

Chapter 5

# **Regulation and Rural Development**

## Contents

	<i>Page</i>
Findings .....	115
Introduction .....	115
Regulatory Implications for Economic Development .....	115
Technology Diffusion and Network Modernization .....	115
Rate-of-Return Regulation .....	116
Depreciation Practices and Modernization .....	118
Alternatives to Rate-of-Return Regulation .....	119
Cable Television .....	120
Information Services .....	122
Affordable Technologies Necessary for Economic Development .....	123
LATA Boundaries .....	123
Extended Area Service .....	124
Coordination of Users and Providers: Leveraging Demand and Supply ..	126
Rural Area Networks: Coordinating Users .....	127
Rural Area Networks: Coordinating Providers .....	129

### *Boxes*

<i>Box</i>	<i>Page</i>
5-A. Experimenting With Price Caps .....	120
5-B. Price Caps With Rural Provisions .....	121

### *Figures*

<i>Figure</i>	<i>Page</i>
5-1. National Local Access and Transport Area (LATA) Map .. .. .	125
5-2. Rural Players .. .. .	129
5-3. Bloomsburg, PA Telecommunications Network Configuration .. .. .	129
5-4. Iowa Network Services .. .. .	130
5-5. Palmetto Network Configuration .. .. .	130

# Regulation and Rural Development

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## Findings

Telecommunications regulation has greatly affected the extent to which rural areas gained access to telecommunications in the past. Despite deregulation, regulatory decisions will continue to determine whether rural areas have access to advanced telecommunications and, hence, whether they can participate fully in the global marketplace.

The small populations and large distances of rural regions are incompatible with the economies of scale that characterize many aspects of telecommunications. As a result, market forces, absent regulatory mandates and incentives, rarely work to benefit rural areas. Current regulatory approaches do not bridge the gap between market forces and the technology needs of rural areas.

Regulators must develop new regulatory approaches for rural areas. The communications infrastructure provides socioeconomic benefits that must be incorporated into their cost-benefit analyses. Similarly, the indirect costs of distance-sensitive pricing practices such as interLATA and inter-exchange toll charges, which make communications more expensive for rural citizens, must be evaluated in this context. Regulation must also encourage communities and telecommunications providers to find new ways to create economies of scale and scope, making the deployment of advanced communications technologies to rural areas financially feasible.

## Introduction

*The* conflicts between economic development goals and regulatory goals stand out in rural areas. From an economic development perspective, communications is a means to a larger end. The current regulatory climate, however, views communications narrowly, as a commodity to be bought and sold. As such, it is an end in itself. Urban areas, with many independent users who can create their own private

communications networks and afford the costs of interconnection, can adjust to and benefit from such regulatory policy. In rural areas, however, this is not the case. It is more costly to deploy technologies in remote areas, and there are fewer users to share these costs. Therefore, if the infrastructure evolves by market forces to meet the needs of dispersed individuals in rural areas, it will be uneven and service quality will vary.<sup>2</sup>

It is important for policymakers to consider both the commodity and infrastructure characteristics of communications technologies in determining their role in rural development. While focusing on communications as a commodity may lead to inadequate infrastructure in rural areas, treating all infrastructure development in a uniform manner could waste resources.

Communications can help arrest the decline of rural areas, so it is imperative to balance rural economic development and regulatory goals. Currently, little is being done to achieve this. Regulators rarely consider multifaceted economic development goals when making regulatory policy. On the other hand, educators, health officials, and local government are often unaware of what is at stake for them in the regulatory process.

## Regulatory Implications for Economic Development

### *Technology Diffusion and Network Modernization*

Economic and technological trends are changing the global economy and transforming rural economies, forcing them into the information age. The speed with which rural areas will gain access to the advanced technologies, allowing them to participate in the information economy, will be determined largely by the regulation or deregulation of communications and information.

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<sup>1</sup>Along with the State legislators and the courts, who determine the scope of regulators' authority.

<sup>2</sup>An unevenly developed network has several important implications. As the technological sophistication of the public switched network increases, the potential for geographical disparity of service also increases. A danger is that the network will continue to evolve, but with different standards of service depending on the power a region or community can leverage in the telecommunications marketplace. Even under the unified BSystem, the network evolved unevenly. As a result, locations exist in rural areas where there is no telephonservice, while other remote locations that are able, like most urban regions, to generate enough demand or command public service commission attention have relatively sophisticated communications.

During the era of the Bell monopoly,<sup>3</sup> regulation encouraged subsidized service to rural areas from the excess revenues earned in densely populated areas. This is no longer the case. Nonetheless, the partially competitive post-divestiture climate encouraged alternative providers, such as digital radio carriers, to enter the communications market with innovative products that can improve service in rural areas.

Rate regulation critically affects network modernization and technology deployment in rural areas. In many areas, rate-of-return regulation is giving way to price-cap regulation and the impact on rural areas is uncertain. In addition, other forms of regulation, including depreciation rates and the cable/telco cross-ownership ban, also impact rural network modernization.

### ***Rate-of-Return Regulation***

Until recently, both National and State regulators almost exclusively used rate-of-return regulation for the telecommunications industry. Under rate of return, regulators determine the total revenue a firm requires to provide service. This *revenue requirement* includes operating expenses, depreciation and taxes, and a "fair" return on its *rate base*. The rate base consists of the total of the firm's invested capital, including switching, transmission, and distribution facilities.

A number of subtleties of rate-of-return regulation affect the incentives to improve the network facilities and to extend service to rural areas. These factors involve how regulation treats the firm's costs and how these costs affect the consumers' prices. First, regulators can allow or disallow modernization costs in the rate base. If these costs are allowed, the rate base increases and the firm must raise more money from its subscribers through higher rates to generate the prescribed rate of return. If the costs are disallowed, then new equipment does not become part of the rate base and the company may not be willing or able to invest in plant equipment for which consumers do not directly pay. In this case, modernization likely occurs more slowly. Regulators must



Photo credit: Mark G. Young

A "Slick-96" host-remote switch in Houlton, ME. This remote digital switching unit improves the quality of transmission for rural residents because their calls no longer necessarily have to travel the many miles, along which the signals get attenuated, to the central office switch in a larger town.

strike a balance between technological sophistication and the cost to the consumer.

Regulators also determine how costs are split between consumer groups, such as residential and business. Businesses usually pay more than their proportional share of the costs so that residential consumers can pay lower prices. Similarly, urban areas historically have paid more than their share of the costs to subsidize rural services.

Many inefficiencies are attributed to rate of return regulation,<sup>4</sup> but two problems are particularly relevant to network modernization and technology diffusion to rural areas. First, regulators must rely on cost forecasts and data provided by the firms they regulate to determine the revenue requirement. The allocation and justification of costs determine the prices consumers are charged and affect the firm's rate of return. Hence, there are incentives to misreport costs. Regulators must be wary that a firm could report cost estimates higher than its actual costs, charge customers higher prices, and thus earn a higher return. However, regulators must also be concerned about revenue short-falls caused by faulty

<sup>3</sup>& ch. 3 describes, the present regulatory structures still allow for subsidies to high-cost regions, but the nature and extent of these subsidies have diminished since the divestiture of AT&T and the growth of a partially competitive telecommunications market. If the telecommunications industry evolves, as many believe it will, toward an even more competitive structure, the system of subsidies that benefits rural communities could become further eroded, either forcing the consumers to pay higher rates than their urban counterparts for comparable service, or implying that rural telephone companies might not be able to invest enough in their facilities to maintain adequate service--service comparable to that in urban areas.

<sup>4</sup>Ronald R. Brauetigam and John C. Panzar, "Diversification Incentives Under 'Price Caps' and 'Cost Based' Regulation," *Rand Journal of Economics*, vol. 20, No. 3, autumn 1989, p. 390.

cost estimates. If a firm's costs significantly exceed the estimated costs, resulting in a lower than prescribed rate of return, the firm might not be able to afford modernization costs. Although there is no guarantee that the company will recover its entire revenue requirement, on average the company will earn close to a market return on its investment.<sup>5</sup>

Second, some believe consumers face higher prices because rate of return can induce firms to overinvest in capital.<sup>6</sup> Because the amount of a firm's return is directly proportional to the size of its rate base, the firm might seek to expand its rate base by investing in more technology than would be economically warranted without the regulatory incentive.<sup>7</sup> Such investments can be wasteful because consumers pay higher rates for unneeded technologies.

In addition to making the rate base larger, over-capitalization can increase revenues in other ways. In the past, the separations and settlements process affected the relative costs of modernizing different parts of the local network. Since a local exchange carrier's (LEC) share of pooled nontraffic-sensitive (NTS) costs determined its share of the settlements pool, there was incentive for overinvestment in certain facilities. Recently, the LECs' desire to insulate themselves from competitive pressures may have led them to invest in technologies that raise entry barriers or lower their own costs at strategic points in the network. However, it is

difficult to prove that these are anticompetitive practices, and there are no reliable empirical studies supporting this hypothesis.

To safeguard against over-capitalization, firms must gain regulatory approval to make large capital investments. Regulators determine whether demand for the proposed technology exists in the local community before it is approved. This process requires the community and regulators to understand the potential and capabilities of telecommunications to improve community life. Rarely does such an understanding exist, either in the local community or in the regulatory bodies.<sup>9</sup> Thus, the regulators' efforts at consumer protection can work against the consumers' broader interests.

Industry observers question whether rate-of-return regulation actually produces incentives for the firm to overinvest in capital. They contend that the many assumptions—about the regulated firm, the industry, and the regulatory agency—needed for the method to function make it ill-suited for the telecommunications industry.<sup>10</sup>

As the telecommunications industry becomes more competitive, the effects of rate-of-return regulation become more complicated. With more private networks, the costs of completing calls between the shared public network and private networks could rise because fewer customers are sharing the costs on the public network. This trend could affect how much subscribers to the public network must pay

<sup>5</sup>Sanford Berg, "Regulatory Structures and the Deployment of Information Technologies in Rural Areas," contractor report prepared for the Office of Technology Assessment, June 1990.

<sup>6</sup>Breutigam and Panzar, *op. cit.*, footnote 4. As part of the overinvestment, firms might choose inefficient technologies or undertake cost-reducing innovation in an inefficient way. For example, a cost-reduction innovation could require more labor input, but the firm would substitute more expensive technology for the labor in order to increase the rate base.

<sup>7</sup>Averch and Johnson first identified this tendency in 1962, in their seminal piece, "Behavior of the Firm Under Regulatory Constraint," *American Economic Review*, vol. 52, pp. 1052-1069.

<sup>8</sup>As John T. Wenders explains, the separations and settlements process is extremely complicated: "[i]t is a full-employment act for accountants. . . Separations simply refer to the policy of separating both the traffic and nontraffic sensitive portions of local accounting costs into two parts: One part remains in the state jurisdiction in which the exchange is located, and the other part is assigned to the interstate arena under the jurisdiction of the Federal Communications Commission (FCC) where these costs are added to the cost of providing interstate toll services." John T. Wenders, *The Economics of Telecommunications: Theory and Policy* (Cambridge, MA: Ballinger Publishing, 1987), p. 2. This process was an integral aspect of the rate averaging between high-cost and low-cost service areas, which benefited rural areas because of their high cost of service.

<sup>9</sup>Ch. 4 describes how the lack of information about and understanding of the role of information technologies in community and economic development serves as a barrier to rural economic development. Even if rural communities gain access to sophisticated technologies, lack of understanding of their capabilities will persist as a barrier unless some form of technology transfer and education is part of a larger development plan.

<sup>10</sup>Brooks B. Albery and Mark P. Sievers, "The Averch-Johnson-Wellisz Model and the Telecommunications Industry," *The Federal Communications Law Journal*, vol. 40, No. 2, April 1988, pp. 157-192. Brooks and Sievers list 12 assumptions of the Averch-Johnson Model, 6 about the firm and 6 about regulation. About the firm: 1) the firm chooses inputs so as to maximize profit; 2) the firm's profit maximizing revenues are greater than its revenue requirements as set by the regulator; 3) the cost of capital ( $r$ ) is constant and is set in a perfectly competitive environment 4) inputs are perfect substitutes; there are no constraints on inputs employed; and inputs displace diminishing marginal returns; 5) demand for the firm's product or service is fixed; 6) the firm has no competitors. About regulation: 1) the allowed rate of return is set greater than the firm's true cost of capital ( $r$ ); 2) revenue requirement adjustments occur instantaneously; 3) the only regulatory tool used by the regulator is the allowed rate of return; 4) the firm is constrained by only one regulator; 5) cost minimization (economic efficiency) is the only goal of regulation; 6) all parties possess perfect information.

and the extent to which they can enjoy advanced technologies. In some situations, rate-of-return regulation can reduce incentives for efficiency and innovation, and result in higher costs than with alternative regulatory approaches. For example, why should a firm undertake a risky modernization program if consumers immediately benefit from any cost savings resulting from innovation, but investors must bear the risk of regulatory disallowances and losses from unsuccessful innovations. Such asymmetric regulation can result in higher costs to the rate payers, delay modernization of the country's infrastructure, deny customers access to new and innovative services, and compromise the competitiveness of regulated firms in the marketplace.

Regulators must be aware of potentially anticompetitive practices by regulated firms. Well-heeled firms could subsidize a competitively offered service long enough to force out their competition. This could effectively foreclose unregulated providers from offering a competitive service, potentially slowing the rate at which rural areas could gain access to new technologies. Yet, excluding regulated firms from competitive markets could deny consumers lower prices, and deny investors of opportunities to take advantage of new markets.<sup>11</sup>

The effects of regulation on network modernization are complex and generalizations cannot be made. Since incentives for innovation and network modernization are central to economic development, it is important that the implications of rate of return regulation be considered in the context of economic development. When communications is viewed as an infrastructure, necessary for a variety of social and economic functions, the regulator's dilemma of allocating costs gains a different perspective.

Regulators must consider the costs to society and also to the individual subscriber, if the community cannot link up with the rest of the world. If the local hardware store cannot exchange data with the larger national franchise, it may not be able to remain in business. If the school cannot access library infor-

mation services or video courses, the community suffers in the short and long term. Similarly, regulators must also consider the value of the range of applications of information technologies within a community. Telecommunications access to state-of-the-art medical technologies, international markets, and distance learning curricula is more valuable to a community than merely the ability to make routine telephone calls. The effects of rate of return regulation could be very different if regulators calculated the costs and benefits of network modernization and technology for economic development.

### *Depreciation Practices and Modernization*

The rate at which a company depreciates its capital investments affects the rate at which it can modernize its facilities.<sup>12</sup> A long depreciation schedule can imply a slower modernization process because the cost of equipment must be spread over a long period of time. In this case, a firm could not afford to make new investments as quickly, but subscribers rates could remain low. A short depreciation schedule recovers the cost of an investment over a short time, and the consumer absorbs this with higher rates. Because the firm recovers the cost of the investment quickly, it can afford to make new investments sooner. In addition, the shorter payback period means that the company will pay less interest on the loan, and therefore the total cost of the equipment will be less. Thus, although the higher cost is passed to consumers, they ultimately pay less for that technology.<sup>13</sup>

Historically, rural independent telephone companies have faced relatively long depreciation rates. Rather than replace their equipment with new technologies before the old equipment was fully depreciated, most companies continued to use electro-mechanical switches while urban areas installed analog electronic switches. Technology advances have occurred rapidly in recent years, so digital electronic switches have replaced analog electronic switches as the preferred technology. At the same

<sup>11</sup>Some analysts call for "residual pricing" of core services, using revenues from new services with market-based prices to cover a portion of shared costs. However, the share covered by new services would not be based on some arbitrary "fully allocated cost," but on what the market dictates.

<sup>12</sup>The links between depreciation practices and modernization are clear in theory, although quantitative studies are unavailable. One of the few empirical studies in this area found that higher realized rates of return lead to greater investments in plant modernization by AT&T in the 1960s and 1970s. B. Branch, "Quality of Service and the Allowed Rate of Return: American Telephone and Telegraph," *Journal of Economics and Business*, vol. 32, 1979, pp. 86-98.

<sup>13</sup>Strictly speaking, this ignores the opportunity cost to the consumer of the extra money they will pay for a shorter period of time. Consumers will pay less for the technology assuming that the telephone company cannot earn a higher return on the extra amount of money it would be paying on the shorter depreciation schedule if it invested that money elsewhere and paid the utility over a longer depreciation schedule.

time, the electromechanical equipment in some rural areas was fully depreciated, enabling telephone companies in rural areas to purchase digital switches—essentially leap-frogging a level of technology. As a result, many rural areas have digital switching before their urban counterparts. Nonetheless, the majority of rural areas are still behind urban areas in terms of technology.

If regulators allow fast depreciation schedules, a telephone company might modernize its network more quickly. However, regulators must consider the value of the sophisticated equipment in light of the higher rates consumers must pay. Although industry observers, regulators, and communications companies continue to debate how sophisticated the technology needs to be for the average consumer, the scope of the debate and the range and number of those debating are limited. When such debate occurs, it often focuses on the residential users' needs. If, however, communications is viewed as an infrastructure, simultaneously supporting multiple functions, the community's need for advanced technology is much greater.

In determining an appropriate depreciation rate, regulators must balance not only the firm's financial needs, the effects on consumers' rates, and the expected life of the equipment, but also the level of technological sophistication needed by the community. This requires accurate technology forecasting as well as accurate accounting.

### *Alternatives to Rate-of-Return Regulation*

Price-cap regulation is designed to overcome some of the negative aspects of rate-of-return regulation. This alternative approach sets a price based on the firm's costs for a designated group of

services. The set price changes over time, based on inflation, improvements in productivity, and changes in the prices of inputs.<sup>14</sup> By regulating prices rather than the costs of physical inputs, price caps create an incentive for firms to innovate in order to reduce costs and improve their efficiency.<sup>15</sup> Advocates of this form of regulation argue that investors may face greater risks, but the reward structure is more symmetrical (see box 5-A).<sup>16</sup>

Enthusiasm about price caps must be tempered by a recognition of implementation difficulties. Regulators, for example, must consider what price levels are appropriate as a starting point, what productivity index should be used to partially offset inflation adjustments, what items should be in the regulated bundle and what items should be unregulated, the extent to which the firm could cross-subsidize its regulated services with the revenues from its deregulated services, the time period for such a plan, what interval is appropriate for reassessing the price-cap approach, and under what conditions and by what criteria to reevaluate the results of price caps.

In addition, regulators must also monitor quality of service for all subscribers. A firm with capped prices can potentially discriminate between customers by making concessions to politically powerful consumer groups or more profitable users.<sup>17</sup> Furthermore, the firm may be subject to deregulation: regulators (and legislators) cannot guarantee that they will not intervene again in the future. A reevaluation after a given time period is generally specified in the negotiated price-cap agreement.

Price-cap regulation relies on competitive incentives for firms to undertake efficient and innovative activities. This type of regulation could leave rural

<sup>14</sup>Usually the price is set according to a formula, such as  $P_{T+1} = P_T + I - X$ , where  $P_{T+1}$  is the allowed price, which is equal to  $P_T$ , the price in the previous time period, adjusted for inflation,  $I$ , and minus a given amount  $X$ , which accounts for increases in the firm's productivity that should lower its costs.

<sup>15</sup>Breutigam and Panzar argue that, "at least in principle, [price-cap regulation] can induce the firm to minimize costs, produce efficiently in noncore markets, undertake cost reducing innovation as an unregulated firm would, and diversify into a noncore market if and only if diversification is efficient. Incentives to misreport cost allocations and choose an inefficient technology simply disappear." Breutigam and Panzar, *op. cit.*, footnote 4, p. 390. Additionally, Cabral and Riordan (1989) find that incentives for innovation are greater under a price-cap system. L.M.B. Cabral and M.H. Riordan, "Incentives for Cost Reduction Under Price Cap Regulation" *Journal of Regulatory Economics*, vol. 1, 1989, pp. 93-1(E2).

<sup>16</sup>Many believe that price-cap regulation also leads to better regulatory oversight because regulators can focus directly on the policy issues of concern, rather than on detailed historical data, such as historic costs or depreciation expense, which can clutter regulatory proceedings—diverting attention from how utility activity affects the telecommunications industry.

<sup>17</sup>Many regulators and economists believe that price caps create incentives for firms to discriminate in such a way.

### Box 5-A—Experimenting With Price Caps

Several States and the Federal Communication Commission have begun to experiment with price-cap regulation. At the State level, public utilities commissions (PUCs) have undertaken price-cap regulation as part of a technology deployment and economic development strategy. For example, in Vermont—a predominantly rural State—the PUC granted greater pricing flexibility to the local exchange carrier (LECs) in exchange for a commitment from the telephone companies to upgrade their technology and provide a basic level of service to every community. Kansas recently took a similar approach. Under the TeleKansas plan, Southwestern Bell agreed to invest \$160 million in network technology at a faster rate than it would have under the traditional rate of return regulation. In exchange for Southwestern Bell's commitment, the Kansas Corp. Commission agreed to more flexible pricing regulation. A number of other States are also taking similar approaches.

At the Federal level, the local exchange carriers have received price caps with ambivalence. Although all seven of the Bell operating companies face mandatory price-cap regulation, the majority of independent telephone companies have yet to yield to the new regulatory regime. Meeting the required productivity increases appears to have discouraged some of the smaller telephone companies.<sup>1</sup>

<sup>1</sup>Independents Snub Telco Price Caps, "Telephony, Nov. 16, 1990, p. 20. See also, "Price Caps? No Thanks," *Communications Week*, Nov. 12, 1990, p. 12.

areas vulnerable.<sup>18</sup> Rural areas have traditionally been among the last to get new technologies precisely because firms will maximize profits by serving the least expensive, most lucrative, and easiest-to-serve customers first. Analysts have little hard evidence about how price caps would affect rural areas because these plans have not been in effect until recently, or have been implemented only in limited cases, mostly for competitive long-distance service. If the regulatory flexibility of price caps promotes beneficial technical change, firms and customers, including those in rural areas, could realize substantial savings (see box 5-B).

An analysis of the positive and negative incentives of price caps would be incomplete if costs are viewed strictly as the cost of the firm's investments. Communications technologies are much more than a commodity, especially for rural areas, so regulators should treat investments in communications technologies as investments in community infrastructure.<sup>19</sup> Price caps alone cannot accomplish this. Even if regulators implement a social contract, mandating investments that firms would not make otherwise as a condition of allowing price-cap regulation, regulators and firms must identify the costs and benefits

they will be working with, the source of funds, and the means to evaluate these investments. Will the cash flows come from cost savings induced by the new regulatory incentives? Will the financial markets view the new social contract as involving net benefits to investors? Will prices in urban areas be kept artificially higher—providing subsidies for rural customers? Depending on the answers to such questions, rural areas could benefit or lose.

Interestingly, in those cases where States have adopted price caps under the condition that the telephone company make specific investments, the funds for those investments do not come solely from productivity increases. Rather, urban consumers' or business rates are allowed to rise to compensate for the increased investments in the network. Cross-subsidization between urban and rural areas, therefore, persists.

### Cable Television

The possibility of one company providing both cable television and telephone service could have significant impact on the rate of network moderniza-

<sup>18</sup>Even urban areas and large business users can be vulnerable to some of the abuses that can arise from price-cap regulation. In markets without effective competition, telecommunications companies will face greater incentives to maximize profits by *not improving service*. This experience has been the case in the United Kingdom, where price caps have been in place the longest. A Citibank executive notes, "for longer-haul long distance service, . . . price caps have kept rates down because of the fierce rivalry between British Telecom plc and Mercury Communications Ltd.," but for less competitive markets, such as local service and medium-distance toll service, Citibank "has faced escalating rates." Kathleen Killete, "Price Caps Criticized," *Communications Week*, July 16, 1990, p. 12.

<sup>19</sup>In many cases, regulators are constrained by State law and court precedents in the extent to which they can consider economic development concerns.

**Box 5-B—Price Caps With Rural Provisions**

Utah's Public Service Commission recently adopted price-cap regulations for the Bell operating company serving the State. Under the new plan, US West is granted greater pricing flexibility in exchange for their commitment to invest over \$6 billion to upgrade their service to the rural regions in the State. However, as a result of the new plan, residents of Salt Lake will likely pay higher rates.

tion and technology deployment in rural areas.<sup>20</sup> Economically and technologically, such an arrangement is not only possible, but also advantageous for rural areas. Economies of scale exist for both telephone lines and cable television lines in rural areas and therefore, each is a natural monopoly in a rural setting.<sup>21</sup> Both telephone lines and cable television lines can carry digital information. Thus, entertainment video as well as voice and data messages could easily travel along the same lines. This capability will grow as fiber optics, or other high-capacity transmission media, are adopted for cable and for telephone lines. Because it is so expensive to lay the wires for cable television, telephone, and other telecommunications services across vast distances in rural areas, combining all modes of traffic along one conduit could enable rural areas to take advantage of economies of scope and thus more easily and quickly afford a sophisticated communications infrastructure.

Despite the potential advantages of jointly providing services in rural areas, such an arrangement raises important public policy issues. Legal and regulatory barriers against this type of facilities-

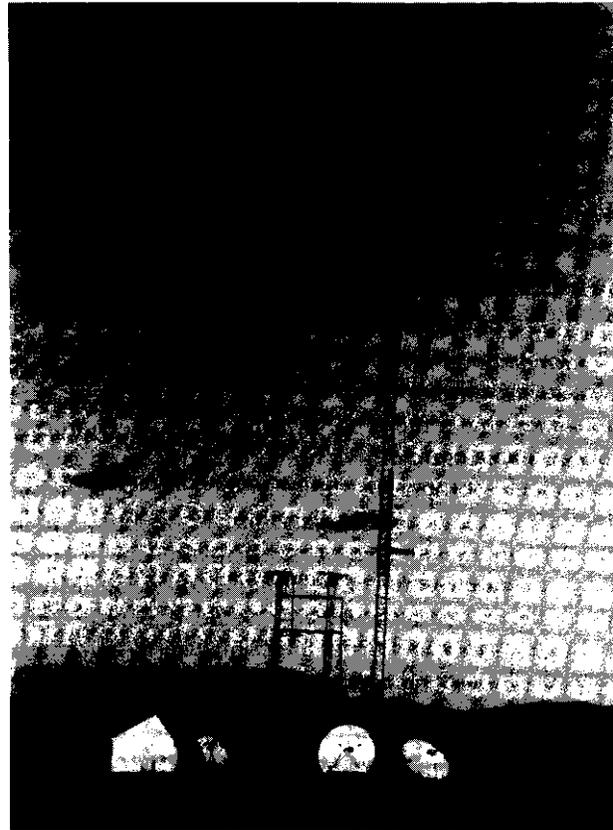


Photo credit: Mark G. Young

A cable television satellite-receiver and microwave-transmission site in rural Virginia.

sharing have been devised to protect consumers against possible monopoly abuses that could arise from one firm controlling the only lines of communication and information. Action to change these restrictions will be hotly contested because the stakes are very high for both the cable and the telecommunications industries.<sup>22</sup>

<sup>20</sup>As Robert M. Pepper explains, "whether or not telephone companies provide video programming may not make a significant difference to whether LEC's eventually deploy fiber but may significantly affect the timing of such deployment" [emphasis added]. Robert M. Pepper, Office of Plans and Policy, Federal Communications Commission, "Through the Looking Glass: Integrated Broadband Networks, Regulatory Policy, and Institutional Change," 1988, p. 16.

<sup>21</sup>One reason that AT&T was divested in 1984 was that people had begun decades earlier to question the natural monopoly characteristics of the telecommunications industry. In urban areas, telecommunications may not, in fact, be a natural monopoly; the size of the subscriber base, combined with the density of subscribers, may mean that several firms might be able to achieve the requisite economies of scale. In rural areas, however, this is not the case. For further reading about the natural monopoly characteristics of terrestrial telecommunications service rural areas, see John C. Panzar, "The Continuing Role for Franchise Monopoly in Rural Telephony," *Rural Telecommunications*, summer 1987, pp. 43-50. Also, John C. Panzar, testimony for NTIA Notice of Inquiry: Comprehensive Study of the Domestic Telecommunications Infrastructure, Docket No. 912969296.

<sup>22</sup>See Roger Noll and Bruce M. Owen, "United States v. AT&T: An Interim Assessment," discussion paper No. 139, presented to the Workshop On Applied Macroeconomics, Industrial Organization, and Regulation Stanford University, Stanford, CA. See also, U.S. Congress, Office of Technology Assessment, *Critical Connections; Communications for the Future, OTA-CIT-407* (Washington DC: U.S. Government Printing Office, January 1990). See also "Cable TV Rates, Deployment of Fiber to Rural Homes Debated Before Rep. Wise's Panel," *Telecommunications Reports*, Feb. 12, 1990, pp. 20-21.

Under the 1984 Cable Communications Policy Act,<sup>23</sup> local telephone companies cannot provide video programming within their service areas. By prohibiting telephone companies from providing cable programming either directly (along their own lines) or indirectly (along the lines of an affiliate or subsidiary), the Cable Act effectively created a monopoly for the cable providers in each franchise territory. From a strict economic perspective, two separate transmission lines terminating at each home or business is a wasteful solution.

One rationale for codifying the cable monopoly was to encourage technology diffusion. Policymakers reasoned that a monopoly would deploy technology faster than a competitive market. They feared that, if telephone companies could own cable television facilities, they could discriminate against cable programmers and operators who were not in some way affiliated with the telephone company. Moreover, the telephone company could undercut competitors' prices and drive the competition out of the market. As a result, technology would advance at a slower pace.

Although the cable monopoly persists, policymakers continue to debate whether telephone companies should be banned from the cable industry. The focus of the debate has shifted from the question of technology diffusion to that of market power. Some analysts believe that the cable industry has abused its monopoly position and should be subject to the discipline of a competitive market that would include telephone companies. Others contend that the telephone companies are already so large and powerful that they could easily purchase existing cable systems and thwart any real competition.

In some rural areas, the cable-telephone cross-ownership debate has been resolved. The Cable Act includes an exemption from the rules for towns with populations under 2,500. Congress is now considering expanding the current Federal Communications Commission (FCC) definition of rural area from population of 2,500 to 20,000, so that many more



Photo credit: Mark G. Young

**A cable company and telephone company in rural West Virginia share the same premises but maintain separate transmission facilities and completely separate ownership structures.**

rural locations would be exempt from cross-ownership restrictions.<sup>25</sup> This action represents a first step in recognizing the unique problems of rural areas and addressing rural issues differently from urban issues.

### *Information Services*

*The* rationale for allowing telephone companies to offer information services, such as videotex, electronic yellow-pages, dial-up video, and cable television is similar to the rationale for allowing cable-telephone company cross-ownership. Such an arrangement could take advantage of economies of scope, by utilizing the same facilities for several different functions, and economies of scale, by attracting the demand of several different user groups. The Bell operating companies (BOCs) argue that such an increase in the demand for network capacity would be necessary to justify rapid, high-capacity network modernization. Before this could occur, however, the provisions of the court-supervised Modified Final Judgment that prohibits the BOCs from offering information services would

<sup>23</sup>47 U.S.C. § 533 (-b).

<sup>24</sup>Pepper, *op. cit.*, footnote 20, p. 21. The Cable Communications Act of 1984 prohibits any relationship between a cable operator and a telephone company, other than that of carrier-user. This means that the telephone company may provide the cable company with telephone service, but there can be no other relationship, whereby the telephone company would provide capacity for the cable company to transmit its signals along. Additionally, there can be no financial affiliations between the two parties.

<sup>25</sup>S. 20800, of the 101st Congress, included provisions to expand the definition of a rural area from 2,500 people to 20,000 for the purposes of a cable-teleco cross-ownership waiver. Although this legislation did not pass, it is expected to re-emerge in future sessions of Congress as an important issue.

have to change.<sup>26</sup> This ban exists to prevent the Bell companies from acting in an anticompetitive way that could slow technology diffusion and industry innovation, and could make consumers ultimately pay higher rates.<sup>27</sup> In addition, some Critics contend that the information-services ban should remain in place because it would be dangerous for one company to control all the information to each household.

As a way to allow the telephone companies to offer information services, the FCC and several State regulatory agencies<sup>29</sup> have proposed a system of Open Network Architecture (ONA).<sup>30</sup> With ONA, enhanced service providers could gain equal access to the telephone companies' networks. Thus, the telephone companies could offer information services under the condition that they open their network to competitors, who would pay for the technology that they needed to reach potential customers. Hypothetically, ONA would create a 'level playing field' whereby a BOC could not use its network to discriminate against competing enhanced services vendors who rely on the local network.<sup>31</sup> Such an arrangement would take advantage of the economies of scope while also taking advantage of competitive forces.

Network unbundling, which is implicit in ONA plans, could create incentives for faster network modernization and technology diffusion, but it could also place rural America at a further disadvantage relative to the rest of the country. If rural areas are not able to configure the various pieces of the network, they will not be able to effectively use

communications as a component of their economic development plans.

## Affordable Technologies Necessary for Economic Development

Bridging the technological gap between rural and urban areas is not enough. Modern technologies will be of little value to rural citizens if they cannot afford to use them. Often, because of their remote location, rural citizens must pay more for transactions that are part of economic development and vitality. The extra cost of making a long-distance telephone call to a nearby database that lies across an exchange boundary, or to call the local school in another LATA,<sup>32</sup> is a barrier to economic development. Not only do rural areas need access to technologies that are comparable to those in urban areas, this access must be comparably affordable.

### LATA Boundaries

One factor that creates a cost differential between urban and rural areas is the greater frequency of interLATA calling in rural areas. Because LATA boundaries tend to reflect the calling patterns and exchange locations of standard metropolitan statistical areas, most urban subscribers can conduct daily transactions, such as ordering materials for their business, without considering the extra cost of an interLATA call. LATA boundaries often do not match rural calling patterns so well. Whether they must call an adjacent community, or the nearest urban center, rural citizens frequently encounter the

<sup>26</sup>Cable television service would qualify as an information service.

<sup>27</sup>Many economists and cable industry advocates contend that the B(XS) could subsidize their competitive services, which would include cable television if the information service ban were lifted, with revenues from their monopoly local telephone service. In doing so, they would charge their "captive" monopoly customers higher prices and use the extra revenue to compensate for losses they might incur by under-pricing their competitive products. This would then drive out the competition and create a monopoly for all services.

<sup>28</sup>The BOCs and several telecommunications industry and consumer organizations, including the Videotex Industry Association, the U.S. Telephone Association, and Action for Children's Television, issued a joint request to U.S. District Court Judge Harold Greene asking for the lifting of all the restrictions for information services, claiming that there is no evidence that telephone company entry into information-services markets would be anticompetitive. They went so far as to say that such an action would stimulate competition. *Telecommunications Reports*, Aug. 27, 1990, p. 5.

<sup>29</sup>Federal Communications Commission, through Computer Inquiry III, and New York State along with several other State Utilities Commissions have issued comments on ONA.

<sup>30</sup>As the FCC continues its debate on ONA, several States have decided to go forward with network unbundling and ONA. Under such a plan, Washington has ordered that the BOC establish separate subsidiaries for its information services and its plain old telephone services.

<sup>31</sup>Kenneth Donow and Lynn McGlynn, "Open Network Architecture: Public Policy for an Evolving Telecommunications Network," contractor report prepared for the Office of Technology Assessment July 1990, p. 3.

<sup>32</sup>A LATA (Local Access and Transport Area) is comprised of a relatively large number of local exchanges. The term local exchange refers to the geographic area served by the same local switching equipment. Subscribers within a local exchange have telephone numbers with identical three-digit prefixes. LATAs were developed as a result of the divestiture settlement to define geographic areas within which the former Bell operating companies (BOCs) provided telephone service. The settlement allows the BOCs to provide intraLATA service, but it forbids them from providing interLATA telecommunications.

extra costs of making an interLATA call (see figure 5-1).

Whether this disparity is unfair is debatable. Many economists argue that the extra costs required for more frequent interLATA calls from rural areas are not necessarily unjust because rural areas have always been subject to more long-distance calls than urban areas.<sup>33</sup> The question of whether or not LATA boundaries are fair may be less important, however, than whether they impinge on development in rural areas. Since LATAs were an artifact of divestiture, they are unlikely to change unless the Modified Final Judgment changes significantly.

### *Extended Area Service*

*In* addition to the long-distance costs of crossing LATA boundaries, rural citizens face higher costs for calls that cross exchange boundaries. Because small, independent telephone companies often serve rural areas,<sup>34</sup> calls across short distances may require different companies to make the connection. If two firms must interconnect to complete a call, the costs of that call must be allocated between them and thus usually cannot be covered by each company's flat local service rate. Although it crosses relatively short distances, this call is a toll call.

The exchange boundaries that have existed for several decades may not correspond with local economic or political boundaries, so they may seem even more arbitrary than LATA boundaries. Because urban areas are usually served by one large telephone company, urban subscribers do not face these interconnection charges.<sup>35</sup>

Many States have started to implement Extended Area Service (EAS) plans to address rural customers' concerns about paying toll fees for calls that cross short distances.<sup>36</sup> Under such a plan, telephone

companies redistribute their costs. For example, consumers might pay an extra \$2 on their monthly bill so that they can call the neighboring community without long-distance charges; some consumers never call that community, while others need to call frequently. On average, the extra revenue from the higher flat rate should cover the lost long-distance revenues.<sup>37</sup>

The local exchange carriers' choice of technologies, their network plans, and the state of modernization are important considerations for defining a local calling area for an EAS plan. This is because the costs for each company depends not only on present engineering and cost allocation, but also on future technologies. For example:

An all-digital, all-glass network would have a significantly superior ability to handle congestion and to reroute traffic. Also, such a system may be largely distance-insensitive because of its handling characteristics capacity .38

Thus, future technology plans might make EAS much more feasible. It might be worthwhile, however, to implement EAS earlier rather than later so that consumers who would provide demand for sophisticated technologies in the future would remain in the current calling region.

Future modernization decisions will depend on present definitions or redefinitions of local calling areas, as much as the definitions of the local calling area will depend on technology deployment plans. The economics of telecommunications are such that costs tend to decrease as size of the service area and capacity increases. As a result, the addition of a host-remote switch, the creation of radio networks, or the deployment of high-capacity transmission facilities that could serve more customers at a lower

<sup>33</sup>Some propose that the complaint of the unfairness of LATA boundaries in rural areas is legitimate under only two circumstances: 1) if their own calling areas were somehow reduced as a result of the divestiture process, or 2) if interLATA rates have risen dramatically due to regulatory policy. This argument follows since rural consumers needed to make long-distance calls for many transactions even prior to divestiture. Additionally, competition in toll markets, which resulted from divestiture, has tended to lower interstate and intrastate long-distance prices.

<sup>34</sup>While the majority of independent telephone companies serve rural areas, most rural areas are still served by the Bell operating companies.

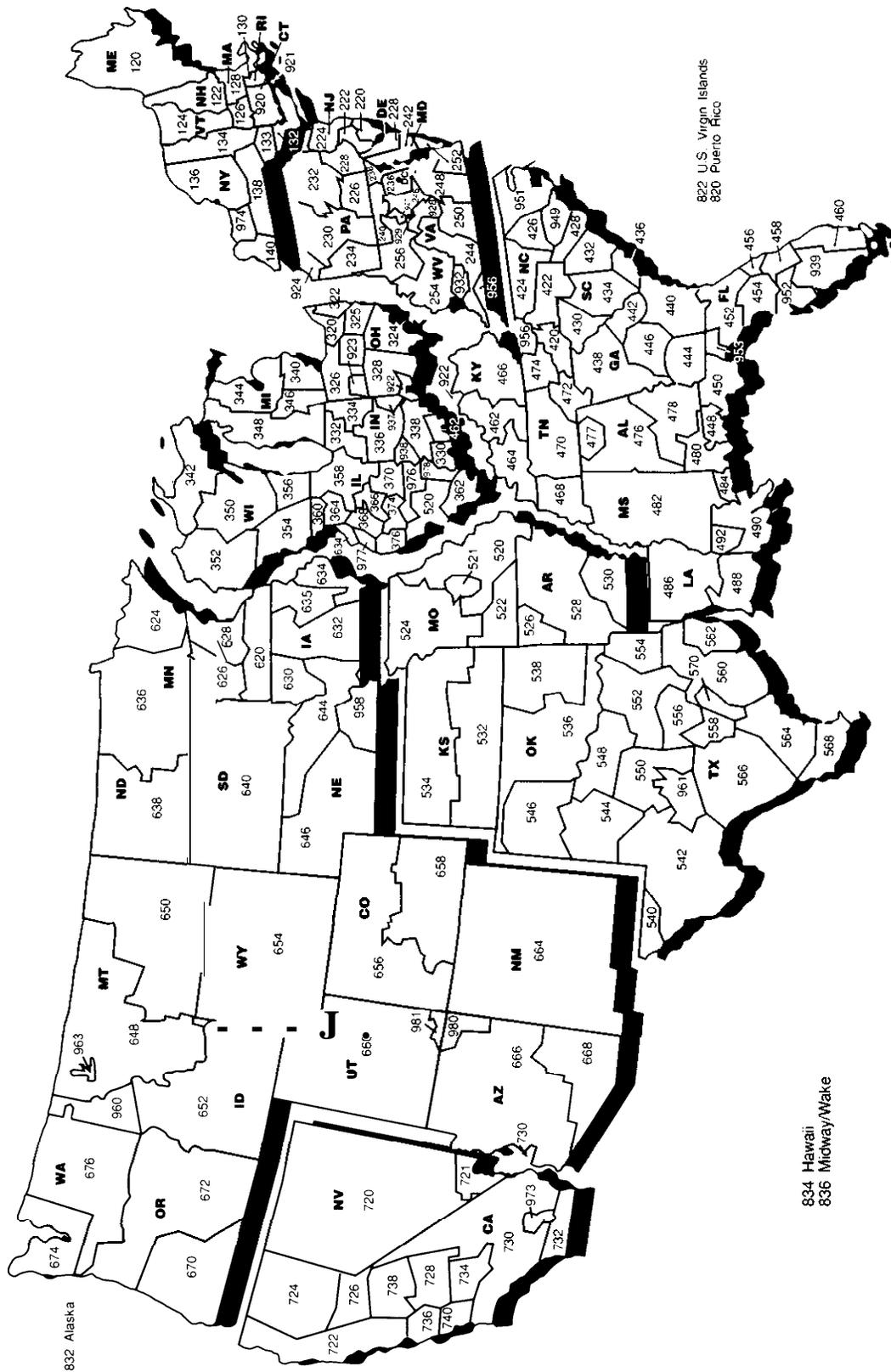
<sup>35</sup>The costs for C<sub>n</sub>-exchanges within the boundaries of a larger firm are covered by the averaging that occurs with the flat rate for local service in the monthly bill.

<sup>36</sup>Colorado has been very proactive in implementing EAS plans. The rural regions of the State experienced the biggest changes as a result of the new plans because their calling areas were increased significantly.

<sup>37</sup>Although on average firms will make up for the lost long-distance revenues, this average works out because some firms earn fewer revenues and some earn more. States may still have to establish a high-cost fund that would compensate firms who earn lower revenues as a result of the new plan.

<sup>38</sup>Raymond Lawton and John Borrows, *Factors Affecting the Definition of the Local Calling Area: An Assessment of Trends* (Columbus, OH: The National Regulatory Research Institute, 1990), p. 45.

Figure 5-1—National Local Access and Transport Area (LATA) Map



LATA boundaries divide up the country geographically into calling areas, based on usage patterns, but do not correspond to the area code boundaries.  
SOURCE: Reprinted with the permission of CCMI, a division of United Communications Group, Rockville, MD, 1991.

cost might seem more feasible if local calling area boundaries expand.<sup>39</sup>

To establish the appropriate EAS boundaries, regulators must first determine the community of interest. Often, they will survey the calling patterns of prospective communities to assess how often they might call a neighboring community. However, the same problems that are involved in forecasting demand for technology exist in forecasting demand for EAS service. If, for example, consumers must pay toll rates to call a nearby community, they might call less frequently and report on the survey few long-distance calls.<sup>40</sup>

Regulators must also consider characteristics of the local communications market when reviewing EAS plans. Three features of the telecommunications market are relevant to EAS.<sup>41</sup> First, whether the local telecommunications provider is a monopolist will affect the ease with which EAS plans might be implemented. If an EAS plan requires significant changes in the technical facilities, regulators could more easily mandate such changes to a monopoly supplier than to suppliers in a competitive telecommunications marketplace. Second, the redefinition of a local calling area could impact the sustainability of intraLATA toll competition. If competition exists for the long-distance calls that occur within LATA boundaries, competitors might not be able to afford to offer service if their consumer base erodes because fewer calls are toll calls. Third, the extent to which consumers use telecommunications could affect the extent to which they would be willing to pay the extra cost of EAS. Often, many customers will make mostly local calls and accept paying a premium for infrequent toll calls. However, for many business customers, and increasingly hospitals, schools and individual subscribers, distance-sensitive rates translate to higher costs to reach extended markets or needed information. These added costs are important for products with highly elastic demand.

Regulators must balance the impact of EAS on the rates of those who do not directly benefit from the service compared to the cost savings for those who use the service extensively.<sup>42</sup> Standard cost-benefit analyses, using economic cost data, are of limited usefulness when many of the costs and benefits are not characterized by physical entities or direct savings, but rather by social costs and benefits. These benefits may include positive externalities associated with an increased calling volume.<sup>43</sup> A negative impact would be that consumers who do not make long-distance calls must pay higher rates without benefiting directly.

Local calling area boundaries are subject to regulatory approval. Hence, regulators effectively determine market boundaries at the same time they determine local calling area boundaries. Therefore, regulators must be sensitive to economic development concerns and explore new approaches for cost-benefit analyses. As the role of telecommunications and information technologies increases in society, regulators' decisions increasingly function as de facto economic development policies. Ideally, these decisions would take place in conjunction with State and local economic development planning.

### **Coordination of Users and Providers: Leveraging Demand and Supply**

Market forces often work against rural areas; this is the case for telecommunications technologies and services. The vast distances and sparse populations that characterize rural life do not generate the economies of scale and scope that make communications technologies more affordable in urban areas. Many of the subsidies that provided telecommunications to rural areas at prices less than the cost of service have disappeared since divestiture. Now rural consumers must also absorb the costs of understanding and configuring telecommunications services and technologies to fit their needs.<sup>44</sup> In this

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<sup>39</sup>*Ibid.*, p. 67.

<sup>40</sup>*Ibid.*, pp. 33-53.

<sup>41</sup>*Ibid.*, p. 50.

<sup>42</sup>Often, a minority of subscribers will make the majority of the phone calls. These subscribers, however, are frequently the community leaders and volunteers, who are integral to the development process.

<sup>43</sup>When Colorado implemented an EAS plan, calling volume in the region increased by 500 percent. The large increase indicated that many people were now communicating because it became affordable. Moreover, increased communication tends to lead to even more communication. With such a growth in calling potential with EAS plans, regulators and local telephone companies must be prepared to make the necessary equipment upgrades to handle the new traffic.

<sup>44</sup>For a more detailed discussion see ch. 3.

new environment, rural communities and businesses must find creative ways to make the same market forces that work to the advantage of corporations also work for them. However, communities will likely encounter regulatory barriers that will inhibit their efforts to exploit the market. In many cases, the same regulations designed to protect small consumers from market abuses can impede their abilities to compete.

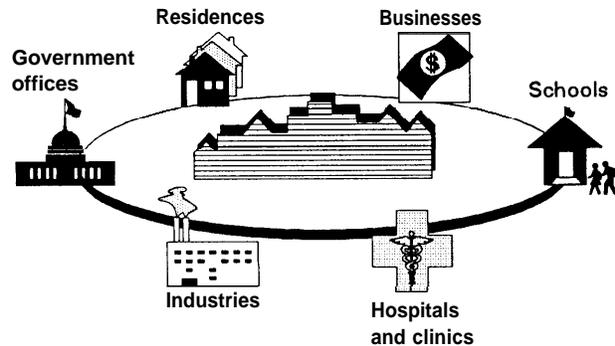
### *Rural Area Networks: Coordinating Users*

Despite their disadvantages in the telecommunications marketplace, rural areas can take advantage of market forces to gain access to advanced telecommunications technologies and services. The notion of Rural Area Networks (RANs) illustrates a strategy that could enable rural communities to do just that. However, the current regulatory environment might discourage or inhibit such demand agglomeration. In many cases regulation may not directly prohibit shared usage arrangements, but to the extent that such arrangements are unprecedented, communities that try this type of strategy could find themselves in the midst of drawn out regulatory proceedings.

### Pricing

Pricing regulation could present an obstacle to using telecommunications as part of a development strategy if RANs utilize the public switched network.<sup>45</sup> In most States, the local exchange carriers (LECs) must file with the PUC for each different rate, or tariff, they might offer to different customer groups—e. g., business, residential, or university—and for different services—e. g., voice, data, or video services.<sup>46</sup> Thus, residential subscribers pay certain rates for the use of the lines to their homes, while businesses, hospitals, and colleges may pay different rates for the lines terminating to their facilities. However, if the local community college were to share broadband capacity with local businesses, extend a link to the community's medical clinic, and connect several other community agencies or businesses with services or markets outside the community, the capacity would no longer be dedicated to the sole use of any of the individual subscribers or for any particular service (see figure 5-2).

**Figure 5-2—Rural Players**



A Rural Area Network can include many different players in a rural community, including small businesses, government offices, hospitals, schools, and community colleges or universities.

SOURCE: Office of Technology Assessment, 1991.

At minimum, an arrangement like the RAN described above would require that the community, the telephone company, and regulators agree on a tariffing arrangement that treated these various users as a defined group. Such agreements are commonplace, but typically involve similar entities. For example, all the State colleges in Vermont are treated as one users' group and thus all face the same rates, which are lower than would be possible if each were treated as individual users. This system benefits both the colleges, with lower rates, and the telephone company, by guaranteeing a sufficient volume of traffic over their lines. Telephone companies typically cannot define a users' group and implement a new rate without filing a tariff with the public utilities commission. Thus, even if a RAN were not controversial, it would likely require a rate hearing and substantial administrative proceeding before it was approved. Most likely, either the LEC or the community would have to hire lawyers and technology consultants in order to file for a regulatory waiver. With a RAN, this process could take a long time and a lot of energy and expense because so many different parties and types of services would be involved.

This scenario also introduces new complications into the cost-based, or de-averaged, pricing strategies that arose in the partially competitive post-

<sup>45</sup>Pricing is not a concern on private networks—except for internal amounting purposes—since private networks are not subject to regulatory oversight.

<sup>46</sup>This is true for States with rate-of-return regulation. The extent to which the local exchange carriers must file tariffs with the PUC will vary under alternative regulatory methods.

divestiture telecommunications market.<sup>47</sup> With a shared arrangement, such as RANs, prices cannot be assigned strictly according to the cost of service for each user or each type of service since it is likely that none of the services could be provided affordably if the other services were not sharing the costs. A tariff designed specifically for RANs might require a reaveraging of costs across different user's groups, and possibly across regions.<sup>48</sup> Moreover, the benefits derived from access to advanced services in rural areas may not correspond to the cost of providing these services. For these reasons, standard cost-benefit analyses would be of limited usefulness in evaluating RANs unless they included the broader benefits of economic development and the opportunity costs of *not* having advanced services available in rural areas. The inclusion of such nonequipment or unquantifiable costs and benefits in regulatory and pricing calculations runs counter to the trend in telecommunications regulation of pricing according to the stand-alone cost<sup>49</sup> of a service.<sup>50</sup> It is critical, however, to consider that the economic models of telecommunications regulation that work well in urban areas may be inappropriate to apply to rural areas.

## Bypass

Just as many large businesses, universities, and State governments are opting to build their own telecommunications networks, some rural communities are finding that creating their own network would be easier than wading through lengthy regulatory procedures and convincing the telephone company that the community could generate sufficient demand for service to justify the investment in sophisticated telecommunications equipment. The town of Bloomsburg, Pennsylvania is taking such an approach. In conjunction with Bloomsburg University and the Ben Franklin Partnership, the town has proposed the construction of a high-capacity digital "highway" to Harrisburg, where it would link up with the access points of all long-distance telecommunications providers (see figure 5-3).<sup>51</sup> Bloomsburg decided to establish its own telecommunications system largely because alternative strategies were unavailable, or unworkable. For example, because the town cannot demonstrate sufficient demand conditions at the present, long-distance carriers are unwilling to invest in the technology that would make the link between Bloomsburg and Harrisburg unnecessary. This route also crosses a LATA

<sup>47</sup>For a more detailed discussion of the movement toward cost-based pricing, see ch. 3.

<sup>48</sup>Prior to divestiture, prices were averaged across consumer groups. Many economists argue that price averaging introduces inefficiencies into the market, which ultimately make consumers worse off. For example, Leland Johnson argues that allocating costs in a way that allows cross-subsidization on the part of the telephone company between profitable and costly services raises the possibility of two types of dangers. First, cross subsidization could enable the regulated firm to keep other, possibly more efficient suppliers, out of the market by pricing their competitive service below the actual cost of providing it and making up the difference in the monopoly market. On the other hand, if the regulated firm is subject to price floors, under which it cannot price its services, Johnson warns of the danger of "umbrella" pricing, under which new entrants could undercut Bell's prices even though their costs would be higher than Bell's costs of offering the service in combination with its noncompetitive services." Leland Johnson, *Competition and Cross-Subsidization in the Telephone Industry* (Santa Monica, CA: Rand Corp., 1982), p. 19.

Concerns about cross-subsidizations can be important in markets that are truly competitive, or even partially competitive. However, the economics of providing telecommunications to sparsely populated rural areas is unlikely to support competitive provision of service, at least until ONA is a reality. John Panzar argues persuasively for the telecommunications monopoly in rural areas. See Panzar, *op. cit.*, footnote 21, pp. 43-50.

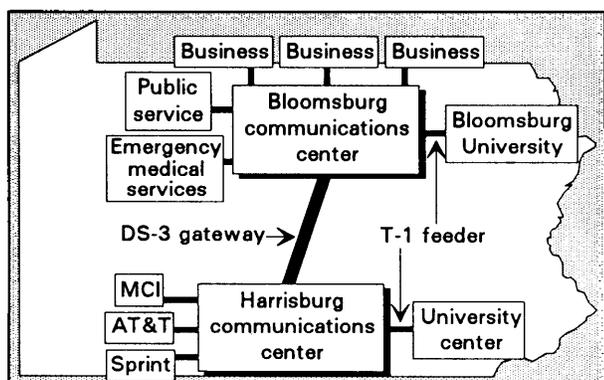
<sup>49</sup>Economists calculate the stand-alone cost of a service to test whether a service is cross-subsidized by or is cross-subsidizing another service. The test aims to capture whether the "revenue of this service exceeds the cost of that service produced in isolation, rather than in combination with others." Johnson, *op. cit.*, footnote 48, p. 19.

<sup>50</sup>Incorporating economic development concerns into the regulatory purview is particularly difficult because the telecommunications industry is in a state of flux, with the final balance of competition and regulation unknowable. Inappropriate cost-allocation rules will yield inefficient price signals, unfairly burdening particular customers. Costing procedures become even more arcane when regulators must determine whether to allot costs within a single time period or across a longer time horizon. This problem is especially difficult for evaluating new products. In particular, with new product pricing, two factors suggest instances in which typical regulatory practices might be quite inappropriate. G.R. Faulhaber and J. Boyd, "Optimal New-Product Pricing in Regulated Industries," *Journal of Regulatory Economics*, vol. 1, 1989, pp. 341-358. First, there are customer "demonstration effects" and network externalities. People become familiar with the capabilities of new technologies by observing how their cohorts benefit from a new service. In addition, some new services are valued on the basis of number in the network having a fax machine is much more useful if many others have compatible equipment. Thus, over time, demand-side effects cause future demand to be a function of current consumption levels. Second, there are producer "learning curve" effects. Longer production runs in early periods promote learning, which tends to lower costs in later periods.

Such intertemporal interdependencies imply that a simplistic cost-allocation scheme could doom a new service. If regulators ignore these caveats, they could reduce the rate of new product development and introduction. Period-by-period cost recovery can be very detrimental to both telcos and consumers. However, the regulator's job becomes difficult because different consumer classes will likely value quality improvements associated with network modernization differently. Moreover, these values will likely change over time, as residential subscribers become familiar with new services.

The town plans to use digital microwave technology to provide the 45 Mbps of capacity between Bloomsburg and Harrisburg. In addition to voice traffic, this network could handle high-speed data, high-resolution graphics, and compressed motion video. Town of Bloomsburg, "Telecommunications Concept for the Town of Bloomsburg," 1990, pp. 4-5.

**Figure 5-3-Bloomsburg, PA Telecommunications Network Configuration**



The Bloomsburg Telecommunications Network aggregates the telecommunications demand of many local users, including businesses and Bloomsburg University. This aggregated traffic then travels along DS-3 lines to Harrisburg, where MCI, Sprint, and AT&T each have points of presence.

SOURCE: Dovetail Systems Corp., "Telecommunications Opportunities for Bloomsburg," Bethlehem, PA, June 1989.

boundary, so Bell of Pennsylvania cannot carry the traffic. Finally, although the public switched network could technically accommodate many of the services the town needs, town officials have suggested it is more economical for the town to build its own system because of the way the regulated services are priced.

The University of Maine faced a similar situation when it was considering expanding its fiber optic distance education network into the neighboring New England States.<sup>52</sup> Although the University worked out an arrangement with New England Telephone to deploy the fiber optic network within Maine, the LEC could not offer its services across the State's border because interstate traffic is the domain of the interexchange carriers (IXCs), such as AT&T, MCI, and Sprint, and is regulated by the FCC. The interstate tariffed rates for DS-3 lines were so prohibitively expensive<sup>53</sup> that it made more sense for the university to build digital microwave links across the State borders to link up with the networks in the other States.<sup>54</sup>

The logistical problems that the University of Maine and the town of Bloomsburg face in developing their RANs will likely confront many rural communities and community organizations as they begin to explore using telecommunications as part of an economic development strategy. Because the regulatory system could not accommodate economic development concerns, Bloomsburg and the University have few options but to bypass the public network. Although building a RAN--or part of a RAN--on privately owned facilities might be the least expensive solution for the immediate future, the cost of many small networks will almost surely exceed the cost of extending advanced technology along the public switched network to these communities. Thus, there is a significant cost of failing to reconcile economic development and regulatory policies.

### *Rural Area Networks: Coordinating Providers*

Consortia of telecommunications providers can take advantage of market forces in much the same way that coalitions of users can leverage market power to gain access to advanced telecommunications services and technologies. By cooperating or entering joint ventures, telecommunications providers can distribute the high costs and diminish some of the risk of investing in advanced telecommunications technology in rural areas. However, regulatory restrictions and anti-trust considerations often prevent or impede such arrangements from developing. In many cases, the regulations and laws that inhibit the formation of a telecommunications consortia were developed to protect consumers from market abuses that typically occur when suppliers collude with one another.

Iowa Network Services (INS) illustrates the problems that could arise if telecommunications providers ally to create RANs. INS is a consortium of 128 of Iowa's 150 independent telephone companies that joined forces in 1984 to build a fiber optic network providing centralized equal access to rural communities across the State.<sup>55</sup> Individually, none of the independent companies could have afforded to

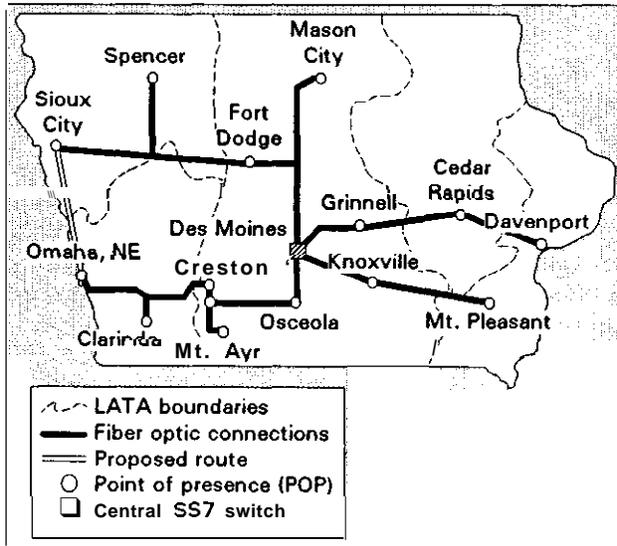
<sup>52</sup>The expansion has not yet occurred.

<sup>53</sup>The interstate rate is so expensive because of the capacity required to transmit a video message, like those used for distance education or teleconferencing. Essentially, sending one video message is equivalent to sending thousands of data streams.

<sup>54</sup>Estimates for the tariffed DS-3 lines were around \$1.2 million, compared to the \$300,000 to \$400,000 estimated cost of the microwave links.

<sup>55</sup>William H. Davidson, Anne C. Dibble, and Sandra C. Hem, *Telecommunications and Rural Economic Development* (Redondo Beach, CA: MESA Inc., 1990).

Figure 5-4-Iowa Network Services



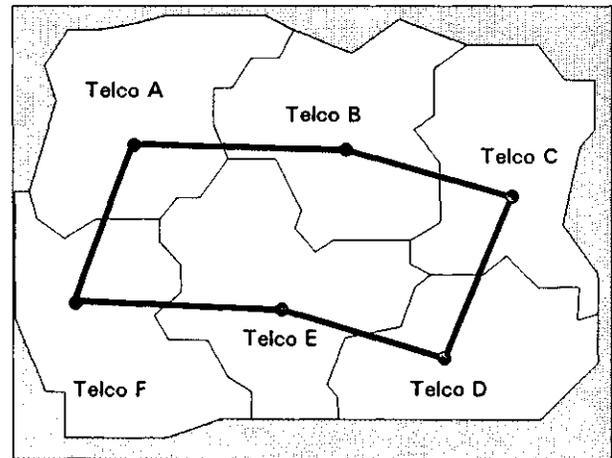
Iowa Network Services is a consortium of independent telephone companies, who jointly invested in a fiber optic network and an SS7 switch.

SOURCE: *The INS Story* (Des Moines, 1A: Iowa Network Services, 1990).

provide such sophisticated services to their rural customers. Organizing the consortium and finding financing for their venture proved to be only the first hurdle these independent companies encountered in offering advanced telecommunications capabilities to their customers. The BOC serving Iowa brought an anti-trust suit against INS in an effort to block the network. The suit failed, but it took 31/2 years of Federal and State regulatory hearings and proceedings before INS could offer its services (see figure 5-4).<sup>56</sup>

In contrast to the INS experience, a group of independent telephone companies in South Carolina encountered few regulatory or legal obstacles when they joined together to form a fiber optic network, called PalmettoNet. Each participating, independent telephone company built, operates and maintains the section of the network that passes through their territory. The consortia, PalmettoNet, then leases capacity from the individual companies to create the unified network (see figure 5-5).<sup>57</sup>

Figure 5-5-Palmetto Network Configuration



PalmettoNet is a consortium of independent telephone companies in South Carolina, who jointly invested in a fiberoptic network.

SOURCE: Harmeet Sawhney, University of Texas at Austin, 1991.

Arrangements such as Iowa Network Services and PalmettoNet take advantage of synergies to make market forces work to the advantage of rural subscribers. These approaches require strategic planning at the regional level, rather than at the level of each independent telephone company.<sup>58</sup> Thus far, such consortia are largely unprecedented. Therefore, their legality or feasibility remains untested in many markets. As the examples show, it is difficult to predict the extent to which companies will face regulatory or legal obstacles. Where uncertainties exist, stakeholders who are opposed to the strategy might use the regulatory and legal system to halt progress on such a project. Therefore, anti-trust suits will be likely if the dominant carrier in a region perceives such networks as a competitive threat.

Currently, regulatory and development policy in most States and at the Federal level is unprepared to deal with creative approaches, such as user coalitions and provider consortia, to technology deployment in rural areas. If rural areas are to access advanced communications technologies in an economical fashion, it is critical that policymakers at the local, State, and Federal levels think about and plan for such arrangements.

<sup>56</sup>Ibid.

<sup>57</sup>Harmeet Sawhney, "Complementarily Strategy," contractor document prepared for the Office of Technology Assessment, November 1990.

<sup>58</sup>Harmeet Sawhney, "Rural Telecommunications: A Cultural Hypothesis" (draft), doctoral dissertation, The University of Texas at Austin, 1991.