

# NTIA REGULATORY ALTERNATIVES REPORT

NTIA REGULATORY  
ALTERNATIVES REVIEW STAFF



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JULY 1987





**UNITED STATES DEPARTMENT OF COMMERCE**  
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Washington, D.C. 20230

July 22, 1987

MESSAGE FROM THE ASSISTANT SECRETARY

Whatever benefits traditional telephone regulation might once have yielded, now more than ever, it is an institution that warrants major changes. Today, America is part of a global economy, and an economy that is increasingly founded on telecommunications and related information technologies. Ensuring our world competitiveness, plus the national efficiency, investment, and employment opportunities that are clearly needed, requires readiness to reexamine outmoded assumptions, and take bold steps when plainly warranted.

There follows here an extensive appraisal of one of the telecommunications industry's oldest and most familiar regulatory institutions -- rate of return, or rate base, regulation. Based on careful analysis, NTIA concludes this outmoded institution is simply unneeded.

The report urges Federal and State initiatives aimed at removing price, entry, and profit constraints now applied to communications services which are effectively competitive. At the same time, it recommends comprehensive steps to reform the current regulatory scheme regarding those offerings which are not yet competitive.

We have stressed in previous NTIA reports, assessments, and other statements the need to mobilize America's telecommunications resources today. This analysis presents Federal and State regulators a major opportunity to foster both more effective competition and improved, more "target efficient" regulation. I urge regulators, users, and industry to capitalize on this to the ultimate benefit of our country.

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Acknowledgment

Information and assistance was provided by  
Dr. Larry F. Darby, NTIA Consultant.

July 1987



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## I. INTRODUCTION AND OVERVIEW

The last two decades have witnessed substantial changes in the U.S. domestic telecommunications industry. Technological developments -- and Government actions, including the 1984 Bell System breakup -- fundamentally altered the industry's market structure and significantly eroded the relatively stable and predictable environment in which services historically were provided. Yet despite these developments, the traditional regulatory regime applied to established telephone companies remains largely unchanged.

The net effect of initiating commendable policies designed to foster competition and efficiency, while retaining outmoded regulatory regimes premised on cost and monopoly assumptions increasingly eclipsed by events, has been to create an environment where the public all too often experiences the worst of both worlds. That is, it achieves neither the full benefits and efficiency gains of open competition, nor the ostensible advantages traditional regulation might once have afforded. How best to remedy this situation is the fundamental conundrum that this report addresses and endeavors to resolve.

### Rapid Technological and Competitive Change

Technological changes including the advent of microelectronics and fiber optics have steadily reduced the cost of new transmission media to supplement or supplant twisted pair cable, thus creating market opportunities for competitive facility providers and undermining conventional natural monopoly assumptions. Decreases in the size and price of customer-premises switching equipment have also enabled users to concentrate, switch, and route traffic independently of the established telephone companies.<sup>1/</sup> Since customers no longer depend wholly upon telephone company-provided switching services, moreover, they can more readily utilize transmission facilities offered by alternative suppliers. Such commercial and technological advances have facilitated expansion of private satellite, radio, and landline communications networks functioning apart from the conventional public-switched telephone network, and relying on fewer carrier offerings than before.

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<sup>1/</sup> See National Telecommunications and Information Administration, Competition in the Local Exchange Telephone Service Market, NTIA Rept. 87-210 at 7 (Feb. 1987).

The convergence of computer and communications technologies has both accelerated these developments and made an imposing array of innovative, non-traditional telecommunications services available. Conventional voice traffic remains the dominant use of communications facilities, and that seems likely to remain true through the balance of this decade. But computer-related services are experiencing consistently much higher rates of growth; such new services, by some estimates, may comprise as much as one-third of total communications traffic by the turn of the century.<sup>2/</sup>

Federal and state regulatory authorities have encouraged new firms to serve new and conventional markets by permitting greater competitive entry. While regulatory jurisdiction over basic communications remains divided, the Federal Communications Commission (FCC) has preempted state entry and pricing controls with respect to "enhanced services," and thus forestalled direct regulation of this expanding line of commerce. At the state level, some 28 states in recent years reportedly have removed entry barriers and relaxed price and profit controls with respect to intrastate long-distance offerings. At last tally, moreover, some 35 states have explored, proposed, or adopted simpler means of regulating local telephone offerings.

#### Major Economic and Competitive Factors

During this same period, broad economic and social forces have combined to increase the importance of efficient telecommunications service to the nation's economy. Coincident with fundamental changes in communications, the United States has been evolving toward a service economy. Service-producing industries share of the gross national product increased from 64.6 percent in 1972 to 67.6 percent in 1985, for example, and virtually all employment growth during that period evidently occurred in service-related, non-manufacturing industries. With regard to international trade, positive balances in service-

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<sup>2/</sup> See National Telecommunications and Information Administration, NTIA Trade Report: Assessing the Effects of Changing the AT&T Antitrust Consent Decree, NTIA Special Publ. 87-19 at 45-47 (Feb. 1987).

related sectors have also mitigated persistent deficits in merchandise trade during that period.<sup>3/</sup>

In an increasingly competitive, global economy, companies have depended more and more upon telecommunications to conduct and expand their businesses. Telecommunications typically enables firms to reduce costs, offer new products, and improve their marketing and customer service, thus enhancing their ability to compete effectively against domestic and foreign rivals, both at home and abroad. As competitors -- particularly foreign-based firms -- make greater, more effective use of "high-tech" telecommunications at home, the clear need has arisen to ensure U.S. firms ready and efficient access to similar services here.

Telecommunications services constitute the essential "highway for the information age," the conduit through which new computer-based services are being made available to businesses and consumers. Growth in the telecommunications sector, has consistently outstripped that in almost all other major commercial sectors for nearly a decade, and this is likely to remain true well into the next century. The nation's economic wealth and social welfare, in short, have come increasingly to depend on the availability of innovative, reasonably priced, telecommunications services.

#### Need for Policy Reexamination

These developments should precipitate a thorough reexamination of the nature and scope of government regulation of the U.S. telecommunications industry. To date, much of the emphasis has been, first, on reducing traditional barriers to new, competitive entry, and, second, on establishing the terms and conditions governing the ensuing competitive engagement. Federal and progressive state policymakers have sought to minimize application of traditional regulatory controls to new entrants. Relatively little attention has been accorded until recently, however, to the equally important issue of whether conventional price, profit, and service regulation of incumbent carriers should be streamlined, "de-thicketed," or, in some instances, abandoned altogether.

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<sup>3/</sup> U.S. Department of Commerce, 1987 U.S. Industrial Outlook at 11.

In recent years, Federal and state policymakers have reassessed governmental regulation in a variety of other industries, including trucking, railroads, airlines, financial services, and energy. Attention has been paid to the need both to liberalize entry restrictions and to reduce the level and intensity of regulatory controls retained as established industry players confront actual and potential competition. In each case, reexamination culminated in substantial (and, in some instances, near total) deregulation. Barriers to entry have been removed and most controls regarding new and established companies lifted. The available evidence demonstrates, moreover, that reduced regulation has produced substantial net public gains.<sup>4/</sup>

It is thus appropriate to assess whether comparable, comprehensive regulatory reform might generate similar benefits in the U.S. telecommunications industry. Some kind of regulatory control may be essential in instances where actual and potential competition is clearly insufficient to preserve reasonable, nondiscriminatory rates, and avoid any ratepayer burdening occasioned by anticompetitive cross-subsidization. The particular regulatory scheme employed, however, should be much more cost-effective than today's approach, and both enable and encourage regulated firms to keep pace with technological changes while offering innovative services. For to the extent government regulation discourages innovation, limits otherwise desirable pricing flexibility, or creates disincentives to minimize production costs, it can only harm consumers, regulated firms, and, ultimately, damage the American economy.

#### Preliminary Steps Taken

Federal, and especially certain state regulatory authorities, already have begun to reappraise traditional notions underpinning conventional telecommunications regulation. The FCC and some states commendably have sought to lay the groundwork for more marketplace-oriented regulation of the industry by authorizing greater competitive entry into an expanding roster of telecommunications markets. They have also reduced regulatory burdens on certain telecommunications carriers.

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<sup>4/</sup> See, e.g., Economic Report of the President, 20 Weekly Comp. Pres. Doc. 149 (Feb. 2, 1984). See also National Telecommunications and Information Administration, NTIA Competition Benefits Report, NTIA Special Publ. 85-17 (Nov. 1985).

While these marginal advances doubtless have proved beneficial, there remains a need for more thorough reassessment of the traditional regulatory scheme. Regulation should be eliminated where there is a reasonable likelihood competition can serve as an effective surrogate. And, where regulation is still needed, it should be fundamentally reformed.

Integral to the concept of limited government is the principle that market intervention, even where compelled by overarching public interest considerations, nevertheless should be undertaken only to the extent absolutely warranted -- and checks on private decisionmaking will be applied only to the degree clearly needed. This report focuses in particular, therefore, on the principal mechanism for government regulation of the telecommunications industry, that system of price and profit controls generally known as rate of return or rate base regulation.

#### Need for Further Reforms

Our analysis convinces us that whatever its past virtues and accomplishments, rate base regulation has plainly become an inappropriate mechanism for regulating this rapidly changing industry. It is too costly to implement, requiring large expenditures by regulated firms, public interest and other user groups, and, of course, by regulatory agencies as well. The current process not only entails direct outlays of at least \$1 billion yearly -- costs that are disproportionate to discernible public interest gains. It also almost certainly imposes even larger indirect cost by discouraging efforts to minimize production costs, dampening regulated firm's incentives rapidly to innovate, and, potentially, facilitating possible anticompetitive behavior.

Ample experience with rate of return regulation demonstrates that, all too often, it proves less an objective process for establishing reasonable prices than a ritualistic game played by firms, regulators, and intervenors -- all, ultimately, at the public's expense:

- o Item. Though customers often erroneously assume, for example, that government is directly policing carrier rates, in reality agencies generally influence actual price levels only indirectly, by controlling overall profits. Very rarely do agencies actually engage in direct prescription of telephone charges.

- o Item. Regulated firms too often propose intentionally excessive price and profit increases. This, of course, affords regulators politically appealing opportunities, with appropriate fanfare, to roll back requests in the name of protecting the public. On average, one-half to one-third of the amounts requested over the past decade were rejected, a degree of rejection that belies the notion of a finely honed, necessarily principled regulatory process. The familiar ritual of excessive requests, followed by well-publicized rollbacks, better serves political than user interests. As one former state commission chairman candidly stated, "I would have killed any company that came in with a 'reasonable' rate request."
  
- o Item. Customers are induced to believe government is protecting them from excess prices while, in fact, the current regime is very likely causing unnecessary investment, extra costs, and sheer waste that inevitably drives prices higher. One expert economist has suggested that it is by no means overwhelmingly clear on the present record that the public would be noticeably worse off, if served by an efficient but unregulated monopolist, than it is today paying prices charged by regulated, but not always very efficient, firms.
  
- o Item. Regulators too often are encouraged to impose organization and rate structures less because they might benefit users than because they will protect competitors. Agencies are urged to investigate allegations of "predatory pricing" whenever prices are reduced by established firms. As one regulatory agency chairman put it, "Competitors are always trying to make me convert an economic regulatory agency into a cartel management operation, or an antitrust tribunal."

These and other characteristics of the present process can only undermine public confidence in government generally, and regulatory institutions in particular. Rate of return regulation, in short, displays pretensions of analytical rigor, objectivity, and procedural regularity too often belied by practical realities. For these reasons alone, the public interest would be better served by replacing the current rate of return regulatory scheme by a fairer, more effective, less manipulatable, and less intrusive government system.

## II. THE PRESENT SITUATION

In this chapter, the origins, rationales, and current workings of the prevailing rate of return regulatory regime are briefly discussed and analyzed. Important to note is the fact there is some considerable variation among the nation's various regulatory jurisdictions. Not all observations, therefore, are necessarily applicable in every instance. In general, however, practices are far more similar than they are different, and thus the conclusions that can be drawn from current regulatory operations are fundamentally the same.

### Description of Rate of Return Regulation

Although the industry experienced perhaps its most rapid growth and advancement under almost completely free market conditions, most telephone companies have been subject to rate of return regulation at the state level since the early decades of this century.<sup>5/</sup> Federal regulation of interstate telephone service arose in 1910 with the passage of the Mann-Elkins Act.<sup>6/</sup> Pursuant to that law and the subsequent 1921 Willis-Graham Act, however, the telephone industry was only nominally regulated.

An overwhelming objective of the common carrier provisions of the 1934 Communications Act, which superseded previous statutes, was to ensure more effective regulation of the then-dominant firm, American Telephone and Telegraph Co. (AT&T). But the FCC did not strictly apply rate of return regulation to AT&T until the mid-1960s.<sup>7/</sup> Prior to that time, the FCC supervised

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<sup>5/</sup> See, e.g., Board of Pub. Util. Comm'rs v. New York Tel. Co., 271 U.S. 23 (1926); Missouri ex rel. Southwestern Bell Tel. Co. v. Public Serv. Comm'n., 262 U.S. 276 (1923); Prendergast v. New York Tel. Co., 262 U.S. 43 (1923). See also W. Jones, Regulated Industries 65 (1967); Gabel, The Early Competitive Era in Telephone Communications, 1883-1920, 34 L. & Contemp. Prob. 340 (1969).

<sup>6/</sup> That statute gave the Interstate Commerce Commission jurisdiction over interstate telephone and telegraph companies. See W. Jones, Regulated Industries at 74. Jurisdiction passed from the ICC to the FCC with the passage of the Communications Act of 1934.

<sup>7/</sup> See AT&T, 2 FCC 2d 173 (1965).

AT&T's prices and profits through an informal process known as "continuing surveillance."<sup>8/</sup>

Throughout most of the period 1934-1965, long-distance telephone costs steadily declined, in both real and nominal terms, particularly with the introduction of cost-reducing technologies including microwave transmission and crossbar switching. The FCC's principal focus during that period, however, was not necessarily on implementing interstate price reductions commensurate with declines in cost. Rather, a primary goal was redistributing cost reductions between Federal and state jurisdictions. In collaboration with state regulators and the industry, an elaborate system of subsidies of varying magnitude and direction was instituted, ostensibly to ensure "universal service" at "affordable" rates. This was explained as enabling local ratepayers to capture economies arising in long-distance, not necessarily local, telephone operations.<sup>9/</sup>

At the state level, in contrast, price and profit controls were more systematic, driven by concerns over local service prices. The conventional economic rationale for telecommunications regulation was that the provision of local telephone service is a "natural monopoly." A natural monopoly is generally said to exist if there are declining average costs to scale or a massive capital outlay is required to provide service, or both, and thus customer demand for a particular service can be satisfied at the lowest cost by a single firm.<sup>10/</sup> Where such conditions prevail, competitive entry will, in theory, prove short-lived and simply waste scarce resources.

In the absence of competition, economic theory teaches that an unregulated monopolist will have an incentive to maximize profits by restricting output and raising prices. The result would entail inefficient allocation of scarce resources and

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<sup>8/</sup> Id. at 177; Comments of AT&T at 10. See also "Fundamental Changes Needed to Achieve Effective Regulation of Communications Common Carriers," House Subcommittee on Communications Staff Report, 94th Cong., 1st Sess. (1975); "Agenda for Oversight: Domestic Common Carrier Regulation," House Subcommittee on Communications Staff Report, 94th Cong., 2d Sess. (1976).

<sup>9/</sup> See Crandall, Has the AT&T Breakup Raised Rates, 5 Brookings Review 37 (1987); Kahn, The Road to More Intelligent Telephone Pricing, 1 Yale J. Reg. 139 (1984).

<sup>10/</sup> See, e.g., Posner, Natural Monopoly and its Regulation, 21 Stan. L. Rev. 521, 548 (1969).



welfare losses to society.<sup>11/</sup> There is considerable question, however, whether any or all telephone services exhibit natural monopoly characteristics. Long-distance services, particularly interstate services, for example, currently are provided on a competitive basis. There is also disagreement regarding what particular telephone functions might evidence natural monopoly characteristics -- transmission systems or switching, for instance.<sup>12/</sup> Rate of return regulation, nevertheless, was devised and has been continued to mitigate the expected effects of monopoly pricing, by constraining total revenues toward levels that would hypothetically prevail under competitive market conditions.

Rationale for Considering Alternatives to  
Rate of Return Regulation

Where the natural monopoly rationale is inapplicable the justification for economic regulation is significantly weakened. In today's market, moreover, rate of return regulation almost certainly is not the most cost-effective means of regulating those parts of the telecommunications industry which may still be noncompetitive.

Rate base regulation entails the exercise of regulators' judgment regarding such complex questions as valuation of a firm's rate base and determining appropriate profit levels -- typically through quasi-judicial, adversarial proceedings. Decisions that were difficult enough when costs and technology were relatively stable and competition was limited, however, have become even more complex and problematical when accelerating technological developments rapidly alter costs and investment decisions, and competition is more pervasive, as today. These problems almost certainly will be compounded, moreover, with the advent of integrated services digital networks (ISDN), which will permit simultaneous provision of multiple services -- regulated and unregulated, monopoly and competitive -- over the same physical facilities. Problems associated with determining capital structures, risk premiums, and the cost of equity, for example, have been difficult enough to resolve to all parties'

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<sup>11/</sup> See S. Breyer, Regulation and its Reform (1982).

<sup>12/</sup> See generally National Telecommunications and Information Administration, Issues in Domestic Telecommunications: Directions for National Policy, NTIA Special Publ. 85-16 (July 1985) at 83 et seq. (and citations therein).

satisfaction in the past, and related costs and economic distortions stand to grow exponentially in the future, unless some more effective means of regulation is devised soon.

Few state statutes mandate any particular means of price or service regulation, and the Communications Act requires only that the FCC generally ensure "just and reasonable," nondiscriminatory prices. For the most part, therefore, regulatory agencies enjoy broad discretion regarding the tool or tools they may employ to ensure that "fair" prices will continue to be offered by companies earning an "adequate" investment return.

Almost from its inception, there has been criticism of this traditional, and predominant, communications regulatory tool. Since the early 1960s, a number of economists have identified and, in some cases, sought to quantify, the excessive costs attributable to rate of return regulation.

Most of these expert studies have found that this traditional approach creates undesirable incentives to overinvest, to twist rate structures uneconomically, and fails to ensure adequate incentives to minimize operating costs. The economic literature is replete with criticisms of the "cost-plus" approach implicit in the process, and the fact that rate of return regulation characteristically carries with it the notion of institutionalized, governmentally imposed, barriers to competitive entry.

These and other inherent problems suggest that rate of return regulation may produce distorted and inefficient results, even under relatively stable market conditions. Given the uncertainties created by a rapidly changing environment, there is little reason to believe that rate base regulation will produce less unacceptable results in the future and, indeed, every reason to assume it will increasingly engender more and more intractable problems.

These concerns prompted NTIA to issue a Notice of Inquiry<sup>13/</sup> soliciting comments on the advantages and disadvantages of rate base regulation and several potential alternatives.<sup>14/</sup> In the following sections of this report, the

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<sup>13/</sup> Comprehensive Review of Rate of Return Regulation of the U.S. Telecommunications Industry, 51 Fed. Reg. 36837 (1986).

<sup>14/</sup> The 41 parties who responded to the Notice are listed in Appendix A.

various regulatory alternatives (including rate of return regulation) are examined in detail. We then determine which approach represents the most cost-effective way to regulate firms in a rapidly changing market environment.

### Framework for Analyzing Regulatory Alternatives

To evaluate regulatory alternatives properly, it is necessary to specify a set of assessment criteria. The criteria employed generally should reflect the essential economic and other goals of an effective regulatory regime.

The criteria outlined below endeavor succinctly to state those goals. They also recognize that any acceptable regulatory scheme should balance the need to promote economic efficiency with the desire that the regulatory process be reasonably predictable, administrable, and fair to investors, competitors, and consumers of regulated services.

- o Reasonable rates. Regulation obviously should seek to ensure reasonable prices for regulated services. Among other things, preventing excessive rates will preserve longstanding goals (e.g., universal service and affordable basic rates).
- o Cost minimization. Regulation should create positive incentives for firms to minimize the costs of producing quality offerings. Encouraging cost-minimization will reduce pressures for future rate increases while also ensuring that the provision of regulated services consumes an optimal amount of scarce capital and other resources.
- o Innovation. Regulation should not dampen a regulated firm's incentives to invest in new technology and to offer new services. Given the growing importance of telecommunications to the nation's economy, and the substantial amount of national capital invested in domestic telecommunications networks, regulation clearly must encourage maximum efficient use of valuable communications resources.
- o Price flexibility. A regulated firm should enjoy flexibility to adjust prices, subject to any necessary constraints against excessively high or low rates. Pricing flexibility will enable firms to respond to changes in costs, supply, and demand,

again, promoting more efficient resource allocation. It will also allow regulated firms to respond more effectively to competitive entry as it occurs, and afford users greater opportunity to capture the economies inherent in today's modern technologies.

- o Administrative efficiency. A regulatory scheme should be simple to administer and minimize the direct (and indirect) costs of regulation. Although some costs are unavoidable, a regulated firm's resources should be devoted primarily to providing service, rather than to satisfying the demands of government regulators.
- o Adequate returns. Shareholders of any regulated firm must be given an opportunity to earn a reasonable return on investment. That return must also be sufficient to preserve the financial soundness of the firm, and enable it to attract sufficient capital to maintain and improve its facilities through timely introduction of new technology.
- o Fairness. What makes it possible to pursue procompetitive policies in telecommunications is a general consensus such policies will yield public benefits, ensure opportunities, and, overall, prove fair. Important to maintaining this consensus in favor of marketplace solutions is providing a forum where legitimate customer concerns can be addressed and resolved to the maximum extent possible. A regulatory system, therefore, should provide some means by which legitimate complaints and other issues can be aired.

In addition to promoting these fundamental objectives, any acceptable regulatory scheme must also allow for flexibility in both geographic and product market approaches. Some uniformity is beneficial in some respects. Without it, undesirable service level differentials may arise, and competition and service innovation on a broad regional or national scale may be hampered. Market conditions, however, often vary considerably from jurisdiction to jurisdiction (or even from firm to firm), as do rate and cost of service conditions.

Subscriber plant costs vary widely across the United States. A recent estimate for the Bell companies, for example, showed monthly revenue requirements ranging from \$21 per subscriber in Wisconsin and Texas (Mountain Bell), to \$45 in Wyoming.<sup>15/</sup> Levels of actual or potential competition also vary, partly because of differing costs but also due to of different regulatory policies. Local residential telephone prices are abnormally low in California, for example, and intrastate toll prices thus abnormally high to generate the needed subsidy dollars. The potential for competitive entry there, accordingly, as well as the possibility of ratepayer "shock," may thus be greater than, say, in Vermont, where local rates are considerably higher because regulators in recent years have sanctioned considerable "toll deloading."

As a result, the degree of regulation -- and reliance on competition -- that might be suitable in one state may be inappropriate in another. Similarly, a level of regulatory scrutiny appropriate for one firm may be counterproductive for another in the same jurisdiction. Consequently, it is unwise to prescribe a uniform regulatory scheme for all jurisdictions and all companies. Rather there should be a basic model that affords regulators the flexibility to tailor the precise regulatory rules to the market conditions of their respective jurisdictions.

### III. SHORTCOMINGS OF RATE OF RETURN REGULATION

Under conventional rate of return regulation, a telephone company is allowed to set prices for regulated services at levels that cover the firm's "revenue requirement." That revenue requirement is derived by multiplying the value of the firm's capital investment (the "rate base") by a certain factor (the "rate of return") and adding the firm's allowable operating expenses (including taxes). Although relatively simple in basic concept, however, the application of this concept obviously can become an inordinately complex, time-consuming and judgment-laden proposition.

Where the firm provides multiple regulated services, for example, which is almost always the case, regulators usually must decide what portion of the overall revenue requirement will be recovered from relevant services, an inherently arbitrary

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<sup>15/</sup> Congressional Budget Office, The Changing Telephone Industry: Access Charges, Universal Service, and Local Rates, June 1984, at 12-13.

process. Where there are substantial joint and common costs, moreover, regulators must necessarily make judgment calls regarding cost allocations. Some jurisdictions seek to require all services to be priced so as to earn the same rate of return. This has the effect of minimizing private discretion and maximizing policeability, but typically at some considerable cost in terms of the ability on the part of regulated firms to price competitively and responsively in changing markets. Other jurisdictions tend to focus on aggregate profit levels and, by so doing, sanction considerable carrier-devised and administered price discrimination, and subsidies of uncertain magnitude and direction flowing among various user groups.

Ascertaining the allowable rate base, in turn, entails substituting regulatory judgments for management decisionmaking regarding, among other things, appropriate depreciation schedules. Protracted schedules may tend to produce low revenue requirements today -- but at the risk of far higher ones tomorrow. Conversely, shorter depreciation periods may have the effect of ballooning current charges, and precipitating the political controversies telephone price hikes nearly always cause. Depreciation policies also bear directly on the ability of incumbents to compete with new entrants and thus have become an increasingly popular focus for competitive disputes in recent years.

Rate of return regulation becomes even more complicated where allowable rates of return vary among regulatory jurisdictions, as is typically the case. Telephone companies today, for example, are allowed between 12-12.25 percent on that investment allocated to interstate operations, but sometimes more or less on those portions allocated to intrastate jurisdictions. Since most industry investment is used to provide both intrastate and interstate service, the relative arbitrariness of allocations is obvious. The ability of firms to avoid limits on profits by altering the apportionment of plant among jurisdictions is also a problem.

Once cost allocation methods and appropriate profit levels are determined by regulators, setting actual prices for services typically is left to the carrier's discretion. Prices are set based upon demand estimates and embodied in tariffs. For each regulated service, the firm then files tariffs which may or may not be reviewed by the regulator prior to their effective date. Even the most modest changes in allowable rates of return, of course, typically generate very large quantities of paper which not even the most dedicated of regulators can hope to review expeditiously or in depth. Tariffs may still be found unlawful at a later time, moreover, and refunds ordered as a result.

Rate base regulation gives government agencies exceedingly broad authority to review the costs, profits, and rates of regulated firms. Because the process usually entails a diversity of rate structure issues and choices, the process also involves making fundamentally political judgments regarding the prices which various user groups should pay for telephone services -- and the degree of competition new entrants should confront.

Over the years, state regulators especially have exercised their authority to maintain affordable telephone rates and to promote universal service goals.<sup>16/</sup> The overwhelming bias has been to ensure minimal charges for basic residential telephone service, a goal which has been accomplished both through limiting overall firm profits and manipulating carrier rate structures to accomplish inter- and intraservice subsidies.

Some contend that rate of return regulation has effectively achieved one important goal of regulation -- the prevention of excessive prices for certain customer groups (e.g., residential subscribers). Whether this is strictly true, however, is a matter of some dispute.

Minimizing residential local service rates in the past also was consistent, for example, with the commercial interests of the then-unified Bell System. It maximized telephone penetration and, in so doing, increased the overall value of telephone service. It heightened usage of very profitable long-distance operations then protected from competition. It also minimized any potential for local service competition as it is difficult to compete against artificially low, subsidized prices. And, it virtually assured that the incidence of new technology would be predominantly outside the local exchange network.

"Universal" telephone service has been largely achieved in other countries such as Sweden, West Germany, France, Japan, and Great Britain where telephone service is provided by largely autonomous, self-regulating government enterprises -- and rate of return regulation as we practice it is largely unknown. Indeed, the rate structures and inter/intra-class subsidies in those overseas nations are remarkably similar to those which traditionally have prevailed here. Even assuming that there is some nexus between rate base regulation and accomplishing universal telephone service, however, the evidence suggests that it has been less successful in attaining other important regulatory objectives.

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<sup>16/</sup> See Comments of BellSouth at 18-19.

### Earning A Reasonable Return on Investment

In the long term, rate base regulation should afford regulated firms' shareholders adequate opportunities to earn a "fair" return on their investments. The traditional regulatory process, of course, contemplates periodic adjustments of each firm's authorized rate of return to ensure that (1) prices produce revenues covering necessary costs while yielding a reasonable profit for shareholders, and (2) the allowed rate of return keeps pace with other investments of comparable quality and risk.

Rate of return regulation is less successful, however, in producing reasonable returns in the short run, chiefly due to the existence of the regulatory lag implicit in such a complex and procedure-laden approach. In almost all instances, delay between a regulated firm's request for a price or profit adjustment and the time when such a change becomes effective is substantial. NYNEX points out, for example, that the average regulatory lag in its region has been approximately 329 days, with some delays approaching 390 days.<sup>17/</sup> Nor is such lag by any means unique. Efforts by the FCC recently to establish a new rate of return for interstate services took nearly three years, and the agency literally for decades sought to establish the appropriate return for a number of AT&T's interstate private line offerings.

Regulatory delays of such magnitude create obvious problems, particularly in periods of significant inflation.<sup>18/</sup> During such periods, regulatory delays mean, for example, that a firm cannot change its prices quickly or frequently enough to account for escalating costs. A firm can attempt to mitigate this problem by requesting more frequent rate changes, but that strategy will further increase regulatory costs for both the firm and regulators. In the inflationary years between 1967 and 1981, for example, total expenditures by state regulatory agencies in nominal dollars increased by some 312 percent, significantly above the rate of inflation.<sup>19/</sup> Alternatively, the firm may seek

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<sup>17/</sup> Comments of the NYNEX Telephone Companies.

<sup>18/</sup> See, e.g., Comments of the District of Columbia PSC at 12; Comments of the Colorado Public Utilities Commission at 10. See also Norgaard and Riley, Regulatory Lag: Everybody Loses, Pub. Util. Fortnightly, May 26, 1983, at 29.

<sup>19/</sup> See Phillips, The Changing Structure of the Public Utility Sector, 117 Pub. Util. Fortnightly 13, 14 n. 3 (Jan. 9, 1986).



to "front-load" its prices today, in anticipation of possible downstream losses, or, in extreme cases, seek to ameliorate the effects of inflation by reducing service, deferring otherwise desirable investments in anticipation of future demand, or both.

### Pricing Flexibility

Regulatory lag can also undesirably limit pricing flexibility for regulated firms. Because firms often cannot change prices without prior notice or agency approval, or, in other cases raise or lower prices and risk exceeding allowable profit ceilings, they cannot always respond effectively to incipient competition, and thus are placed artificially at a competitive disadvantage. Rigid pricing schemes sustained by government fiat, moreover, can have the effect of inducing entry on the part of firms that would not otherwise enter the market, were incumbents able to price more flexibly in response. Once firms enter a market sheltered by "umbrella pricing," government's tendency is to maintain such distortions lest genuine price competition impair the value of new entrants' investments. The result too often is to limit the public's ability to capture both the full benefits of new, potentially less costly technology, and the obvious benefits of vigorous price competition.

Pricing flexibility will be increasingly important to local companies in the future, as technology produces alternatives to their offerings. Rigidly fixing special access line rates may prove an artificial inducement to the creation of local bypass facilities, for example.

Furthermore, the presence of unwarranted regulatory lag inevitably creates short-term mismatches between regulated rates on the one hand, and supply, demand, and costs on the other. As a result, there will always be times when prices are either too high or too low. Customers, therefore, are induced to over-consume or underconsume the relevant telephone services which, in turn, causes or perpetuates inefficient resource allocation and distorted investment patterns.

In our free enterprise economy, we generally rely on pricing signals to allocate resources among competing needs, to stimulate private acts of conservation and investment, to spur innovation, and, in myriad ways, dynamically and efficiently to bring together supply and demand. As applied to competitive services, the prevailing rate of return regulatory regime is antithetical to the clear priority of ensuring the accuracy and integrity of pricing signals in this key sector. It thus impairs the efficient functioning of competitive communications markets. And, as communications increasingly constitutes a component of a broadening array of other goods and services, inefficiencies visited upon the telecommunications sector by the current regulatory system are compounded as they ripple throughout a larger and larger portion of our overall economy.

#### Innovation and New Services

In the Notice, we solicited comments on the potential effects of rate of return regulation on innovation. In an effort to ascertain whether rate base regulated firms are less innovative, we also sought to explore possible effects on the direction of their innovation (e.g., whether they focus on capital-saving versus labor-saving products, or on reducing costs versus stimulating demand).

The objective literature on rate of return regulation and the direction of innovation is inconclusive, and there is a broad range of subjective writing on the topic. Some argue, for example, that a profit-maximizing, rate regulated firm will be biased toward technologies that increase the productivity of labor, as opposed to capital.<sup>20/</sup> Others, however, maintain that it is impossible to determine, as a theoretical proposition, whether rate base regulation has such an effect on the direction of technological change.<sup>21/</sup>

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<sup>20/</sup> See Smith, The Implications of Regulation for Induced Technical Change, 5 Bell J. Econ. 623 (1974).

<sup>21/</sup> See, e.g., Magat, Regulation and the Rate and Direction of Induced Technical Change, 7 Bell J. Econ. 478 (1976); Okaguchi, The Implications of Regulation for Induced Technical Change: Comment, 6 Bell J. Econ. 703 (1975). For a detailed discussion of these papers, see affidavit of John H. Vander Weide at 23, App. at 34-38. This accompanied comments filed by BellSouth.

The Notice cited a 1976 study by Arthur D. Little Inc., one of relatively few serious studies in this area, which suggested a rate regulated firm will tend to favor cost-reducing innovations over demand-inducing innovations, but some have seriously questioned this particular conclusion.<sup>22/</sup> Critics suggest that any such conclusion depends on unwarranted assumptions -- that the time required to invent, develop, and implement new products and technologies, for example, is short in relation to the period between fundamental regulatory reviews. Such critics maintain that, in fact, major innovations, whether cost-reducing or demand-inducing, typically entail a lengthy cycle of research, development, testing, and deployment.<sup>23/</sup> This suggests a firm would be foolish to bias its initial research and development (R&D) expenditures toward cost-reducing innovations on the assumption that, when the innovation is deployed, it would be able to achieve the cost savings -- but that the same would not be true in respect of demand-inducing innovation.

Of course, incentives created by rate of return regulation may affect decisions whether to deploy the fruits of any carrier-undertaken innovation. Innovations which might stimulate demand for new services at the expense of existing offerings could have the effect of prematurely obsoleting existing rate base investment. Inherent in the introduction of demand-inducing innovation, moreover, is the potential that any unsatisfied demand might trigger entry by new firms into the market. Such competitive entry, in turn, might challenge, if it does not erode immediately, the long-run commercial value of incumbent firm's embedded plant and equipment.

Rate of return regulation may influence the rate of innovation in other ways. The profit cap imposed by rate base regulation may limit a firm's incentive to invest in R&D because it may be unable to keep all or any additional profits resulting from successful innovation. The payoff structure often becomes asymmetric; that is, the costs of unsuccessful innovation are borne by shareholders, while a substantial share of successful innovation will ordinarily be captured by regulators and converted to ratepayer advantage. This may thus persuade the firm to forego the financial risks of R&D altogether.<sup>24/</sup>

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<sup>22/</sup> See Notice at 36839.

<sup>23/</sup> Vander Weide at 26.

<sup>24/</sup> See, e.g., Comments of NYNEX at pp. 25-27; Comments of the Virginia State Corporation Commission at 11.

A regulated firm's rate of innovation may also depend on how a regulatory agency reacts to the firm's investment in both capital and research.<sup>25/</sup> If the agency reacts by disallowing such expenditures, or directs price reductions commensurate with cost savings, the firm may be better off using capital/labor and knowledge/labor ratios that are less than those that minimize costs.<sup>26/</sup> If the firm is allowed to keep some of the benefits of its research, it may be more likely to invest in R&D than would an unregulated firm.

Some commenters contend that regulatory lag may also dampen innovation incentives. NYNEX asserts, for example, that regulated firms may be reluctant to invest in new technologies because of the gap between the time an investment is made and the time it is included in the rate base. "This delay," NYNEX states, "can result in costs being incurred without offsetting revenue, which decreases profits [and rate of return]."<sup>27/</sup> It suggests the potential decrease in profits could dissuade the firm from making the investment.

Pacific Bell contends regulatory lag may have a similar adverse effect on new service introduction. New regulated services are subject to agency review and actual or potential competitors can intervene, possibly gaining valuable insight into the regulated firm's pricing and marketing strategies. The net result may be that a socially beneficial service appears on the market later than it would have if prior authorization were not required.<sup>28/</sup> As just one example, introduction of the Bell companies' local packet switching services -- which, among other things, enable incompatible computer terminals to communicate -- was apparently delayed nearly two years before regulatory approval was finally obtained.<sup>29/</sup>

Other factors bear on telephone companies' incentive and ability to innovate, including restrictions imposed under the AT&T antitrust consent decree. Removing those restrictions and

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<sup>25/</sup> See Klevorick, The Behavior of the Firm Subject to Stochastic Regulatory Review, 4 Bell J. Econ. 57 (1973).

<sup>26/</sup> Vander Weide at 25.

<sup>27/</sup> Comments of NYNEX at 6.

<sup>28/</sup> See Comments of Pacific Bell at 10. See also Comments of the NYNEX Telephone Companies at 6-7.

<sup>29/</sup> See Comments of the Bell Atlantic Telephone Companies at 6.

reforming rate regulation along the lines recommended by NTIA may not necessarily result in rapid, substantial increases in telephone company R&D. Without such necessary steps, however, there almost certainly will be no significant improvement in this respect, which possibility is a major public policy concern.

Innovation is especially important in this sector because the potential for progress is much greater than in other fields. The usefulness of telecommunications as a key component to the "information economy," and the contribution this sector can make toward increased U.S. international trade, depends in large measure on the level and intensity of research, development, and innovation. Measures which do not foster such desirable activities on the part of the industry and, indeed, may discourage such potentially valuable endeavors, thus should be reexamined promptly and removed as rapidly as possible.

#### Limiting the Direct Costs of Regulation

Another significant problem with rate of return regulation concerns the direct costs it imposes on firms, their customers, and regulators. For the industry, these costs include principally the expenses incurred in developing, presenting, and defending rate cases and tariff filings. For the regulatory agencies, the direct costs are generally reflected in the operating budgets devoted to telecommunications regulation. In some jurisdictions, those costs are also borne by the industry by virtue of user fees and related charges. A number of state utility commissions are required to be self-sustaining. The FCC also imposes user fees on interstate carriers to offset some of its regulatory costs.

Though most agree that the elaborate requirements associated with conventional regulation are costly, there is uncertainty concerning just how expensive this particular government institution might be. BellSouth, for example, estimates its annual costs to be approximately \$46 million (or roughly \$3.25 per access line per year) in connection with regulation at both the state and Federal levels.<sup>30/</sup> For the GTE telephone companies, "the easily identifiable and directly attributable costs of regulation" are approximately \$35 million per year, or about \$3.33 per access line. GTE also estimates

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<sup>30/</sup> Id. at 8-9.

annual direct regulatory costs for the entire industry of some \$500 million, or roughly \$4.32 per access line.<sup>31/</sup>

As for the costs incurred by regulatory agencies, USTA asserts that the budgets of the local commissions and the FCC cost telephone ratepayers an additional \$3.60 to \$4.00 per access line per year.<sup>32/</sup> US West indicates that the total costs incurred by the state commissions within its region are approximately \$16 million annually, or about \$1.43 per access line.<sup>33/</sup> In 1985, the C&P Telephone Company paid approximately \$2 million to cover costs incurred by the District of Columbia Commission in regulating C&P. C&P also paid some \$586,000 to defray expenses incurred by the Office of People's Counsel, the District's consumer representative.<sup>34/</sup> C&P's share of the District's regulatory budget in 1985 thus amounted to about \$2.99 per access line.<sup>35/</sup> In 1986, C&P's payments to the Commission and the Office of People's Counsel were approximately \$1.5 million or roughly \$1.74 per access line.

The evidence suggests that the direct costs of intrastate rate of return regulation incurred by local telephone companies and regulatory agencies average approximately \$6-\$8 per access line per year. Additionally, AT&T contends that its direct cost of regulation was \$250 million in 1984. Assuming those costs are passed through to consumers, this equates to an additional \$2 per access line per year.

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<sup>31/</sup> See Comments of the General Telephone Operating Companies at 15. As of December 31, 1985, GTE controlled some 10.5 million local access lines, while the entire telephone industry controlled slightly more than 116 million lines. See United States Telephone Ass'n,  Holding Company Report 1986  at i, 10. These figures were used to calculate annual costs of regulation per access line.

<sup>32/</sup> Comments of USTA at 8.

<sup>33/</sup> Comments of US West at 15.

<sup>34/</sup> See Comments of the District of Columbia PSC at 6-7. C&P is the only telephone utility regulated by this PSC. See National Association of Regulatory Utility Commissioners,  1984 Annual Report on Utility and Carrier Regulation 602  (1985).

<sup>35/</sup> At the end of 1985, C&P controlled about 864,000 local access lines. See Federal Communications Commission,  Statistics of Communications Common Carriers  (1985 Preliminary Data, Aug. 1986).

The total direct costs of inter- and intrastate regulation probably range from at least \$8 to \$10 per access line per year. These average figures, moreover, do not reflect the disproportionate burden that regulation imposes on smaller telephone companies. As USTA indicates, the regulatory costs for those companies are as much as \$45 per access line per year since requirements tend to be the same, regardless of the subscriber base across which costs can be spread.<sup>34/</sup>

These cost estimates may be understated somewhat because they do not include regulatory expenditures incurred by third parties (e.g., consumer and user groups, competitors, governmental agencies), which casual empiricism suggests are quite considerable. On the other hand, our estimate may be overstated some respects. First, the costs cited included expenditures incurred in connection with Federal regulation. Not all of the FCC's activities involve domestic rate of return regulation and the same may be true in many states; a significant portion of those expenses may thus continue even if rate base regulation were eliminated entirely. Second, replacement of rate of return regulation with an alternative regulatory scheme would only reduce, not eliminate, direct costs for regulated firms and regulatory agencies.

These direct costs may not be excessive when compared with the average annual residential telephone bill, estimated by the FCC recently to be about \$540 a year, of which about \$191.88 was for local service.<sup>36/</sup> In absolute terms, we estimate that direct costs approach \$1.1 billion per year, which is not obviously excessive in macroeconomic terms, considering total industry revenues, forecast to be about \$120.43 billion for all regulated communications services this year.

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<sup>34/</sup> Comments of USTA at 8.

<sup>36/</sup> See Common Carrier Bureau, Federal Communications Commission, Primer and Sourcebook on Telephone Price Indexes and Rate Levels at 6 (1987).

By the same token, these direct outlays may be substantially in excess of any real public risks that they ostensibly forestall. At present, for example, very few proposed local rate increases are pending and, indeed, rate reductions will be forthcoming in a number of jurisdictions by virtue of provisions of the recently passed Federal tax reform legislation. Most long-distance prices have declined in recent years, or held flat, because of intensifying competition, lower carrier costs, and more efficient systems. Experts also believe technological advances, lower equipment prices, and greater actual or potential competition for some local services imply stability or declines in local communications prices. It is thus reasonable to question a regime that imposes some \$1.1 billion in direct costs -- borne ultimately by customers -- when the price hikes those expenditures, in theory, insure against are relatively small.

#### Creating Incentives for Cost Minimization

In addition to the direct costs, rate of return regulation imposes certain indirect and opportunity costs which, while difficult to quantify, are nevertheless quite real and, indeed, may substantially exceed direct outlays. A principal criticism of rate base regulation, for example, is that it fails to create adequate incentives for regulated firms to minimize their production costs with the result that regulated rates are higher than they should be -- and that regulated firms use excessive amounts of scarce resources to satisfy consumer demand. In this section, therefore, two aspects of this problem -- the potential for over-capitalization and the possibility of inflated operating expenses -- are examined.

Potential for Over-capitalization. Most concerns about over-capitalization by rate base regulated firms are premised on the so-called Averch-Johnson (A-J) effect. Because a rate regulated firm's profits are directly related to the size of its rate base, the A-J theory suggests that a profit-maximizing firm has an understandable incentive to make more capital investment than economically optimal to produce a given level of output.<sup>37/</sup>

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<sup>37/</sup> See Averch and Johnson, Behavior of the Firm under Regulatory Constraint, 53 Am. Econ. Rev. 1053 (1962). Somewhat contemporaneously, Wellisz completed a study on the effects of rate base regulation on a regulated firm's peak and off-peak prices. Wellisz, Regulation of Natural Gas Pipeline Companies, 71 J. Pol. Econ. 30 (1963). In the Notice, we referred to these separate papers as identifying an "A-J-W effect." In this report we use the term A-J effect to denote the influence of rate of



Although most scholars agree this proposition is true under the A-J assumptions, there is substantial question whether those assumptions hold true under general market conditions.<sup>38/</sup> Consequently, there is disagreement over whether the A-J effect occurs in actual practice and, if so, to what extent.

First, the A-J model assumes that regulated firms act to maximize profits, though all firms may not choose to do so but may instead seek to maximize sales or revenues.<sup>39/</sup> When economists have refined the A-J model to determine a regulated firm's input choices where that firm's objective was other than to maximize profits, they found that a sales-maximizing or output-maximizing firm would tend to undercapitalize. Thus, A-J may not be applicable to firms whose goal is not to maximize profits.<sup>40/</sup>

The A-J model, second, also assumes regulation will continuously match rates with underlying costs, but the existence of regulatory lag means that rates will seldom match costs at any given time.<sup>41/</sup> Regulatory lag thus weakens the A-J effect, with the moderating effect varying directly with the length of the lag.

Finally, the A-J model rests upon the assumption that the firm's rate of return exceeds its cost of capital, but that relationship, again, does not hold true in all circumstances. Indeed, the predictions of the A-J model rest explicitly on the assumption that regulators consistently overestimate the carriers' cost of capital, thereby permitting persistently excessive earnings. Since regulatory lag generally prevents a perfect alignment of rates and costs there may be times when a

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return regulation on a firm's input choices, as distinct from its pricing decisions.

<sup>38/</sup> See Vander Weide at 20.

<sup>39/</sup> See O. Williamson, The Economics of Discretionary Behavior: Managerial Objectives in a Theory of the Firm (1964).

<sup>40/</sup> See Bailey and Malone, Resource Allocation and the Regulated Firm, 1 Bell J. Econ. 129, 137 (1970).

<sup>41/</sup> See Joskow and Schmalensee, Incentive Regulation for Electric Utilities, 4 Yale J. Reg. 1, 7 & n. 29 (1986).

firm fails to earn its allowed rate of return and the actual return may, in fact, fall below the cost of capital. Thus, one of the authors of the A-J proposition has recognized that the A-J effect may not hold during inflationary periods.<sup>42/</sup>

Because the assumptions underlying the A-J model limit its applicability, no conclusive evidence of investment biases has yet been found.<sup>43/</sup> Studies testing for the presence of an A-J effect among regulated electric utilities, are inconclusive.<sup>44/</sup> The sole telecommunications-specific study, using data from 1952 through 1976, discovered an A-J effect within Bell Canada.<sup>45/</sup> When the analysis was restricted to the years 1963-1976, however, no such effect was evident.<sup>46/</sup>

While there is thus disagreement regarding whether rate of return regulation leads to over- or undercapitalization, there is little dispute but that it does appear to have some effect on regulated carrier behavior. In unregulated markets, investment decisions are guided by marketplace considerations; but in this regulated sector, government policies have a direct and not substantial impact. It should be noted that the amounts of national capital consumed by the telecommunications industry relative to other sectors are substantial indeed. Even if government-induced, artificial incentives to overinvest are relatively small from a percentage standpoint, therefore, in absolute terms quite large dollar volumes may be involved.

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<sup>42/</sup> See Johnson, Behavior of the Firm under Regulatory Constraint: A Reassessment, 63 Am. Econ. Rev. 90 (1973).

<sup>43/</sup> Comments of the Colorado Public Utilities Commission at 11. Accord Comments of the NYNEX Telephone Companies at 22.

<sup>44/</sup> The conflicting papers are referenced and briefly discussed in Vander Weide at 21-22.

<sup>45/</sup> See Mirucki, A Study of the Averch-Johnson Hypothesis in the Telecommunications Industry, 13 Atlantic Econ. J. 121 (1984).

<sup>46/</sup> The occurrence of an A-J effect in the prior period was apparently due to an anomaly in the data for the years 1957-1962. See Vander Weide, App. at 22.

Potential for Excessive Operating Costs. A rate base regulated firm may also be disinclined to minimize operating costs (as opposed to capital expenditures) because it will not be able to benefit from such cost reduction. If rates remained constant, lower costs would produce higher profits. If profits exceed the authorized rate of return, however, regulators may order a rate reduction or refunds to ratepayers. The benefits of cost minimization are thereby passed through to ratepayers, rather than to the firm. While this may be a desirable result in the short run, it does not encourage managers of the regulated firm to reduce costs.

On the other hand, the regulated firm may benefit by increasing its operating costs, since those costs generally can be recovered on a dollar-for-dollar basis. While such action will not increase profits from regulated operations, it may, as one commenter suggests, promote other purposes:

These purposes include improving service levels to sustain the firm's political legitimacy; incurring costs of administration which ease the job of managers; being flexible in labor disputes to ensure harmony; or taking any number of other possible actions.<sup>47/</sup>

The firm can also benefit where, as is increasingly the case, it provides both regulated and unregulated services. The firm may seek to advantage its unregulated services by shifting costs (particularly joint and common costs) from those services to its regulated operations. Such cost shifting would enable the firm to reduce its unregulated service prices in the face of competition without incurring losses (or, alternatively, maintain existing prices and increase profits). The firm's regulated service profits would not necessarily suffer because it could use its increased costs to justify higher regulated rates.

Of course, a regulated firm cannot inflate operating costs with impunity. As noted, regulated firms are entitled to recover only those costs reasonably incurred. Regulators can and occasionally do disallow expenditures in some instances, although this varies from agency to agency. In exercising that authority, however, regulators frequently lack the information and staff necessary to detect any excessive firm expenditures in a way that

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<sup>47/</sup> Leone, The Indirect Costs of Rate-of-Return Regulation in the Telecommunications Industry at 8. This report accompanied the comments of the Ameritech Operating Companies.

would satisfy legal standards for disallowance. While regulators tend to scrutinize cost increases, moreover, relatively little attention is accorded baseline costs.<sup>48/</sup>

Another constraint is consumer demand, as a firm will have no incentive to increase costs unless it can raise prices proportionately and not sacrifice profits. The firm's ability to do so will depend on the elasticity of demand for the service or services involved (*i.e.*, the degree to which customers react to price changes). Where demand is relatively inelastic (*i.e.*, where customer demand is unaffected by price increases, as seems the case for most regulated local exchange services), customer demand, however, will exert a relatively weak influence over a firm's pricing and costing decisions.

Regulatory lag may also constrain a rate regulated firm's incentives to inflate costs.<sup>49/</sup> By minimizing operating costs, for example, a firm can increase its profits, at least until the regulator reacts in the next rate case. Similarly, during inflationary periods, the firm can minimize erosion of its profits by reducing costs until it can adjust its rates. On the other hand, a firm's incentive to reduce costs between rate cases may dissipate once it decides to file a rate case. As one expert points out, "Once it becomes clear that [the firm] will have to seek some rate increase, it no longer has an incentive to keep costs down (say, during a potential test year), because it must provide evidence of high costs to obtain the rate increase."<sup>50/</sup>

Government scrutiny and regulatory lag do not completely eliminate a rate regulated firm's incentives to inflate its operating costs. Where profits are capped, yet almost all expenses are recoverable, managers have an incentive to "compete" in terms of staff size, perquisites of office, and other expenditures. There is also evidence that some firms act upon those incentives in actual practice. Regulated firms'

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<sup>48/</sup> Comments of the Virginia State Corporation Commission at 4.

<sup>49/</sup> See, *e.g.*, Bailey and Coleman, The Effect of Lagged Regulation in an A-J Model, 2 Bell J. of Econ. 278 (1971).

<sup>50/</sup> S. Breyer, Regulation and Its Reform 48 (1982). The effectiveness of regulatory lag as an agent for cost control also varies with the length of the lag. Thus, a firm will likely exert greater control over its costs if rate adjustments are relatively infrequent. Its incentives will probably be quite different if rate adjustments are the rule, rather than the exception.

recent efforts to cut costs in the face of growing competition, for example, suggest the existence of some excessive costs, some "rate base padding," at least in the past.

GTE, for instance, reportedly cut corporate overhead by 20 percent in 1986, while also lowering the number of employees per access line by 32 percent.<sup>51/</sup> Since divestiture, Ameritech has reduced its telephone employees by 20 percent, and other companies have made comparable reductions as well.<sup>52/</sup> These cost-cutting measures may be attributable to technological changes, declining costs due to more competition in equipment markets, and so forth. They also suggest, however, that rate of return regulation has not worked as effectively as competition and profit incentives when it comes to holding costs down.

Consequences of Rate of Return Regulation Failures. The fact that rate of return regulation does not create adequate incentives for firms to control expenditures produces other incidental costs. Whether regulated companies actually overinvest or overstate operating costs, many regulators believe they may do so. One of the principal regulatory concerns, moreover, is the potential for the shifting of costs from a firm's unregulated services to its regulated operations. Such cost shifting potentially harms not only regulated ratepayers (by increasing regulated rates), but also competitive providers of unregulated services (by enabling regulated firms to underprice their unregulated services). There is a relative dearth of empirical evidence demonstrating that such cost-shifting or alleged "predatory pricing" has, in fact, occurred. Nevertheless, in an effort to protect their primary constituency -- ratepayers -- and out of an antitrust-like concern for preserving competition, both state and Federal regulators have been driven to fashion controls. The various mechanisms adopted, however, introduce additional costs into the regulatory process.

The FCC, for example, previously sought to foreclose potential cost shifting (and forestall any expansion of regulation) by requiring that AT&T and the Bell companies provide

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<sup>51/</sup> See "Can GTE Keep Foiling the Raiders," Business Week, Apr. 4, 1987, at 101.

<sup>52/</sup> See "Muscle and Moxie: The Bell Regional Companies Have Plenty of Both," Barron's, Oct. 27, 1986, at 7.

unregulated services and customer premises terminal equipment only through fully separated subsidiaries.<sup>53/</sup> The FCC eventually concluded, however, that structural separation not only imposed significant costs, but also delayed the introduction of desirable new services. AT&T contended, for example, that complying with the FCC's requirements cost the firm as much as \$1.4 billion yearly, a figure which, even if overstated by a factor of two, approaches, if it does not exceed, the combined profits of the competitive enterprises ostensibly protected. Recently, the FCC, therefore, decided to address concerns via improved accounting rules and new cost allocation guidelines.<sup>54/</sup>

While preferable to structural regulation, accounting mechanisms are also imperfect. First, there are many different views about what the accounting guidelines should look like. As a result, regulators and interested parties are likely to be caught up in protracted and expensive attempts to develop appropriate accounting rules and methodologies.<sup>55/</sup> Neither accounting nor economic theory, moreover, offers a good basis for allocating true joint and common costs and, indeed, there is disagreement concerning what methodology constitutes the least-inefficient approach.<sup>56/</sup> Any division of such costs is unequivocally arbitrary and tends to be driven by some other purpose -- "fairness," protecting competitors, or market allocation, for example.

Regulated firms will tend to favor allocation rules that assign more costs to regulated services, or to those regulated offerings that confront the least competition, while regulators and competitors will naturally favor the opposite approach. Resolution of these conflicting positions may produce cost allocations that only approximate economic reality, and which impose significant costs. Uneconomic allocation of costs will, in turn, produce inefficient prices, with attendant misallocation of resources and welfare losses. Simply the time and

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<sup>53/</sup> See Amendment to Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry), 77 FCC 2d 384, recon., 84 FCC 2d 50 (1980), further recon., 88 FCC 2d 512 (1981), aff'd sub nom. Computer and Communications Indus. Ass'n v. FCC, 693 F.2d 198 (D.C. Cir. 1982), cert. denied, 461 U.S. 938 (1983).

<sup>54/</sup> See Computer III Order.

<sup>55/</sup> Comments of the Bell Atlantic Telephone Companies at 5.

<sup>56/</sup> Affidavit of Stanford L. Levin at 8 (submitted as Attachment A to the Bell Atlantic comments).

attention devoted to devising accounting and cost-allocation rules satisfactory to all players in increasing rivalrous markets implies some economic waste and, perhaps as importantly, distracts firms from their primary mission which is, after all, serving the public.

There may be some workable alternatives. Among those which have been suggested are requirements that there be annual independent audits with significant fines in the event misallocations are found, or even the possible posting of a "performance bond," with complaints to be resolved through speedy, binding arbitration. Few of these alternatives, however, have given serious attention, and efforts -- and significant expenditures, both public and private -- to develop accounting safeguards continue.

Finally, there is the threat that as the emphasis of regulation shifts from promoting the largely satisfied goal of universal service, toward encouragement of innovative service, that an excessive regulatory concern with cost shifting may be counterproductive. If, in fact, innovative service amounts to finding new and creative ways to unlock the telephone resource, this would seem potentially inconsistent with attempts to ensure that regulated resources not be applied or even available to non-regulated endeavors. In short, the concepts of synergy and cross-subsidy may need to be reconciled.

#### IV. EVALUATION OF ALTERNATIVES TO RATE OF RETURN REGULATION

In the Notice, we presented four possible complete or partial alternatives to traditional rate of return regulation for comment: marketbasket regulation, banded pricing,<sup>57/</sup> social contract, and deregulation of small telephone companies. Some advantages and disadvantages of each alternative were briefly discussed, and additional information was requested from interested parties. In the following section, we consider how well these potential alternatives plus others suggested in the comments achieve the goals set forth above.

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<sup>57/</sup> Notice, 51 Fed. Reg. at 36839-36840.

### Marketbasket Regulation

Under this approach, a regulated firm's overall performance would be compared to a "marketbasket" composed of the stocks of other companies with comparable performance and risk characteristics. The comparison could be based on either (a) the annual increase in average stock prices of marketbasket firms, or (b) the average annual net earnings (or cash flow) per share, or return on equity for those firms. If the regulated firm outperformed the marketbasket (*i.e.*, experienced a greater change in stock price, or earned a larger return on equity), excessive profits would be presumed and regulators could order refunds or price reductions. Conversely, if the regulated firm lagged behind the marketbasket index, it might be allowed to increase prices in an effort to generate "adequate" profits. Subject to this overall constraint, however, the firm would have broad discretion in setting individual service prices and in designing its rate structure.

Marketbasket regulation is not necessarily a new concept. A comparable earnings approach is now used by regulators when setting telephone industry rates of return. It is an approach, too, which admits to a number of variations. One proposal, for instance, has been to compare average production costs on the part of marketbasket and regulated firms.<sup>58/</sup>

At least in theory, this approach might avoid some of the direct costs associated with rate of return regulation. Once marketbaskets were established, for example, future proceedings should be shorter and less complex than the periodic rate cases which currently occur. Since marketbasket regulation, moreover, would not entail direct price regulation, it might eliminate costs associated with tariff proceedings. Academics who have suggested this alternative, furthermore, contend it has more intrinsic logic, and is thus less arbitrary, than other possible approaches.

On the other hand, marketbasket regulation would not avoid all of the problems prevailing under rate of return regulation. Under marketbasket regulation, regulators would have to identify comparable firms to place in each regulated company's marketbasket. As US West points out, however, "There is no good,

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<sup>58/</sup> Joskow and Schmalensee, 4 Yale J. Reg. at 34-35.



administratively simple way to determine comparable companies."<sup>59/</sup> Difficulties in selecting comparable firms would limit the reliability of the various marketbaskets. As a result, regulators may not be sure in all cases that discrepancies in performance between regulated firms and their respective marketbaskets suggest excessive or inadequate profits, rather than simply imperfections in marketbasket definition. Even assuming marketbaskets could be developed, the costs and delays associated with the proceedings would also significantly reduce the short-run cost savings available under this approach.

Marketbasket regulation would increase pricing flexibility for regulated firms, thus enhancing their ability to respond to competition and adjust prices quickly in accordance with changes in costs, supply, and demand. The effects of this pricing flexibility, however, may not be entirely benign.

Since marketbasket regulation would scrutinize only overall firm profits, it might not ensure fair and reasonable rates for particular regulated services. So long as a regulated firm did not exceed its overall profit constraint, it could, for example, set excessive rates for some regulated services in order to lower rates for other services more vulnerable to competition. Such pricing discretion on the part of the carrier would not be without risk; if it misjudged customer demand and, consequently, earned excessive returns, it would trigger a possible refund obligation. Except for this risk, however, marketbasket regulation might not be regarded as adequately protecting customers from excessive rates for services lacking effective substitutes, and for that reason might not command sufficient political acceptability and support.

A marketbasket approach may also restrict a firm from earning a reasonable rate of return where it provides both regulated and unregulated services, as performance indexes likely would reflect a firm's overall financial performance as opposed

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<sup>59/</sup> Comments of US West at 26. See also Comments of Telephone and Data Systems, Inc. at 23-24; Affidavit of Stanford Levin at 16-17; Comments of the Virginia State Corporation Commission at 8; Joskow and Schmalensee, 4 Yale J. Reg. at 35 ("Utilities differ from one another in so many dimensions, not only because of current market conditions, but also because of past investment decisions, that we are not likely to find a large number of truly comparable utilities.").

to financial performance based strictly on its regulated lines of business.<sup>60/</sup>

If a particular firm outperformed its marketbasket, regulators might have difficulty determining whether that were attributable to excess profits from its regulated operations, especially since the firm almost certainly would contend otherwise. If regulators could not make that determination accurately, they might erroneously order a refund or price reductions by a regulated firm whose untoward profits resulted from successful unregulated operations. That rate reduction would, in turn, diminish the firm's profits from regulated services.

Finally, marketbasket regulation may fail to create sufficient incentives for regulated firms to minimize costs because, as with rate base regulation, it would not distinguish between profits resulting from excessive rates and profits attributable to efficiency gains. Indeed, since exemplary performance might trigger refunds, a regulated firm would have little incentive to reduce costs (or to innovate and introduce new services), to the extent such actions cause the firm to outperform its marketbasket.<sup>61/</sup> Conversely, if substandard performance qualified the firm for price increases, the firm might have every incentive to inflate costs (e.g., by shifting costs from unregulated operations). Marketbasket regulation thus might create nearly as many problems as it could resolve, and could be criticized as entailing simply a shift from a known to a less well-known evil.

### Banded Pricing

Under this possible approach, regulators would establish minimum and maximum rates for each service subject to regulation, and permit firms to raise or lower rates within each band without prior regulatory approval.<sup>62/</sup> At the regulator's

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<sup>60/</sup> See Comments of BellSouth at 45; Comments of AT&T at 50-51; Comments of the Virginia SCC at 9; Comments of BellSouth at 45.

<sup>61/</sup> See Comments of Bell Atlantic at 17; Comments of AT&T at 51.

<sup>62/</sup> Different versions of banded pricing have been adopted in nearly two-thirds of the states, primarily with respect to interLATA services. See National Telecommunications and Information Administration, Telephone Competition and

discretion, the "width" of the various bands or the minimum and maximum rates could be adjusted over time to reflect, among other factors, changing costs. Such an approach, of course, was taken in legislation deregulating the air passenger business which, over several years, was permitted more and more carrier pricing discretion until finally, all controls were lifted.

As in the case of marketbasket regulation, banded pricing has the potential virtue of simplicity, and could reduce the direct costs of regulation. Indeed, banded pricing may entail fewer costs than marketbasket regulation because it avoids the "comparable firm" analyses that must occur under the latter scheme.

Regulatory proceedings would still be necessary to establish the various pricing bands and, where appropriate, to adjust those bands in later periods. Once bands were established, however, regulated firms would have discretion to change prices within them, thereby eliminating the costs of periodic tariff filings and review.

Besides promoting considerable pricing flexibility, banded pricing could also encourage regulated firms to minimize costs. A regulated firm could, for example, increase profits if it reduced production costs below those prevailing when the rate bands were set. Yet unlike rate of return or marketbasket regulation, banded price regulation would not force the firm to relinquish those additional profits, thus potentially penalizing it for innovation or increased efficiency.

Because firms would face a rate cap for regulated services, efforts to inflate production costs would inevitably result in reduced profits. An effect would be to lessen potential cost misallocation among services, or between regulated and unregulated offerings. Any need for regulators to police cost allocations to forestall anticompetitive cross-subsidization also would decline under a banded pricing approach.

Banded pricing would not ensure reasonable rates or permit firm shareholders to earn a reasonable return, however, unless the maximum and minimum rate levels were carefully determined. If the maximum rate level were set too high, regulated rates might be excessive, thus reducing consumption and depressing

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Deregulation: A Survey of States (1986). Generally, states have employed banded pricing to reduce regulation of traditionally dominant carriers (i.e., AT&T and local exchange companies) in markets where they are subject to increasing competition.

social welfare. Conversely, if the minimum rate level were set too low, regulated firms might be able to set rates that are predatory. Existing banded pricing plans, however, generally do not address this critical detail in great depth. Some schemes simply require that rates may not vary by more than a fixed percentage. Others use existing rates as the upper bound and give firms complete discretion to charge lower rates.

One commenter proposed a methodology for establishing maximum and minimum rates in a banded pricing plan, predicated upon "contestability theory." A contestable market is one where firms can easily enter and exit without losing any of their investment. Where this is true, an incumbent firm, even if it is the sole supplier, cannot charge excessive prices without attracting entry. The threat of entry thus, in theory, produces efficient prices, prevents excess profits, and eliminates potential cross-subsidization.<sup>63/</sup>

Not all telecommunications markets are contestable, particularly in view of state restrictions on local service competition. It has been suggested, however, that contestability analysis can still be employed to develop an efficient banded pricing regime, and ensure an incumbent firm has little incentive to set prices below incremental or above stand-alone costs.

The use of stand-alone costs may be theoretically appealing. The stand-alone costs of a given service are the costs an efficient entrant would incur in providing that single service or, in the case of a multiproduct entrant, the cost of providing that service in combination with any subset of the company's services. In practice, however, such an approach could result in an inappropriate price ceiling for regulated services, particularly in the case of a multiproduct firm.

A multiproduct firm can achieve cost efficiencies (so-called "economies of scope") not always possible in the case of a "specialized" or single product firm. As a result, a specialized firm may be at a competitive disadvantage vis-a-vis a multiproduct competitor. Consequently, using a specialized firm's stand-alone costs to generate the price ceiling for the regulated multiproduct incumbent could produce a price ceiling

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<sup>63/</sup> See generally Bailey and Baumol, Deregulation and the Theory of Contestable Markets, 1 Yale J. Reg. 111 (1984).

that is quite permissive. In fact, it is conceivable that such a price ceiling would exceed the incumbent firm's profit maximizing price.<sup>64/</sup>

One possible solution to this potential problem is to calculate stand-alone costs for a hypothetical multiproduct entrant. This solution has the defect, however, of making the estimate of stand-alone costs dependent upon the number of services the potential entrant will offer, which makes any estimate of stand-alone costs even more arbitrary.

### Social Contract

The "social contract" approach has received much attention at the state level as an alternative to rate of return regulation, primarily due to the commendable efforts of state regulators including Eugene Maudlin of Oregon, Louise McCarren of Vermont, and Phillip O'Connor of Illinois. By one tally, some 35 states have considered or adopted this approach in whole or in part.

While several different plans have been proposed, debated, or implemented, they generally take the following form: local exchange rates are fixed, typically at existing levels, and future adjustments are allowed only in accordance with a predetermined formula (e.g., the Consumer Price Index or some fixed percentage). Continuing supervision is maintained through a complaint process, and service quality is still monitored. Prices for all services not subject to the contract, however, are deregulated.

This approach is not unique to the United States. A variation on the social contract approach was adopted for British Telecom, for example, in June 1984, as part of legislation privatizing that enterprise. In Britain, price regulation continues for "essential network services," defined as residential and business line rentals, local calls, and "national" (i.e., long-distance) calls. Yearly rate increases for the entire group of regulated services are limited to changes in the inflation rate, less 3 percent to account for productivity gains. British Telecom has discretion to reprice specific regulated services, although line rental charges may not

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<sup>64/</sup> See Baumol, Minimum and Maximum Pricing Principles for Residual Regulation, Eastern Econ. J. 235, 237 (1979).

be increased by more than the inflation rate plus 2 percent. The regulatory contract is scheduled for review in 1989. A similar approach has also been suggested by an expert study group in Belgium.

Social contract regulation obviously avoids many of the direct costs associated with rate of return regulation, since proceedings are required only to set initial rates for regulated services. During the contract period, rates can be adjusted without regulatory approval, so long as they do not exceed the relevant index. This makes possible price adjustments to reflect changes in costs, supply, and demand. It also confers flexibility to reduce prices in response to actual or potential competitive entry.

The approach creates strong incentives for regulated firms to minimize costs for their regulated services. Since price increases are limited by the prevailing index, a firm faces loss of profits if it allows costs to exceed annual index increases. At the same time, if the firm "outperforms" the index through innovation or increased productivity, it can keep all additional profits.

This type of regulation also tends automatically to police carrier cost allocations, a concern especially if the firm is engaged in both competitive and noncompetitive enterprises. If the company undertakes to shift costs to monopoly ratepayers, the effect is simply to diminish any profits earned on such noncompetitive offerings (or, if those services are priced below cost, to increase revenue shortfalls.) The approach, in short, tends to reduce many of the cross-subsidization problems some perceive when regulated firms operate in both competitive and noncompetitive markets, even if it may not always eliminate those concerns altogether.

This approach, in theory, should effectively prevent excessive -- or politically unacceptable -- rates for regulated services, if properly implemented. A problem, however, is that the tendency is simply to freeze prices for the most politically sensitive services -- local residential service, for example, -- at prevailing levels. This, of course, could have the effect of perpetuating, indeed, exacerbating efficiency concerns raised by the inter- and intraclass cross-subsidies implicit in most telephone company rate structures.

This is less of a problem today than was true five years ago because many regulators appropriately have taken steps to align local service prices more closely with actual cost. There still are special cases, however. United Telecom's subsidiary serving Bellmead, New Jersey, for example, currently charges \$2.35 per month for residential service. Indeed, that price reflects a reduction from \$2.65 earlier this year to account for "detariffing" of inside wiring. In other jurisdictions, residential prices have been held flat despite regulatorily ordered expansion of local calling zones, which can also increase price-cost disparities.

By virtue of post-divestiture local rate increases (which aggregate in the 40 percent range), however, and reforms including the instituting of end-user access charges, revenue shortfalls occasioned by artificially low residential service rates have generally diminished. The risk of locking in economically undesirable cross-subsidies by freezing prevailing local service prices as part of a "social contract," therefore, while still present, is nevertheless smaller than once was true.

There is also some small risk that a social contract approach could, over time, result in higher prices for local (or other) regulated services than underlying costs warrant. This might be the case, first, if there were sharp declines in the cost of providing local service -- similar to the declines which occurred in the long-distance sector in the 1950s and 1960s -- or an inappropriate rate adjustment index were chosen.

The cost of providing local service might decline, by virtue of competition-driven equipment price reductions, greater capacity of new, computerized switches and fiber optic transmission systems, workforce attrition, and other cost-reducing developments. Most experts, however, appear to believe that the chief risk is that an inappropriate index will be chosen.

Some social contract proposals allow firms to raise rates by a fixed percentage or flat amount, without regard to changes in underlying costs. In Nebraska, for example, rates may be increased up to 10 percent annually without approval. (Until September 1, 1991, however, the commission generally must review rates if petitioned by 5 percent of the utility's customers.) Similarly, a bill passed (but vetoed) in the last session of the Idaho legislature would have allowed telephone companies to increase regulated rates by \$1 per month (\$12 per year) without

approval of the state commission. Under such proposals, regulated firms could continually increase their rates, thus potentially giving them windfall gains.<sup>66/</sup>

Rate and cost discrepancies may also arise if the services subject to regulation are not carefully specified. Many social contract proposals would only regulate basic local exchange services. In Nebraska, for example, rate regulation is limited to "basic local exchange service," defined as the "access and transmission of two-way switched voice communications within a local exchange area." Basic service is defined similarly in social contract legislation recently enacted in Vermont. Such proposals may eliminate regulation of services which lack effective substitutes, but for which firms retain some market power.

Finally, and as previously discussed, problems will arise if initial rates for regulated services are set too low. Many social contract proposals (e.g., Nebraska, Vermont) simply set regulated rates at existing levels. Many commenters have noted, however, that current rates for some services are below cost.<sup>67/</sup> Fixing regulated rates at existing levels may thus produce problems along the lines discussed above.

#### Small Telephone Company Deregulation

Deregulation (or relaxed regulation) of small telephone companies is another alternative discussed in the Notice that received considerable support. At present, local telephone service in the United States is provided by some 1400 companies, although about 25 of those firms account for more than 97 percent of local operating revenues. Despite the fact most phone companies thus are very small economic entities, typically serving remote rural or other less well-populated areas, they remain subject to many of the same regulatory rules and procedures which apply to far larger enterprises.

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<sup>66/</sup> See Comments of Colorado PUC at 16; Comments of Illinois Commerce Commission at 28.

<sup>67/</sup> See Comments of USTA at 13; Comments of Telephone & Data Systems at 22.



The public policy case for very substantially reducing the level and intensity of regulation of small companies is strong and, indeed, some 16 states already have done so.<sup>68/</sup> Small telephone companies face many of the same competitive threats (including bypass) that large companies do plus, in some instances, the risk large firms serving adjacent franchise areas may impinge on their already limited customer bases and "pick-off" major commercial users.<sup>69/</sup> There is also merit in the familiar contention that small, independent phone companies may be less likely to engage in "price gouging" or anticompetitive conduct simply because, in many instances, they are closer to their communities.

Complete deregulation of small telephone companies would obviously achieve many of the goals outlined above, at least in respect of these firms. It would virtually eliminate direct regulatory costs, grant total pricing flexibility, and permit small companies to earn any rate of return their markets would support. Deregulation would also spur small companies' incentives to innovate or to introduce new services. And, based on experience in those states where regulatory reform has already been undertaken, such steps entail few, if any, significant consumer risks.

Recently, the FCC substantially, and commendably, reduced interstate tariff filing requirements for telephone companies with fewer than 50,000 access lines, a move which NTIA supports. This should significantly reduce regulatory cost burdens which the U.S. Telephone Association estimated ran as high as \$4 per access line per month! The FCC has also appropriately permitted independents in Indiana, in effect, to join together to sell access to their customers, a step which tends to reduce the disparity of bargaining position small firms confront when negotiating with very much larger companies including AT&T. A similar proposal involving Iowa independents is now pending.

There are, of course, downside risks associated with completely deregulating all services offered by small, independent telephone companies. As a matter of fundamental fairness, rural telephone customers are as entitled to the benefits of competition as any others -- or to the safeguards of effective regulation where actual or potential competition does not exist. Some small phone companies, as in the case of

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<sup>68/</sup> See Comments of The Independents, Appendix A.

<sup>69/</sup> See Comments of USTA at 18; Comments of NTCA at 6; Comments of The Independents at 12; Comments of OPASTCO at 3.

local exchange companies generally, do not now face competition for all services and so-called "yardstick competition," while useful, may not be an adequate check on carrier discretion in all instances. Longstanding cost allocation policies, moreover, have allowed many small companies to keep local rates very low by recovering a substantial portion of their costs from interstate services.

The FCC has implemented rule changes which will result in some of those costs being shifted back to the intrastate jurisdiction in coming years.<sup>70/</sup> A number of rural phone companies have also taken steps in recent years to bring prices and costs more into line. Without some regulation, and in the absence of effective competition, however, some small companies might have the incentive and ability to recover those (and other) costs primarily from customers who have few alternatives. Such increases could have an adverse impact on existing rural customers (who generally have lower incomes than the national average), reduce subscribership, and thus undercut the important national policy goal of maintaining universal availability of basic telephone services at affordable rates.

Fortunately the NTIA program for regulatory reform outlined subsequently in this report offers a means of balancing the need to ensure universal service, especially in rural areas, and eliminating unnecessary government constraints. At such time as actual and potential competition is more prevalent, comprehensive deregulation of small telephone companies may be an option appropriately pursued at the Federal and state level. At this particular time, however, we believe our recommended approach is preferable for both small and large telephone companies alike.

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<sup>70/</sup> See, e.g., Interstate Rates, 96 FCC 2d 781 (1984) (replacing the "subscriber plant factor" with a 25% "basic allocation factor"); Amendment of Part 67 of the Commission's Rules, 89 FCC 2d 1 (1982) (phase-out of customer premises equipment); Recommended Decision & Order, FCC 87J-1 (released Mar. 31, 1987).

### Incentive Regulation

Recently, some states including New York, Wisconsin, New Jersey, and California have considered variations of rate of return regulation known as "incentive" regulation, approaches not raised in our Notice but discussed in a number of comments. Under these approaches, regulators would still set rate of return levels for regulated firms, but allow the firms to keep some percentage (usually half) of any profits in excess of those authorized levels (with the other half being passed through to ratepayers).

Pacific Bell proposed such a plan last summer. In return for the ability to keep some portion of any potential overearnings and have price flexibility with respect to competitive services, the company proposed to freeze residential rates through 1989. This proposal, which is similar to a four-year residential rate freeze proposed by New Jersey Bell, is currently being redrafted for resubmission to the California PUC.

New York recently adopted a plan which will bar New York Telephone from filing for general rate increases before January 1, 1991. In addition, rates are to be lowered by \$700 million during that period by virtue of Federal tax law changes. In return, however, New York Telephone may keep half of any profits in excess of its authorized intrastate rate of return (14 percent) which it achieves through streamlining its operations. Wisconsin also has adopted such an approach. Although the authorized intrastate rate of return for Wisconsin Bell has been lowered from 14.25 to 13.50 percent, the company may keep all earnings up to 13.75 percent, and half up to 14.50 percent.

As the name suggests, a principal advantage of incentive regulation over the traditional approach is that it provides inducements for cost minimization. If a firm can improve profits above authorized levels through innovation or increased productivity, for example, it will be able to keep at least a portion of those additional profits. Ratepayers presumably benefit from greater utility efficiency, and because some portion of any additional profits are passed through, either in the form of lower rates or refunds.

While incentive regulation provides inducements for cost minimization, it does not correct other major problems with rate of return regulation. Because it essentially preserves the rate of return process, for example, incentive regulation may not significantly reduce direct regulatory costs below existing levels. Furthermore, it does not necessarily give firms

additional flexibility to adjust regulated prices in responses to response to changes in costs, supply, and demand. Incentive regulation thus provides only limited improvement on rate of return regulation.

#### Rate Stabilization and Equalization Plan

Described as a "hybrid" form of rate of return regulation, Alabama's "Rate Stabilization and Equalization Plan" was also an alternative to traditional rate of return regulation that was not raised in our Notice but was a focus of comments. It is not unlike the incentive approach discussed above.

Under this approach, South Central Bell's rate of return is limited to a range between 12.15 to 12.65 percent, and there is also a requirement that any earnings over that range will trigger rate reductions. Rates may be increased only when earnings fall below the range, and the company is also barred from requesting any changes in the allowed return range prior to January 1, 1989.

By reducing the scope and frequency of rate case proceedings, the Alabama plan should result in direct regulatory costs below the levels experienced under conventional rate base regulation. The plan should also create some additional incentives for cost minimization because it allows South Central Bell to keep all profits earned while the company stays within the authorized range.

These incentives are limited, however, by the fact any profits in excess of the allowed range will trigger rate reductions. The Alabama plan also does not allow much pricing flexibility. As long as South Central Bell's earnings fall within the allowed range, for example, it cannot adjust its rates, and is thus unable to respond to changes in the marketplace. Even when the company is allowed to adjust rates, moreover, its options are strictly limited.

Both of these plans, as well as others which states have proposed or adopted, evidence growing awareness on the part of regulators of the disproportionate costs imposed by the traditional regulatory approaches -- and the feasibility and desirability of developing workable alternatives. They also show some appreciation of the fact that rigid profit controls do not always ensure communications customers the efficient and responsive service they have a right to expect. For as a practical matter, the public's primary concern is the price

charged for quality service, and not necessarily the profits which may inure to telephone company investors. While commendable, such state initiatives can be criticized, however, for seeking to retain too much of the traditional paraphernalia associated with conventional regulation. More fundamental reforms, in our judgment, are clearly needed.

#### V. NTIA'S PROPOSAL

A substantial volume of thoughtful and high-quality information was submitted by a large number of parties in response to our Notice. Based on our review of these submissions, as well as independent analysis, we concluded that no one approach completely satisfied all of our basic policy objectives. Each alternative involves pluses and minuses. Table 1 ranks alternative according to how well we believe they would promote or attain the major goals outlined above. The table assumes that each of the basic objectives should be weighted equally, although some might be more important to some regulatory authorities than others. We have concluded that the best approach would be to remove competitive services from regulatory controls and, in the case of offerings that are not yet competitive, replace rate base regulation with a new form of regulation.

TABLE 1  
COMPARISON OF REGULATORY ALTERNATIVES  
WITH MAJOR GOALS OF REGULATION

	Reasonable Rates	Fair Return on Investment	Cost Minimi- zation	Pricing Flexibility	Reduce Regulatory Costs	Encourage Innovation	TOTAL
NTIA Plan	3	3	3	2	3	3	17
Social Contract	2	3	3	2	3	3	16
Marketbasket Regulations	1	2	1	3	2	2	11
Banded Pricing	1	3	3	3	2	3	15
Small Telephone Company Deregulation	1	3	3	3	3	3	16
Incentive Regulation	3	3	2	1	1	2	12
Rate Stabiliza- tion and Equalization	3	3	2	1	2	2	13
Rate of Return Regulation	3	2	1	1	1	2	10

Legend: 1 = Scheme weakly promotes/achieves goal  
 2 = Scheme moderately promotes/achieves goal  
 3 = Scheme strongly promotes/achieves goal

Deregulation of competitive offerings has the clear potential substantially to further the national welfare by encouraging efficiency, innovation, carrier responsiveness, and price competition. We rely on unregulated competition throughout most of our free enterprise economy, and that approach plainly benefits both American industry and the public. No other nation affords its citizens the breadth of choice, and the economic abundance, America's fundamental commitment to competition yields. In telecommunications, we have moved only part of the way toward a less regulated, more competitive sector. If we wish to capitalize fully on all of the promises of today and, indeed, tomorrow's technology, however, it is critical that we move further. Promptly and effectively removing unwarranted government constraints now hobbling competition in those communications markets which are effectively competitive thus is a highly desirable step.

With respect to those communications markets which are not yet competitive, a modified social contract approach will work best. Such an approach is clearly superior to rate of return regulation in achieving other critical regulatory goals. It gives regulated firms pricing flexibility unavailable under rate base regulation, thus enabling them to react more quickly to competition as well as changes in costs, supply, and demand. It should boost a firm's incentives to invest in innovative technology and introduce new services. It will also greatly reduce the direct costs now associated with rate base regulation. Finally, unlike rate of return regulation, this approach fosters strong incentives for firms to minimize their production costs. These incentives will promote efficient use of scarce resources and will also lessen the need for costly regulatory mechanisms to deter conduct (e.g., cost shifting) that may arise when a firm lacks incentives to minimize costs.

Ours would be a highly flexible regulatory mechanism to implement. The specific terms of the agreement, such as the services to be regulated and initial rate levels, would be tailored to particular market conditions. Through public proceedings regulators, users, public interest groups, and the industry can hammer out agreements which take into account any significant local needs or special considerations.

Such an approach, in a sense, represents a return to traditional policies in telecommunications regulation, as some authorities have pointed out. It is an oversimplification, but nevertheless broadly accurate, that in the past there was a pact or understanding between industry and regulators. In return for a commitment to keep local residential prices artificially low -- something which furthered commercial interests in

maximizing revenues from other offerings, but which also satisfied regulators' political concerns -- the dominant firm in the industry, AT&T, was tacitly allowed to monopolize the otherwise competitive long-distance services and communications equipment markets. Now, under social contract regulation, in return for maintaining stable rates for noncompetitive basic communications offerings, the industry would again be given a relatively free hand but only to compete in, not monopolize, competitive markets.

It is axiomatic that any effort to secure public interest gains carries with it some potential costs and risks, and social contract regulation along the lines recommended here is no different in that regard. There is some risk, for example, that further relaxing regulatory controls over competitive offerings might produce very vigorous price competition, to the detriment of less efficient producers now populating some of the relevant markets. As we demonstrated in our 1985 Domestic Policy report, however, sometimes-voiced concerns about the long-run viability of competition, and what is flamboyantly labeled the "remonopolization of markets," find precious little support in objective fact.

Such fears must be grounded, as we have pointed out, on assumptions that one or more of the market players enjoys some decisive cost advantages unavailable to others. The traditionally assumed locus for such hypothetical advantages has been transmission systems, however, or an ill-defined cluster of advantages colloquially referred to as "trunking efficiencies." But transmission costs today represent a quite small -- and declining -- part of the overall cost of running long-distance communications business. And, trunking efficiencies, most experts suggest, are available and, indeed, may well peak at about 3 percent of the toll market. Several long-distance firms today have exceedingly modern and sophisticated transmission systems, and sufficient traffic volumes to generate trunking efficiencies. The probability that reducing or eliminating rate of return regulation might conceivably result in any "remonopolization," while not entirely nonexistent, nevertheless is exceedingly remote.

Conversely, there are concerns that removing profit controls applicable to firms providing competitive services might lead to unwarranted price hikes or, less unlikely, some slowing of the interstate service price declines that have steadily occurred over the past few years. Here again, however, speculation should be measured against objective facts. And, if the relevant facts are reviewed, reasonable parties should conclude that our increasingly competitive marketplace affords ample safeguards.



As shown in our 1987 Local Competition report, telephone company pricing discretion in many markets or, more accurately, submarkets, is increasingly hedged by marketplace developments, most specifically, new bypass technologies.

Not a few contend that existing bypass does not today constitute a check on possible excessive carrier pricing. But the real issue is whether bypass would emerge as a significant threat, if carriers endeavored to price competitive services monopolistically. For the fact that a given firm enjoys a significant market share by itself is not decisive proof that the market at issue is noncompetitive. The real test is whether customers are unable to avail themselves of alternatives, should abuses arise.

Few seriously contend that the very large corporate customers which constitute so large a share of current telephone traffic in nearly every competitive service category lack the ability to safeguard their interests in the face of hypothetical carrier pricing abuses. Private communications networks, both local and long-distance, are also proliferating. The U.S. Government, for example, which is the single largest communications customer, currently operates what constitutes the second largest nationwide, facilities-based network. That network, for policy reasons, is not generally used to handle its conventional telephone traffic. But such large users' networks might be so used -- and expanded -- if users confronted noncompetitive supplier markets characterized by monopolistic pricing.

Absent illegal collusion among carriers now competing in competitive communications markets, moreover, any one firm attempting to price excessively would simply heighten the likelihood that it would relinquish customers and revenues to other firms.

Others suggest that social contract regulation may prove unenforceable over time -- that while carriers may be willing to accept ceilings on noncompetitive service prices today, downstream they may confront regulators with a choice between possible service degradation or relief from their earlier bargain. While not necessarily an unwarranted concern, in actuality this hypothetical problem does not differ appreciably from problems regulators deal with today under rate base regulation.

Virtually every carrier request for "rate relief" includes often imaginative forecasts of horrors that inevitably will follow unless precisely the relief requested is immediately

granted. Regulators have proven able to deal with such contentions, and there is little ground to assume they will be less able to do so under our proposed system. Our system, moreover, would include provision for periodic review and other measures that, if adopted, should ameliorate this perceived potential problem.

While there thus are some risks inherent in the deregulatory and regulatory reform initiatives we recommend, there are also risks and, indeed, far larger risks, in our judgment, associated with simply maintaining the rate of return regulatory status quo.

As amply documented both here and in the informed submissions we received, the prevailing system imposes excessive direct costs, probably fosters inefficiencies and retards innovation, and thus costs far more than the benefits which it might yield. Those costs are especially unacceptable given the ready availability of workable alternatives, such as we recommend.

#### Summary of the NTIA Proposal

Based upon our evaluation of the various alternatives, we believe the public interest would best be served by replacing rate of return regulation with the following system, which represents a modification of the social contract approach. Although several other alternatives (particularly banded pricing) represent improvements on rate base regulation, we believe our approach would best achieve the essential goals outlined above. Our approach would contain the following elements:

1. First, the specific services subject to regulation would be determined after public proceedings conducted by the appropriate regulatory body at which users, public interest groups, and industry could participate. The goal should be to minimize regulation; as a rule, regulation should apply only to those essential services that do not face effective competition. Contestability should be considered as part of that examination.

In this regard, there are compelling reasons to eliminate regulation for all of AT&T's interstate services, with the exception of 800 service. While regulation of local exchange company-provided switched access services should continue, special access offerings should be deregulated.

As for intrastate services, possible candidates for deregulation include Centrex, cellular mobile radio and paging services, private line services, interLATA toll services, and billing and collection services.

2. Second, the prices for regulated services generally should seek to reflect incremental cost as a goal, consistent with economic theory. But where use of incremental cost may result in substantial rate increases (e.g., for basic residential telephone service), rates should be set at existing levels. The objective should be to minimize any residential customer transitional inequities while, at the same time, avoid locking in prices that are artificially too low.
3. Third, the rules governing any future price increases should be adopted. We believe regulated rates should be increased no more often than annually, and in accordance with the percentage increase in an average telecommunications price index (developed along the lines described in Appendix B), minus the percentage increase in telecommunications productivity. Both indexes should be industry-wide averages and be developed cooperatively by the National Association of Regulatory Utility Commissioners (NARUC) and the U.S. Telephone Association.
4. Fourth, it should be provided that firms will, at a minimum, maintain existing levels of quality for regulated services. They should be free to improve service quality or to modernize their networks, but should not be obliged to comply with specific government-devised network modernization schedules.
5. Fifth, a review of legal barriers to entry in telecommunications markets should be commenced to determine whether the public interest would be better served by their eventual modification or elimination.

6. Finally, the terms and conditions for regulatory oversight should be established. In general, a firm's performance under the regulatory contract should be subject to a one-time review within three years after the effective date of the initial contract. At that time, regulators should examine the firm's profits on regulated services to determine whether any adjustments should be made to the components of the plan. Where a firm is deemed to have earned excessive profits, it should be required to remit a portion of those gains (perhaps 50 percent) to ratepayers. Regulators should also investigate a firm's provision of any service deregulated pursuant to the contract, if the regulator receives complaints from 3 percent of the customers of that service.

#### Discussion of the NTIA Proposal Elements

The following may prove useful in further understanding the approach which we believe optimal, and applying our recommendations.

Identifying Services to be Deregulated and Regulated. In general, economic and entry regulation should be neither extended nor maintained for competitive services. Where competition exists, market forces are as likely as regulation, if not more likely, to ensure reasonable rates, service quality, and efficient and responsive operations. Imposing regulation on services where competition can be reasonably expected to serve as an effective regulatory surrogate will impose direct, indirect, and opportunity costs without conferring commensurate benefits.

Certainly it may not always be easy in practice to determine whether a particular service faces sufficient competition to warrant deregulation. There are, however, several criteria that may assist regulators in making that decision.

Before turning to that discussion, another matter that affects the decision to regulate or deregulate a particular service must be considered. Regulation should apply only to "necessary" or "essential" products that consumers could not forego without suffering substantial hardship. Where a product is non-essential, demand characteristics will generally prevent the supplier from setting excessive prices. The nature of demand for such products ordinarily ensures that, if a supplier tries to

exploit its monopoly, its sales and profits will suffer accordingly. In the case of discretionary products, as with competitive offerings, any additional price protection due to regulation would not justify the costs and market dislocations imposed.

Basic residential telephone service undoubtedly qualifies as a "necessity," but that is not true of all other services. AT&T and the Bell companies, for instance, currently provide "Dial-It" services -- mass announcement services that allow customers to "vote" on sundry matters by phone, or to access prerecorded messages. Although those services may have no competitive electronic alternatives, there is little reason to regulate their rates. If the rates for AT&T's 900 offering go too high, for example, consumers are likely to abandon its use, without suffering any substantial welfare loss. Thus, when regulators consider which noncompetitive telecommunications services should be subject to regulation, they should first determine whether each service is a "necessity." If not, regulation should not be imposed, even if the service does not face direct competition.

Criteria for Distinguishing Competitive Services. Where a service is deemed a necessity, regulators should then consider whether it is subject to "effective competition." If it is, the service should not be regulated.

There are literally thousands of pages of legal and economic writing regarding what standards should be used to assess the presence or absence of market power. Under the antitrust laws, illicit market or monopoly power -- sufficient to warrant sanctions or, in some instances structural change -- is not determined solely by reference to market share. Rather, monopoly power generally is considered, to be an excessively broad zone of unfettered pricing discretion, or the ability unilaterally to control supply of a product, or both. Under this concept, it is at least theoretically possible to have an effectively competitive market now served by a single firm -- as long as that firm's discretion is significantly curtailed by the presence of potential competitors "waiting in the wings," able easily and quickly to enter the market should the incumbent choose to abuse its position.

Theoretical concepts aside, a number of legislative proposals or enactments have sought to define necessary conditions for "effective competition."<sup>71/</sup> Each appears to rely upon the following relatively straightforward criteria:

a. Availability of Comparable or Substitutable Services from Alternative Suppliers at Comparable Rates

Such a requirement gives customers an opportunity to shift from one firm's services to another's, if rates become unacceptably high. Alternative providers mean no one firm can expect to hold customers captive by manipulating rates. The existence of alternative suppliers also saves the customer from the choice of either paying one firm's rates or foregoing service altogether.

The alternative supplier's services must be "substitutable" which usually turns on whether the alternative facilities can provide similar service coverage and quality at comparable rates. Where equal access is available, for example, MCI's standard long-distance or MTS service is an effective substitute for AT&T's domestic MTS service, because the customer can dial the same number of digits, call virtually the same locations, and obtain similar transmission quality at comparable rates. In contrast, a computer firm may not be able to substitute an ordinary local telephone line for a high-speed private line because the former facility could not provide comparable speed and reliability.

b. Number and Relative Size of Alternative Providers

Besides offering comparable services, competitive providers must also have sufficient capacity to accommodate increased demand from customers dissatisfied with the incumbent firm's rates.<sup>72/</sup> Where that is not the case, the existence of substitute services will have little practical

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<sup>71/</sup> See, e.g., S. 898, 97th Cong., 1st Sess. Sec. 203(c) (1981); Washington, Wisconsin, and Illinois deregulation statutes.

<sup>72/</sup> See Comments of the Department of Justice in FCC CC Docket No. 83-1147 at 17.

effect for most customers and the incumbent firm may retain substantial market power.

c. Existence of Entry Barriers

Finally, where market entry is relatively easy, potential entry can impose significant competitive discipline upon the incumbent firm's ability to charge excessive rates. The most obvious barriers to entry are legal restrictions on the competitive provision of telecommunications services. Economic barriers may also be significant, however. For example, where a potential entrant has to incur substantial costs in order to serve a particular market (which cost could not be recovered if the firm subsequently exited the market), it may elect not to enter even if legally permitted to do so.

Application of the Criteria to AT&T's Interstate Services. Based upon these criteria, it appears that almost all of AT&T's interstate services today are subject to effective competition. With respect to MTS services, the FCC recently reported that 561 carriers were providing interstate MTS services to one part of the country or another as of March 31, 1987.<sup>73/</sup> At least three carriers (including AT&T) were purchasing equal access service in each of the 47 states surveyed (including the District of Columbia).<sup>74/</sup> By the end of 1986, MCI had points of presence established in some 93 percent of all local access and transport areas (LATAs) representing the great majority of telephone subscribers; Sprint served better than 80 percent.<sup>75/</sup> Some rural areas are not yet served, but developments such as the "Indiana Switch" and Iowa projects discussed above suggest this is a fast-changing situation.

MCI and Sprint, moreover, are offering business services in direct competition with AT&T's WATS services. MCI competes with AT&T's private line services, as well as AT&T's virtual

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<sup>73/</sup> FCC Common Carrier Bureau, Industry Analysis Division, Summary of Long Distance Carriers at 3.

<sup>74/</sup> Id. The FCC's report was based upon data received from the Bell companies, which do not provide service in Alaska, Hawaii, and Connecticut.

<sup>75/</sup> See Comments of AT&T at 15.

private line offering, SDN. Thus, there appear to be adequate carrier-provided substitutes for almost all of AT&T's interstate services.

AT&T's competitors also appear to have sufficient capacity to accommodate any increased demand from potentially dissatisfied AT&T customers. MCI's interstate network was expected to reach 530 million circuit miles as of February 1987, while Sprint's network was expected to encompass 219 million circuit miles by that date. By the end of 1988, both companies plan to have in place 34,000 route miles of fiber optic cable with a total capacity of some 1.85 billion circuit miles.

Other companies are also constructing extensive interstate networks. One company, a joint venture between Centel and Alltel, two local exchange companies, has announced plans to construct a nationwide network. NTN, a partnership of several fiber optic carriers, recently completed construction of a coast-to-coast fiber network consisting of more than 10,500 route miles, and reaching 128 cities. The NTN network reflects a total investment to date of approximately \$1 billion.<sup>76/</sup> A consortium of major electric utilities, moreover, is in the process of developing a large-capacity fiber optic network, "Nordtel," that will span much of the upper midwest.

The existence of these and other alternative facilities effectively limit any potential market power AT&T might exercise. This will be the case over the entire useful lives of the alternative facilities. These facilities will remain in place, even if their original owners should exit the market. Consequently, they will be available to enable other firms to enter or expand in the market.

The FCC and the courts eliminated legal barriers to entry into the interstate market a decade ago, and the extensive network construction underway has rapidly eroded commercial barriers as well. AT&T does not yet face direct competition in some areas of the country, but that situation is changing rapidly, as previously noted. AT&T customers in the few remaining noncompetitive areas can be adequately protected in far less costly ways than continued imposition of rate base regulation. Requiring AT&T to maintain nationwide averaged rates for deregulated interstate services, for example, will ensure customers in areas served solely by AT&T receive the benefits

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<sup>76/</sup> See Response of the National Telecommunications Network to Comments Filed on Report and Recommendations of the Department of Justice at 2 (filed Apr. 27, 1987).



resulting from market pressures at work in areas where AT&T faces competition. In some states, furthermore, AT&T's intrastate toll operations have already been deregulated, with virtually no adverse effects. A strong case can be made, in short, that AT&T's interstate services currently face "effective competition," and should, therefore, be speedily deregulated.<sup>77/</sup>

An exception may be appropriate, however, for AT&T's 800 service, which allows customers to make toll-free calls to business locations and associated facilities. The service, which accounts for some \$4 billion annually, is predicated upon a sophisticated signaling system which, until recently, only AT&T had developed. As a result, there are no effective substitutes for AT&T's 800 service at this time. This particular service, moreover, has become critical to the efficient functioning of a large number of large and small businesses. Although other firms are developing alternative services, there may not be sufficient competition today to warrant deregulation of 800 service.

Application of the Criteria to the Services Offered by the Local Exchange Companies. The FCC also regulates certain services provided by the local exchange companies, primarily switched and special access services. Application of the criteria suggests that, while switched access services do not appear to face effective competition now, special access services do. Only the former services should thus remain regulated in our view.

At present, there are relatively few substitutes for switched access services. To be sure, above certain usage levels large volume customers may economically replace switched access with either local carrier-provided special access or non-carrier provided facilities. Nonetheless, if long-distance carriers want to serve a majority of business or residential customers, they have no choice but to use switched access. Furthermore, because local carrier's switched access services are provided over networks which typically are state-sanctioned monopolies, there remain substantial legal barriers to direct competition.

Special access services, on the other hand, present a quite different situation. Because of FCC's policies, for example, there are no legal barriers to competitive provision of

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<sup>77/</sup> The FCC recently instituted a rulemaking proposing to "streamline" its regulation of some interstate services offered by AT&T. See Decreased Regulation of Certain Basic Telecommunications Services, FCC 86-348, CC Docket No. 86-421 (released Jan. 9, 1987).

such services and alternative providers are increasingly active, especially in major markets including New York, Washington, and Chicago. Because special access is a non-switched service, moreover, the investment required to provide comparable services is relatively small. As a result, economic barriers to entry are not as high as they are for switched services.

A growing number of firms are providing facilities that are substitutable for the local carrier's special access services. High-capacity fiber optic transmission networks are in operation or under construction in several major metropolitan areas.<sup>78/</sup> Cable television systems are also providing special access-type services in a number of large cities, as well as smaller communities. Private and common carrier microwave facilities are multiplying rapidly. The existence and future growth of these comparable facilities will constrain local carriers' ability to charge excessive special access rates. For these reasons, we believe the FCC should not continue to regulate the local carriers' interstate special access services.

Telephone companies may not now face direct competition for special access (or related private line) services in every exchange that they serve. Again, however, there are far less costly safeguards reasonably available; continued imposition of rate base regulation of special access is thus not required. A general requirement that carriers charge uniform prices in their service areas, for example, would minimize potential problems in non-competitive exchanges. The key point remains that there are far more "target-efficient" means of addressing concerns here than simple rote application of rate of return regulation.

Application of the Criteria to Intrastate Services. The Communications Act of 1934 gives state regulatory agencies authority to regulate intrastate services and, in recent years, an increasing number of commissions have acted to reduce or eliminate regulatory burdens. By one estimate, some 28 states have largely removed price and, in most cases, entry regulations with regard to intrastate toll service. In most instances, this has passed virtually unnoticed by the general public.

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<sup>78/</sup> See National Telecommunications and Information Administration, Competition in the Local Exchange Telephone Service Market, NTIA Rept. 87-210 at 34-42 (Feb. 1987) P. Huber, The Geodesic Network: 1987 Report on Competition in the Telephone Industry (1987) at 2.13-2.26.

At present, legal barriers to entry vary from state to state.<sup>79/</sup> Levels of competition also vary, indeed, even between different areas in the same state. State authorities should very seriously assess the feasibility and desirability of accelerated regulatory reform and deregulation of telecommunications services, however, for reasons including the following.

First, in an era of sharply declining transmission costs, providing services across broad geographic areas using relatively few centralized switches becomes increasingly attractive, and hence traditional economic or technical distinctions between intra- and interstate long-distance service will continue to blur. Here, as in other markets, if tight regulation is maintained over one set of services -- intrastate toll, for example -- while it is removed for another -- interstate long-distance, for instance -- that will inevitably affect carrier investment, user calling patterns, and consumer attitudes. Already there is a significant price difference between interstate and intrastate calls in some jurisdictions. This is partly due to decisions to "load" costs on intrastate toll, perhaps to maintain low residential rates, but it also appears due in part to different regulatory policies toward competition. Endeavoring to maintain outmoded pricing structures and noncompetitive conditions with respect to intrastate toll and other state-regulated services, in short, has the potential to place a given state's telecommunications infrastructure increasingly at risk.

Second, the character of a given state's telecommunications infrastructure will become even more important in the future in terms of attracting and maintaining business and industry in the "information economy." Enterprises which rely heavily on telecommunications, over time, will tend to gravitate toward the most hospitable communications environment.

The Federal experience is clear. Less regulation and more competition has meant more customer options, lower prices, traffic growth and stimulation, and significantly greater and more rapid carrier investment. The extraordinarily rapid rate with which fiber optic transmission systems have been installed since the announcement of the AT&T consent decree in 1982 -- and resulting surge in interstate toll competition -- affords ample evidence of that last point.

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<sup>79/</sup> See National Telecommunications and Information Administration, Telephone Competition and Deregulation: A Survey of the States, NTIA Rept. 86-205 (1986).

States including Illinois, Nebraska, and Washington have recognized the virtues of less regulation and more competition in this field. In each state, deregulatory steps were initiated deliberately to ensure the kind of procompetitive communications infrastructure most conducive to industrial and commercial growth and investment in today's information-intensive environment. Other state authorities, therefore, should bear in mind the risks of comparative disadvantage they may incur by failing to act quickly enough to adapt their communications regulation to today's industrial development realities.

There are other intrastate services for which the need for continued regulation is far from certain. Centrex services, for example, currently face stiff competition from customer premises switching equipment. There is also competition for local private line services from many of the same firms which are providing substitutes for interstate special access services. Indeed, in recent years, a number of states have identified a growing list of services (including Centrex, private line, interLATA toll, directory advertising, billing and collection services) that merit reduced regulation or deregulation. We are aware of virtually no instance in which deregulatory steps have, on balance, yielded other than plain benefits.

Continued regulation may still be warranted in the case of the basic exchange services which local carriers provide to residential and business customers. There are generally no effective substitutes for these services currently, and continued -- but reformed -- regulation may be necessary to protect against monopoly pricing by the local carriers.

In considering deregulation, both state and Federal regulatory officials should also bear in mind the need to afford local carriers more competitive flexibility, in view of the deregulation of interstate offerings that we strongly recommend. Deregulation of those offerings will maximize the ability of interstate carriers to capture cost savings as increased profits. At present, cost savings may simply result in reduced profits because firms operate under a rate of return profit ceiling.

If toll carriers have the ability to capture all cost savings as profits, and bypass offers such savings, that may increase the propensity to establish facilities to bypass all or part of the local telephone companies' networks -- unless those local companies are also accorded a full and fair chance to compete. Under the NTIA plan, local carriers would have considerable pricing and other flexibility to compete against potential bypass alternatives, because special access services would not be regulated. Without such flexibility, however, local

carriers would have less ability to compete with bypass alternatives, traffic that currently makes some contribution to fixed costs might be lost, and ultimately, there might be increased pressure for higher local service rates. Deregulation of both inter- and intrastate special access services, accordingly, is strongly recommended.

Initial Level of Regulated Rates. As previously discussed, determining the initial rates for those services which remain regulated presents special issues. We believe that the best way to set these initial rates is through open proceedings in which all parties -- customers, public interest groups, industry, and regulators -- have a chance to participate.

What basic policy goals should obtain? Economic theory teaches, of course, that efficiency will be maximized if the price of a given service aligns with incremental cost. This benchmark, however, presents some problems of application. In a declining cost industry, for example, rigid application of incremental cost standards may result in the firm incurring an overall operating deficit. Some departure from incremental cost, therefore, is necessary, or has been considered necessary -- in regulating telecommunications.

There are additional complications in seeking to determine the incremental cost of activities that may constitute a substantial part of a given firm's offerings. The difficulties of establishing incremental costs satisfactory to all parties in fiercely contested rate proceedings also are well-known to most regulatory authorities. And, there is the additional problem that, in some instances, the current price for basic exchange telephone service may be significantly below virtually any measure of incremental costs.<sup>80/</sup>

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<sup>80/</sup> This may not be a problem with respect to all services. We understand that current rates for local business services may approximate incremental costs, while toll service rates may substantially exceed costs. See Danielsen and Kamerschen, "Economic Regulation: Old Wine in New Bottles," in Foster, et al., eds., Regulatory Reform: The State of Regulatory Art, Emerging Concepts and Procedures 46 (1984). Setting rates for those services at incremental costs may, therefore, not significantly harm customers.

Although we appreciate the difficulties, we nevertheless believe that the overall goal of initial rate setting should be to align price to the maximum extent possible with incremental cost, with certain caveats. Where it is clear, for example, that ascertaining such costs would entail an excessive expenditure of time and resources -- or a sharp increase in residential subscriber rates -- we believe setting initial prices at their prevailing levels makes the most sense. Such an approach is desirable in that it would avoid "rate shock" and thus safeguard legitimate transitional equities. By the same token, one should not overlook the fact that in some instances current local service prices are far below almost any measure of cost.

Earlier, we discussed this problem and alluded to an existing \$2.35 per month regulated charge. Estimates of the "total" cost of providing local phone service, of course, vary considerably. The industry in the past has suggested it costs some \$26 per month, on average, to provide residential service. Others have speculated that the cost is considerably lower. Even taking into consideration the propensity for "creative accounting" endemic to this as well as other sectors, obviously a \$2.35 a month price is far below service costs.

We have suggested that the current price generally be chosen when incremental cost is substantially above it. We also believe that current prices should not be chosen when they are two-thirds or less of the national average for comparable service.

We appreciate, that fixing local residential service rates in many states is a jealously guarded state prerogative, and some state regulators are acutely sensitive to anything that smacks of real or imagined Federal interference. We believe, however, that in instances where regulators strongly desire to retain such abnormally low service rates, it is important to ensure that the public more fully understand the logical long-run consequences of such actions.

Maintaining some rates that are significantly below cost might, for example, cause a company to be highly vulnerable to competition in the other services which are priced artificially high. Even more importantly, having business services carry large subsidies might hurt a state's business climate or result in inadequate network improvement. It is important that this initial rate setting process include the consideration of such factors, for in a technologically dynamic and more competitive world, blind adherence to decades-old rate subsidies carries more risk.

The choice remains with local commissions, as it should. But the reasonably predictable effects of maintaining artificially low prices should be well and publicly understood.

Determining the Rate Index. Social contract regulation typically entails use of an index which governs any changes in still-regulated rates. A number of social contract schemes, both here and abroad, employ the general Consumer Price Index (CPI) as the basic rate escalator. The CPI has the advantage of being an average, economy-wide measure which, as it is independently developed, is largely beyond the control of any one group. It is also, of course, perhaps the most widely used and thus most readily available of indexes.

On the other hand, the CPI generally measures only changes in output prices, which only imprecisely reflect changes in input costs. Since it is an economy-wide index, it is not necessarily the best measure of changes in the cost of providing telecommunications service. It is both feasible and desirable, moreover, to develop an index directly relevant to telecommunications, and to make it work.

The mechanics of developing such an index are discussed in Appendix B to this report. Not only does the index which we recommend take changes in telecommunications input prices much more precisely into account than would simple use of the CPI, our index also endeavors to take changes in industry productivity into consideration. This latter point is especially important, as commentators including Britain's Office of Telecommunications have noted. An objective of social contract regulation is to foster greater cost-consciousness and efficiency on the part of regulated firms. Accordingly, above average increases in productivity should be encouraged and, indeed, rewarded. We believe that our recommended telecommunications index would accomplish this goal.

In this regard, we urge NARUC, in consultation with the U.S. Telephone Association, to work with state agencies to develop a single national index. The development of different telecommunications indexes by each of the state and Federal regulatory agencies has clear potential to generate a degree of confusion and potential conflict which is fundamentally inconsistent with the overall objective of less complicated, more cost-effective regulation of those few noncompetitive offerings where regulation is still warranted. As the principal spokesman regarding state regulatory interests, NARUC and its expert

subcommittees are in a good position to develop a telecommunications index which both satisfies the need for a more "target effective" index than the CPI, and minimizes the potential for possible confusion.

Maintaining Service Quality. No other country, with the possible exception of Canada, ensures its residents the technical quality of telephone service which today is routinely available in the United States. By virtually any measure, U.S. telephone service is superior; this is important not only to the general public, but to business, industry, and Government as well. It is critical, therefore, that Americans continue to enjoy the superior quality of telephone service which they have the right to expect.

There is the hypothetical chance, however, that a social contract-regulated firm might attempt to increase profits by degrading service. Presumably, a firm could reduce operating costs if it allowed regulated service quality to deteriorate, or chose to forego today investments, needed to ensure high-quality service tomorrow. Since the firm could retain those costs savings under the terms of the contract, it would realize higher profits.

Regulatory contracts, accordingly, should require that regulated firms maintain existing levels of service quality for regulated services. NARUC currently publishes such standards and some state regulatory agencies regularly monitor service quality. The contracts should not obligate firms, however, to take steps regarding the technical performance of the network beyond those necessary to comply with "equal access" and "comparably efficient interconnection/open network architecture" requirements imposed under the AT&T and GTE consent decrees, and the FCC's recent Third Computer Inquiry.<sup>81/</sup>

So long as service quality is maintained, regulated firms should only be required to make such network improvements as are economically justifiable. If firms are compelled to make investments that are neither financially sound nor dictated by customer demand, the ultimate result would be increased regulated rates, or reduced firm profits, or both.

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<sup>81/</sup> See United States v. AT&T, 552 F. Supp. 131, 232-234 (D.D.C. 1982), aff'd sub nom. Maryland v. United States, 460 U.S. 1001 (1983); United States v. GTE Corp., 1985-1 Trade Cas. Para. 66,355 (D.D.C. 1984); Amendment of Section 64.702 of the Rules (Computer III), Report & Order (CC Dkt. No. 85-229), FCC 86-252 (rel. June 16, 1986), recon., FCC 87-102 (rel. May 22, 1987).



Regulated firms have strong incentives to upgrade their networks even in the absence of government directives. They have incentives to make improvements that reduce regulated service costs because, under the approach we recommend, they may keep all or at least most additional profits. Furthermore, regulated firms would, again, be inclined to improve their networks because many unregulated services will continue to depend on underlying regulated offerings. By improving their basic networks, regulated firms could thus increase the quality and competitiveness of their unregulated offerings as well as stimulate further use of their network by new, unregulated service vendors. Finally, maintaining modern, reliable regulated services is likely to prove the best insurance against competitive entry which might otherwise be induced.

Review of Barriers to Entry. While some state agencies have sought to reduce traditional barriers to competitive entry into intrastate service markets, much as has been accomplished at the Federal level, significant restrictions regarding competition in other state-regulated markets remain. Most jurisdictions today proscribe direct competition in local exchange service markets, for example, prohibitions which sometimes are invoked with respect to the creation of so-called "smart buildings." Periodic disputes arise, moreover, among phone companies regarding the economic integrity of their respective franchise areas.

Most of the arguments in favor of maintaining local communications service monopolies are similar to those advanced unsuccessfully nearly two decades ago with respect to competition in interstate markets. Monopoly is necessary, its proponents contend, in order to maintain particularly the prevailing local residential rate structure, or to generate the profits needed to fund necessary plant improvements, or to forestall "cream-skimming," or allegedly wasteful facilities overbuilding.

If Federal experience -- as well as that in other countries such Britain -- is any guide, local communications service markets almost certainly will become much more competitive over time. Technology and competition in equipment markets is steadily driving costs down and, at the same time, demand for services -- both new and conventional -- is growing. These, of course, are precisely the same factors which drove competition in interstate markets. Where interconnectability of networks is present, moreover, as technology and developments including the Corporation for Open Systems will facilitate, any hypothetical proliferation of local networks carries with it far fewer of the

adverse economic potentials such a development might once have implicated.

At the same time regulators seek to eliminate unnecessary constraints and to reform those economic controls which might still be needed, we believe they should also commence an examination of remaining legal barriers to entry into telecommunications markets. This examination should seek to identify such barriers clearly, determine whether they are the least anti-competitive necessary to meet a clearly defined social goal, and then consider whether the public interest would be served by eventual elimination of such barriers and, if so, over what specific timeframe.

It may well be that open entry in many instances would desirably increase competitive pressures on both regulated and unregulated rates, thus mitigating any threatened harms resulting from deregulation of services for which the firm retains vestigial market power. The removal of entry barriers in regulated markets might also permit future entry that may eventually make continued regulation unnecessary or facilitate the availability of new services valuable to consumers. In Canada, for instance, regulatory authorities recently moved to curtail limits on the resale of local services explicitly to encourage more "smart buildings." And in Britain, direct competition in certain local markets has benefited users by spurring carrier responsiveness.

Promoting open entry should exert further pressures on regulated firms to operate efficiently. Although our recommended approach would encourage operational efficiency, even reformed regulation is, at best, an imperfect substitute for competition as an agent for efficient firm behavior.<sup>82/</sup> Though alleged economies of scale associated with provision of basic exchange services -- and the fact such services are said to be priced considerably below cost -- may discourage widespread competitive entry for some time, the threat of entry may nevertheless encourage regulated firms to control costs, lest inefficient operation accelerate the advent of competition.

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<sup>82/</sup> See, e.g., Primeaux, An Assessment of X-Efficiency Gained Through Competition, 1977 Rev. of Econ. and Stat. 105; Liebenstein, Allocative vs. X-Efficiency, 56 Am. Econ. Rev. 392 (1966).

At a minimum, there should be a clearer delineation of the exact scope of monopoly than now prevails, together with consideration of precisely what social goals any monopoly grant is intended to further. Regulators should seek to assure the public that existing limits constitute the least anticompetitive method possible, in order to ensure that the benefits of price and service competition are not needlessly sacrificed.

Review of Firm Performance. We believe our recommended approach will foster competition and preserve reasonable rates, while also creating incentives for more efficiency on the part of regulated firms. Implementation of that model, however, will necessarily entail making new decisions and incurring some risks.

The identification of regulated and unregulated services, for example, may prove imperfect, and the initial rates for regulated services may be too high or too low. The price escalator employed, moreover, may be too generous or too restrictive. There must thus be provisions for review -- a truing-up process -- to ensure that the contract is operating as anticipated.

Any significant problems should be detectable and correctable if each firm's performance under its contract is subject to a one-time review within three years after the effective date of the initial contract. This review should not be a prelude to reimposition of rate of return regulation, nor should it be an occasion for government "micromanagement" of the regulated firm's operations. It should simply ensure that the regulatory contract, as initially developed, has generally worked as planned.

To be most useful, the review should focus on the following four areas: first, regulators should examine quality levels for regulated services to ensure that service quality has been maintained. Second, regulators should consider available data regarding subscriber levels to ensure that any rate increases under the contract have not adversely affected universal telephone service. Third, regulators should examine the firm's regulated service price structure to assess whether prevailing rates are reasonably fair and consistent with the overall goal of economic efficiency. Fourth, the regulated firm should be required to estimate its overall return on equity for regulated services, to the extent possible, and that return should be compared, for example, against the Standard and Poor's index for utilities. If the firm's return is excessive (e.g., more than 2 percent above the benchmark), regulators should require the firm to give up half of those profits through refunds

or future service discounts to ratepayers. If the firm's return on equity is insufficient (e.g., more than 2 percent below the benchmark), moreover, regulators should consider increasing the levels of regulated rates.

The firm should not be compelled to relinquish all "excessive" profits, for if this were the case, regulated firms might be less aggressive in minimizing production costs. Partial refunds, however, should sufficiently protect ratepayers, yet preserve the efficiency benefits to be gained from strong incentives for cost minimization.

## VI. CONCLUSION

Deregulation constitutes one of the great American economic success stories of the 1980s. It produced substantially lower energy costs, and disposed of previous ill-based scarcity notions. It caused much lower airfares and brought air transportation within reach of many more Americans. Deregulation yielded lower rail and trucking rates, thus contributing to lower prices for nearly everything consumers buy. And, in telecommunications, deregulation substantially expanded customer choice, stimulated investment and innovation, and, in some instances, produced lower prices. Neither customers nor business users, however, nor the overall American economy, have yet been afforded the maximum possible opportunity to capitalize on the gains freely competitive telecommunications markets might yield.

In this report, we recommend a comprehensive Federal-State program calling for removal of regulation where it is clearly unneeded, and substantial regulatory reform where markets are not yet effectively competitive. We believe this forward looking program is far better suited to the telecommunications industry as it stands today, and will develop tomorrow.

Marketplace forces and competition need not be perfect to make them preferable to costly and unduly intrusive government regulation. All the competitive marketplace need do is perform "as effectively" as regulation. And, we do not believe it would be hard to function "as effectively" as traditional rate of return regulation. Indeed, we are convinced our program, responsibly implemented, would produce far greater public dividends than even the most dedicated and conscientious of regulators, laboring under the burdens of prevailing rate of return regulation, could hope to achieve.

Our program would safeguard monopoly ratepayers and thus further the fundamental policy goal of ensuring the continued availability of basic telecommunications service at reasonable and affordable rates. At the same time, our program would reinforce and amplify incentives for greater productivity and efficiency, while spurring firms to innovate and operate more responsively.

In the immediate analysis, prime beneficiaries of the NTIA program would include telecommunications customers as well as industry. Our expectation, however, is that the clear gains our program would accomplish ultimately would ripple throughout the American economy. By mobilizing the nation's telecommunications resources, significant competitiveness gains could be secured throughout an economy increasingly dependent on this critical sector. The spin-offs in terms of greater investment and employment opportunities, as well as further benefits to consumers, are substantial. The chance is thus available to industry and regulators to make a major contribution. We strongly urge them to take prompt steps to implement the NTIA program.



## APPENDIX A

### Notice of Inquiry: Commenting Parties

Ad Hoc Telecommunications Users Association  
Alabama Public Service Commission  
American Newspaper Publishers Association  
American Telephone and Telegraph Company (AT&T)  
Ameritech Operating Companies  
William J. Baumol  
Bell Atlantic Telephone Companies  
BellSouth Corporation  
British Office of Telecommunications (OFTEL)  
British Telecommunications plc  
Colorado Public Utilities Commission  
Competitive Telecommunications Association (CompTel)  
Consumer Federation of America  
Contel Corporation  
District of Columbia Public Service Commission  
General Telephone Operating Companies  
Illinois Commerce Commission  
International Communications Association (ICA)  
LCI Communications, Inc.  
Multinational Business Services, Inc.  
National Association of Regulatory Utility Commissioners  
(NARUC)  
National Rural Telecom Association (NRTA)  
National Telephone Cooperative Association (NTCA)  
New Hampshire Public Utilities Commission  
New York Public Service Commission  
NYNEX Telephone Companies  
Ohio State Consumers' Counsel  
Organization for the Protection and Advancement of Small  
Telephone Companies (OPASTCO)  
Pacific Telesis Group  
Rochester Telephone Corporation  
Southwestern Bell Corporation  
Taconic Telephone Corporation, et al.  
Telephone & Data Systems, Inc.  
Texas Power & Light Company  
United States Telephone Association (USTA)  
United Telephone System, Inc.  
US Sprint Communications Company  
US West, Inc.  
Virginia State Corporation Commission  
Washington Utilities and Transportation Commission  
West Virginia Public Service Commission





## APPENDIX B

### Designing the Telecommunications Index

An effective index should have three general characteristics. First, it should be an industry average, rather than firm-specific. An average index, after all, should create incentives for cost minimization because firms can realize increased profits if they outperform that index.

Second, the index should be beyond control of any one party. It should be based on objective data independently developed to the maximum extent possible, so that neither regulators nor the industry can necessarily control index performance.

Third, and most important, the index should be tied to changes in input prices paid by regulated firms and also take changes into account in productivity. In this way, the index will tend to ensure that regulated service prices vary more directly with changes in the total cost of providing service.

The most commonly used method of measuring changes in prices over time for a basket of commodities is the Laspeyres price index which the U.S. Department of Labor's Bureau of Labor Statistics (BLS) uses to compute the Consumer Price Index (CPI). Generally speaking, a Laspeyres index is the ratio of the value of that basket in the base year to its value in a given succeeding period.<sup>1/</sup> Since the number of inputs in the basket is held constant from period to period, the Laspeyres price index shows how much of the changed value of those inputs over time results from changes in their prices.

The starting point in the construction of a telecommunications input cost index is the development of price and quantity indexes for each of the inputs included in the overall price index. Much of the data necessary to compute such indexes for the telecommunications industry is currently available. BLS as part of its Producer Price Index, for instance, collects data which can be used to construct quantity

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<sup>1/</sup> Symbolically, the Laspeyres price index is defined as

$$I = p^1 x^0 / p^0 x^0$$

where  $p^1$  and  $p^0$  represent the prices of input factors in the comparison and base periods, respectively, and where  $x^0$  represents the quantities of these inputs in the base period.

and price indices, specific to the telecommunications industry, for three input cost categories: (1) telephone wire and cable; (2) telephone apparatus; and (3) radio communications equipment. Similar data necessary to construct quantity and price measures for the cost of non-salaried labor in the telecommunications industry is currently collected by BLS.

Data upon which to construct price and quantity indices for capital inputs are not, to our knowledge, available for the telecommunications industry. As a result, the construction of price and quantity indices will have to be developed on a more aggregated basis. While this is clearly a second-best solution, the amount of imprecision introduced is likely to be much less than would be introduced by basing rate adjustments on changes in the CPI.

The input price index should be adjusted for changes in productivity. This is because a firm's true production costs are determined both by the prices it pays for resources and its productivity, the "efficiency with which inputs are transformed into useful output within the production process."<sup>2/</sup> Society benefits from improvements in productivity by making possible the production of a given level of output using fewer inputs, or conversely, by allowing the production of a greater amount of output with a given amount of input.

A firm's overall productivity, or "total factor productivity," is defined as the ratio of aggregate output to aggregate input.<sup>3/</sup> Total factor productivity is usually calculated by measuring the growth in a firm's total output that is not attributable to growth in factor inputs. One of the most

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<sup>2/</sup> T. Cowing and R. Stevenson, eds. Productivity Measurement in Regulated Industries 6 (1981).

<sup>3/</sup> Aggregate output is a composite measure of the individual services or products a firm produces. Due to the enormous variety of outputs produced by telephone companies, studies of total factor productivity commonly measure aggregate output in constant dollar revenues. See Denny, Fuss, and Waverman, "Total Factor Productivity in Canadian Telecommunication," in T. Cowing and R. Stevenson, eds., Productivity Measurement in Regulated Industries (1981). Aggregate input, in turn, is a composite measure of the various resources the firm uses to produce those services and products.

common ways of achieving this is through the use of an index.<sup>4/</sup> A Divisia index is frequently used because of its attractive properties.<sup>5/</sup> Verbally, the Divisia index for aggregate output (input) is defined as the percentage change in output (input) weighted by their respective revenue (value) shares.<sup>6/</sup> The rate of growth in total factor productivity is derived by subtracting

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<sup>4/</sup> Estimates of total factor productivity have also been arrived at through the use of econometric techniques. The principal advantage of this approach is that it permits one to decompose total factor productivity into a number of causes. See Nadiri and Schankerman, "The Structure of Production, Technological Change, and the Rate of Growth of Total Factor Productivity in the U.S. Bell System," T. Cowing and R. Stevenson, eds., Productivity Measurement in Regulated Industries (1981).

<sup>5/</sup> Divisia indexes are less restrictive in their underlying assumptions than either the Laspeyres or Paasche indexes. Unlike the former indexes, Divisia indexes do not depend upon the assumption of fixed share weights over time. Divisia indexes also possess the attractive theoretical property of correspondence to Fisher's Ideal Index. For a detailed discussion of the properties of Divisia indexes, see Hulten, Divisia Index Numbers, 41 *Econometrica* 1017 (1973).

<sup>6/</sup> Symbolically, the Divisia aggregate output index is defined (in discrete terms) as

$$\Delta \ln Q = \ln(Q_t/Q_{t-1}) = 1/2 \sum (r_{jt} + r_{jt-1}) \ln(Q_{jt}/Q_{jt-1})$$

where  $Q_{jt}$  is the quantity of output  $Q_j$  produced in period  $t$ ,  $r_{jt} = P_{jt}Q_{jt} / \sum P_{jt}Q_{jt}$  the revenue share of output  $Q_j$  in total revenue during period  $t$ . Similarly, the Divisia aggregate input index is defined as

$$\Delta \ln X = \ln(X_t/X_{t-1}) = 1/2 \sum (s_{it} + s_{it-1}) \ln(X_{it}/X_{it-1})$$

where  $X_{it}$  is the quantity of input  $X_i$  used in period  $t$  and  $s_{it} = w_{it}X_{it} / \sum w_{it}X_{it}$  the value share of input  $X_i$  in total cost during period  $t$ . Note that the components (e.g., labor, capital and materials) of aggregate input must themselves be constructed as aggregate indices using the above Divisia index methodology. Note also that the discrete form of the Divisia Index is often referred to as the Tornqvist index. See Tornqvist, The Bank of Finland's Consumption Price Index, 10 *Bank of Finland Mon. Bull.* 1 (1936).

the rate of growth in aggregate input from the rate of growth in aggregate output. One economist has constructed such an index in order to calculate total factor productivity for the Bell System between the years 1947 and 1979.<sup>7/</sup> His calculations indicate that the Bell System's total factor productivity grew at an average annual rate of 3.2 percent during that period.

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<sup>7/</sup> See Christensen, Total Factor Productivity in the Bell System (1947-1979) (unpublished paper, 1981) (on file at NTIA's Office of Policy Analysis and Development).

**BIBLIOGRAPHIC DATA SHEET**

	1. PUBLICATION NO.	2. Gov't Accession No.	3. Recipient's Accession No.
4. TITLE AND SUBTITLE  NTIA Regulatory Alternatives Report		5. Publication Date <u>July 1987</u>	
7. AUTHOR(S) NTIA Regulatory Alternatives Review Staff		6. Performing Organization Code	
8. PERFORMING ORGANIZATION NAME AND ADDRESS National Telecommunications & Information Administration U.S. Department of Commerce 14th & Constitution Ave., N.W. Washington, D.C. 20230		9. Project/Task/Work Unit No.	
11. Sponsoring Organization Name and Address National Telecommunications & Information Administration U.S. Department of Commerce Washington, D.C. 20230		10. Contract/Grant No.	
14. SUPPLEMENTARY NOTES		12. Type of Report and Period Covered	
15. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)  NTIA solicited comment from telecommunications industry participants on the costs and benefits of rate of return regulation and several possible alternatives. Based upon those comments and independent research, NTIA determined that rate of return regulation should be replaced by a variation of social contract regulation.		13.	
16. Key Words (Alphabetical order, separated by semicolons)  Rate of return regulation; state regulation.			
17. AVAILABILITY STATEMENT  <input type="checkbox"/> UNLIMITED.  <input type="checkbox"/> FOR OFFICIAL DISTRIBUTION.		18. Security Class. (This report)  Unclassified	20. Number of pages  79
		19. Security Class. (This page)	21. Price:





