

## TELECOMMUNICATIONS MODERNIZATION: WHO PAYS?

prepared for the

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## EXECUTIVE SUMMARY

The study has been motivated by the fact that telephone utilities are spending increasing amounts of capital to modernize the basic telecommunications network infrastructure that is used to provide both regulated and unregulated services. The modernization of embedded telecommunications plant and facilities confronts regulators with significant policy challenges, because the timing of the replacement of plant rarely coincides with the cost recovery of the investment in either the old or the new facilities. Moreover, changes in the industry that have led to increased "below-the-line" business activities using common (rate base) plant have also led to a potential mismatch between the parties who pay for the new plant and those who enjoy the benefits of services produced by - and profits derived from - that new plant. Finally, a policy of accelerated plant modernization leads to increased retirements of plant prior to the date at which such retirements would have been originally expected based upon normal mortality curves for the facilities. This, coupled with the investment cost in the new plant, increases the effective capital costs for the new plant, at least in the short term. The increased capital costs must be weighed against two potential benefits associated with the more modern facilities: decreased maintenance costs and additional and/or improved services.

The dilemma for regulators in responding to the pressures for modernization of facilities is that, while the underlying economic theory is clear and easily understood, an assessment of specific capital decisions is rarely straightforward. The introduction of new technologies often brings with it the availability of new services along with cost efficiencies in the provision of existing services. There is seldom agreement among all parties as to the relative merits of the new services for different classes of customers or as to the benefits of the operating efficiencies that should be attributed to existing services. As the telecommunications industry evolves, it is apparent that new facilities will be used both to furnish existing services more efficiently and to provide new services, some of which may be furnished on an unregulated basis. Regulatory authorities are called upon to determine how costs attributable to new facilities should be allocated between existing and/or "above-the-line" services and new and/or "below-the-line" services. The cost allocation affects the rate base, and hence the rates, that customers pay for regulated services. It influences the price that a telecommunications utility can justify for a potentially competitive service, and it affects the economic viability of the modernization decision itself. Thus, a regulator's choice among many options becomes a policy decision of enormous significance both for customers and for the competitors of the regulated telecommunications firms.

Two extreme views of the response to the "who pays?" question exist. Some would advocate that only those who use new network features should be assigned responsibility for the cost of the new facilities. "Basic" service, as it is defined today, would bear none of the costs of modernization. Under this scenario, the concept of basic service would never expand to include additional features and benefits that become available through the more modern facilities. At the other extreme, the cost of all network enhancements would be borne by the general body of ratepayers because all would ultimately benefit from access to a state-of-the-art infrastructure. While this view permits an upgrading of the definition of basic service as the network evolves, it

also requires state regulators to coordinate the utilities' regulated and unregulated costs to ensure that neither ratepayers nor competitors are disadvantaged by whatever cost allocation policy is adopted.

State regulatory commissions have long taken the position that modernization activities must be justified based upon demonstrable improvements in operating efficiency, either in the short run or over the longer term. Modernization for its own sake has not been allowed. The cost/benefit analysis typically relies on a "discounted cash flow" study, such as the Bell companies' CUCRIT, that compares the costs of maintaining embedded resources with the costs of replacing the older plant with more modern facilities. Among the factors that can be included in the analyses are the savings in operating expenses anticipated with the newer facilities and the additional revenues generated through sales of new services that becomes possible only with the newer equipment and systems in place.

Questions of attributing benefits of more modern plant between basic regulated services and competitive or potentially competitive services had not arisen until very recently. In a proceeding before the Public Service Commission of the District of Columbia (DC PSC), regulators confronted the issue of how to allow the Chesapeake and Potomac Telephone Company (C&P) to compete for business customers with a digital Centrex offering. The DC PSC fashioned a plan that would allow C&P to develop "Individual Case Basis" rates for Centrex service for specific customers in exchange for assurances that the risk of recovering the investments made to satisfy those customers' needs would be borne by the shareholders and not by the general body of ratepayers. Thus, the DC PSC has established a principle that, when the utility gains flexibility in pricing and marketing new services in competition with other firms, the risks and responsibility for recovery of the investment needed to furnish that service should be shared in proportion to the risk between the general body of ratepayers and the shareholders.

The California Public Utilities Commission (California PUC) has also recently reviewed modernization activities of Pacific Bell. The California PUC Staff has recommended a penalty in the form of a rate reduction against Pacific Bell because it found its modernization projects to be unreasonably risky. Pacific Bell responded to the Staff recommendation by suggesting that the Staff had not adequately considered the benefits of modernization such as maintenance savings, productivity improvements, and additional revenues. These factors could have and should have been included in the discounted cash flow analysis used by Pacific to analyze its modernization program. Thus the California PUC may question whether there are benefits associated with Pacific Bell's modernization program that cannot be translated into quantifiable factors, and if so, how the policy issues associated with these intangibles can be adequately addressed.

Regulatory commissions will be required to assess modernization projects involving facilities that are used to furnish both regulated and unregulated services. A mismatch of costs and benefits from these projects can occur if costs and revenues are not consistently allocated between the ratepayers and the shareholders. A mismatch can also occur if there is a change in the regulatory status of one of the services furnished using upgraded plant subsequent to its acquisition. Finally, the cost of capital of a regulated firm may change as the firm takes on increasingly risky activities. Each of these potential cost/benefit mismatches arises because the telecommunications utility is no longer providing only regulated services. Since it is neither possible nor desirable, given the present state of the industry, to return to an environment where regulated utilities offer only regulated services, the policy challenge is to devise a method to reduce or eliminate these potentially significant cost/benefit mismatches.

## Telecommunications Modernization: Who Pays?

As a practical matter, the sharing of risks and responsibility between ratepayers and shareholders must be accomplished by an allocation of investment between "above-the-line" and "below-the-line" activities. The first principle for this allocation is one with which regulators are already familiar: Regulators have traditionally taken the position that economic benefits to ratepayers must exceed the additional costs of modernization if the modernization project is to be approved. Since tangible benefits from reduced operating expenses and increased sales of new services can be quantified, this threshold standard should be maintained.

On the other hand, ratepayers should not be required to fund a portion of plant that is either initially or ultimately dedicated to non-regulated activities, *even if they would benefit from the cost savings attributable to the modernization standing alone*. Thus, a cost allocation should fairly divide the investment between plant that is used for regulated services and resources that are intended for unregulated activities.

To ensure that the investment is not overallocated to regulated services, the utility should not be permitted to reassign "spare" facilities that had originally been allocated to regulated activities to an unregulated business, without compensating the regulated services at a level that is comparable to the cost that would have been faced by a competitive firm acquiring those same additional facilities. There are several ways to determine the level of this compensation. One is to reallocate the investment retroactive to the date on which the facilities were installed, with all carrying costs for the investment also charged to the unregulated activity. Because this may result in an unreasonable penalty if the reallocation occurs long after the initial investment, it may be necessary to cap the length of time for the reallocation. Alternatively, investment could be reallocated only prospectively, with a premium payment made to the relevant regulated capital accounts to recognize the incremental cost that the unregulated activity would have paid if it were otherwise required to acquire the facilities on a stand-alone basis.

This study examines basic questions of allocation of the risks and responsibilities for recovery of capital investment as the telecommunications industry evolves. The question of "who pays?" for more modern facilities has become much more complex as the traditional telecommunications utilities have expanded their opportunities for competitive activities using the common telecommunications network infrastructure. The report attempts to strike a balance among the sometimes conflicting interests of basic ratepayers, more sophisticated consumers of telecommunications services, competitors of the traditional telecommunications carriers, and the regulated firms themselves. Regulators can best assure that the stakeholders who benefit from modernization bear the cost of that activity by:

- Requiring the utilities proposing modernization programs to provide a cost/benefit analysis to support the program that clearly identifies the costs and the benefits both for ratepayers and for shareholders;
- Developing an allocation procedure that assigns the costs associated with modernization consistent with the distribution of the benefits, and also encourages regulated firms to use their best efforts to accurately assess the impact of the program; and
- Monitoring the impact of the modernization program and providing for mid-course corrections to ensure that the allocation of costs continues to track the distribution of benefits.

## Telecommunications Modernization: Who Pays?

Successful implementation of this policy will mean that as a nation we will continue to enjoy high quality, low cost telecommunications services with the assurance that the costs and efficiencies associated with a modern integrated infrastructure will be equitably distributed among all stakeholders.



## PREFACE

The study has been motivated by the fact that telephone utilities are spending increasing amounts of capital to modernize equipment and facilities used to provide both regulated and unregulated services, and seeks to address policy questions regarding the distribution of costs and benefits of modernization activities. The purpose of the study is to provide NRRI and state regulatory agencies with data and analyses that examine the potential regulatory treatment of capital expenditures devoted to modernization and that assess the potential impact that such modernization efforts may have on consumers of telecommunications services.

Douglas N. Jones  
Director, NRRI

Columbus, Ohio  
September, 1988



## SECTION I

### A PERSPECTIVE ON NETWORK MODERNIZATION

Viewed in its largest sense, the telecommunications infrastructure in the United States is a basic national resource whose role in American society and in our economy is probably incalculable. For nearly a century the custody and management of that resource was vested in a partnership of non-overlapping franchised local and long distance common carriers under a "natural monopoly" industry and regulatory model. Under the "social contract" within whose framework the U. S. telecommunications infrastructure was managed, the franchised carriers ceded their opportunities to extract supracompetitive prices and profits in exchange for which their dominance and, in most instances, virtual exclusivity within their franchised operating territories was assured by government fiat. Although this industry model has undergone dramatic change over the past decade or so, it is instructive in this context of our present examination of the "network modernization" issue to begin by observing how such matters were implicitly dealt with under the historical regulatory environment and how the current post-divestiture era has altered that policy scenario.

As discussed in the January 1988 Report prepared by NRRI on "Telecommunications Modernization: Issues and Approaches for Regulators" (the "NRRI Report"), modernization of the embedded telecommunications network facilities presents issues of great importance to regulators because the timing of the replacement of embedded plant and facilities rarely matches the timing of the cost recovery of the investment associated with those facilities. In the pre-competition, pre-divestiture era, the policy consequences of such a temporal mismatch of costs and benefits, while still presenting some of the same concerns as exist today, would not have been as severe, since ultimately, it was assumed, those ratepayers who bore the costs would also realize the eventual benefits.<sup>1</sup> This is no longer the case. Ratepayer-funded capital outlays can be and are used to support deregulated and other "below-the-line" business activities of the telephone utility or of its corporate affiliates, and so the mismatch in *timing* is exacerbated by a mismatch between those who pay for versus those who benefit from modernization expenditures.

Most often the decision to modernize increases the rate at which *existing* plant is retired and replaced, causing plant to be taken off the books sooner than would have been expected on the basis of the original mortality curve. The financial effect of this process is the creation of a "reserve deficiency" that is resolvable both through higher future depreciation rates (on both embedded and new plant) and through amortization of the deficiency itself. Other treatments include tax write-offs and write-offs against shareholders, although the latter course of action, while used in other utility fields, has not been extensively used for telecommunications utilities.

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1 The assumption is only that, *on average*, ratepayers would both bear the costs of modernization and realize the benefits through reduced rates for monopoly services. It is possible, and indeed likely, that there were mismatches of costs and benefits among various *classes* of customers. The nature and extent of those past mismatches are not a focal point of this report.

Moreover, since the retired plant is itself being replaced with new facilities whose cost must also be recovered from ratepayers, the short-term impact of a modernization program is increased capital costs for the telecommunications utility.

The merit of such increased capital costs must be weighed against two possible sources of benefit for the utilities' customers - decreased maintenance and/or operating costs for the new facilities, and additional or improved services that can be provided only by the new facilities. In some instances an analysis of the replacement will indicate that the economic trade-offs favor the new plant because the ongoing cost savings associated with the new facilities will more than offset the additional capital cost associated with the premature retirement of existing facilities.<sup>2</sup> Nevertheless, even in those instances, the question of "who pays?" for the new facilities must still be answered.

## Evolution of the Telecommunications Infrastructure

Ultimately, of course, the regulatory treatment of the capital expenditures will answer the question of who pays for the new facilities; however, modernization is not simply an economic issue. It is also important to examine the scope and availability of new services that modernization allows, as well as the issues of who "needs" or "wants" them. But industry/regulatory structure notwithstanding, the telecommunications infrastructure is not a *static* resource; it evolves continuously to incorporate new technologies and to satisfy new user demands. Long before the "closed" telecommunications industry was opened to competitive entry and regulatory reform, the network had undergone dramatic changes. From simple manual cord switchboards network switching evolved through several generations of electromechanical and then electronic switching technology. Transmission systems evolved from discrete copper wire pairs through frequency division carrierized cable and radio systems, through satellites to digital cable, radio and most recently fiber optic transmission media. Network signalling evolved from the earliest magneto telephones through various forms of in-band signalling, direct distance dialing, and most recently to out-of-band signalling and control systems such as Common Channel Interoffice Signalling.

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2 For a monopolist, however, the ability to allocate costs to captive, monopoly customers means that the traditional economic "net cash flow" analysis test may not be interpreted in the same fashion as would be done by a profit maximizing, unregulated firm in a competitive market. For an unregulated firm, modernization is only chosen when the modernization will produce a greater net future revenue stream than the option of not modernizing. To make any other decision, at least in the short term, would not maximize firm profits. This disciplines the firm to make accurate forecasts. For a regulated utility, an incentive exists to conduct what looks to be the same type of economic analysis, but instead to augment the future revenue streams (from new services) required by the analysis by allocating a disproportionate share of the costs to monopoly ratepayers. Thus, a utility could have, on paper, a positive net future revenue stream for its modernization effort that might not be "positive" if the monopoly ratepayer paid a share exactly proportionate to the direct, short-term benefits it would receive from the modernization program. Such analyses must be interpreted with care. As will be seen in later sections, our comments necessarily assume an objective economic modernization analysis.

Throughout all of this evolution, the question of "who pays?" for network modernization was *implicit* in the regulatory system itself: Under traditional "rate of return" regulation as practiced in virtually every state and federal jurisdiction, the franchised carriers would undertake the necessary research and development, develop construction plans and capital budgets, and make the investments necessary to achieve their network development goals. As long as their actions were reasonably prudent and their investments were for assets that were "used and useful" in the provision of regulated telecommunications services, the franchised carriers could be assured full recovery of their investment plus a "competitive" return thereon. The costs - depreciation expenses (capital recovery), cost of money (return and associated income taxes), and ongoing operating expenses, were charged to and recovered from customers of regulated services - "ratepayers" - within the overall public utility regulatory revenue requirement. Utility management made both the "how much?" and the "who pays?" decisions, subject to what in most instances amounted to "passive ratification" by the responsible regulatory agencies.<sup>3</sup>

But the "closed" and highly regulated telecommunications industry has been replaced by a more "open" market structure in which many *legal* barriers to entry have been removed. No longer are the franchised utilities the sole custodians and managers of the telecommunications infrastructure. That responsibility is shared among the incumbent dominant firms and their newer start-up rivals. Besides opening the industry to new entry, the current regulatory structure also permits *regulated* dominant carriers to themselves engage in *unregulated* lines of business, in some cases within certain defined limits, and to pursue both their regulated and unregulated businesses out of a common corporate organization and resource base. In the "closed" market structure, capital investments were made for the benefit of "ratepayers" and were in the end financed by these same "ratepayers."<sup>4</sup> But where the utility itself has the opportunity to engage in both regulated and unregulated businesses, the costs and the benefits of its capital investments will necessarily be shared (in some manner) by its "ratepayers" and its "stockholders." Precisely *how* that "sharing" actually takes place - and more specifically the extent to which it is consistent on both sides of the cost/benefit equation - is probably the most visible factor both in addressing the "who pays?" question in the post-open entry era and in framing the key public policy questions raised thereby.

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3 Proponents of "price caps" and other alternatives to traditional "rate of return" type regulation argue that this arrangement resulted in "gold plating" of the nation's telecommunications infrastructure. The theory is that under traditional regulation, the utilities were confronted with incentives that tended to encourage, if anything, overcapitalization because the marginal cost of capital was typically below the marginal return thereon. While one result of this "gold plating" might be that, as a nation, we have paid more for our existing telecommunications network than might have been necessary, one important virtue of the traditional ROR/"closed" industry environment is that utility management could pursue network modernization decisions with a longer time perspective than is possible in a more competitive, "next quarterly report"-oriented incentive structure. Even if the economic benefit of a particular investment was far from immediate, it could still be justified - and would still have been prudent - if in the long term it would ultimately inure to the benefit of the ratepayers who funded it.

4 Of course, this result applies only on average. It was always a matter of contention as to whether each monopoly customer class was repaying this investment in direct proportion to its benefit from or use of the new facilities.

## Regulatory Review of the Decision-Making Process

That regulators will increasingly be called upon to set policy with respect to the treatment of costs associated with installation of new facilities cannot be questioned. There is perhaps no time in the history of the telecommunications industry where the pressures on telecommunications utilities to modernize their facilities have been so great as they are today. The Regional Bell Operating Companies (RBOCs), in particular, believe that their future depends upon their ability to offer services that compete with other suppliers of telecommunications-based products and services. While the RBOCs are still subject to restrictions on their activities as delineated in the *Modified Final Judgment* (MFJ),<sup>5</sup> these firms are presently expanding their offerings through modifications to and waivers of these restrictions. Further, the RBOCs hold the continuing hope that all of the restrictions will be eliminated in the not-too-distant future through legislative action if not through the courts. The RBOCs had initiated modernization programs, in part, to comply with MFJ and FCC requirements for equal access for interexchange carriers; however, the perceived need to be ready to offer competitive services whenever their remaining line of business restrictions are lifted has caused the RBOCs to press ahead with modernization plans. Thus, the pace of replacement of existing, older technology facilities is likely to increase in the next few years.

The dilemma for regulators is that, while the *economic theory* underlying modernization decisions can be readily understood and explained, the actual assessment of capital decisions made by telecommunications utilities is rarely straightforward. Specific plant decisions are not generally driven by a single goal. The introduction of new technologies often brings with it the introduction of new services. These new services might consist of enhanced or information services that the RBOCs themselves would like to offer, or they may involve network access functions such as "Open Network Architecture" basic service elements that independent enhanced and information services providers have requested from the RBOCs to improve these firms' ability to offer new products and services. Thus, any plant replacement decision where the existing facilities are replaced with facilities that incorporate the new technology will afford increased service opportunities to the telecommunications utility *whether or not the basic POTS needs alone would have justified the decision*. Further, regulators will undoubtedly be faced with the need to set policy on how costs will be allocated between new and existing services, either of which may be regulated or unregulated.

For example, a decision to replace an existing crossbar central office switch with a new digital switch may be driven by several different factors, including both the desire to offer new services and the need for additional capacity for POTS customers. Whether or not there are offsetting benefits attributable to the replacement, e.g., decreased maintenance costs or the ability to avoid a building addition that would otherwise be required, regulators must answer the question of who pays for the new switch. Some would argue, at one extreme of this debate, that as long as the replacement *can* be justified on the basis of a net benefit to POTS customers, then all of the capital costs should be allocated to POTS *even if other regulated and nonregulated services also derive some benefit*. At the other extreme, the argument has been advanced that these *other* services should bear the main capital costs as long as they derive benefits, with POTS bearing only a small residual cost or none at all. Some would suggest that the first approach gives new, potentially competitive, services a "free ride" at the expense of the POTS customers. At the other extreme, the argument goes, all of the costs of the new facilities should be assigned

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<sup>5</sup> *U.S. v. Western Electric*, Civil Action No. 17-49, U.S. District Court for the District of Columbia, 1982.

to new services, since, absent the replacement, such services could not be offered in the first place. Clearly, the choice among these policy alternatives, or some middle ground between the extremes, is a policy decision of enormous significance both for the customers and the competitors of the regulated telecommunications utilities.

As noted above, state regulatory commissions have already begun to identify alternatives for treatment of capital expenditures, because for some time they have been faced with changing competitive conditions. For example, the Public Service Commission of the District of Columbia (DC PSC) has had to address the potential for and treatment of stranded investment and modernization plans of the C&P Telephone Company that arise from changing conditions in the market for Centrex services. In one recent proceeding (discussed at length below), the DC PSC addressed the relative costs and benefits to the ratepayers associated with C&P's marketing plans for a new digital Centrex service intended to be competitive with developing PBX alternatives. The Commission also recognized that the introduction of new services that made use of common facilities requires a reassessment of the assignment of risk associated with the new investment. While in the past the common facilities that were used in the provision of the new service would simply have been included in the regulated rate base and charged to ratepayers, the opportunities for a LEC to use these same facilities to provide competitive services means that the telephone utility must share in the risk of recovering the investment. The regulatory treatment adopted by the DC PSC, which is intended to spread the costs and the risks of the old and new investment appropriately in accordance with the perceived and actual benefits, is one model that must be examined.

The NRRI report also notes that the experience of regulators in dealing with investment in nuclear power plants may be relevant to the questions associated with investment in telecommunications facilities. Specifically, there have been recent instances where nuclear plants have been abandoned, and regulators have had to determine whether and how the investment in the abandoned facilities can or will be recovered from ratepayers. To the extent that older generation telecommunications facilities are retired before the planned end of their useful life, the issues are, indeed, similar. However, the very different nature of the products and services produced by these industries means that the issues ultimately presented to regulators turn on different factors. In the case of the electric power industry, there is a single commodity, electric energy, produced, and the capital decisions affect primarily the cost of producing that commodity. In the case of telecommunications, as noted above, the modernization of facilities usually brings with the opportunity to sell additional and/or improved services, and capital decisions also affect the utility's revenues, both above the line and below the line. Thus, while there are some lessons to be learned from the regulators' experiences with the nuclear industry, the policies for telecommunications modernization will necessarily be quite different.

### Two Views of "Who Pays?"

The issue of "who pays?" can be framed by examining the two extreme positions in this debate. The appropriate policy prescription will likely fall somewhere inside of this range.

**Only those who need the new network features should pay.** Under this theory, the costs of all network modernization programs are to be borne solely by those who *directly* benefit from the new features and services made possible thereby. The definition of "basic" service would thus be based upon the standard network offering as it exists at a given point in time (e.g., today). Any enhancement of the infrastructure beyond the capabilities necessary to support that "frozen" definition of "basic" service would be automatically *and permanently* treated as "non-basic." As such, any network enhancements beyond those embraced by the fixed definition of "basic"

would have to be priced at a level sufficient to fully recover all of the costs of upgrading the network to a point where the enhancement can be offered. This approach would preclude an orderly technological evolution of the network over time. For example, had the definition of "basic" been established prior to the availability of Touch Tone signalling, this would have been classified as "enhanced" and would permanently be priced at premium levels. Society's needs are not frozen for all time, and the concept of "basic" telecommunications services must be flexible enough to change over time.

**All network enhancements are funded by the general body of ratepayers.** This theory basically preserves the "closed" industry model at least in regard to the assignment of *costs* associated with network modernization. The network infrastructure continues to evolve in response to new technologies and new demands. The costs of achieving and supporting a modern, state-of-the-art infrastructure must, as they have in the past, be borne by the general body of ratepayers. Under this scenario, the specification of "basic service" is not frozen, but itself is permitted to change over time, as it has in the past. However, in the context of a "competitive" telecommunications marketplace, there is no precise commitment to evolve the definition of "basic service" at precisely the same rate as that characteristic of the underlying capabilities of the network itself.

There are several ways in which this can occur. Under a relatively conservative (from a regulatory standpoint) approach, the network may be upgraded to provide for universal availability of touch tone signalling, but the feature itself is still treated for ratemaking purposes as a premium item that is nonetheless still subject to the aggregate regulatory revenue requirement. In a more aggressive arrangement, only "basic" services would remain regulated, with "enhanced" services - those that while still utilizing the same network infrastructure extent beyond the then-current definition of "basic" - would be unregulated and proprietary to the utility's stockholders. As we shall discuss at considerable length below (Section V), this model demands a close coordination between regulated and unregulated costs and benefits at a level that has frequently been resisted up to now by the principal dominant telecommunications carriers. Nevertheless, some state commissions have begun to recognize the need for this coordination. In the next section, we will examine the existing state regulatory policies with respect to capital recovery where the impetus for the construction program has been modernization, particularly those which recognize the need to establish a policy for use of common facilities by multiple regulated and unregulated services.



## SECTION II

### PLANT CONSTRUCTION AND REPLACEMENT

Since the introduction of telephone service more than a century ago, the telecommunications infrastructure has been continuously evolving. As the country and the subscriber base have grown, telephone companies have added new plant to meet the new demands on the system. New technology and innovations to the network have been incorporated into the existing facilities through construction programs. While the reasons for construction of telecommunications plant include the desire of telephone utilities to upgrade older facilities, modernization is certainly not the only basis for initiation of construction jobs. In general, it has been the telephone company practice to classify construction jobs into categories of growth, modernization, and plant replacement (where "replacement" refers to the replacement of damaged or worn out, as opposed to obsolete, equipment). [See, for example, *Re New York Telephone Company*, 54 PUR 4th 220, 292.]

In theory the factors that drive the classifications are relatively self-evident. If a length of cable is damaged during a storm and must be replaced, the job would be classified as "replacement."<sup>6</sup> If an additional switch (or switching component) is required to accommodate new customers in a particular central office, the job would be classified as "growth." Finally, if the purpose of the job is to replace an electromechanical switch with a digital facility, the job would fall into the modernization category. However, in practice, the assignment of investment funds among these categories is less straightforward. A single job need not be assigned to one category. Indeed, often the investment dollars associated with a single job will be allocated among all three categories, and the reasons for the allocations may appear to be arbitrary.

A telephone company's construction budget is commonly reviewed during the course of a general rate proceeding before a state regulatory commission and, as will be discussed in the next section, expenditures that are designated as modernization-related have been subject to review by a number of commissions. However, the actual classification of expenditures - as growth, modernization or replacement - has rarely been examined in regulatory proceedings. Nevertheless, a relatively recent New York case demonstrates the difficulty with such categorization.

New York Telephone (NYT) had estimated construction expenditures for 1983 of approximately \$1.2 billion, of which 33% were classified as modernization-related. [54 PUR 4th 220, 292.] Following criticism of the level of modernization expenditures by the New York Public Service Commission Staff, NYT filed a revised construction forecast that reduced the level of modernization expenditures for 1983 but increased the growth and replacement expenditures. [*Id.* at 292-293.] The Commission concluded that NYT had failed to provide a satisfactory explanation for the increases to the growth and replacement expenditures and the decrease in modernization expenditures and, accordingly, upheld an adjustment to the construction. [*Id.* at

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<sup>6</sup> It is not always apparent from the cause of a replacement job whether the activity will be classified as maintenance or capital. The treatment of the expenditure is determined using FCC accounting rules for telecommunications utilities. The criteria used for classification is typically the size of the job.

294.] Clearly, the Commission's concern in this proceeding was that NYT's revisions to its construction budget were arbitrary changes to the categorizations rather than substantive changes to the actual construction budget.

That is not to suggest that there is no relationship among the categories of expenditures. Modernization projects will provide additional capacity for growth that would not necessarily be available if the modernization project is deferred. Thus, growth expenditures could increase as modernization expenditures decrease. By the time of the next general rate proceeding in New York this factor had entered the discussion of NYT's construction budget. [61 PUR4th 337, 396.] The Administrative Law Judges concluded that substantial cuts in NYT's proposed modernization program could indeed lead to a "'growth backfill' penalty." [*Id.* at 396.]<sup>7</sup>

In sum, modernization is one of three major categories used by local exchange carriers to classify construction expenditures, the others being growth and replacement. To date, there has been little review of factors used to allocate investment among these categories, and there is some evidence that such classifications are, at least in part, relatively arbitrary. Nevertheless, as we shall discuss further, modernization decisions do impact the local exchange carriers' opportunities for future growth of both regulated and unregulated services and the revenues associated therewith. The need for state regulatory commissions to understand and to review such expenditures will continue to grow.

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<sup>7</sup> While this concern tempered the Judges' concerns with respect to adjustments to NYT's construction budget, they nevertheless recommended, and the Commission upheld, adjustments to NYT's construction budget that were designed to recognize reduced actual expenditures and to cap modernization expenditures based upon past experience.

### SECTION III

#### STATE COMMISSION STANDARDS FOR REVIEW OF MODERNIZATION EXPENDITURES

As noted above, utility construction expenditures, and particularly modernization expenditures, have been reviewed by a number of state regulatory commissions. There are several general observations that can be made with respect to these proceedings and the accompanying decisions. First, the general approach to review of these matters has focused on the economic impact of construction on ratepayers through changes to the rate base as well as changes to the utility's expenses. The question that commissions have examined is whether costs associated with modernization of the telecommunications infrastructure are outweighed by the economic benefits enjoyed by the ratepayers.

Second, while the general concern with the economic outcome of the decisions is similar to that used for other regulated utilities, such as the nuclear power industry, there is a fundamental difference between the nature of the decisions in the electric power industry generally and those that are made in the case of dominant telecommunications carriers. Unlike the electric power industry, the decision to modernize telecommunications facilities often brings with it the ability of the telecommunications utility to offer new services and, hence, the ability to generate additional revenues. These revenues may be "above the line" (i.e., associated with regulated services) or they may be associated with unregulated activities and thus "below the line." As discussed in Section V below, this difference makes strict comparisons between treatment of electric utilities' plant construction decisions and telecommunications utilities' modernization decisions inappropriate.

Finally, commissions have raised the traditional standards of "prudence" and whether plant is "used and useful" in the context of telecommunications utilities' modernization decisions. These standards are directed to the classic economic analysis that examines management decisions against the costs and benefits to the ratepayers. However, the fact that new equipment leads to new services and additional revenues, whether or not included in the regulated rate base, adds a dimension to the analysis that makes it difficult to apply such standards to modernization decisions. "Prudence" or the "used and useful" nature of plant will no longer be the only questions before commissions. As we will discuss in detail in Section V, the changing regulatory structure of the telecommunications industry suggests that the appropriate assignment of risks between the ratepayers and the utility's shareholders will be based upon cost allocation principles that recognize management prerogatives to choose to expand service offerings so long as the investment risks associated with those offerings are not borne by the ratepayers. Prior to that discussion, however, in this section we will review several recent decisions by state regulatory commissions that demonstrate the present methodology used to analyze telephone utilities' construction programs.

## Recent State Decisions on Modernization Expenditures.

There have been a number of state regulatory decisions in recent years in which the commissioners have specifically stated that the decision to construct new plant must be based upon an economic analysis that demonstrates that the benefits to the ratepayers exceed the costs of the project. The Kentucky Public Service Commission articulated this standard, including the observation that it could be met by use of a discounted cash flow study, in a 1984 decision. [62 PUR4th 624, 635.] The Commission established the requirement for economic justification for modernization projects in no uncertain terms:

Where facilities presently exist and provide adequate service a company must prove that modernization is the most economical plan of action if the company intends to proceed in that direction. To do this the company usually performs discounted cash flow studies over a suitable period which compare the cost associated with retaining the existing equipment and replacing it with more modern equipment.

[*Id.*]

Earlier in the same year, the Kentucky Public Service Commission had specifically noted that South Central Bell (SCB) had an obligation to demonstrate that modernization programs would benefit customers as well as the company. After reviewing SCB's proposed construction expenditures, the Kentucky Public Service Commission ruled:

Dramatic changes in telephone technology, coupled with the introduction of competition in the industry, have resulted in significant construction activity by SCB aimed at modernizing its facilities. It is incumbent upon SCB to demonstrate that the equipment replacement and modernization programs are being performed in a manner that ensures that they are beneficial not only to the company, but to its customers as well.

[58 PUR4th 196, 241.]

The North Dakota Public Service Commission faced the issue of the cost of modernization of plant in connection with establishing the proper employee levels for the Northwestern Bell's test year. Northwestern Bell had argued that a commission staff adjustment based on a productivity improvement attributable to modernization programs was inappropriate because the staff had failed to identify specific programs which would result in employee reductions. [57 PUR4th 446, 451.] Bell further argued that it could not identify any employee reductions associated with additional construction. The North Dakota Commission was unimpressed with Northwestern Bell's protests. The Commission observed that much of the new construction was associated with modernization rather than expansion and concluded:

There would be little purpose in these modernizations if they could not contribute to improved productivity through decreased operating, maintenance, and employee costs.

[*Id.*]

In Vermont, commentators at public hearings on a New England Telephone (NET) proposed rate increase worried that the increase was in part attributable to NET's substantial construction budget, including expenditures for modernization. [71 PUR4th 652, 656.] The Vermont Public Service Board noted these concerns and set forth its view of the Board's obligations to the ratepayers in reviewing NET's proposals:

In reviewing the financial decisions regarding modernization, it is the board's obligation to make sure that those decisions will not raise the price of existing services more than would be the case without the investment. That is, investment decisions will be approved only if the cost savings in operating and maintenance expense, plus any revenue increases from new services, will provide a positive economic benefit over the life of the new investment. However, the fact that such new investment may increase rates today is not by itself a reason to disapprove it. Put another way, NET could be required to defer new investment and to serve customers with aging equipment that performs adequately but which is expensive to maintain. Such a strategy would be foolish in the long run because it would result in higher costs later and a deterioration of service. Thus, what is important is that the board and the department review investment decisions to assure that they are correctly made.

[*Id.*]

In a 1984 Decision, the Public Service Commission of the District of Columbia articulated a policy that requires benefits from modernization to be quantified as part of the review process and has also indicated that construction expenditures must be allocated on the basis of the benefits associated with the project. [57 PUR4th 367, 437-442.] With respect to the quantification of benefits, the Commission commented:

[W]here the company attempts to justify construction activities on the basis of "cost savings," "increased productivity," "modernization," and "technological innovation," such concepts must be defined in operational terms and translated into figures indicating which customers benefit from such activities and the extent to which they do so.

[*Id.* at 442.]

The DC PSC had also ruled that C&P must allocate construction expenditures to the customers who would enjoy the benefits of the new construction. In this regard, the DC PSC said:

Accordingly, in future cases the company must provide and efficiently explain cost studies which show that its construction costs are properly allocated to all its services on a cost causation basis. Thus, construction costs not necessary to or benefitting basic service should not be charged against that service. Where there is a shared benefit, fully supported allocations must be made.

[*Id.*]

The issue of allocation of construction costs to specific services based upon specific benefits was revisited by the DC PSC in a later proceeding involving rates for Centrex service. The policy formulated in that proceeding called for allocation of specific investment, and the risk of recovering that investment, between ratepayers and shareholders where a portion of the investment will be used to furnish a competitive service. Because this principle of allocation of investment forms the basis upon which we answer the question "who pays," this DC proceeding is discussed in some detail in the next section.

### **The District of Columbia PSC Policy on Digital Switch Deployment**

The DC PSC was recently required to face the issue of "who pays" for modernization head on in the context of efforts by Chesapeake and Potomac Telephone Company (C&P) to compete in the market for Centrex service. The DC PSC adopted an approach designed to provide complete protection for monopoly non-Centrex ratepayers.

In Formal Case No. 828 - Phase II, C&P expressed the need to deploy state-of-the-art digital switching technology in order for its central office-based Centrex service to be competitive with developing PBX alternatives. Centrex service is of particular importance in the District of Columbia, where Centrex loops comprise some 40% of total loops served by C&P, and the potential impact of stranded investment due to lost Centrex business is quite severe.

In making its case before the DC PSC, C&P outlined its game plan to deploy digital switches either for "customer" reasons, i.e., because it faced specific demand for digital Centrex service from a particular customer or group of customers, or for "network" reasons, i.e., because it could realize cost savings beneficial to all ratepayers. Although the introduction of new flexibly-priced Centrex tariff offerings was the impetus for this filing,<sup>8</sup> C&P's planned deployment of digital switching equipment in connection with those new tariff offerings emerged as an important issue in its own right, and in many respects, dominated the proceeding. In large part the attention given to the digital deployment issue arose out of natural concerns regarding C&P's potential to cross-subsidize the costs of providing competitive Centrex services. In addition, this proceeding was the very first time that C&P had come forward with plans of any sort to deploy digital equipment. [DC PSC Order No. 8756 at 51.]

The specific questions that the DC PSC sought to address in the Formal Case No. 828 proceeding relative to C&P's plan to deploy digital switches were as follows:

- Do the competitive pressures on Centrex service require additional investment in new technologies or equipment to attract new customers or keep existing customers? If so, what is the appropriate allocation of costs?"

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<sup>8</sup> In Formal Case No. 828 - Phase II, C&P proposed, and the DC PSC approved, several new Centrex tariffs including customer-specific contract pricing arrangements for large Centrex systems, referred to by C&P as "Individual Case Basis" (ICB) tariffs, and a Facilities Based Tariff (FBT) targeted at small- to medium-sized Centrex customers who do not have highly specialized service requirements. Under the ICB tariff, C&P has the ability to set prices to be charged under contracts for the intercommunications portion of the customer's Centrex system without prior Commission approval, with those prices to remain intact regardless of any future finding by the Commission. Under the FBT, C&P has the ability to offer stabilized intercommunication rates set on the basis of such factors as loop length and number of lines.

## Telecommunications Modernization: Who Pays?

- "What cost, revenue and rate studies has C&P made which reflect the impact of its apparent decision to advance the deployment of digital switches?"
- "Will advancing the deployment of digital switches negatively affect non-Centrex ratepayers? Will advancing the deployment of digital switches benefit non-Centrex ratepayers?" [DC PSC Order No. 8756 at 49-59.]

There was little dispute in the record concerning the first two areas of inquiry. The parties to the case were in general agreement that C&P needed to deploy digital switches if its Centrex offerings were going to be able to effectively compete with PBX systems. Similarly, the CUCRIT analyses performed by C&P to justify its digital deployment decisions were generally accepted.<sup>9</sup> However, there was substantial debate concerning the impact of C&P's digital deployment plan on non-Centrex ratepayers, i.e., on ratepayers subscribing to monopoly (as opposed to competitive) service offerings.

C&P's position was that non-Centrex ratepayers would be positively affected by the deployment of digital switches regardless of whether the trigger for the deployment was based upon "customer" or "network" reasons. Where deployment occurred for "customer" reasons, C&P argued that non-Centrex ratepayers would be made better off because of the additional contribution that would be available as a result of a customer choosing to take Centrex service vis-a-vis the alternative of being a PBX subscriber. Where deployment occurred for "network" reasons, C&P argued that non-Centrex ratepayers would be made better off because of overall cost savings achieved as a result of the decision to deploy. [DC PSC Order No. 8756 at 51.]

The DC PSC was not convinced, however, by C&P's claims that in all instances non-Centrex ratepayers would be positively affected. The Commission was particularly concerned about the possibility that non-Centrex ratepayers would be improperly burdened with increased costs in those instances where digital deployment occurred for "customer" reasons (i.e., in order to satisfy the specific demand of Centrex customers), embracing the "but for" argument advanced by the District of Columbia Office of the People's Counsel. According to the "but for" argument, the costs of facilities that would *not* be deployed "*but for*" the expressed need of the Centrex customer to receive digital technology should not be allocated to non-Centrex ratepayers. [DC PSC Order No. 8756 at 52-54.]

To further assure the protection of non-Centrex ratepayers, the Commission formulated a multi-faceted strategy that involved:

- the development of a "Digital Deployment Reporting System" to monitor the status of major switch investments and the assumptions underlying C&P's investment decisions, with reports to be filed on a semi-annual basis [DC PSC Order No. 8756 at 106-107];
- the development of an "Individual Case Basis Cost Manual" that sets forth in detail a uniform incremental cost methodology to be used to calculate price floors for C&P's

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<sup>9</sup> CUCRIT is a computer-based discounted cash flow analysis program widely used in the telecommunications industry, particularly by the former Bell Operating Companies. Discounted cash flow analyses are discussed in Section IV.

## Telecommunications Modernization: Who Pays?

ICB tariff offerings and to assure the Commission that C&P is appropriately allocating the full economic costs of new digital facilities deployed in connection with those offerings [*Id.*];

- the development of an "Embedded Cost Study Methodology" that sets forth in detail procedures for the allocation of C&P's various investment, revenue, expense, and tax accounts to Centrex vis-a-vis other C&P services, which are to be used to determine whether Centrex services in the aggregate are recovering category costs (including an allocation of common and joint costs) over time (i.e., to identify potential revenue deficiencies on an embedded basis), and also to aid the Commission in potential investigations of stranded investment [*Id.*];
- the establishment of "working groups" consisting of major parties in the case to develop and oversee implementation of the three monitoring devices listed above [*Id.*]; and finally,
- the requirement that C&P agree in writing that its shareholders would absorb any Centrex revenue deficiencies resulting from application of the newly approved tariff offerings during the entire term those rates are in effect [*Id.*].

The regulatory model established by the DC PSC creates a number of interrelated yet distinct tracking and monitoring devices designed to protect monopoly ratepayers from being burdened with costs of modernization programs motivated by competitive pressures. The DC PSC has used cost allocation principles to shift to the shareholders, in large part, the risks of modernization that are motivated by competitive pressures, in exchange for which the commission has granted substantial pricing flexibility in those competitive markets. In answer to the question, "Who pays for modernization?", the DC PSC Model focuses on the motivation for that modernization, and assigns both costs and risks on that basis.



## SECTION IV

### DISCOUNTED CASH FLOW ANALYSES

As noted earlier, the most widely accepted method for evaluating the economics of a particular investment decision is the discounted cash flow (DCF) method. The discounted cash flow method examines the net present value of cash inflows and outflows associated with alternative investment scenarios.

As generally applied by telephone utilities, the DCF method is used to develop a net present value for the overall differential cash flows associated with various investment alternatives available to the utility *relative* to the present mode of operation. Where an alternative investment scenario involves a greater level of cash expenditure than the present mode of operation, there is a net cash outflow. Similarly, where the investment alternative involves a lesser level of cash expenditures, there is a net cash inflow. If we consider these outcomes as they are applied to a modernization project in which older facilities would be replaced with new equipment, in the former case, the economic analysis would suggest that the proposed project should be rejected, since the installation of new facilities would raise the total cost of furnishing service as compared with the existing alternative. In the latter case, the analysis suggests that there would be an economic benefit to the replacement, since the total costs, adjusted to reflect the time value of money, would be lower.

The most commonly used discounted cash flow program in the telecommunications industry is called "CUCRIT." It is a computer program that was developed under the old AT&T License Contract, and is currently maintained by Bellcore, the Regional Bell Operating Companies' central services organization. In recent years, many of the RBOCs have begun to diverge from AT&T standards and have made changes to their analytical tools, including CUCRIT. Some no longer use the program on a stand alone basis, and others may have customized the manner in which the program operates, including the use of variables that they believe are most appropriate to their specific situations. Nevertheless, RBOCs do consistently use a discounted cash flow analysis, even if it is no longer called CUCRIT or has some minor variations from the present Bellcore standards.

In using CUCRIT or another DCF program, the project evaluator develops a series of alternative investment scenarios for dealing with a specific facility, such as a central office building. The scenarios would typically include a "present mode of operation" (PMO) solution, in which no replacement of existing facilities occurs, several growth scenarios (e.g., expansion of existing CO capacity, "freezing" of existing CO capacity with growth satisfied by a new switching entity), and one or more equipment replacement scenarios. Generally, the CUCRIT program compares each alternative to the PMO solution and a differential cash flow for each alternative is developed. CUCRIT then calculates the net present value of each cash flow, and the most positive (or least negative) value would be viewed as the best solution.

The comparison of alternative scenarios with the PMO can be illustrated with a simply example. The following table illustrates the process by which a differential cash flow can be derived from two alternative payment streams, both of which involve only outflows. This simplified illustration assumes that the remaining economic life of the PMO and the economic life of the alternative investment are each five years.

Year	Present Mode of Operation	Alternative Investment	Differential
0	0	-100,000	-100,000
1	-40,000	-10,000	+30,000
2	-40,000	-10,000	+30,000
3	-40,000	-10,000	+30,000
4	-40,000	-10,000	+30,000
5	-40,000	-10,000	+30,000

Source: Authors' Construct

In this example, the Alternative Investment has an initial capital cost of \$100,000 (which is shown as -100,000 in year 0), while the PMO has no initial investment. However, in later years, the operating expenses for the Alternative Investment are only \$10,000 (shown as -10,000 on the Table) as compared with operating expenses of \$40,000 annually for the PMO. An actual CUCRIT analysis is much more complicated and would include both inflows and outflows. Nevertheless, the basic approach of determining differentials for each item is the same.

A copy of a sample of one form of CUCRIT output is shown in Table 2. The telephone company, in this case Pacific Bell, needed additional capacity for growth in one of its central office districts, at that time served by two switches: a Number 1 crossbar and a Number 1ESS. The table provided shows a comparison between the expansion of those existing facilities to accommodate growth (with a replacement of the crossbar machine late in the study period) and the installation of a Number 5ESS in the second year of the study. The table shows the net differences in revenues and expenditures that would occur if the Number 5ESS is installed. The columns on the table show these revenues and expenditures. The second column shows projected incremental revenue in years 4-8 from the sale of additional services. The third column (Cash Flow Expenses) and the seventh column (First Cost) show the net difference in capital expenditures and operating expenses between the two plans, not the actual expenditures for either of the plans. Taxes and salvage are also included in the calculation. At the bottom of

the table, the net present value of these differences in revenues and expenditures is calculated, and, given the input assumptions (e.g., discount rate of 16%) the analysis shows a positive NPV for the Number 5ESS alternative of \$216.5 million over the twenty-five year study period.<sup>10</sup>

Use of CUCRIT or any other DCF analysis requires a large number of assumptions and input variables. The assumptions and inputs fall into three categories: General economic factors (e.g., the discount rate, the federal tax rate), factors specific to the company (e.g., the company's cost of capital, trend rates for labor costs), and factors specific to the project under study (e.g., the type and capacity of existing facilities and the forecasted growth in service demand within the study area). CUCRIT is specifically designed to include in its analysis two factors that will have a significant impact where the purpose of the project is explicitly identified as modernization: Changes in operating expenses (e.g., labor savings, avoidance of building additions), and increases in revenues (i.e., the revenues associated with new services that can be offered if the replacement facilities are installed). These factors are often the prime drivers for modernization of existing telecommunications facilities, since embedded telecommunications equipment (particularly central office switching facilities) does not generally "wear out" in the ordinary meaning of that term.

The outcome of a CUCRIT study will be sensitive to the value of each of the assumptions and input variables, although the degree of sensitivity can vary considerably. To determine the level of sensitivity of the outcome to the value of a particular variable, a sensitivity analysis is used. The value of the variable under study is changed over some range of values while all other inputs are held constant. It is good practice to determine the sensitivity of the study results to the values used, particularly where those values are either speculative or controversial. On the one hand, if a utility justifies a modernization project on the basis of additional revenues from new services associated with the more modern equipment, it would be prudent for a regulatory commission to require the utility to assess the sensitivity of its study to the level of additional revenues generated.<sup>11</sup> On the other hand, if a regulatory commission were to adopt a cost allocation requirement for the underlying investment that prevented reallocation of investment to regulated services if demand for unregulated services fails to materialize, the utility's shareholders would be absorbing the risks associated with an incorrect revenue forecast. In that case, a sensitivity analysis would not be required from a regulatory perspective. (Presumably, the shareholders themselves would demand this level of prudence on the part of the firm's management.) We address the subject of cost allocation for modernization projects as between regulated and unregulated services in more detail in Section V below.

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<sup>10</sup> For the example shown in Table 1, if the discount rate is 15% or less, the NPV of the differential cash flow for the alternative investment is positive, and the alternative investment would be selected. If the firm's discount rate were above 15%, the NPV of the differential cash flow would be negative, and the PMO would be preferred.

<sup>11</sup> For example, the CURCRIT analysis shown in Table 2 includes \$500,000 to \$600,000 per year in additional revenues for years 4-8. Without this additional revenue, the differential NPV of this alternative would not be positive.

TABLE 2

ILLUSTRATIVE CUCRIT OUTPUT

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 \* INCREMENTAL CASH FLOW DETAILS \*  
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STUDY: 6- ESTAB SESS REPL 1XB AND 1ESS 1985

PLAN: 6-REPL 1XB SESS VS. 1-REPL 1XB 1990

TIME POINT	TOT. REV.	CASH FLOW EXP.	FIT PAID	OTHER TAXES	NET SALVAGE	FIRST COST	NET CASH FLOW
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	-116.4	-9.1	19.9	0.0	-593.0	698.6
2	0.0	1466.2	157.6	31.3	0.0	8255.7	-9910.8
3	0.0	27.3	-2018.4	-91.0	558.2	0.0	2640.4
4	476.0	-843.6	-315.1	74.9	0.0	64.8	1495.0
5	526.0	-1156.5	-230.4	93.1	0.0	-3157.5	4977.3
6	573.0	-1010.6	576.1	139.7	-24.0	-6603.0	7448.8
7	608.0	-2683.8	1574.0	144.1	0.0	-177.7	1751.4
8	611.0	-27.8	2027.0	230.6	0.0	0.0	-1618.8
9	0.0	295.2	902.6	-13.0	0.0	0.0	-1184.8
10	0.0	333.1	872.7	-21.2	0.0	-217.7	-966.9
11	0.0	346.0	575.2	-30.3	0.0	0.0	-890.9
12	0.0	379.5	-75.7	-37.0	0.0	0.0	-266.7
13	0.0	424.9	-110.1	-40.9	0.0	-266.7	-7.2
14	0.0	444.7	-76.7	-45.5	0.0	0.0	-322.5
15	0.0	487.8	-112.3	-49.9	0.0	0.0	-325.6
16	0.0	542.9	-154.9	-54.7	0.0	-326.8	-6.5
17	0.0	571.5	-113.4	-60.3	0.0	0.0	-397.8
18	0.0	626.9	-159.0	-66.1	0.0	0.0	-401.8
19	0.0	695.5	-212.1	-72.3	0.0	-415.1	4.0
20	0.0	737.7	-175.5	-79.8	0.0	0.0	-482.3
21	0.0	811.8	-240.4	-87.9	-5.3	0.0	-488.8
22	0.0	839.3	-281.6	-91.1	0.0	-220.2	-246.4
23	0.0	895.2	-280.0	-99.3	0.0	0.0	-515.9
24	2.0	979.1	-329.9	-108.5	4.8	0.0	-533.9
25	0.0	1067.2	-371.2	-117.6	-2531.9	0.0	-3110.3

TIME PT. 0 CORRESPONDS TO 1/1/1983.

\*NET SALVAGE CONTAINS AN END OF STUDY EFFECT OF -2538.8

CUMULATIVE DISCOUNTED NET CASH FLOW

TIME POINT	0	1	2	3	4	5
CASH FLOW	0.0	600.2	-6714.6	-5040.5	-4226.1	-1896.7
TIME POINT	6	7	8	9	10	11
CASH FLOW	1097.3	1702.3	1221.9	919.8	708.1	540.4
TIME POINT	12	13	14	15	16	17
CASH FLOW	497.3	496.3	457.9	424.5	423.9	393.8
TIME POINT	18	19	20	21	22	23
CASH FLOW	367.7	367.9	344.8	324.7	315.9	300.2
TIME POINT	24	25				
CASH FLOW	286.3	216.5				

Source: Pacific Bell, California Public Utilities Commission A. 85-01-034

One final note with respect to the treatment of sunk investments in a discounted cash flow analysis is necessary. From an economic perspective, any cost that cannot be recovered is considered "sunk." Since the cost is not affected by any alternative scenario, i.e., it must always be paid, it is excluded from a DCF analysis. Moreover, since CUCRIT is generally used to develop *differential* cash flows, even if a sunk cost were included in the analysis, it would be eliminated in the comparison in any event. Thus, the level of undepreciated investment in existing facilities is *not* a factor in a replacement decision. This outcome is not unreasonable if the modernization project shows a net benefit to the ratepayers. The fact that the result of the analysis is positive suggests that the cost savings exceed the additional capital costs associated with the new facilities. In that case, it is entirely appropriate to replace the existing equipment. However, as we shall discuss below, where the modernization project is driven by revenues generated from new, unregulated services, the analysis must clearly establish the positive benefits to the ratepayers when the new revenues will be recorded "below the line." Moreover, even where the analysis shows a net benefit to ratepayers, equity requires that, to the extent that modernization is driven by the opportunity to generate unregulated revenues, shareholders must absorb the risk of recovering sunk investment from these unregulated services.

### **The California Commission and Pacific Bell Modernization**

As we have noted, discounted cash flow analyses are a common tool used by utilities and their regulatory commissions to assess the reasonableness of construction projects. In California, questions regarding Pacific Bell's modernization efforts have promoted an extensive review of both the accuracy of CUCRIT and the DCF studies upon which the utility relied in making its modernization decisions. This review is being conducted as part of the most recent Pacific Bell general rate proceeding. [California Public Utilities Commission Application Number 85-01-034.] The procedural history of the proceeding is complex and will not be restated here. While testimony has been filed in several stages of the proceeding questioning various aspects of Pacific's studies and challenging the reasonableness of its modernization program, what is of most interest to the present discussion is a recently released California PUC Staff report recommending a penalty in the form of a rate reduction of some \$700 million based upon Staff consultants' findings that a number of the modernization projects were unreasonably risky or were likely to fail. [See, California Public Utilities Commission Application No. 85-01-034, *Staff Report on Pacific Bell's Capital Decision-Making Process: Based Upon the Work of SRI International and the Salazar Oakford Company*, (hereinafter "CPUC Staff Report).]

This particular aspect of the proceeding is of interest in the context of our present study because it highlights the enormous difficulties associated with establishing standards, even when the basic methodology of a discounted cash flow analysis is agreed upon by the parties to a review of a construction program. Since the CPUC Staff Report has recently been issued, this paper will not attempt to analyze the consultants' findings or the initial Pacific studies. The nature of the controversy is, however, of interest. Pacific had undertaken an aggressive modernization program prior to its filing of its 1985 general rate proceeding. This program came under review during initial stages of the proceeding, prompting the CPUC Staff and Pacific to arrange jointly for an outside consultant (to be paid by Pacific) to audit Pacific's program and provide findings to the Commission. [CPUC Staff Report, pp. I-1-4] The consultant concluded that the Company's decision-making process, which utilizes a discounted cash flow analysis, and hence the program itself, were reasonable. [*Id.* at I-4] The CPUC Staff, after reviewing that report, sought a "second opinion." [*Id.* at I-4-5.] The Staff's consultant concluded that the decision-making process, and perhaps the analysis tool itself, were flawed. Thus, the consultants (each having different clients), having examined the same studies, came to opposite conclusions.

Pacific responded to the Staff's recommendation and the consultants' conclusions with a statement that the consultants' report did "not evaluate the benefits these modernization projects bring to customers, nor does it reflect the actual use of these investments by our customers." [*Telecommunications Reports*, August 15, 1988, p. 15.] Pacific further asserted: "Our modernization program has helped Pacific Bell trim its workforce by about 14% in the last four years, at a time when we added 1,600,000 new customers. Our modernization program is one reason the [California] PUC has been able to reduce our rates by almost half a billion dollars in the last four years." [*Id.*] This quotation suggests that the analysis did not include factors such as maintenance savings, productivity improvements, and additional revenues attributable to the modernization projects even though, as we have just discussed, these factors are inputs that can have a substantial impact on the outcome of the study.

Pacific Bell's recent activities in the "Intelligent Network" debate cause additional concern relative to its use of discounted cash flow analyses. Pacific created a task force composed of various educators, business and government officials, and community and public service activists to study the concept of an Intelligent Network. The task force recommended that the telecommunications network in California be modernized to give all consumers the ability to utilize information services. Pacific, in response to the recommendation and in a recent filing in a separate California PUC proceeding on competition, stated that the investment necessary to achieve this goal could be made without raising rates for regulated services, although the Company has not provided a financial analysis that demonstrates how the investment is possible without forcing an increase in the revenue requirement. [*See, California Public Utilities Commission Investigation 87-11-033, Testimony of G.F. Schmidt, Phase II, Appendix III, p. 7.*] However, Pacific also states that "the necessary investment cannot be fully justified under existing tests." [*Id.*] These "existing tests" are discounted cash flow analyses such as CUCRIT. Thus, Pacific seems to be saying that its proposed modernization program will not pass the cost/benefit test represented by the CUCRIT model. Again, factors that Pacific has cited<sup>12</sup> as benefits from the modernization, e.g., decreased operating costs and sales of new services, can readily be quantified and thereby included in a CUCRIT analysis. Thus, a policy question to be answered as part of the justification for the modernization program is, "What benefits generated by the program *cannot* be translated into quantifiable factors to be included in CUCRIT (or any other discounted cash flow analysis)?"

As can be seen from this example of the ongoing debate in California regarding Pacific's past and proposed modernization efforts, the mere existence of economic analysis tools does not solve the problem of evaluating proposed construction programs nor assure that such evaluations are accurate and economically sound. Even where there is agreement as to the tools to be used, regulatory commissions will be required to look beyond the bottom line of the economic analysis, both to examine whether use of the tool itself is reasonable and to assess additional policy issues associated with projects when the strict economic analysis does not appear to justify the modernization effort.

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<sup>12</sup> For example, in the comments regarding the CPUC Staff Report in *Telecommunications Reports*, August 15, 1988 at p. 15, and in Mr. Schmitt's recent testimony in CPUC Investigation 87-11-033.

## SECTION V

### COST ALLOCATION/ASSIGNMENT OF RISK

Assuming that *some* type of network modernization takes place, the outcome of the "who pays?" question will ultimately depend upon how the costs incident to that modernization program are allocated (a) as between customers of regulated services and the shareholders of the utility (who would bear the investment risk for competitive services), and (b) among the various users of "basic" and "not-so-basic" regulated services. There are, in fact, several elements of the larger "cost allocation" issue that severally and collectively bear upon the "who pays?" question:

- Allocation of the capital investment costs.
- Allocation of the risks.
- Allocation of the effect of dominant carrier entry into "competitive" market segments that are perceived by the financial markets to increase the overall risk - and hence the aggregate cost of capital - of the firm.

The manner in which these allocation questions are resolved goes directly to the prudence of the modernization investment in conferring benefits upon customers of regulated telecommunications services, and thus must be an essential element of the overall capital budgeting/approval process. If a particular project is justified on the basis of, among other things, incremental revenues to be generated from new (i.e., enhanced) services that the new equipment or facilities make possible, then the disposition of those additional revenues as between "above the line" (i.e., regulatory revenue requirement) and "below the line" (i.e., stockholder) treatment *must be known at the time of original project approval*. If project approval is predicated upon the inclusion of the additional revenues as a "pay back" on the investment itself, then those revenues must continue to accrue "above the line" throughout the life of the plant and not be diverted to other sources. It is the potential for such diversion that raises the possibility of a mismatch of relative costs and relative benefits as between ratepayers and shareholders, and it is also this same potential that underlies much of the present controversy relative to the plant modernization issue.

#### **Mismatch of Costs and Benefits**

The sharing of risk and responsibility for cost recovery is different in the telecommunications industry as it exists at the present time. Here, the question is not so much whether the decision to install the plant was prudent *per se* but whether the investment and operating costs of the capital

project *that are to be borne by customers of regulated services* bear an appropriate relationship, in the overall context of the economic justification for the project as a whole, with the portion of the total *benefits* from the project that are to flow to them.<sup>13</sup>

A mismatch of ratepayer versus shareholder costs and benefits can arise in one or more of three principal ways:

- **Mis-allocation of costs vis-a-vis revenues as between ratepayers and shareholders.** If, for example, the capital investment is justified solely on the basis of future savings in ongoing maintenance and operating costs and certain additional revenues flowing from *regulated services* to be furnished using the new equipment (e.g., "Custom Calling" type services), then the utility may seek to have most or all of the capital costs and associated expenses treated as "above the line" items, with only those small additional costs (if any) that are associated with nonregulated services to be charged to shareholders. In this way, *regulated services* bear the totality of the stand alone costs of the facility replacement, with only those small marginal costs of certain enhanced services capabilities being assigned to shareholders. The owners of the business are thus enabled to enter a "competitive" market segment *without having to incur the stand-alone costs of such entry*. In this situation, economic benefits might arise from physical and organizational integration of "basic" and "enhanced" services. However, these benefits will flow exclusively to shareholders and not to ratepayers whose funds were used to provide the capital base for the competitive entry.
- **Change in regulatory status of certain activities and services.** A mismatch of costs and benefits can also occur when a change in regulatory policy is effected *subsequent to the investment in the upgraded plant*. If, at the time that an investment were made, the applicable regulatory model contemplated "above the line" treatment on a rate of return regulation basis of all costs and revenues, then a change in that policy - one that permits certain services to be deregulated and their revenues to be taken "below the line" - would result in a situation in which ratepayers were required to pay the costs (in the past) so that shareholders could realize the revenues (in the future). This *inter-temporal* mismatch is particularly serious in the context of policies that affirmatively encouraged accelerated capital recovery through higher regulatory depreciation rates and "reserve deficiency" amortizations, coupled with the apparent willingness of regulators, legislators and the courts to consider dominant carrier attempts to secure partial or total deregulation of many categories of service.
- **Increase in cost of capital due to "competitive activities" of the utility.** To the extent that a regulated telecommunications utility diversifies into riskier nonregulated lines of business, the financial markets may demand higher debt and equity returns to account for what investors would perceive as increased overall risk. Unless regulators are able to

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13 That is not to say that a commission review of capital projects should ignore the question of prudence. Commissions continue to require companies to perform cost/benefit analyses for proposed projects and should set standards for acceptance of projects, based upon the costs and benefits, that encourage companies to undertake only those projects that are, in the aggregate, prudent.



separate out these "risk premiums" from the overall cost of capital, an effective transfer of capital costs from nonregulated lines of business to regulated services will have occurred.

All three of these sources of cost/benefit mismatch arise because the dominant carriers are no longer exclusively engaged in regulated activities; accordingly, the policy challenges created by their presence could be largely eliminated if the preexisting "closed" environment could be resurrected. Since, at this point, that is neither possible nor desirable when viewed in the larger policy context, the policy challenge that confronts us now is to devise a means by which these potential and real cost/benefit mismatches can be reduced and, ideally, eliminated altogether. Some ideas on the means for accomplishing this are presented below.

### **Allocation of Costs Between Regulated and Unregulated Activities**

As a basic principle, if and to the extent that some portion of the revenue to be generated from the new plant is associated with new services, whether regulated or unregulated, all such revenues should be included in the financial analysis, and the new services should be allocated a share of the investment cost for purposes of determining revenue requirements. Moreover, it is essential that this *ex ante* allocation of costs between existing and "new" services and between regulated and unregulated services be maintained throughout the life of the new plant, so as to prevent the kind of inter-temporal effects discussed earlier. In addition, as we shall discuss further, the rules for these cost allocations must be structured so that the utility will have an incentive to make the best estimate possible of revenues associated with new services to prevent under-allocation of investment to the new services.

Thus, if it is determined that a project can be justified on the basis of, say, a 70% allocation of cost to regulated services (we will shortly discuss how such an allocation should be made), then that allocation should normally not be permitted to *increase* over the life of the asset except in certain specific situations. The carriers must understand and accept this principle and make no *ex post* effort to alter it. If the dominant carriers believe that they will be able to reallocate costs from unregulated to regulated services in the future, they will have an incentive to adopt less rigorous acceptance criteria and to behave in a strategic manner so as to affirmatively create and foster inter-temporal cost transfers and cross-subsidies.

One approach to dealing with the potential for reallocation of cost from non-basic to basic services or from unregulated to regulated services can be derived from policies adopted by the Iowa State Utilities Board and by the District of Columbia Public Service Commission (discussed in Section III) with respect to the assignment of central office investment costs between Centrex and "POTS" (Plain Old Telephone Service). The basic policy issue can be stated quite directly: Suppose that a new central office is constructed for \$10 million on the basis that 60% of its cost will be assigned to and recovered from the provision of Centrex. The 60/40 Centrex/POTS allocation would be based upon relative occupancy of the various components of the switch by the two categories of service. For example, suppose that the office is expected to handle a total of 20,000 line terminations, of which 12,000 are expected to be Centrex and 8,000 will be POTS.<sup>14</sup> Now suppose that the demand for Centrex, which is a competitive service, falls short of the original expectation, and that only 4,000 lines are sold,

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<sup>14</sup> This is a very simplified allocation formula; in practice, the cost allocation would be based upon relative interoffice and intraoffice usage, feature usage, and other factors, in addition to line terminations.

rather than the 12,000 that were originally expected. An allocation of costs based upon actual in-service line terminations would, under those circumstances, assign only 33.3% of the \$10 million investment to Centrex, while assigning the remaining 66.7% to POTS. If such an allocation were permitted, the utility would have been enabled to shed a substantial amount of the investment loss arising from the lack of Centrex sales by transferring the investment earmarked for Centrex to its regulated POTS customers:

TABLE 3

## ILLUSTRATIVE CENTREX/POTS INVESTMENT ALLOCATION

	Initial allocation	Actual allocation	Amount shifted to POTS
Centrex	\$ 6.0 million	\$ 3.3 million	\$ 2.7 million
POTS	4.0 million	6.7 million	-0-

Source: Authors' Construct

The solution that was adopted by the Iowa and DC Commissions for dealing with the potential for such transfers between service categories is that no reallocations between categories would be permitted, unless the category that would receive the increase in its allocation actually required the capacity that was being reallocated. In the above example, there is no increase in the demand for POTS, only a drop in the demand for Centrex, such that there is no requirement for additional capacity to serve POTS. Hence, the reallocation illustrated in the above table would not be permitted. However, were there an increase in POTS demand large enough to require the transfer of a portion of the unused capacity that was originally earmarked for Centrex, then a reallocation to reflect the transfer of only that specific capacity that was required to meet the increased POTS demand would be allowed. Thus, no reallocation of cost would take place until excess spare (i.e. spare over and above administrative spare) allocated to at least one of the categories has been depleted. In other words, the only real "trigger" for reallocation occurs when usage growth in a category exceeds the level of available spare in that category, thereby hitting up against a capacity constraint. Thus, under this scheme, differences will emerge over time between the existing allocation of investment among categories and an allocation based upon current usage requirements associated with those categories, but only because of the *actual utilization* of excess spare in satisfying growth.

Although this discussion focuses on investment in new central office equipment, the same principle holds for investment in any other category of plant as well. However, it only deals with future reallocations of cost that were initially founded upon all uses to which the plant would be put. This method would not be capable of dealing with a situation in which the utility failed to fully disclose all of the potential revenue sources that were expected to be available as a result of the investment, and hence offered an initial allocation that was excessively weighted in the direction of regulated services. To some extent, this problem can be addressed through periodic reallocations of investment cost based upon actual resource utilization (between regulated and

unregulated services) over the life of the asset, but even under such a practice the utility is afforded a considerable incentive to understate and minimize the initial allocation to unregulated services.

To see why this is so, consider the following example. Suppose that a new \$10 million central office is to be acquired as a replacement for an existing electromechanical switch, and that the entire cost can be economically justified on the basis of ongoing maintenance and operating cost savings. Although new and enhanced services could potentially be offered utilizing the new switch, the utility offers no projection as to the existence, let alone the magnitude, of such revenues. Accordingly, 100% of the \$10 million investment cost is allocated to regulated services. Now, suppose that after a few years the utility is able to offer and generate below-the-line revenues from certain enhanced services, and accordingly accepts a (then) appropriate allocation of cost based upon resource utilization, revenues, and/or other factors. Even if that allocation is equitable *on a current basis*, customers of basic services will have been required to fund the initial acquisition and bear the financial and business risks thereof until the utility was able to develop a market for its unregulated services.

### **Principles for Sharing Investment Risks Between Ratepayers and Shareholders**

It is useful first to identify general principles with respect to the position of the ratepayers vis-a-vis the new facilities and then to posit solutions to the cost allocation process that are consistent with that principle. The first principle relates to analysis of economic benefits of a proposed project. As discussed earlier, state regulatory commissions have long taken the position that construction projects undertaken specifically for modernization purposes must be justified using a standard cost/benefit analysis. The economic benefits to the ratepayers must exceed the additional costs that they would bear as a result of the project. As we have also discussed, there is no reason to abandon this standard since the tangential benefits cited by utilities (e.g., ability to offer new services or prevent loss of existing customers) can also be quantified and thus incorporated fully into the analysis. Thus, as a first principle, at a minimum, a cost allocation of the investment for a modernization project should not increase the cost of traditional "basic" services.

However, there is a second principle of cost allocation necessary to ensure that ratepayers are not required to fund a utility's entry into nonregulated activities. If the standard adopted was merely that the allocation should not increase costs for basic services, the ratepayers could still be required to fund facilities that were ultimately used to furnish new and/or unregulated services whose revenues went solely to benefit the shareholders. This would be the case if, for example, a utility provided a cost/benefit analysis that assumed only enough revenue from new services to show a non-zero benefit for the basic service ratepayers even though the utility anticipated much higher revenues from sales of these new services. The understatement of revenues from new services quite clearly leads to an underallocation of investment to new services and an overallocation to basic services, regardless of whether revenues or some usage measure is used to derive the allocation. Thus, the second principle of the cost allocation rules must be that the basis for the allocation may not require the ratepayers to fund any portion of plant that is either initially *or ultimately* dedicated to nonregulated services.

That leads to a third principle. Put simply, the utility should not be allowed to use "spare" facilities, the investment in which has been allocated to basic services, to furnish new and/or unregulated services without fully and fairly compensating the ratepayers for such use of those additional facilities, *even if ratepayers otherwise obtained a net benefit from the modernization initiative*. Moreover, the compensation to the ratepayers should reflect the conditions the utility

would confront if it were a competitive firm that had underestimated the facilities necessary to furnish a competitive service, a condition that would typically require the company to pay a premium price for unanticipated additions to its facilities base.

If properly implemented, this standard represents a "win-win" situation for both the ratepayers and the shareholders. Requiring that the utility reimburse the ratepayers at a premium price if the initial allocation for new services is found to be too low provides a strong incentive to the utility to make its initial forecasts as accurate as possible. However, even if unforeseen events occur (as they often do for competitive firms) and the initial demand forecast turns out to be too low, the utility is still not necessarily disadvantaged relative to where it would be in a fully competitive, unregulated marketplace. First, the utility will continue to enjoy the economies of scale and scope associated with its ability to offer service from common plant, unlike the utility's competitors who must always construct stand-alone facilities to provide equivalent competitive services. In addition, a requirement to pay a premium to "buy" additional facilities simply places the utility on equal footing with competitive firms. For example, if a competitive firm underestimated sales and thus purchased a computer that could not meet its needs, the firm would pay a premium price for the additional capacity as compared with the price *it would have paid* had it purchased a larger machine in the first place. The purpose of this premium would be to compensate the ratepayers for having carried the investment over the period between installation and its use by the unregulated business, and for having borne the risk that the plant might not be placed into revenue producing service at all. In addition, such a premium should act to structure the "purchase" of additional capacity from the ratepayers by the unregulated business to approximate the transaction that a competitive firm would be required to make under similar circumstances.

The problem is then to determine how to establish the premium price that the unregulated business would pay for its additional capacity. One solution would be to require that any reallocation from regulated to unregulated services be made retroactive to the initial date of acquisition of the plant, and that the unregulated business of the integrated utility be required to reimburse the regulated portion for all costs, including accumulated depreciation and other carrying charges, such as maintenance and administration, of any plant it uses for the provision of unregulated services, with interest going back to the date of original acquisition. Thus, to return to our earlier example, if in year 5, 20% of the capacity of the central office is assigned to unregulated services, the unregulated line of business would be obligated to pay to the regulated utility 20% of all costs associated with the machine since its initial acquisition, including interest thereon. Under this solution, the ratepayers are compensated for having carried the investment until it was needed for the provision of unregulated services, while the riskier unregulated business is afforded the opportunity to escape most or all of the costs and risks associated with the initial equipment acquisition until and unless the equipment is *ultimately* utilized.

This solution does, however, have certain drawbacks. As the length of time prior to use of the asset for the provision of unregulated services increases, so too does the cost of the retroactive reallocation that would have to be borne by the unregulated activity at the time it begins to actually use the capacity that had been set aside for that purpose. If that cost escalates to a point where it actually exceeds the (then) current cost of acquiring brand-new (stand-alone) equipment for the provision of the unregulated services, the utility may have an incentive to forego use of the in-place plant and thereby leave it permanently stranded in the regulatory rate base where it will generate no revenue at all. Thus, there may be a reason to limit the extent of the retroactive reallocation, perhaps by limiting the number of years over which it would be calculated.

To avoid the complexity of the reallocation process, as well as the potential problem with imposing an extreme penalty through the retroactive application of capital-related costs, one could reallocate the investment only prospectively and require the unregulated business to pay an additional amount to be credited to the relevant capital accounts. In this instance, the challenge is to determine an amount for the payment that is fair to the unregulated business but also recognizes the fact that regulated services have been carrying the investment since the completion of construction. The level of the premium payment should be such that the amount the unregulated business "pays" for the additional capacity does not exceed the stand-alone costs for those additional facilities if purchased on an incremental basis at the time that they are required. In addition, the premium payment should not exceed the interest and carrying charges, appropriately adjusted for risk, that the regulated services have been required to bear as a result of the investment having been made, since a payment in excess of that amount would amount to a windfall for the ratepayers.<sup>15</sup>

### Treatment of Depreciation Costs

Plant modernization affects the telecommunications utility's depreciation expenses and depreciation reserve in several important respects, and it is essential that these effects be recognized in developing policies that address the "who pays?" question. The utilities' persistent efforts to accelerate the replacement of older plant motivated them to seek and gain regulatory approval of higher depreciation rates for *embedded* equipment. Moreover, to the extent that the pace of retirement of older plant exceeds even that contemplated by the increased depreciation rates, depreciation reserves are drawn down and "reserve deficiencies" arise, causing the utilities to seek the right to resolve these deficiencies through an amortization schedule, with the costs thereof charged to and recovered from ratepayers. These depreciation-related effects generally translate into increased regulatory revenue requirements and thus into higher prices for the utilities' services.

As we have previously noted in Section IV, the "sunk" costs of existing in-place equipment that would be replaced by the newer plant do not themselves enter into the economic justification for the equipment replacement *per se*. This is, as we noted, entirely proper from the perspective of an economic plant replacement analysis: If prospectively there are net benefits arising from plant replacement even if the older equipment has to be literally thrown away, then the project should be undertaken. Inclusion of the undepreciated investment to be written off in the to-be-retired embedded plant would only distort that economic analysis, and lead to erroneous rejections of what would in other respects be appropriate replacement actions. The problem, of course, is that in the case of a rate-of-return regulated public utility, you don't just "throw away" older equipment that is removed from service, you must ratably remove it from the utility's books through the depreciation and amortization process. Unlike the case of a nonregulated corporation, where the firm's *shareholders* would bear the costs of a write-off of discarded older equipment, in the case of a regulated utility its *ratepayers* bear that cost through prices for the utility's services that reimburse the firm for the accounting costs of the write-off.

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15 There may be instances where it appears that a utility has deliberately understated forecasts for revenue from new services in order to avoid an allocation of investment to these new services. In those instances, commissions may have other authority to impose sanctions on the utility. For example, plant could be disallowed from the rate base using either a "prudence" or "used and useful" standard, or the commission might rule that the facilities in question could not be reallocated to the unregulated business.

This method of recovering the costs associated with the write-off of retired equipment would not present any particular policy problem so long as all of the economic *benefits* of the replacement action were conferred exclusively on the utility's ratepayers. In that case, and assuming that the economic analysis underlying the replacement decision were itself valid, the ratepayers should still be better off *even with the higher depreciation charges* with the newer equipment than without it. But where a portion of the benefits of the newer equipment flow to *shareholders* rather than to ratepayers, it does not automatically follow that *ratepayers*, if required to absorb 100% of the increased depreciation costs, are necessarily better off as a result of the replacement than without it. Moreover, even if the ratepayers were made no worse off by a requirement that they absorb 100% of the sunk costs of the retired plant, equity demands that the shareholders share in the costs of the write-off *at least in proportion to the benefits that they are to derive from the introduction of the new equipment*. Accordingly, an allocation of the depreciation expense and reserve amortization impact of individual equipment replacement decisions and of an overall plant modernization program is an essential element of the larger cost allocation requirement.

It is important that the effects of accelerated depreciation practices as employed by telecommunications utilities be recognized as these affect the outcome of the "who pays?" question, because on balance the ability of the utilities to recover the bulk of the capital outlays during the early years of an asset's life serves to exacerbate the *inter-temporal* cost/benefit mismatch as between ratepayers and shareholders. As we noted earlier, the relative utilization of plant for the provision of unregulated services can be expected to increase over time (a) because the overall demand for these services is likely to grow, and (b) due to a likely expansion of *deregulatory* policies so as to place more services in a "below the line" status over time. To the extent that utilities are able to charge a substantial portion of the costs of new plant "above the line" in the initial years of that plant's life, its potential costs of acquiring the *use* of that plant's capacity for the provision of unregulated services *in future periods* could be significantly reduced. This effect of accelerated depreciation underscores the importance of two of the principal policy recommendations we have advanced here:

- That the costs of new plant be allocated between regulated and unregulated services at the time of the initial economic analysis, and that procedures be adopted to retroactively reallocate costs of plant that were initially assigned to regulated services where that plant is ultimately used for the provision of unregulated services.
- That the scope of services subject to "above the line" and "below the line" treatment be considered relatively frozen, and that the utilities be discouraged from continuing efforts to whittle away at the services that are included in the "above the line" category.

## SECTION VI

### CONCLUSION

The pressure for modernization of the telecommunications infrastructure will continue to increase as communications customers and their needs become more sophisticated. In addition, as opportunities to offer unregulated services using common equipment increase, the need for a rational approach to sharing the costs, risks and benefits associated with the additional investment necessary to modernize the network will also grow. This study has concluded that the question of "Who Pays?" for modernization of the telecommunications network should be answered as "The stakeholders who benefit should pay in proportion to their relative benefits." Regulators can best ensure that this result will be the case by pursuing the following specific policies:

- Requiring the utilities proposing modernization programs to provide a cost/benefit analysis to support the program that clearly identifies the costs and benefits both for ratepayers and for shareholders;
- Developing an allocation procedure that assigns the costs associated with modernization consistent with the distribution of the benefits, and also encourages regulated firms to use their best efforts to accurately assess the impact of the program; and
- Monitoring the impact of the modernization program and providing for mid-course corrections to ensure that the allocation of costs continues to track the distribution of benefits.

Successful implementation of this policy will mean that as a nation we will continue to enjoy high quality, low cost telecommunications services with the assurance that the costs and efficiencies associated with a modern integrated infrastructure will be equitably distributed among all stakeholders.

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