is not noticeably different across CA, NY and IL versus TX and AR. However, it is also important to emphasize that for the years 1989 to 1993 CA, NY, and IL were significantly ahead of TX and AR in the pervasiveness of this new technology in their networks.

The final infrastructure modernization measure we present is ISDN capability in the RBOC's network. We look at this from the perspective of the number of ISDN capable access lines, the number of switches equipped with ISDN capability, and number of local switches equipped with ISDN capability. All of this information is available from the ARMIS Form 43-07 report.

In terms of the fraction of total access lines with ISDN capability, AR and TX lag far behind CA, IL, and NY in this dimension for all years but 1995 in TX, when the number of ISDN-capable lines increased from 874,000 in 1994 to 5,932,000, and the percentage of access lines that are ISDN capable lines exceeds that value for CA. Stated differently, in 1994, 55% of CA's access lines were ISDN-capable but only 11% of TX's and 27.5% of AR's were ISDN-capable. By 1994, these figures were 64.4% for CA, 71.9 for TX and 34.64 for AR. In 1995, NY and IL still had higher rates of ISDN-capable access lines than these three states.

One explanation for the dramatic increase in the number of access lines with ISDN capability between 1994 and 1995 is the election, under the Public Utility Regulatory Act (PURA) of 1995, by the RBOC serving TX of the option to be subject to an incentive regulation plan. In exchange for a commitment by the RBOC serving TX to adhere to a timetable of network infrastructure modernization, that RBOC's rates would be to set by an incentive regulation plan, rather than by a traditional rate-of-return regulatory process. Immediately following the September 1, 1995 effective date of the PURA, the RBOC serving TX made this infrastructure commitment and elected to be subject to an incentive regulation plan. In an effort to meet the infrastructure modernization timetable for the deployment of ISDN in a timely manner, the RBOC serving TX elected to pursue two strategies for increasing the number the number of access lines with ISDN capabilities that do not require upgrading the all of its central office switches to be ISDN-capable. For exchange areas having more than 50,000 or more access lines as of February 22, 1995, the RBOC elected to use a Foreign Serving Office (FSO) approach to making many of these access lines ISDN-capable. Under this approach, a customer connects to an ISDN-capable office in the same exchange but outside the serving office area in which the customer's station is located. For exchange areas having less than 50,000 access lines, the RBOC elected to use a Foreign Exchange (FX) approach to making many of these access lines ISDN-capable. In this case, the customer's access line is made ISDN-capable by means of a circuit connecting a customer's station to a primary serving office of another exchange. This foreign exchange (FX) approach has the following two drawbacks. The customer faces the possibility of a change in phone number (because the service is provided from a different exchange) and an additional mileage-based charge--the FX rate--for making ISDN service available in this manner.

For total switches equipped with ISDN capability, CA, IL and NY dominate TX and AK by a significant margin in all years. For example, in 1994, 48% of CA's switches are ISDN capable relative to 10.19 in TX and 7.64 in AK. In 1995 these numbers are 50% for CA, 23% for TX and 9.15 for AK. For local switches equipped with ISDN, similar results obtain, with NY and particularly CA and IL having a significantly higher percentage of total local switches equipped with this capability in all years compared to TX and AR.

The infrastructure modernization comparison can be summarized as follows. Particularly, for the period 1989 to 1994 the states of NY, IL and CA were significantly in front of TX and AK in terms the pervasiveness of modern telecommunications infrastructure in their networks. For a few of our infrastructure modernization measures, notably SS7 switches and access lines connected to SS7 switches, TX and AR were able surpass CA, NY or IL in 1994 or 1995. However, in these cases the penetration rate of the technology in all RBOC networks was sufficiently high, in excess of 89%, so that it is difficult to attach much economic significance to these differences in penetration rates across states by 1995 for these infrastructure technology variables. These results are broadly consistent with the conclusion that in those states where competition has been historically encouraged (CA, IL and NY), the RBOCs engaged in more significant infrastructure modernization programs at an earlier date than in those states historically slower to adopt competitive policies (TX and AR).

One possible explanation for these differences in infrastructure modernization rates could be that the RBOCs in TX and AK earned less revenues from their customers than those in CA, IL and NY and therefore were unable to fund more ambitious infrastructure investment programs. The gross capital expenditure figures given in Table 3 seem consistent with this view, because both AR and TX are at the high end in terms of gross capital investment as a fraction of net revenues and gross capital investment per access line. However, it is important to note that, as discussed at the beginning of this section, these gross capital expenditures figures include many more categories of investment expenditures beyond the infrastructure modernization categories discussed in this section. Consequently, although Table 3 indicates TX and AK have engaged in significantly more gross capital expenditures per residential access line that CA and IL, from the results presented in this section, it does not appear that as large of a portion of these gross capital expenditures have gone into infrastructure modernization in TX and AK as was the case in CA, IL and NY, particularly for the years in our sample before 1995.

To gain an understanding of whether this difference in infrastructure investment rates is due to differences in the relative availability of funds across the RBOCs, we now turn to our discussion of per-line revenues earned by the RBOCs in the five states under consideration.

**4. Revenue Comparisons**

The ARMIS Form 43-01 collects annual revenue for each of the RBOCs by broad product categories. Table 8 gives the annual net revenue of each RBOC broken down by three major product classes—basic local service, network access service, toll network service—and a residual category—other revenues—composed of settlements, uncollectables and miscellaneous revenues. Basic local service is defined as the total of Uniform System of Accounts (USOA) Accounts 5001-5060. These accounts are: Basic area revenue, optional extended area revenue, cellular mobile service revenue, other mobile service revenue, public telephone revenue, local private line revenue, customer premises revenue and other local exchange revenue. Network access service revenue is defined as USOA Accounts 5081-5084. The accounts are: end user revenue, switched access revenue, special access revenue, and state access revenue. Toll network services revenue is defined as USOA Accounts 5100, 5110, and 5121-5160, excluding 5129. These accounts are: long distance (LD) message revenue (Class A), unidirectional LD revenue, sub-voice grade LD private network revenue, voice grade LD private network revenue, audio program grade LD private network revenue, video program grade LD private network revenue, digital transmission LD private network revenue, LD private network switching revenue, and other LD private network revenue.

With the exception of CA, all RBOCs have experienced steady growth in net revenues from 1992 to 1995, with TX experiencing the highest rate, at an average annual rate of 5.5% over this period. IL had the next highest growth rate, at an average annual rate of 4.5%. AR's net revenue grew at an average rate of 3.7% per year and NY's revenues grew at an average rate of 0.85% per year. Table 8 also computes the percent of total net revenue that the RBOC obtains from each of the three classes of revenues. Consistent with the low population densities in CA, TX and AR relative to NY and IL, a larger fraction of these two RBOC's net revenues come from the provision of basic local service.

This basic service revenue share of total net revenue is approximately 60% for NY and IL, more than 10 percentage points more than for TX, AR and CA. The large amount of revenue CA makes from toll network service (primarily intraLATA toll service) comprises approximately one-quarter of its net revenues for all years but 1995. It is important to note that effective January 1, 1995, California Public Utilities Commissions allowed Pacific Bell to enact intraLATA toll price reductions of approximately 40% and increases in the price of basic local residential service on the order of 35%. This explains the large increase in the share of CA's revenues coming from basic local service and the decline in the share coming from toll network service. Another notable aspect of this table is the consistently smaller share of net revenues coming from network toll service in TX relative to CA. AR has a toll network service revenues share of net revenues that is substantially higher than that value in TX, although this share is significantly smaller than the CA share in all years but 1995.

For revenue from network access service, TX is once again the outlier, with a significantly higher fraction of net revenues from network access service. This result can be explained in part by the large geographic area and low population density of TX and large number of LATAs there relative to the other states. However, as discussed earlier, the number of square miles of land area per LATA in TX is only slightly larger than that ratio in CA. Nevertheless, the RBOC in TX generates a greater share of its net revenue from long-distance access than the RBOC in CA, although the share of net revenues from toll network service and network access service combined are approximately equal across the two states. For example, in 1995, these combined toll and access shares were 46.74% in CA and 44.65% in TX.

In an attempt to understand these revenue differences across the states we compute measures of average revenue from the three classes of services provided by the RBOCs. First we compute the average basic local service revenues per residential access line. For TX and AR this figure has shown a steady increase from 1992 to 1995. For both TX and AR it increased an average annual rate of 2.1% over this period. The figure for CA basic local service revenues per residential access line is lower than that number in all other states for all of the years in the table. For example, even in 1995 (after the 35% increase in the price of basic local residential service) CA earned $387.11 of basic local service revenue per residential access line compared to $452.80 in AR, 518.32 in IL, $618.26 in NY and $459.79 in TX. In addition, the average basic local service revenues per residential access line fell from 1994 to 1995 in IL and NY.

The ARMIS Form 43-08 collects information on total number of minutes of InterLATA access minutes (terminating and originating) sold by each RBOC on an annual basis. This form also collects information on the total number of intraLATA tolls call sold by each RBOC annually. We use these figures to compute the average revenue measures for network access services and toll network services given in Table 8. These average revenue figures help to explain the differences in revenue shares across states discussed earlier.

For all of the RBOCs, the average revenue measure for network access services declines from 1992 to 1995. However, for TX this decline is very small, and except for NY, the level of average revenue is significantly higher than it is for any of the other RBOCs. For example, in 1995, the average revenue is 6.43 cents/minute in TX, whereas it is 3.99 cents/minute in CA, 4.46

cents/minute in IL, and 4.90 cents/minute in AR. Only NY with 6.42 cents/minute is higher, but NY started at 7.39 cents/minute in 1992 versus 6.56 cents per minute in 1992 for TX, so its average revenues have more steeply declined than those in TX over the period 1992 to 1995.

Because TX is a large state and has many LATAs, one would expect the latent demand for interLATA toll service to be substantial, because the vast majority of within-state calls between large cities, for example Houston to Dallas, are interLATA toll calls. With an average revenue for network access in 1995 that is approximately 60% higher than it is in CA and more than 40% higher than it is in IL, TX is able garner a significantly higher share of its revenues from network access services, despite an interLATA toll call share of total calls from Table 2 on par with the one in IL . Comparing the change from 1994 to 1995 in average network access revenues in CA, IL and NY to those in TX and AR, yields noticeably larger drops in the first three states versus the last two states. The average network access revenue drop from 1994 to 1995 is 3.7% in AR and 2.1% in TX, as compared to 11.1% in CA, 6.6% in IL, 5.7% in NY.

Comparing these average revenues per network access minute in these five states to the average of the terminating and originating intrastate interLATA long-distance access prices that these five RBOC charge IXCs yields even clearer disparities between the access prices charged in states adopting competition-enhancing policies early versus the remaining two states. As of July 1996, Southwestern Bell's per minute total of terminating and originating access charge is slightly more than 12¢ per minute in TX and approximately 6.5¢ per minute in AR. The NY RBOC's average total of terminating and originating access charge is a little under 5¢ per minute, which is significantly lower than the average price in TX. IL and CA have significantly lower average per minute intrastate interLATA long-distance access prices than NY. In fact, CA and IL have the lowest and next lowest values of average total of terminating and originating access prices of all of the RBOCs in the lower 48 states at slightly more than 2.5¢ per minute and a slightly less than 3¢ per minute, respectively, Based on these intrastate interLATA access prices, all three of the historically pro-competition states had significantly lower average access prices than TX or AR.

For toll network services a similar story emerges when comparing CA to TX and AR. CA earns substantially less revenue from toll network services per intraLATA toll call than any other state. Because intraLATA toll calls are charged on a per minute basis some of these average revenue differences across states can be attributed to differences in call durations across the states, but the significantly smaller average revenue per intraLATA toll in CA versus AR and TX cannot be solely attributed to differences in call durations. Because the average size of LATAs are approximately equal across these three states, a significant portion of this difference can be attributed to higher prices in AR and TX versus CA. TX and AR have larger local calling areas within their LATAs than does CA, so the average cost of an intraLATA call is higher in these two states than in CA (because it travels a longer distance), but it is hard to argue than this average longer distance results in average costs that are more than twice as high in TX and AR than in CA, which is ratio of the average revenue figures across these states show in Table 8.

**5. Conclusions**

The average revenue comparisons presented in the previous section suggest that the less intensive infrastructure modernization programs in TX and AR noted in Section 3 cannot be attributed to the inability of the RBOCs in these states to generate sufficient revenues to fund infrastructure modernization programs similar to those in CA, IL and NY. CA, IL and NY experienced sluggish and sometimes negative growth in basic local service revenue per residential access line from 1992 to 1995, whereas TX and AR experienced steady growth in this same magnitude over this same time period. In addition, particularly for TX, the average revenue from network access services is significantly higher than it is in all states but NY and has declined at a slower rate than it has in the three historically pro-competition states. Moreover, the current average (over terminating and originating access) price of intrastate interLATA network access in TX is more four times higher than the values in CA and IL and twice the average price in NY. The current average access price in AR is more than twice the values in CA and IL, and approximately 40% higher than the average price in NY.

The more rapid declines in the average revenue measures for basic local service, network access service and toll network service from 1994 to 1995 in CA, IL, and NY versus TX and AR (except for toll network services in AR) illustrates the tangible benefits that competition in local exchange markets can deliver to consumers. The more extensive infrastructure modernization plans by these three RBOC facing early competition documented in Section 3 is consistent with the view that states following historically pro-competition policies have enhanced the incentives their RBOCs have for network modernization. Finally, the recent rapid increase in several measures of infrastructure modernization in TX and AR, particularly for 1995, is consistent with the view that when faced with the prospect of competitive entry, the RBOCs in these two states responded with substantially increased rates of infrastructure modernization investment.

Table 1 -- Telephone Access Lines
by Source of Report

| Access Line Measure | State | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Residential Access Lines (in thousands) | AR | 571 | 586 | 602 | 613 |
| | CA | 9,172 | 9,297 | 9,479 | 9,700 |
| | IL | 3,535 | 3,609 | 3,661 | 3,788 |
| | NY | 6,602 | 6,722 | 6,863 | 6,997 |
| | TX | 4,945 | 5,082 | 5,226 | 5,424 |
| Switched Access Lines per Residential Access Line (43-08) | AR | 1.35 | 1.36 | 1.38 | 1.40 |
| | CA | 1.64 | 1.65 | 1.58 | 1.60 |
| | IL | 1.56 | 1.58 | 1.61 | 1.61 |
| | NY | 1.48 | 1.49 | 1.49 | 1.53 |
| | TX | 1.46 | 1.47 | 1.49 | 1.50 |
| Total Access Lines per Residential Access Line (43-08) | AR | 1.36 | 1.44 | 1.55 | 1.59 |
| | CA | 1.77 | 1.82 | 1.84 | 1.90 |
| | IL | 1.58 | 1.80 | 1.90 | 1.89 |
| | NY | 1.50 | 1.50 | 1.56 | 1.62 |
| | TX | 1.47 | 1.58 | 1.72 | 1.75 |
| Total Access Lines per Residential Access Line (43-07) | AR | 1.36 | 1.35 | 1.39 | 1.41 |
| | CA | 1.57 | 1.58 | 1.59 | 1.62 |
| | IL | 1.55 | 1.58 | 1.62 | 1.64 |
| | NY | 1.51 | 1.52 | 1.53 | 1.54 |
| | TX | 1.48 | 1.49 | 1.51 | 1.52 |
| Total Billable Access Lines per Residential Access Line (43-01) | AR | 1.31 | 1.32 | 1.34 | 1.37 |
| | CA | 1.54 | 1.55 | 1.57 | 1.58 |
| | IL | 1.50 | 1.52 | 1.58 | 1.60 |
| | NY | 1.43 | 1.45 | 1.48 | 1.46 |
| | TX | 1.42 | 1.44 | 1.45 | 1.47 |
| Total Lifeline Customer Premises Terminations per 1000 Residential Access Lines | AR | 12.94 | 12.42 | 11.20 | 10.16 |
| | CA | 192.56 | 218.91 | 228.56 | 241.05 |
| | IL | N/A | N/A | N/A | N/A |
| | NY | 67.83 | 77.21 | 83.23 | 95.29 |
| | TX | 16.10 | 18.88 | 24.80 | 28.18 |
| Population (in thousands) | AR | 2,395 | 2,425 | 2,453 | 2,484 |
| | CA | 30,914 | 31,220 | 31,408 | 31,589 |
| | IL | 11,611 | 11,690 | 11,759 | 11,830 |
| | NY | 18,094 | 18,153 | 18,153 | 18,136 |
| | TX | 17,687 | 18,049 | 18,413 | 18,724 |
| Population per Residential Access Line | AR | 4.19 | 4.14 | 4.07 | 4.05 |
| | CA | 3.37 | 3.36 | 3.31 | 3.26 |
| | IL | 3.28 | 3.24 | 3.21 | 3.12 |
| | NY | 2.74 | 2.70 | 2.64 | 2.59 |
| | TX | 3.58 | 3.55 | 3.52 | 3.45 |

Note : See Section 2 for report-specific definitions of Access Lines.

Table 2 -- Annual Number of Calls Completed
By Type and Per Residential Access Line

| | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Total Calls Completed (in millions) | AR | 3,210 | 3,473 | 3,626 | 3,770 |
| | CA | 57,979 | 58,887 | 60,262 | 62,404 |
| | IL | 20,376 | 21,395 | 21,985 | 22,543 |
| | NY | 24,414 | 24,960 | 26,895 | 27,791 |
| | TX | 34,665 | 36,624 | 38,768 | 40,800 |
| Local Calls Completed (in millions) | AR | 2,768 | 2,986 | 3,080 | 3,164 |
| | CA | 44,136 | 44,340 | 45,005 | 45,583 |
| | IL | 18,397 | 19,207 | 19,752 | 19,969 |
| | NY | 20,688 | 21,076 | 22,688 | 23,376 |
| | TX | 31,160 | 32,845 | 34,495 | 36,031 |
| Local Calls Completed as a percentage of Total Calls Completed | AR | 86.22 | 85.99 | 84.94 | 83.93 |
| | CA | 76.12 | 75.30 | 74.68 | 73.04 |
| | IL | 90.29 | 89.77 | 89.84 | 88.58 |
| | NY | 84.74 | 84.44 | 84.36 | 84.11 |
| | TX | 89.89 | 89.68 | 88.98 | 88.31 |
| IntraLATA Calls Completed (in millions) | AR | 118 | 132 | 147 | 154 |
| | CA | 6,404 | 6,579 | 6,785 | 7,248 |
| | IL | 213 | 221 | 227 | 266 |
| | NY | 332 | 309 | 314 | 329 |
| | TX | 482 | 497 | 495 | 459 |
| IntraLATA Calls Completed as a percentage of Total Calls Completed | AR | 3.68 | 3.81 | 4.06 | 4.07 |
| | CA | 11.05 | 11.17 | 11.26 | 11.61 |
| | IL | 1.04 | 1.03 | 1.03 | 1.18 |
| | NY | 1.36 | 1.24 | 1.17 | 1.19 |
| | TX | 1.39 | 1.36 | 1.28 | 1.12 |
| InterLATA Calls Completed (in millions) | AR | 324 | 354 | 399 | 452 |
| | CA | 7,439 | 7,969 | 8,472 | 9,574 |
| | IL | 1,767 | 1,967 | 2,006 | 2,308 |
| | NY | 3,395 | 3,576 | 3,893 | 4,086 |
| | TX | 3,023 | 3,282 | 3,779 | 4,310 |
| InterLATA Calls Completed as a percentage of Total Calls Completed | AR | 10.10 | 10.20 | 11.00 | 12.00 |
| | CA | 12.83 | 13.53 | 14.06 | 15.34 |
| | IL | 8.67 | 9.19 | 9.12 | 10.24 |
| | NY | 13.91 | 14.33 | 14.48 | 14.70 |
| | TX | 8.72 | 8.96 | 9.75 | 10.56 |

Table 2 -- Calls Completed (continued)

| | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Local Calls Completed per Residential Access Line | AR | 4,846 | 5,094 | 5,114 | 5,165 |
| | CA | 4,812 | 4,769 | 4,748 | 4,699 |
| | IL | 5,204 | 5,323 | 5,395 | 5,271 |
| | NY | 3,134 | 3,135 | 3,306 | 3,341 |
| | TX | 6,301 | 6,463 | 6,601 | 6,643 |
| IntraLATA Calls Completed per Residential Access Line | AR | 207 | 226 | 244 | 251 |
| | CA | 698 | 708 | 716 | 747 |
| | IL | 60 | 61 | 62 | 70 |
| | NY | 50 | 46 | 46 | 47 |
| | TX | 98 | 98 | 95 | 85 |
| InterLATA Calls Completed per Residential Access Line | AR | 568 | 604 | 662 | 738 |
| | CA | 811 | 857 | 894 | 987 |
| | IL | 500 | 545 | 548 | 609 |
| | NY | 514 | 532 | 567 | 584 |
| | TX | 611 | 646 | 723 | 795 |
| Total Calls Completed per Residential Access Line | AR | 5,621 | 5,924 | 6,020 | 6,154 |
| | CA | 6,321 | 6,334 | 6,357 | 6,434 |
| | IL | 5,764 | 5,929 | 6,005 | 5,951 |
| | NY | 3,698 | 3,713 | 3,919 | 3,972 |
| | TX | 7,010 | 7,207 | 7,418 | 7,522 |

Table 3 -- Gross Capital Expenditures

| | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Gross Capital Expenditure (in millions of dollars) | AR | 147 | 122 | 131 | 166 |
| | CA | 1,602 | 1,697 | 1,584 | 1,628 |
| | IL | 531 | 558 | 532 | 519 |
| | NY | 1,210 | 1,333 | 1,317 | 1,422 |
| | TX | 878 | 965 | 958 | 998 |
| Gross Capital Expenditure per Dollar of Net Revenue | AR | 0.29 | 0.23 | 0.24 | 0.30 |
| | CA | 0.21 | 0.21 | 0.20 | 0.21 |
| | IL | 0.18 | 0.18 | 0.16 | 0.15 |
| | NY | 0.16 | 0.17 | 0.17 | 0.18 |
| | TX | 0.20 | 0.21 | 0.20 | 0.19 |
| Gross Capital Expenditure per Residential Access Line | AR | 257.78 | 207.54 | 218.11 | 271.58 |
| | CA | 174.62 | 182.57 | 167.08 | 167.87 |
| | IL | 150.24 | 154.57 | 145.18 | 137.11 |
| | NY | 183.34 | 198.32 | 191.88 | 203.24 |
| | TX | 177.55 | 189.91 | 183.40 | 183.99 |

Table 4 -- Fiber Optic Cable in RBOC Network

| | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Total Fiber Kilometers (in thousands) | AR | 36 | 48 | 68 | 121 |
| | CA | 490 | 586 | 665 | 752 |
| | IL | 279 | 316 | 357 | 398 |
| | NY | 722 | 847 | 962 | 1,099 |
| | TX | 487 | 698 | 889 | 1,064 |
| Fiber Kilometers Equipped with Electronics (Lit) (in thousands) | AR | 36 | 12 | 16 | 23 |
| | CA | 125 | 152 | 172 | 204 |
| | IL | 223 | 57 | 61 | 70 |
| | NY | 283 | 339 | 481 | 414 |
| | TX | 469 | 197 | 175 | 218 |
| Fiber Kilometers Equipped with Electronics (Lit) as a percentage of Total Fiber Kilometers | AR | 100.00 | 24.69 | 22.77 | 19.31 |
| | CA | 25.51 | 25.94 | 25.84 | 27.17 |
| | IL | 80.19 | 18.00 | 17.00 | 17.67 |
| | NY | 39.20 | 40.00 | 50.00 | 37.62 |
| | TX | 96.32 | 28.23 | 19.67 | 20.45 |
| Sheath Kilometers of Fiber Cable (in thousands) | AR | 1.90 | 2.43 | 2.87 | 3.74 |
| | CA | 12.67 | 14.93 | 16.71 | 18.45 |
| | IL | 7.71 | 8.99 | 9.84 | 10.78 |
| | NY | 14.79 | 16.92 | 18.82 | 21.07 |
| | TX | 13.44 | 17.52 | 20.56 | 23.40 |
| Sheath Kilometers of Fiber Cable as a percentage of Total Sheath Kilometers | AR | 3.35 | 4.24 | 4.93 | 6.23 |
| | CA | 3.75 | 4.41 | 4.12 | 5.37 |
| | IL | 6.18 | 7.18 | 7.79 | 8.40 |
| | NY | 6.67 | 7.59 | 8.46 | 9.45 |
| | TX | 4.27 | 5.65 | 6.52 | 7.30 |
| Fiber Digital Carrier Links as a percentage of Total Digital Carrier Links | AR | 75.95 | 76.03 | 71.79 | 87.95 |
| | CA | 58.33 | 61.98 | 84.87 | 91.91 |
| | IL | 91.05 | 94.93 | 97.22 | 96.04 |
| | NY | 74.68 | 84.22 | 88.93 | 88.79 |
| | TX | 70.86 | 74.69 | 75.52 | 87.09 |
| Kilometers of Fiber per Sheath Kilometer of Fiber (Fiber Density) | AR | 18.84 | 19.90 | 23.75 | 32.49 |
| | CA | 38.65 | 39.28 | 39.81 | 40.75 |
| | IL | 36.13 | 35.08 | 36.25 | 36.90 |
| | NY | 48.84 | 50.07 | 51.15 | 52.18 |
| | TX | 36.25 | 39.84 | 43.22 | 45.46 |
| Duct Kilometers of Conduit System (in thousands) | AR | 6.34 | 6.36 | 6.38 | 6.39 |
| | CA | 173.19 | 174.92 | 176.48 | 177.79 |
| | IL | 67.42 | 67.81 | 68.07 | 67.77 |
| | NY | 75.25 | 75.76 | 76.30 | 77.24 |
| | TX | 90.26 | 91.18 | 92.17 | 92.92 |
| Trench Kilometers of Conduit System (in thousands) | AR | 0.76 | 0.76 | 0.77 | 0.77 |
| | CA | 35.54 | 36.24 | 36.99 | 37.59 |
| | IL | 10.07 | 10.25 | 10.36 | 10.43 |
| | NY | 18.57 | 18.86 | 19.11 | 19.55 |
| | TX | 11.18 | 11.49 | 11.87 | 12.20 |
| Duct Kilometers Divided by Trench Kilometers | AR | 8.38 | 8.36 | 8.31 | 8.29 |
| | CA | 4.87 | 4.83 | 4.77 | 4.73 |
| | IL | 6.70 | 6.62 | 6.57 | 6.50 |
| | NY | 4.05 | 4.02 | 3.99 | 3.95 |
| | TX | 8.08 | 7.94 | 7.77 | 7.62 |

Table 5 -- Digital Program Stored Program Controlled (DPSC) Switches

| | | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|
| Lines Served by Digital Stored Program Control Switches | AR | 184 | 215 | 263 | 354 | 423 | 572 | 781 |
| | CA | 3,559 | 4,864 | 5,596 | 6,295 | 7,674 | 10,079 | 11,657 |
| | IL | 1,937 | 2,146 | 2,376 | 2,781 | 3,689 | 4,843 | 5,116 |
| | NY | 4,519 | 5,477 | N/A | 6,853 | 7,863 | 8,982 | 9,655 |
| | TX | 1,417 | 1,603 | 1,927 | 2,394 | 2,887 | 3,265 | 3,524 |
| Lines Served by Digital Stored Program Control Switches as a percentage of Total Access Lines | AR | 25.59 | 29.21 | 34.93 | 45.50 | 53.34 | 68.26 | 90.18 |
| | CA | 27.10 | 35.30 | 39.60 | 43.68 | 52.17 | 66.71 | 74.28 |
| | IL | 36.57 | 39.62 | 43.90 | 50.81 | 64.54 | 81.57 | 82.15 |
| | NY | 47.80 | 56.25 | N/A | 68.68 | 76.91 | 85.73 | 89.44 |
| | TX | 21.28 | 23.29 | 27.20 | 32.70 | 38.05 | 41.29 | 42.72 |
| Digital Stored Program Control Switches | AR | 38 | 44 | 54 | 75 | 111 | 120 | 138 |
| | CA | 337 | 470 | 568 | 603 | 637 | 694 | 722 |
| | IL | 206 | 240 | 255 | 285 | 303 | 342 | 344 |
| | NY | 306 | 358 | N/A | 474 | 514 | 561 | 567 |
| | TX | 172 | 187 | 212 | 322 | 443 | 484 | 607 |
| Digital Stored Program Control Switches as a percentage of Total Switches | AR | 25.85 | 29.93 | 36.24 | 49.02 | 66.87 | 76.43 | 90.20 |
| | CA | 43.00 | 59.40 | 70.20 | 73.54 | 78.35 | 86.43 | 89.25 |
| | IL | 59.71 | 67.99 | 70.83 | 77.23 | 83.70 | 94.74 | 94.77 |
| | NY | 46.20 | 54.57 | N/A | 73.72 | 80.94 | 89.33 | 91.30 |
| | TX | 30.07 | 32.41 | 36.87 | 54.39 | 72.03 | 74.69 | 78.02 |
| Digital Stored Program Control Switches used as Local Switches | AR | 37 | 43 | 53 | 71 | 107 | 116 | 133 |
| | CA | 318 | 451 | 549 | 584 | 618 | 675 | 703 |
| | IL | 202 | 236 | 251 | 274 | 292 | 331 | 333 |
| | NY | 296 | 348 | N/A | 463 | 503 | 550 | 556 |
| | TX | 161 | 176 | 200 | 301 | 424 | 468 | 585 |
| Digital Stored Program Control Switches used as Local Switches as a percentage of Total Local Switches | AR | 25.34 | 29.45 | 35.81 | 47.65 | 66.05 | 75.82 | 89.86 |
| | CA | 41.60 | 58.40 | 69.50 | 72.91 | 77.83 | 86.10 | 88.99 |
| | IL | 59.23 | 67.62 | 70.51 | 76.54 | 83.19 | 94.57 | 94.60 |
| | NY | 45.30 | 53.87 | N/A | 73.26 | 80.61 | 89.14 | 91.15 |
| | TX | 28.70 | 31.10 | 35.52 | 52.71 | 71.14 | 74.05 | 77.38 |

Table 6 -- Infrastructure with Signaling System Seven (SS-7) Technology
SS7-317 (IntraLATA switches) and SS7-394 (InterLATA switches)

| | | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|
| Lines with Access to SS7-317 | AR | 0 | 0 | 0 | 332 | 485 | 722 | 866 |
| | CA | 1,979 | 4,853 | 6,995 | 9,431 | 12,259 | 14,536 | 15,255 |
| | IL | 407 | 2,034 | 2,749 | 3,259 | 4,671 | 5,866 | 6,223 |
| | NY | 0 | 194 | N/A | 5,703 | 7,390 | 8,982 | 9,655 |
| | TX | 0 | 400 | 2,021 | 4,540 | 4,514 | 7,445 | 7,798 |
| Lines with Access to SS7-317 as a percentage of Total Access Lines | AR | 0.00 | 0.00 | 0.00 | 42.67 | 61.16 | 86.16 | 100.00 |
| | CA | 15.10 | 35.20 | 49.50 | 65.44 | 83.34 | 96.21 | 97.21 |
| | IL | 7.68 | 37.56 | 50.78 | 59.53 | 81.72 | 98.80 | 99.92 |
| | NY | 0.00 | 1.99 | N/A | 57.16 | 72.28 | 85.73 | 89.44 |
| | TX | 0.00 | 5.81 | 28.53 | 62.01 | 59.50 | 94.16 | 94.52 |
| Switches with Access to SS7-317 | AR | 0 | 0 | 0 | 35 | 73 | 127 | 148 |
| | CA | 52 | 121 | 230 | 350 | 496 | 738 | 746 |
| | IL | 9 | 86 | 142 | 180 | 282 | 341 | 359 |
| | NY | 0 | 27 | N/A | 284 | 422 | 561 | 567 |
| | TX | 0 | 18 | 81 | 200 | 202 | 564 | 699 |
| Switches with Access to SS7-317 as a percentage of Total Switches | AR | 0.00 | 0.00 | 0.00 | 22.88 | 43.98 | 80.89 | 96.73 |
| | CA | 6.60 | 15.30 | 28.40 | 42.68 | 61.01 | 91.91 | 92.21 |
| | IL | 2.61 | 24.36 | 39.44 | 48.78 | 77.90 | 94.46 | 98.90 |
| | NY | 0.00 | 4.12 | N/A | 44.17 | 66.46 | 89.33 | 91.30 |
| | TX | 0.00 | 3.12 | 14.09 | 33.78 | 32.85 | 87.04 | 89.85 |
| Local Switches with Access to SS7-317 | AR | 0 | 0 | 0 | 35 | 68 | 127 | 148 |
| | CA | 44 | 112 | 221 | 331 | 477 | 719 | 727 |
| | IL | 9 | 80 | 139 | 174 | 272 | 331 | 348 |
| | NY | 0 | 18 | N/A | 273 | 411 | 550 | 556 |
| | TX | 0 | 17 | 81 | 200 | 182 | 564 | 699 |
| Local Switches with Access to SS7-317 as a percentage of Total Local Switches | AR | 0.00 | 0.00 | 0.00 | 23.49 | 41.98 | 83.01 | 100.00 |
| | CA | 5.80 | 14.50 | 28.00 | 41.32 | 60.08 | 91.71 | 92.03 |
| | IL | 2.64 | 22.92 | 39.04 | 48.60 | 77.49 | 94.57 | 98.86 |
| | NY | 0.00 | 2.79 | N/A | 43.20 | 65.87 | 89.14 | 91.15 |
| | TX | 0.00 | 3.00 | 14.39 | 35.03 | 30.54 | 89.24 | 92.46 |

| Table 6 -- SS-7 Capability (continued) | | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|
| Lines with Access to SS7-394 | AR | 0 | 0 | 0 | 389 | 485 | 722 | 866 |
| | CA | 0 | 0 | 966 | 9,431 | 12,259 | 14,536 | 15,255 |
| | IL | 0 | 0 | 1,570 | 2,979 | 4,403 | 5,534 | 6,223 |
| | NY | 0 | 89 | N/A | 5,703 | 7,390 | 9,002 | 9,655 |
| | TX | 0 | 0 | 0 | 4,548 | 4,734 | 7,445 | 7,798 |
| Lines with Access to SS7-394 as a percentage of Total Access Lines | AR | 0.00 | 0.00 | 0.00 | 50.00 | 61.16 | 86.16 | 100.00 |
| | CA | 0.00 | 0.00 | 6.80 | 65.44 | 83.34 | 96.21 | 97.21 |
| | IL | 0.00 | 0.00 | 29.00 | 54.41 | 77.03 | 93.21 | 99.92 |
| | NY | 0.00 | 0.91 | N/A | 57.16 | 72.28 | 85.92 | 89.44 |
| | TX | 0.00 | 0.00 | 0.00 | 62.12 | 62.40 | 94.16 | 94.52 |
| Switches with Access to SS7-394 | AR | 0 | 0 | 0 | 46 | 74 | 127 | 148 |
| | CA | 0 | 5 | 30 | 350 | 496 | 738 | 746 |
| | IL | 0 | 0 | 69 | 157 | 267 | 310 | 358 |
| | NY | 0 | 22 | N/A | 284 | 422 | 561 | 567 |
| | TX | 0 | 0 | 0 | 205 | 241 | 564 | 699 |
| Switces with Access to SS7-394 as a percentage of Total Switches | AR | 0.00 | 0.00 | 0.00 | 30.07 | 44.58 | 80.89 | 96.73 |
| | CA | 0.00 | 0.60 | 3.70 | 42.68 | 61.01 | 91.91 | 92.21 |
| | IL | 0.00 | 0.00 | 19.17 | 42.55 | 73.76 | 85.87 | 98.62 |
| | NY | 0.00 | 3.35 | N/A | 44.17 | 66.46 | 89.33 | 91.30 |
| | TX | 0.00 | 0.00 | 0.00 | 34.63 | 39.19 | 87.04 | 89.85 |
| Local Switches with Access to SS7-394 | AR | 0 | 0 | 0 | 46 | 69 | 127 | 148 |
| | CA | 0 | 0 | 21 | 331 | 477 | 719 | 727 |
| | IL | 0 | 0 | 69 | 154 | 257 | 300 | 348 |
| | NY | 0 | 14 | N/A | 273 | 411 | 550 | 556 |
| | TX | 0 | 0 | 0 | 205 | 221 | 564 | 699 |
| Local Switches with Access to SS7-394 as a percentage of Total Local Switches | AR | 0.00 | 0.00 | 0.00 | 30.87 | 42.59 | 83.01 | 100.00 |
| | CA | 0.00 | 0.00 | 2.70 | 41.32 | 60.08 | 91.71 | 92.03 |
| | IL | 0.00 | 0.00 | 19.38 | 43.02 | 73.22 | 85.71 | 98.86 |
| | NY | 0.00 | 2.17 | N/A | 43.20 | 65.87 | 89.14 | 91.15 |
| | TX | 0.00 | 0.00 | 0.00 | 35.90 | 37.08 | 89.24 | 92.46 |

Table 7 - ISDN Capability in RBOC Network

| | | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|
| Lines with Potential Access to ISDN (in thousands) | AR | 0 | 1 | 32 | 99 | 105 | 230 | 300 |
| | CA | 2 | 778 | 1,431 | 2,771 | 5,185 | 8,317 | 10,112 |
| | IL | 797 | 849 | 989 | 1,281 | 2,867 | 3,518 | 4,500 |
| | NY | 0 | 0 | N/A | 493 | 1,617 | 6,972 | 9,665 |
| | TX | 81 | 369 | 585 | 1,013 | 707 | 874 | 5,932 |
| Lines with Potential Access to ISDN as a percentage of Total Access Lines | AR | 0.00 | 0.14 | 4.25 | 12.72 | 13.24 | 27.45 | 34.64 |
| | CA | 0.00 | 5.70 | 10.10 | 19.23 | 35.25 | 55.05 | 64.44 |
| | IL | 15.05 | 15.67 | 18.28 | 23.39 | 50.16 | 59.26 | 72.25 |
| | NY | 0.00 | 0.00 | N/A | 4.94 | 15.82 | 66.55 | 89.53 |
| | TX | 1.22 | 5.36 | 8.26 | 13.84 | 9.32 | 11.05 | 71.90 |
| Switches Equipped with ISDN | AR | 1 | 2 | 4 | 7 | 7 | 12 | 14 |
| | CA | 1 | 38 | 79 | 141 | 216 | 335 | 405 |
| | IL | 43 | 45 | 53 | 73 | 135 | 134 | 133 |
| | NY | 0 | 0 | N/A | 14 | 44 | 160 | 0 |
| | TX | 10 | 33 | 46 | 49 | 49 | 66 | 179 |
| Switches Equipped with ISDN as a percentage of Total Switches | AR | 0.68 | 1.36 | 2.68 | 4.58 | 4.22 | 7.64 | 9.15 |
| | CA | 0.10 | 4.80 | 9.80 | 17.20 | 26.57 | 41.72 | 50.06 |
| | IL | 12.46 | 12.75 | 14.72 | 19.78 | 37.29 | 37.12 | 36.64 |
| | NY | 0.00 | 0.00 | N/A | 2.18 | 6.93 | 25.48 | N/A |
| | TX | 1.75 | 5.72 | 8.00 | 8.28 | 7.97 | 10.19 | 23.01 |
| Local Switches Equipped with ISDN | AR | 1 | 2 | 4 | 7 | 7 | 12 | 14 |
| | CA | 1 | 38 | 79 | 140 | 215 | 334 | 404 |
| | IL | 43 | 45 | 53 | 73 | 134 | 134 | 163 |
| | NY | 0 | 0 | N/A | 14 | 44 | 160 | 148 |
| | TX | 10 | 33 | 46 | 49 | 49 | 66 | 179 |
| Local Switches Equipped with ISDN as a percentage of Total Local Switches | AR | 0.68 | 1.37 | 2.70 | 4.70 | 4.32 | 7.84 | 9.46 |
| | CA | 0.10 | 4.90 | 10.00 | 17.48 | 27.08 | 42.60 | 51.14 |
| | IL | 12.61 | 12.89 | 14.89 | 20.39 | 38.18 | 38.29 | 46.31 |
| | NY | 0.00 | 0.00 | N/A | 2.22 | 7.05 | 25.93 | 24.26 |
| | TX | 1.78 | 5.83 | 8.17 | 8.58 | 8.22 | 10.44 | 23.68 |

Table 8 -- Net Revenue -- By Class of Service
Per Residential Access Line, Per IntraLATA Call, Per InterLATA Access Minute

| | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Net Revenues (in millions of dollars) | AR | 506 | 532 | 551 | 564 |
| | CA | 7,778 | 7,971 | 8,008 | 7,647 |
| | IL | 2,945 | 3,039 | 3,224 | 3,365 |
| | NY | 7,670 | 7,805 | 7,831 | 7,869 |
| | TX | 4,403 | 4,627 | 4,900 | 5,169 |
| Revenue from Basic Local Service (in millions of dollars) | AR | 243 | 255 | 265 | 277 |
| | CA | 3,323 | 3,450 | 3,406 | 3,755 |
| | IL | 1,775 | 1,842 | 1,923 | 1,964 |
| | NY | 4,617 | 4,704 | 4,748 | 4,795 |
| | TX | 2,134 | 2,238 | 2,286 | 2,494 |
| Revenue from Basic Local Service as a percentage of Net Revenues | AR | 47.94 | 48.05 | 48.11 | 49.21 |
| | CA | 42.72 | 43.28 | 42.53 | 49.10 |
| | IL | 60.27 | 60.60 | 59.63 | 58.35 |
| | NY | 60.19 | 60.27 | 60.63 | 60.93 |
| | TX | 48.46 | 48.37 | 46.65 | 48.25 |
| Revenue from Network Access Service (in millions of dollars) | AR | 148 | 154 | 154 | 163 |
| | CA | 2,153 | 2,261 | 2,353 | 2,357 |
| | IL | 768 | 783 | 825 | 856 |
| | NY | 2,270 | 2,230 | 2,246 | 2,267 |
| | TX | 1,571 | 1,654 | 1,814 | 1,943 |
| Revenue from Network Access Service as a percentage of Net Revenues | AR | 29.28 | 29.02 | 27.89 | 28.88 |
| | CA | 27.69 | 28.36 | 29.38 | 30.83 |
| | IL | 26.08 | 25.77 | 25.58 | 25.43 |
| | NY | 29.60 | 28.57 | 28.68 | 28.81 |
| | TX | 35.69 | 35.75 | 37.02 | 37.59 |
| Revenue from Toll Network Service (in millions of dollars) | AR | 89 | 95 | 91 | 87 |
| | CA | 2,085 | 2,041 | 1,990 | 1,217 |
| | IL | 170 | 169 | 227 | 246 |
| | NY | 334 | 379 | 348 | 347 |
| | TX | 422 | 419 | 389 | 365 |
| Revenue from Toll Network Services as a percentage of Net Revenues | AR | 17.64 | 17.96 | 16.51 | 15.50 |
| | CA | 26.81 | 25.61 | 24.85 | 15.91 |
| | IL | 5.78 | 5.56 | 7.03 | 7.32 |
| | NY | 4.35 | 4.86 | 4.44 | 4.41 |
| | TX | 9.59 | 9.05 | 7.94 | 7.06 |
| Other Revenues (in millions of dollars) | AR | 34 | 37 | 31 | 49 |
| | CA | 469 | 438 | 479 | 544 |
| | IL | 303 | 314 | 347 | 389 |
| | NY | 601 | 647 | 649 | 679 |
| | TX | 353 | 392 | 331 | 453 |
| Other Revenues as a percentage of Net Revenues | AR | 6.73 | 6.91 | 5.56 | 8.76 |
| | CA | 6.03 | 5.50 | 5.98 | 7.12 |
| | IL | 10.28 | 10.34 | 10.76 | 11.55 |
| | NY | 7.84 | 8.29 | 8.29 | 8.63 |
| | TX | 8.01 | 8.47 | 6.76 | 8.77 |

| Table 8 -- Net Revenue (continued) | | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Revenues from Basic Local Service per Residential Access Line | AR | 425.02 | 435.72 | 440.37 | 452.80 |
| | CA | 362.27 | 371.07 | 359.29 | 387.11 |
| | IL | 502.12 | 510.40 | 525.11 | 518.32 |
| | NY | 699.32 | 699.79 | 691.82 | 685.26 |
| | TX | 431.42 | 440.39 | 437.41 | 459.79 |
| Revenues from Network Access Services per InterLATA Billed Access Minutes (cents per minute) | AR | 5.68 | 5.54 | 5.09 | 4.90 |
| | CA | 4.68 | 4.58 | 4.49 | 3.99 |
| | IL | 4.77 | 4.63 | 4.78 | 4.46 |
| | NY | 7.39 | 6.88 | 6.57 | 6.19 |
| | TX | 6.56 | 6.55 | 6.56 | 6.42 |
| Revenues from Toll Network Services per IntraLATA Toll Call | AR | 0.76 | 0.72 | 0.62 | 0.57 |
| | CA | 0.33 | 0.31 | 0.29 | 0.17 |
| | IL | 0.80 | 0.76 | 1.00 | 0.93 |
| | NY | 1.01 | 1.23 | 1.11 | 1.05 |
| | TX | 0.88 | 0.84 | 0.79 | 0.79 |

## Biography

Frank A. Wolak is an Associate Professor of Economics at Stanford University. He received a B.A. from Rice University and a S.M. in Applied Mathematics and a Ph.D. in Economics from Harvard University. He has been a faculty member at Stanford University since 1986. He is a Research Associate of the National Bureau of Economic Research and an Associate Editor of various economics and econometrics journals including the *Journal of Industrial Economics* and the *Journal of Econometrics.*

His research focuses on the analysis of firm and consumer behavior in network infrastructure industries, such as telecommunications, electricity, water delivery and postal delivery services. He is currently engaged in research analyzing the various methods for introducing competition into the electricity industry, as well as work documenting the changing structure of the demand for postal delivery services brought about by the rapid changes in the diversity of products available from the telecommunications industry. His other recent work on the telecommunications industry has studied the impact of increasing competition in all telecommunications markets on the achievement of the goals of universal household access to the telecommunications network.