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# Telecommunication Infrastructure Investments and State Regulatory Reform: A Preliminary Look At the Data

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Proposals for telecommunications reform at the state and federal level call for timely, objective analysis of many issues. This paper is one in a series of focused NRRI analyses of high priority issues in telecommunications from a state regulatory and public policy perspective. The paper was prepared by NRRI with funding provided by participating member commissions of the National Association of Regulatory Utility Commissioners (NARUC). The views and opinions of the authors do not necessarily state or reflect the views, opinions, or policies of the NRRI, the NARUC, or any NARUC member commission.

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By vesting considerably more authority in the Federal Communications Commission than in the past, the telecommunications reform legislation that died in the 103rd Congress was likely to lead quickly to extensive intrastate price cap regulation. The FCC has already moved to price caps in its own regulation of AT&T and the local exchange carriers and would probably extend price regulation given the opportunity. Even without the resurrection of S 1822 in the 104th Congress, price cap regulation is an issue before many states. As a part of the regulatory reform proposals they offer the commissions, telephone companies have often included the promise that freedom from ratebase, rate-of-return regulation will lead to greater investment in advanced technologies. The connection of price caps and technology deployment has sometimes been an implicit assumption. Proposals for alternative regulation often include heroic-sounding commitments to infrastructure modernization. Decision making bodies in the states, including both legislatures and commissions, have often been enticed by the idea that price regulation can give a state an early start on the information age. The argument that powerful new tools like fiber optic cable, digital switching, advanced signaling systems and integrated services digital networks (ISDN) will give a state an edge in economic development and social welfare is appealing.

Whether enhanced investment in infrastructure leads to economic development is only one question, and a problematic one at that. An issue that is almost as thorny is whether nontraditional regulation (for example, price caps) actually leads to the increased investments in infrastructure. This paper investigates the latter question. Our preliminary review of some of the available data suggests that the type of regulation in effect in a state is not an especially important determinant of how much investment will take place. That is, we fail to find evidence that regulatory reform is associated with greater levels of investment in new technologies. We do, however, find significant relationships between relative levels of investment and particular regional holding companies.

## The Literature in Economics

The theoretical economics literature on investment in new technologies by companies regulated by alternative regimes is sparse and provides few clear predictions.[1] The arguments that do exist seem somewhat incomplete and contradictory. The conventional wisdom behind these arguments can be summarized by two general stories. First, previous authors have argued that because traditional rate-of-return regulation encourages the adoption of capital intensive technology, the firm's incentive to adopt new (modern) infrastructure components is greater than under other forms of regulation (Montgomery 1994).[2] This rate-of-return regulation story appears to be a basic extension of the original Averch and Johnson (1962) capital-bias result. One flaw in the reasoning, however, lies in the assumed link between modern infrastructure investment and profitable augmentation of the firm's ratebase (total capital deployment). A rate-of-return constrained firm will tend to invest in newly available technology if this action satisfies two criteria:

1. The investment increases the firm's ratebase (total capital deployment);
2. The firm's rate of return does not fall below the allowed rate of return (revenue net of operating expenses must rise);

Indeed, it is likely that additional modern telecommunications infrastructure will increase the firm's ratebase. But we cannot say, *a priori*, whether the investment will result in higher revenue net of operating expenses. We can, however, identify certain capital investment characteristics that potentially lead to increases in net operating revenue. First, the investment may allow for higher gross revenue through additional demand created by enhanced quality of existing services or by new services made available by the modern technology. Second, the investment may significantly reduce annual operating expenses by reducing production requirements for labor and

[1] The investment in modern infrastructure should not be confused with investment in research and development of technology. The term investment or innovation, as used here, only refers to the purchase and deployment of previously developed infrastructure equipment already available on the market.

[2] Similar arguments have appeared in discussions regarding quality of service selected by the regulated firm.

other inputs. It is interesting to note that these same incentives exist for an unregulated or price regulated company (in equilibrium) faced with a new option to substitute recently developed technology for existing technology.

A common belief is that rate-of-return regulated firms are less concerned about potential risks associated with new infrastructure investments (for example, demand and cost uncertainty) because unprofitable investments can simply be passed on to the consumer through higher prices. This story is questionable for two reasons. First, one previously established equilibrium result suggests that firms constrained by rate-of-return regulation will never operate in the inelastic portion of demand unless forced to do so by additional price constraints imposed by regulators (Bailey 1973 and Sherman 1992). This implies that price increases will not enhance gross revenue but rather reduce revenue. Second, even if the rate-of-return constrained firm is operating in the inelastic region of demand, regulators and consumer interest groups have historically resisted proposed price increases (Joskow 1973), thereby making poor investment decisions costly to the regulated firm. For these reasons, we argue that firms under pure rate-of-return regulation favor capital investments that are expected to enhance demand or lower operating costs and are no less sensitive to the risks associated with such investments.

A second piece of conventional wisdom from recent policy discussions suggests that incentive regulatory schemes encourage regulated firms to invest in modern infrastructure (Greenstein, McMaster, and Spiller 1994). The argument extends the static cost-minimization result for price regulation. Because the firm desires cost-efficient production under price regulation, the regulated firm will adopt new (presumably, cost-saving) technologies to a greater extent than traditional rate-of-return regulated firms. This argument contains a leap of faith in the assumed link between cost minimization and new technology. But even if we take as given that new technologies allow for lower operating costs, the argument fails to consider the optimal investment behavior of the firm. At the risk of being overly simplistic, the price constrained firm will invest in new capital if total costs are reduced and/or revenue increases as a result of the investment. Since capital cost necessarily increases with new asset investments, either operating costs must fall or gross revenue must rise enough to offset the higher capital cost. Notice that

these are the same capital investment characteristics preferred by rate-of-return regulated firms. The firm operating under traditional regulation also desires operating cost reductions and revenue increases insofar as these changes are coupled with increased capital outlay (ratebase).

Theoretically, it appears that unambiguous differences between rate-of-return regulation and alternative regulation for capital investment behavior have yet to be established. Such a theory calls for formal economic analyses based on dynamic investment models rather than conventional wisdom based on static regulatory models. Indeed, it may be the case that only ambiguous conclusions can be found or no real difference in investment strategy arises when moving from one regulatory regime to another. Although formal theoretical inquiry is beyond the scope of this report, we can proceed with an empirical investigation that provides preliminary tests of the two stories discussed above. In light of our previous evaluation of these beliefs, we hypothesize that neither of these stories is correct. That is, deployment of new technology by local exchange companies (LECs) is not affected by the type of regulation employed by the state.

Previous empirical studies provide contradictory results on the effect of incentive regulation on modern infrastructure investment by LECs. Montgomery (1994), in a study supported by MCI, finds that "*the consensus among these studies indicates that to date incentive regulation schemes have not stimulated infrastructure investment by LECs.*" Although alternative regulatory plans have increased net operating revenues for LECs, ". . .increasing the cash flow available to local monopoly telephone companies generally does not change their investment incentives or increase expenditures on their telephone networks" (Montgomery, p.1). In contrast to Montgomery's findings, Greenstein, McMaster, and Spiller (1994), in a study presented at the American Enterprise Institute and funded in part by Ameritech, "find that, in general, more liberal regulatory environments lead to greater incentives to deploy modern equipment, and that LECs respond to those incentives" (p.2). Greenstein, McMaster, and Spiller find such a pattern for fiber optic cable, signaling system 7 (SS7), and ISDN deployment but fail to find such a relationship for digital stored program controlled switches. The seemingly conflicting results from earlier empirical research indicates that further investigation is necessary.

We present descriptive data that cast doubt on both the rate-of-return regulation and the incentive (price) regulation stories described above. Employing firm-specific infrastructure data for the Bell Operating Companies (BOCs), we explore potential sources of variation in the investment levels across the companies. We begin by bifurcating the BOCs into traditional, rate-of-return regulated companies and nontraditional, incentive regulated companies. The nontraditional companies are further partitioned into three subsets: "price cap", "profit sharing", and "basic/nonbasic grouping". We then test for differences in the average deployment of six types of modern infrastructure between traditionally regulated companies and the other nontraditional categories. Only two significant differences are found out of twenty-four tests conducted. Thus, support for either rate-of-return or incentive regulation as predictors of the level of infrastructure investment is far from overwhelming.

In a similar fashion, we test for possible infrastructure differences due to variation in competitive entry policy. The data are again bifurcated, this time by those states that authorized intraLATA toll competition and those states that had not. We fail to find any significant differences between the mean deployment of modern infrastructure by "competitive" BOCs and that by "noncompetitive" companies.

Given the lack of convincing differences between BOCs grouped by state policy, we investigate the possibility that infrastructure deployment at the company level is driven by corporate-level strategy rather than state policies. We compare the company-level means grouped by Regional Bell Holding Company (RBHC) for the same six infrastructure equipment types. Unlike the weak differences between alternative regulatory policies, we find a number of significant differences across RBHCs. This finding suggests that variations in modern technology deployment are possibly due to corporate or regional economic variables rather than variation in state regulatory policy.

## Data Descriptions

We use six alternative dependent variables to measure the degree of deployment in modern infrastructure by individual (state-level) BOCs. The data for these variables were obtained from the FCC's ARMIS (Automated Reporting Management Information System) filings on LECs.[3] Many possible variables exist to measure the level of modern infrastructure investment by the BOC. The following six dependent variables were selected:

1. the percent of access lines served by Digital Stored Program Controlled local switches;
2. the percent of digital carrier links that use a fiber medium;
3. the percent of total working channels that are fiber digital;
4. the percent of total local switches equipped with ISDN;
5. the percent of total access lines with access to ISDN;
6. the percent of total access lines with access to SS7-394.

We use December 1993 ARMIS data for forty-eight BOCs operating in forty-seven states and the District of Columbia.[4] The variation of regulatory policy across these companies/jurisdictions provides an opportunity to empirically test for changes (differences) in the levels of modern technology investment due to regulatory reform. We now turn to these comparisons.

[3] Specifically, we used the ARMIS 4307 infrastructure reports.

[4] Excluded states are Alaska, Connecticut, and Hawaii.

## Results[5]

We begin by separating BOC data into traditional, rate-of-return regulated companies and incentive-regulated companies. We assume that any impact from policy changes will not instantaneously affect the infrastructure mix. Our partitioning of the data, then, is based on December 1992 information which allows for a minimum of one year between the time the regulatory policy was implemented by the state and measurement of infrastructure levels. As of December 1992, twenty-eight states had implemented some form of incentive regulation for the oversight of BOCs included in our data.[6] Of these, six had instituted price cap regulation, ten adopted a profit or revenue sharing scheme, and the remaining twelve formally grouped services for regulatory purposes into "basic" and "nonbasic" categories. Nonbasic services are those selected by the commission for regulatory reform or complete deregulation.

The company-level sample means from these alternative regulation groups are presented in Table 1 for the six infrastructure variables. When compared to traditionally regulated companies, both higher and lower levels (on average) of modern technology deployment are found across the nontraditional companies. We constructed t-statistics (in parentheses) to test for differences between the mean deployment by a traditionally regulated company and the deployment by an incentive-regulated company as well as the three subgroups of incentive-regulated companies. As indicated in Table 1, only two of the twenty four tests suggest that nontraditional states employ more modern infrastructure.[7] These results, however, do not provide overwhelming support for the hypothesis that incentive regulatory reform leads to

[5] To date, we have only constructed tests for differences between means and the reader is warned not to draw substantive conclusions from the results. Since these tests only control for one (binary) variable, the results should be taken as descriptive and preliminary. To account for other variants that influence capital investment by regulated companies such as duration of policies, degree of competitive pressure, and other economic variables, planned future research will include multiple regression analysis.

[6] See the Appendix for a listing of incentive regulation states.

[7] The two positive tests are for profit sharing company means on fiber digital channels and lines with access to SS7-394. See Table 1.

TABLE 1
Sample Means for Modern Infrastructure Deployment:
BOCs Grouped by Regulation Type[a]
(December 1993)[b]

| | Traditional (20 states) | All Non-Trad. (28 states) | Price Caps (6 states) | Profit Sharing (10 states) | Service Grouping (12 states) |
|---|---|---|---|---|---|
| Lines w/Digital Switches | 65.32% | 64.77% (0.119) | 57.57% (1.284) | 65.87% (0.105) | 68.12% (0.443) |
| Fiber Carrier Links | 78.36% | 78.24% (0.034) | 75.55% (0.454) | 84.38% (1.287) | 74.46% (0.855) |
| Fiber Digital Channels | 5.56% | 5.66% (0.064) | 3.31% (1.141) | 9.08% (1.498)* | 3.99% (1.058) |
| Switches Equipped w/ ISDN | 17.28% | 17.79% (0.133) | 22.03% (0.687) | 18.20% (0.182) | 15.33% (0.402) |
| Lines w/ ISDN Availability | 31.06% | 34.83% (0.832) | 37.75% (0.865) | 32.14% (0.185) | 35.62% (0.589) |
| Lines w/ Access to SS7-394 | 66.39% | 74.84% (0.709) | 70.80% (0.435) | 83.51% (2.179)** | 69.64% (0.363) |

[a] t-statistics in parentheses were constructed to test for differences between the mean from traditionally regulated firms and the means of each nontraditional group. Statistically significant differences are denoted by asterisks.

[b] December 1993 infrastructure data were obtained from the FCC's ARMIS data filings. The regulatory regime categories were lagged by one year (December 1992) and are based on information compiled by the National Regulatory Research Institute. See the Appendix for a list of states defined as nontraditional.

* mean difference significant at the 10 percent level.
** mean difference significant at the 5 percent level.

greater deployment of modern infrastructure. One obvious alternative explanation can be based on the observation that most of the profit sharing states are in the BellSouth region. The significant differences in mean infrastructure deployment might almost as well derive from that Company's investment strategies as from the type of regulation. The results also fail to support the notion that rate-of-return regulated companies have a greater incentive to adopt modern technology.

Regulatory reform by state telephone regulators has also included the relaxation of legal barriers to entry in markets formerly monopolized by the BOCs. One such market that has received considerable attention in policy discussions is that for intraLATA toll services. It is reasonable to expect that increased competitive pressure on a BOC may motivate that company to increase its deployment of modern infrastructure.

We bifurcate the data, this time by companies that face intraLATA toll competition and those that do not. As of December 1992, 31 states had authorized facilities-based, intraLATA toll competition.[8] Company-level sample means are presented in Table 2 for competitive and noncompetitive states across each of the six infrastructure levels. Although four of the six competitive company means are higher, we fail to find any statistically significant differences between the means for the six variables.

Our failure to find significant differences in modern infrastructure deployment across states grouped by state regulatory policy (that is, traditional versus nontraditional and competitive versus noncompetitive) suggests that we have not controlled for other determinants of investment. Potentially excluded variants include regional and corporate-level economic variables. We compare the average deployment of modern technology between companies grouped by the parent company. Table 3 provides the company-level sample means for each of the RBHC categories. The observable differences are made explicit by constructing t-statistics to test the differences between the means for select RBHCs which are presented in Tables 4A and 4B. We limited the selection of RBHCs for statistical testing because of the small degrees of

[8] See the Appendix for a listing of competitive states.

TABLE 2

Sample Means for Modern Infrastructure Deployment:
BOCs Grouped by IntraLATA Toll Competition Status
(December 1993)[a]

| | No Toll Competition (17 states) | Authorized Competition (31 states) | Mean-Diff. t-statistic[b] |
|---|---|---|---|
| Lines w/Digital Switches | 63.92% | 65.60% | 0.353 |
| Fiber Carrier Links | 77.22% | 78.87% | 0.448 |
| Fiber Digital Channels | 6.00% | 5.41% | 0.364 |
| Switches Equipped w/ ISDN | 17.95% | 17.37% | 0.147 |
| Lines w/ ISDN Availability | 32.00% | 33.95% | 0.415 |
| Lines w/ Access to SS7-394 | 69.89% | 72.10% | 0.321 |

[a] December 1993 infrastructure data were obtained from the FCC's ARMIS data filings. The category for authorized intraLATA toll competition is lagged one year (December 1992) and is based on information compiled by the authors and Blank, Kaserman, and Mayo (1994). See the Appendix for a list of states defined here as competitive.

[b] t-statistics were constructed to test for differences between the BOC mean in states that authorize intraLATA toll competition and the mean for noncompetitive BOCs.

TABLE 3

Sample Means for Modern Infrastructure Deployment:
BOCs Grouped by RBHC
(December 1993)[a]

| | BellSo | BellAtl | Nynex | USWst | PacBell | SWBell | AmerT |
|---|---|---|---|---|---|---|---|
| Lines w/Digital Switches | 72.19% | 72.22% | 75.16% | 52.25% | 75.90% | 52.90% | 66.82% |
| Fiber Carrier Links | 85.70% | 74.20% | 80.01% | 75.70% | 57.53% | 77.62% | 83.56% |
| Fiber Digital Channels | 10.85% | 8.92% | 3.54% | 2.71% | 1.31% | 5.48% | 4.81% |
| Switches Equipped w/ ISDN | 20.93% | 35.60% | 8.46% | 10.10% | 26.04% | 5.47% | 26.84% |
| Lines w/ ISDN Avail. | 38.52% | 49.99% | 22.97% | 27.33% | 47.55% | 11.77% | 43.86% |
| Lines w/ Access to SS7-394 | 90.27% | 59.77% | 74.21% | 60.28% | 85.93% | 65.97% | 77.18% |

[a] December 1993 infrastructure data were obtained from the FCC's ARMIS filings.

TABLE 4A

Comparisons Between *Bell South* and other Select RBHCs
t-Statistics for Mean Differences
(December 1993)

| | Bell Atlantic | NYNEX | USWest |
|---|---|---|---|
| Lines w/Digital Switches | 0.004 | 0.427 | 3.30*** (BS > US) |
| Fiber Carrier Links | 1.764** (BS > BA) | 1.202 | 2.127** (BS > US) |
| Fiber Digital Channels | 0.531 | 2.039** (BS > NY) | 3.519*** (BS > US) |
| Switches Equip. w/ISDN | 2.656*** (BA > BS) | 2.500** (BS > NY) | 2.850*** (BS > US) |
| Lines w/ISDN Availability | 1.941** (BA > BS) | 2.41** (BS > NY) | 2.068** (BS > US) |
| Lines w/Access to SS7-394 | 2.494** (BS > BA) | 2.068** (BS > NY) | 3.377*** (BS > US) |

* mean difference significant at the 10 percent level.
** mean difference significant at the 5 percent level.
*** mean difference significant at the 1 percent level.

TABLE 4B

Comparisons Between *Bell Atlantic* and other Select RBHCs
t-Statistics for Mean Differences
(December 1993)

| | BellSouth | NYNEX | USWest |
|---|---|---|---|
| Lines w/Digital Switches | 0.004 | 0.365 | 2.88*** (BA > US) |
| Fiber Carrier Links | 1.764** (BS > BA) | 0.780 | 0.240 |
| Fiber Digital Channels | 0.531 | 2.453** (BA > NY) | 4.29*** (BA > US) |
| Switches Equip. w/ISDN | 2.656*** (BA > BS) | 5.049*** (BA > NY) | 6.16*** (BA > US) |
| Lines w/ISDN Availability | 1.941** (BA > BS) | 5.88*** (BA > NY) | 4.57*** (BA > US) |
| Lines w/Access to SS7-394 | 2.494** (BS > BA) | 0.987 | 0.041 |

* mean difference significant at the 10 percent level.
** mean difference significant at the 5 percent level.
*** mean difference significant at the 1 percent level.

freedom for certain RBHCs. A number of significant differences are identified between those RBHCs selected. Of the thirty tests conducted, twenty-one statistically significant differences were found. These findings suggest that variations in modern technology deployment by BOCs may be due to corporate-level or regional economic variables rather than variations in state regulatory policy. *That is, you are more likely to see a difference between a company from BellSouth, which has been aggressively deploying fiber as a corporate strategy, and another BOC, than you are between a state that is still using traditional regulation and one that has adopted price caps.*

## Conclusions, Limitations, and Suggestions for Further Research

The characteristics of tomorrow's "information age" to a great extent will be determined by today's investment in modern infrastructure by private telecommunications companies. It may be useful to researchers and policy makers to know empirically whether state regulatory reforms, such as incentive regulation and authorized competitive entry, have affected the deployment of modern technologies by LECs. The variation in policy across states and the availability of individual BOC infrastructure data provide a unique opportunity for statistical comparison of company investment behavior under alternative regimes. Our preliminary analysis fails to support the hypothesis that regulatory reform (i.e., incentive regulation or intraLATA toll competition) leads to greater deployment of modern telecommunications infrastructure. On the other hand, we find a number of significant differences in average technology investment across RBHCs.

The data presented in this paper are merely descriptive and suggestive and the reader is cautioned from making sweeping conclusions based on these preliminary findings. One problem with the tests for mean differences performed here is that we have not controlled for the many other potential determinants of infrastructure investment decisions that also vary across companies and regulatory jurisdictions. Experimental control of many variables is best done through multiple regression analysis. Future work planned by the authors will include such formal analysis.

Our results are in keeping with those of Montgomery's analysis done under the aegis of MCI. The MCI-funded study concluded on the basis of a thorough though largely qualitative review that "increasing the cash flow available to local monopoly telephone companies generally does not change their investment incentives or increase expenditures on their telephone networks."[9] Further, the study found "no particular form of regulatory relief has produced positive benefits in the form of LEC spending on the telecommunications infrastructure."[10] In fact, the MCI report found some evidence that investment measured by gross plant additions per access line were lower on average in states with alternative regulation than in others.[11] Regulation is only one of many factors that affect decisions on investment, suggested the report, and cautioned that when regulators approve increases in a company's cash flow and the funds are not reinvested in the network they are likely to go to other investment opportunities.[12] Montgomery suggests a number of "policy lessons" for regulators, including having clear targets for those expenditures, a good idea of how the investment plan compares with "business as usual" capital budgets and a sense of whether ratepayer demand will validate new infrastructure.

One study not included in the Montgomery report was the 1994 NRRI review of Ameritech-Ohio's alternative regulation plan. The NRRI report, prepared for the staff of the Public Utilities Commission of Ohio, came to much the same conclusion as the MCI-sponsored study. The NRRI found that most of the company's claimed $1.6 billion infrastructure commitment amounted to business as usual. Very little of the $1.6 billion was actually aimed at advanced infrastructure, and of the money allocated to deployment of advanced technologies, the majority was dedicated to completing modernization efforts already underway. In fact, in real dollars (adjusted for inflation and the time value of money), the Ameritech-Ohio expenditures

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[9] William Page Montgomery, "Promises Versus Reality: Telecommunications Infrastructure, LEC Investment and Regulatory Reforms," mimeo, Montgomery Consulting, Chestnut Hill, Massachusetts, August 1994), i.

[10] Ibid., iii.

[11] Ibid.

[12] Ibid., ii.

proposed for the five years of the price caps plan were over $500 million less than in the five years preceding the plan.[13]

Social scientists who evaluate public policy make a distinction between "theory failure" and "program failure."[14] The success of a policy depends both on being correct about the causal relationship between an action and its desired effect (the theory) and about the means to carry out the action (the program). The theory discussed in this paper that regulators are being called on to evaluate is that investment in advanced infrastructure will lead to economic development. This hypothesis is questionable, but even if there is a causal relationship between economic development and infrastructure investments, price caps may not be the mechanism to do the job.

In conclusion, to ensure ratepayer protection in the seemingly inevitable march toward price caps, whether mandated by the federal government or promoted in the states, commissions should be wary of claims that their state will be able to get ahead of the pack by increasing new technology deployment faster with price regulation. There may be other reasons for choosing price cap regulation over ratebase, rate-of-return regulation. But indications are that commissions should look with a jaundiced eye at the connection between price caps and deployment of advanced technologies. A commission that chooses to move from cost-based to price-based regulation expecting that swift deployment of advanced technological capability will be one of the benefits to the ratepayer should tightly focus the price caps program on specific infrastructure goals.

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[13] Vivian Witkind Davis, Raymond W. Lawton, and Edwin A. Rosenberg, *An Analysis of Selected Aspects of Ohio Bell Telephone's Application for Alternative Regulation: Price Caps, Service Classifications and Infrastructure Commitments* (Columbus, OH: The National Regulatory Research Institute 1994), viii-ix.

[14] Carol H. Weiss, *Evaluation Research* (Englewood Cliffs, NJ: Prentice-Hall, 1972).

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# APPENDIX

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**ALTERNATIVE STATE REGULATION PLANS**
**IN DECEMBER 1992**

| Traditional | Revenue/ Profit Sharing | Formal Distinction Between Basic and Competitive Services | Price Caps |
|---|---|---|---|
| Arizona | Alabama | Colorado | California |
| Arkansas | Florida | Idaho | Michigan |
| Delaware | Georgia | Maryland | New Jersey |
| Iowa | Florida | Nebraska | North Dakota |
| Illinois | Louisiana | Nevada | Oregon |
| Indiana | Kentucky | South Dakota | Rhode Island |
| Kansas | Minnesota | Tennessee | |
| Maine | Mississippi | Texas | |
| Massachusetts | Missouri | Utah | |
| Montana | New Mexico | Vermont | |
| New Hampshire | South Carolina | Washington | |
| New York | | West Virginia | |
| North Carolina | | | |
| Ohio | | | |
| Oklahoma | | | |
| Pennsylvania | | | |
| Virginia | | | |
| Washington DC | | | |
| Wisconsin | | | |
| Wyoming | | | |

Source: 1994 NARUC/NRRI Survey on Alternative Regulation in Telecommunications.

**STATES AUTHORIZING INTRALATA TOLL COMPETITION IN DECEMBER 1992**[a]

| | |
|---|---|
| Alabama | Minnesota |
| Colorado | Missouri |
| Delaware | Montana |
| Florida | Nebraska |
| Georgia | New Mexico |
| Iowa | New York |
| Idaho | Ohio |
| Illinois | Oregon |
| Indiana | Pennsylvania |
| Kentucky | Rhode Island |
| Louisiana | South Dakota |
| Maine | Tennessee |
| Massachusetts | Utah |
| Maryland | Vermont |
| Mississippi | Washington |
| | West Virginia |

[a] Source: Based on information compiled by the authors and Blank, Kaserman, and Mayo, "Dominant Firm Pricing with Competitive Entry and Regulation." IntraLATA toll competition is defined here as facility-based competition. It does not include those states that only allow resale of BOC services. Also, the type of services that may be offered by facility-based entrants is restricted to certain states. For example, Arizona and Arkansas have authorized the unblocking of 10XXX calls but have not allowed competition for all intraLATA toll services. The thirty-one states identified here allow competition for a "full" line of intraLATA services, including MTS (through 10XXX calling), WATS, 800, card, and operator services. No states allowed competitive entry with "1+" MTS service as of December 31, 1992.