

expensive than that normally used by GTE for residential or business switched service.

These line cards are used for non-switched private line services, and allow a DS0 channel to be provided directly from the fiber optic multiplexer within the central office.

Sub-loop Unbundling to Provide Digital Feeder Services

Sub-loop unbundling to provide digital "feeder" services is not technically feasible. All digital services are designed on an end-to-end basis. For digital services provided over copper facilities,¹⁶ the copper cable must be "groomed." This involves ensuring that no load coils are present, that specific cable pairs are capable of certain performance levels, and that "bridge-tap" is limited to a very small amount.¹⁷ The majority of high capacity services (e.g., DS1 and DS3) are provided over fiber facilities, but the same over riding principle applies -- each digital "loop" service is a custom-design.

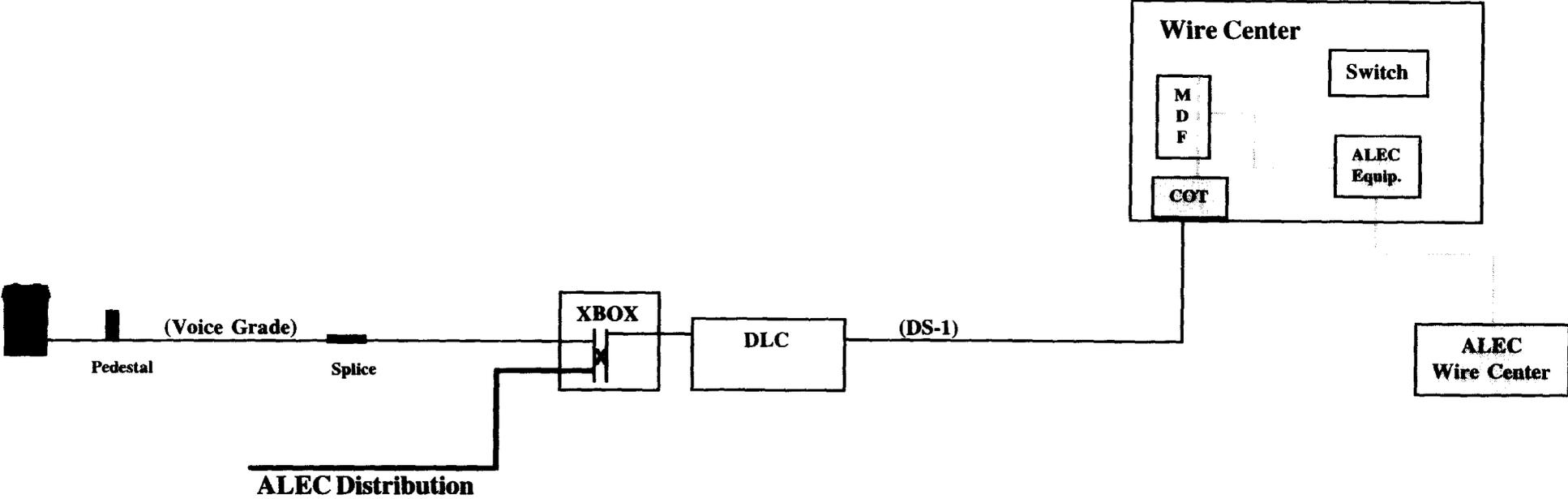
Because digital transmission design parameters govern the total service, piece parts of a digital service that have been separately designed cannot be combined to form a whole without the probable need for additional electronic equipment to maintain the total transmission loss to a certain level. For these reasons, any digital "feeder" service would require either a coordinated design effort, much as occurs with a meet-point interconnection arrangement.

¹⁵ See Drawing 3.

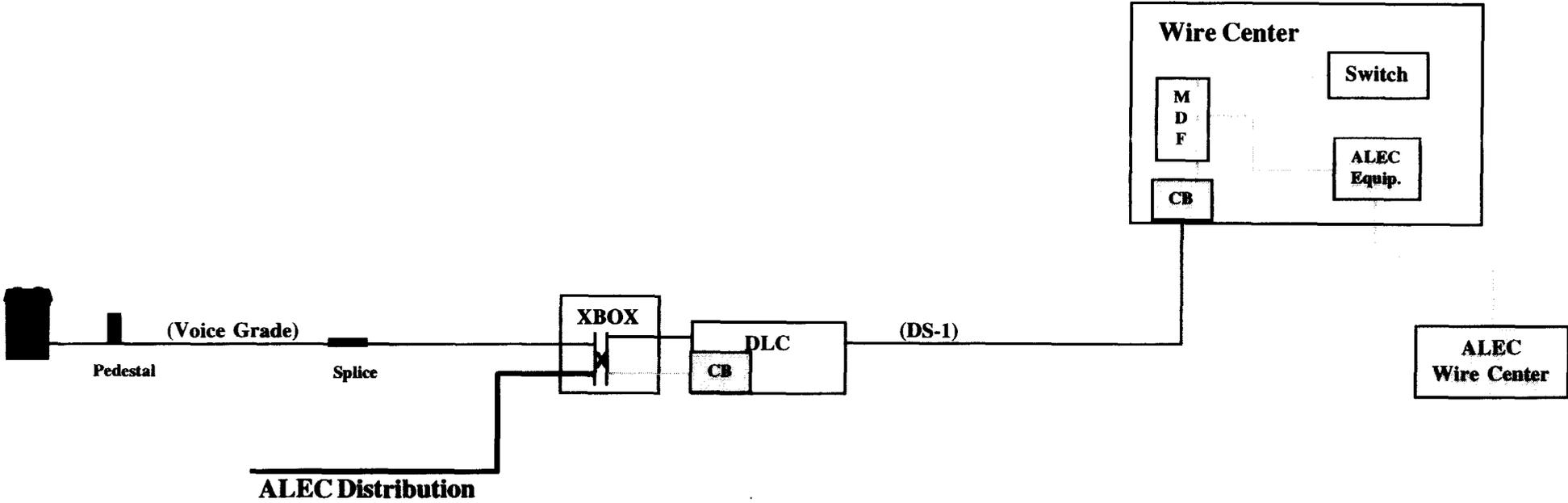
¹⁶ Such as Switched 56, Digital Data Service, and ISDN services.

¹⁷ And, as discussed *supra*, the design engineer must ensure that other services do not exist in the same sheath that would cause a conflict.

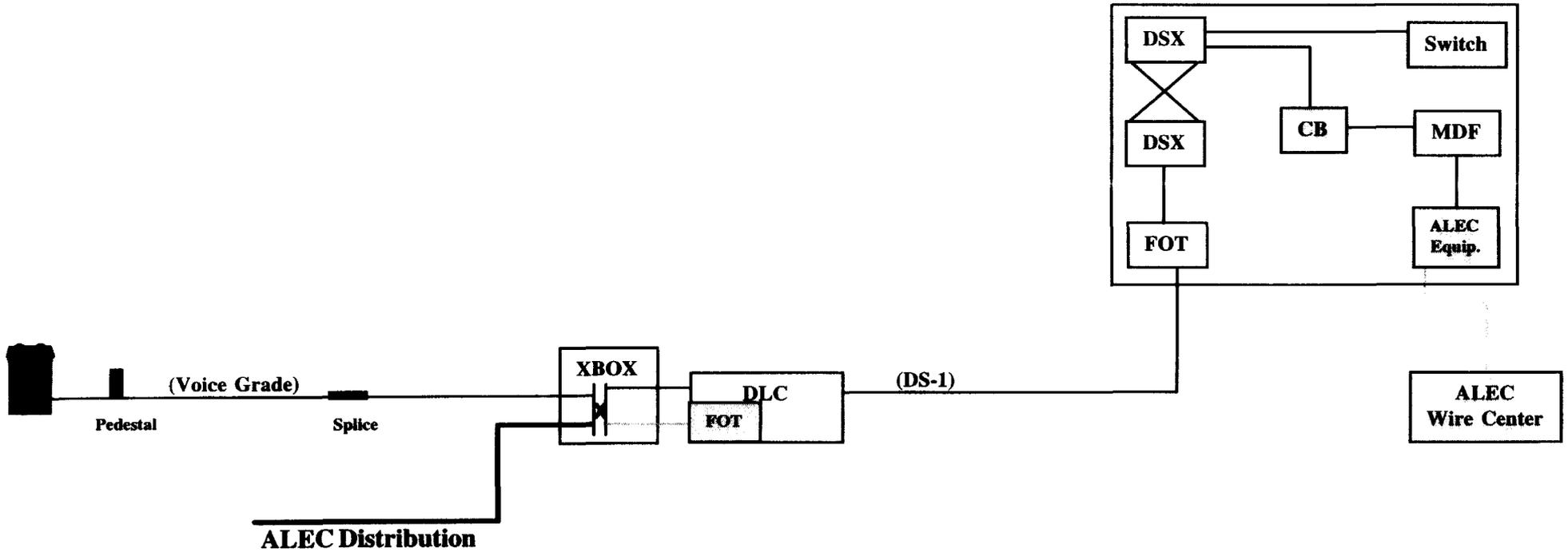
Drawing 1



Drawing 2



Drawing 3



Attachment 2 Definition of Costing and Pricing Terms

Definitions. The NPRM (§ 126) asks commenters to define Long Run Incremental Cost costing methodology terms with specificity.

A regulated multiproduct firm has several different types of costs, including incremental costs, joint (or shared costs), common (or overhead costs), and possibly residual costs. Following is GTE's definition for many of the cost terms used in the industry.

Long Run Incremental Cost ("LRIC") generically identifies the forward-looking costs for an incremental change (the size of the increment not specifically identified) in output for a service offering. LRIC is the cost added (or avoided) by increasing (or decreasing) the output for a service in total or in part.

Total Service Long Run Incremental Cost ("TSLRIC") identifies the forward-looking cost for an entire service offering. TSLRIC is the cost added (or avoided) by offering (or discontinuing) the total service or group of services, holding constant the production of all other services offered by the company. TSLRIC can be thought of conceptually as the difference in the firm's total costs with and without the service. For a single service, TSLRIC consists of the volume-sensitive and volume-insensitive costs.

Volume-Sensitive Cost is the change in forward-looking cost caused by increasing (or decreasing) the output of a service.

Volume-Insensitive Cost is the portion of the forward-looking cost, caused by the offering of a service, that does not vary as the level of output varies. This type of cost is also referred to as service-specific fixed costs.

Embedded Costs represent costs from an accounting or historical booked cost perspective. These costs can no longer be avoided or minimized by curtailment or reduction of output.

Fully Distributed Costs ("FDC") is the assignment of all of the firm's costs to services produced. This process involves the assignment of indirect costs. The assignment of indirect costs are typically done on some arbitrary basis, such as relative investment, revenues, or relative use.

Stand-Alone Cost ("SAC") is the total cost to provide a single service on a stand alone basis expressed per unit of output. Like TSLRIC, SAC includes both the volume-sensitive and all volume-insensitive costs necessary to provide the service on a stand alone basis.

Shared (or Joint) Costs are costs incurred by two or more services (but not the collection of all the firm's services) that are not incremental to any individual

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:)
)
Implementation of the Local) CC Docket No. 96-98
Competition Provisions in)
Telecommunications Act of 1996)

Affidavit of Edward C. Beauvais, Ph.D.

I, Edward C. Beauvais, am Senior Economist for GTE Telephone Operations. For the past twenty years, my research has concentrated on the pricing and costing of evolving telecommunication networks and evaluation of welfare, allocative, and distributive effects of alternative pricing systems. I have also been involved with the evaluation of alternative regulatory regimes for public utility services as well as demand and cost analysis of telecommunications services and the evaluation of competition in telecommunications markets. I am also a member of the visiting faculty of the University of Kansas, teaching in seminars on telecommunications economics. I received my Ph.D. in Economics from the Center for the Study of Public Choice at the Virginia Polytechnic Institute. Prior to joining GTE, my research efforts were concentrated in the economics of electric utility operations. I was employed by the Virginia Electric and Power Company and later as a consultant to the Virginia State Corporation Commission to develop sales and load forecasting methodologies for the major electric utilities in Virginia. I have also served as a Professor of Economics at the University of Alabama and at the University of Connecticut. I have testified before numerous state commissions and legislative bodies on regulatory and economic matters. I have published articles in a number of academic journals, including the *Journal of Econometrics*, *The Southern Economic Journal*, and *The Review of Economics and Statistics*. In addition, I have published numerous articles in the proceedings of industry associations and academic societies.

I illustrate in this affidavit appropriate costing and pricing methodologies to encourage competition. To accomplish this objective, it is convenient to place the discussion in an overall framework.

The pricing of telecommunications services has three fundamental purposes: 1) revenue generation; 2) distribution of costs across customers; and 3) allocative efficiency. The first two items are largely a matter of rate level, the third is a rate structure issue.

Telecommunications pricing has three fundamental purposes: (1) To generate revenues at least sufficient to cover the costs of the firm; (2) To distribute the recovery of those costs among customers; and (3) To create economic incentives to align production and consumption decisions. Clearly the issue of cost arises in all of these areas, so that costing and pricing are related. However, they are not the same and it is very important in developing an efficient and economically correct cost methodology that the two concepts not be confused.

The first fundamental purpose of pricing is to cover the firm's cost. Prices must produce sufficient revenues to cover the firm's costs. Once the total costs have been determined, it must be decided which customers will recover what proportion of the costs. This is clearly where much of the dispute in telecommunications pricing occurs. In an adversarial proceeding it is always in the interest of one group to view the firm's costs as revenues to be collected from someone else. The proposal set forth herein will assign costs in an economically efficient manner.

The LECs should be allowed the opportunity to recover their costs. FDC does not produce the correct result.

An FDC study requires all costs to be allocated to all products and services, even when there is no direct causal linkage among the costs and the products. *The greater the number of products offered over joint and common facilities, the more difficult and misleading this distribution of costs becomes.*

Economic theory is absolutely clear that the relevant costs to look at in making pricing decisions are incremental costs. For expository purposes, I am using incremental and marginal cost interchangeably. So long as the marginal revenue derived from the sale of one more unit is greater than the incremental cost of producing and selling that unit, a profit maximizing firm would want to sell that unit. Likewise from a public policy perspective, so long as the marginal benefit (price) to consumers is greater

than the incremental cost, society is made better off by producing and consuming the additional unit. FDC totally disrupts this decision process. The incremental benefits to the firm/public should be compared to marginal/incremental cost - not fully allocated/fully distributed costs. Thus, I strongly urge the Commission to avoid any linkage between FDC cost study results and pricing.

Incremental costing is the initial starting point for pricing decisions. Pricing all services at incremental cost is not feasible given the level of common costs in an efficient firm.

Given my understanding of FCC objectives and the rivalrous nature of the marketplace, incremental costing should be employed as the starting point for pricing decisions. Incremental costing is useful to establish a floor to avoid cross subsidization.¹ However, joint and common costs must also be recovered. It is widely acknowledged that pricing all services at marginal cost will yield insufficient revenues in the presence of economies of scope and scale. Given this result, the intersection of the first two fundamental purposes of telecommunications pricing implies that prices must depart from a first-best world measured in terms of marginal benefits equaling marginal costs. Simultaneously, the public policy objectives of the Commission will also require some departures from strict adherence to economic first-best rules. However, when such departures are required, the movement away from marginal cost pricing should be made in the most efficient manner possible. *Movements away from strict adherence to marginal cost pricing must take into account the demand characteristics of customers if an efficient outcome is to be achieved and the firm is to recover its total costs.*

It is the movement away from strict accordance with marginal cost pricing where the firm's common costs are recovered. That is, one need not assign or allocate the common costs to all services prior to engaging in the pricing exercise. It is sufficient to know their value in aggregate along with the

¹ It must be acknowledged that the Commission has public policy objectives other than economic efficiency in pricing. However, the pursuit of public policy goals must be separated from the issue of costing. Attempting to incorporate the public policy objectives into costing confuses pricing and costing issues.

incremental costs of the array of products and services. The pricing of the services can then be done by taking into account the demand characteristics of the services, so that the total revenues of the company are equal to the total cost/revenue requirement.²

Given the substantial level of common costs, the pricing of telecommunications services must be approached in a holistic manner rather than piece-parted. A Ramsey-type approach or a multipart tariff is appropriate.

Cost estimates and methodologies by themselves are of no use in addressing the issues of subsidization, predatory pricing, or protection of monopoly services from being allocated all the common costs of the firm. All of these issues involve the relationship of price to cost, so that none of them can be discussed without taking account of that relationship. This is the fundamental reason why I outlined the framework earlier. However, only costing issues should be addressed in the development of the costing approach, not the issues of pricing.

The first issue is the protection of "monopoly" service from being allocated all the common costs at the expense of "competitive" offerings. An efficient pricing scheme would not recover the common costs from just "monopoly services". Rather in determining the prices for all services, the common costs would be recovered from the array of services *roughly* in inverse proportion to the elasticity of demand for each service. This is the familiar Ramsey-pricing solution. All services would make a contribution to the shared and common costs of production and the degree of contribution would be determined by the demand characteristics of purchasers for each service. Therefore, while all services would be making a contribution toward the shared and common costs of the firm, those services with the least elastic demand would initially make a greater contribution.

² Even a non-regulated firm will have a "revenue requirement" in the sense that investors have expectations of earnings which the firm must satisfy in light of the riskiness of the markets served.

The type of pricing structure and price levels recommended promote competitive entry on a dynamic basis.

If the Commission attempts to limit the price increases on the lesser elastic services, it limits the market forces which will increase the firm's elasticity over time. Since market entry is determined in large part by the profitability of the market, by holding down the price for those services, the Commission is limiting the incentive of new firms to enter the market. Further, since one of the principle determinants of the price elasticity of demand faced by an individual firm is the number of firms offering similar products, this restriction on entry places downward pressure on the elasticities. One is led to the conclusion, therefore, that following the precepts of optimal departures from marginal cost pricing, will lead to (1) a case of increasing competition in those services where demand is currently more inelastic as the price rises and (2) that the level of contribution obtained from the mix of "competitive" and "monopoly" services will tend to equality at the margin over time. In working through the dynamics, it would be expected that the percentage of contribution coming from "monopoly services" would decrease over time while the percentage of contribution from "competitive services" would increase. In any event, in virtually no case would "monopoly services" be assigned the burden of all shared costs or vice versa.

I am recommending reliance on Ramsey-type rules for pricing, or other second-best approaches. GTE does not currently have information on elasticity of demand for every service; however, it has information on the demand characteristics of many services indicating the directions in which relative prices should be moved. Such elasticities are clearly different across services currently offered.³ While it is true that the use of the inverse elasticity rules can be gainfully employed to establish relative price levels of the various services, I would recommend that multipart price structures be employed as the primary

³ It is often argued that since elasticity estimates are not available on every service that Ramsey is not implementable. Ramsey is a very useful conceptual idea and information on price elasticities are available on numerous telecommunications services. In any event, making assumptions such as the application of uniform mark-ups is clearly inappropriate given the existing knowledge of price elasticities.

pricing mechanisms, rather than strict reliance on the inverse elasticity approach. In such a rate structure, the price of the marginal unit would be set at or very close to the incremental operating costs while the inframarginal prices would be priced higher to cover the other costs of the service. Such a price structure improves the economic welfare gains derivable from uniform inverse-elasticity (Ramsey) pricing, since the marginal price is set much closer to the marginal cost of a service. This non-linear multipart rate structure may be thought of as a declining block pricing plan for a service. In addition to generating revenues sufficient to cover the joint and common costs of the firm, this non-linear structure can readily reflect the notion of "avoided costs." Retail customers are likely to be smaller volume customers relative to wholesale customers. Accordingly, the price difference between the first and last block can incorporate the net avoided costs. Even in the non-linear multipart rate structure, however, the price elasticities of demand must be taken into account when pricing a service subject to economies of scope or scale. The important fact in this proceeding, however, is that both approaches involve departures from strict reliance on pricing at incremental cost in order to cover the common costs of the firm.

Within the context of a multi-product firm characterized by economies of scope and scale, one must also deal with the issue of how to handle common costs among services. To allocate the costs *ex ante* is only required if one believes in something akin to an FDC methodology. Thus, my opinion is that no allocation of common costs is or should be required on an *ex ante* basis. At the same time, **the total costs of the firm must be recovered**. The mechanism to do so is in the pricing of the service, not in the costing of a service.

As pointed out previously, the second fundamental purpose of any price is to distribute the costs among the customers of the firm. I have indicated how to address the issue - by an approximation of the inverse elasticity rules or by the use of a multipart rate structure. In so doing, the *ex post* allocations of the joint and common costs would be determined, in part, by the competitive nature of the service as reflected in the firm's price elasticities of demand. To the extent that constraints on the process are required to meet social or public policy objectives, then a second-order constrained price determination process could be

conducted following the same methodology. The resulting distribution of contribution to the joint and common costs of the firm will be roughly inversely proportional to price elasticities of demand for the services. To the extent that constraints are placed on the process, the contribution levels will not be strictly proportional, but will depend upon the services constrained.

The costing requirements set forth in the 1996 Act contemplate prices which are necessarily greater than either LRIC or TSLRIC.

The Telecommunications Act of 1996 ("Act") in Section 252(d) calls for the pricing of interconnection and network elements to be "based on the cost (determined without reference to a rate-of-return or other rate-based proceeding) of providing the interconnection or network element (whichever is applicable)." In addition, this Section specifies that these prices will be "nondiscriminatory" and "may include a reasonable profit." While TSLRIC is a very reasonable starting point for the development of such prices, it is not adequate to recover joint and common costs. Indeed, since the 1996 Act specifies that a reasonable profit may be included, any price must make at least some contribution to the joint and common costs of the firm in excess of TSLRIC before profit levels can even be considered.

I urge the Commission to adopt eight principles to be applied to cost studies.

To be consistent with the 1996 Act's requirements with respect to the cost-basis, I believe there are eight (8) major factors the Commission should consider in evaluating whether to endorse a given costing standard: (1) the nature of the total cost function for a telecommunications company; (2) the distinction between short run cost functions and long run cost functions; (3) the treatment of service specific common and or fixed costs; (4) the relevant incremental costs; (5) the separation of pricing and costing; (6) considerations of market structure and degree of competition; (7) utilization of the most efficient technology; and (8) reconciliation to company-specific revenue requirement.

The long run total cost function of the firm shows the relationship of the total costs of the firm to the mix and level of outputs, given the most efficient technologies that are representative of the firm's and

forward-looking costs. Thus a cost function is a causal relationship based on the underlying production function. Even in a long run specification, there may exist common or up-front costs which do not vary with the outputs of individual services, but do vary with the offering of a specific service or group of services. In the case of multiproduct firms which produce their output in variable proportions, as in the case of telecommunications, it is possible to derive separate long run incremental costs estimates for each specific product, holding all other outputs constant. Thus there will be an incremental cost curve for any one product, corresponding to each possible output of the other product or products. This incremental cost function will specify the costs which vary with output as well as any service-specific fixed costs which vary with the offering of the service. However, in a multiproduct firm, there is no counterpart to the single product firm's average cost. Where joint and common costs are present in the long run total cost function, any allocation of such costs to one product among the set of products supplied is irrational in the sense that it does not reflect cost causation. If price is set on the basis of such an arbitrary allocation, too little of the product may be produced. Correspondingly, too much of other products may be demanded if other prices are set too low based on the misallocation of the common costs.

To the extent that in the long run there are common costs associated with the application of the forward-looking technology, they will be included in the total cost function. Further, to the extent that the underlying production function is characterized by discontinuities, e.g., lumpy capacity investments, the resulting cost functions, both total and incremental will also display discontinuities. Even in the long-run, there will be costs to provision a specific service which occur in a discontinuous manner; that is, there will be costs which do not vary with the level of output of that service, but do vary with the offering of the product. These are the long-run service-specific fixed costs. It is also possible and indeed likely that there will be up-front costs, also referred to as common service-specific fixed costs, that are *causally* related to the provision of a number of products. While such costs can be attributed on a causal basis to the provision of the set of products, even in the long run, no allocation of the common costs to the individual products can be made on a causal basis.

Pricing at LRIC or TSLRIC in the presence of common costs and scale/scope economies results in a revenue shortfall. Mandated pricing at those levels is noncompensatory.

Incremental costs for the identified services should be calculated on the basis of cost causation as the change in total cost for a change in the output of a given product, holding all other outputs constant. To the extent that there are fixed and/or common costs, these costs should be identified as well as the services to which they are causally related. No attempt should be made to allocate these costs to the individual services. Rather, the issues associated with the recovery of these common costs attributable to the identified services should be addressed by rate structure. But it is absolutely clear that pricing at TSLRIC or LRIC will not generate sufficient revenues.

Let's assume that a piece of software is required to provide three central office-based services: call-forwarding, call-waiting, and speed dialing. Let's further assume this software costs \$10,000 to acquire, and that this amount is an *annual* license fee from the software manufacturer. This software provides the capability to generate the three services, or any subset of them. Assume also that the incremental cost, given the software has already been acquired, of providing speed-dialing is \$0.50 per month per customer; call-waiting costs \$1.00 per month per customer; and that call-forwarding costs \$0.75 per month per customer. There is no unique method of assigning the \$10,000 cost which is common to these three services to the individual services and no allocation should be attempted in the costing process. It is sufficient in the costing methodology to simply identify that the \$10,000 is associated with the set of these three products.

As I have emphasized, the pricing and costing of services properly should be independent exercises as they are separable activities. The difference between pricing and costing is that the latter is derived from the production process of the firm while the former utilizes the costing results along with the demand side of the market. For any given individual service, its price must equal or exceed the incremental cost of its provision with respect to changes in output. Additionally, revenues for the service must be greater than or equal to the total incremental costs associated with that product. To the extent that

there are up-front or fixed costs of providing that product, these costs will be included in the total cost calculation. Where a group of services is produced using facilities that are common to the group but the common costs are not causally related to any one of the services, an additional condition must be satisfied. When the prices are multiplied by the respective quantities demanded and the revenues summed across the services utilizing the common plant, the resulting revenues should be greater than or equal to the sum of the common costs of producing the outputs plus the long run incremental costs (at the relevant range of output) multiplied by their respective quantities supplied.

Let's return to the three service example of speed dialing, call-waiting and call-forwarding. We already know that the software requires an annual payment of \$10,000 to the manufacturer and that the incremental costs of operation are \$0.50 per month per customer, \$1.00 per month per customer, and \$0.75 per month per customer, respectively. There are 500 monthly customers for speed dialing, 3000 for call-waiting and 1000 for call-forwarding. The incremental costs associated with the operation of these three services is \$4,000 per month or \$48,000 per year. The absolute price floor at the current levels of output are the incremental costs of the individual services with respect to output, i.e., \$0.50, \$1.00, and \$0.75. In addition, however, when multiplied by their respective prices and summed, the revenues generated by these services must be at least equal to the \$48,000 plus the \$10,000 annual license fee, or \$58,000.

Let us say that the current monthly prices are \$0.65 for speed dialing; \$1.40 for call-waiting and \$1.55 for call-forwarding. At these prices, the revenues from these three services will be \$72,900 annually, greater than the minimum required \$58,000. Clearly, no allegation of cross-subsidization or predatory pricing can be made here. Prices are in excess of their respective incremental costs of operation with respect to output and the revenues from the three services covers the total costs of the services as a whole. Just as obviously, if prices of the individual services had been established at their respective TSLRICs, the company would have incurred a revenue shortfall of \$10,000 - the common cost of providing the three services.

Instead of incurring this shortfall, assume that a fully distributed cost methodology had been followed to assign the \$10,000 and the cost distribution mechanism had been based upon the relative number of customers for each service. This would require that speed dialing be assigned 11% of the costs, call-waiting 67% of the costs, and call-forwarding 22% of the costs or \$1,100, \$6,700, and \$2,200, respectively. At the current prices, speed dialing produces only \$3,900 in annual revenues, but this more than covers its incremental operating costs of only \$3000. Yet the fully distributed cost standard would require the service to generate revenues of at least the operating costs of \$3000 plus the arbitrary allocation of \$1,100, or \$4,100. Yet, the product, speed dialing in this case is already making a \$900 annual contribution to covering the \$10,000 in common costs associated with the provision of the set of products.

To make matters more interesting, let's make the assumption that the demand for speed-dialing is unitary elastic, so that a change in price around the existing price produces no more or no less revenue. That is, the current price being charged is already the revenue maximizing price. What actions should be taken? Clearly, if the revenues derived from speed dialing must recover the fully allocated cost of \$4,100 or be judged to be a beneficiary of cross-subsidization or that the company is engaged in predatory pricing, then the only action for the company to take is to withdraw the offering. Yet in doing so, the company forfeits \$900 of contribution. By any reasonable standard of common sense or economics, that is a dumb thing to do. Both the company and the consumers of speed dialing are made worse off by such action. After all, the \$10,000 expenditure has not been affected by the withdrawal of the service, but the service is no longer available to those customers desiring to purchase it from the LEC and the company revenues have been reduced to \$69,000 from their previous level of \$72,900. The use of fully distributed cost has resulted in harm to all parties, except those other entities which might be offering rival products to speed dialing. It can also be seen why the issue of the relative price elasticities of demand is so important in the development of efficient second-best prices.

In evaluating appropriate pricing standards consistent with the 1996 Act, the efficient cost function of supplying a product(s) or service(s) is the same regardless of whether or not the product is provided in a competitive market or an imperfectly competitive one. The presence of common costs among both products with significant market substitutes and those with fewer substitutes available simply makes the problems more complicated.

As can be seen from the above, it is immediately obvious that pricing at TSLRIC cannot be the sole intent of the Section 252 pricing requirements of the 1996 Act. When considered with other sections of the 1996 Act requiring both resale and especially unbundling, it becomes obvious that the cost standard specified in the act is synonymous with some form of determining total costs of the services. It is clear that the cost basis called for in the statute, is the same as I have quickly developed here: it does include LRIC and TSLRIC as a basis and also includes the relevant forgone opportunity costs as a legitimate component of the cost basis as called for in Section 252 of the 1996 Act.

Under the 1996 Act, a three-part test for pricing of services and unbundled features is implicitly called for: Price greater than or equal to LRIC; Revenues greater than or equal to TSLRIC, and, in the presence of common costs, the service or unbundled feature must make some contribution to the firm's common costs. This is similar to a net revenue test and completely consistent with the behavior of a competitive firm.

Clearly the costing/pricing standard under the 1996 Act implies that a three-part test must be passed in the presence of substantial common costs: (1) the price of the service exceeds its incremental cost at the level of output projected; that is, the marginal price must be greater than or equal to LRIC; (2) the incremental revenues generated by the service should cover the incremental costs of providing the service plus any fixed costs associated with the service; that is, the revenues generated by the service must be greater than or equal to the service's TSLRIC; and (3) if the service is part of a group of services, the individual service must make some positive contribution to covering the joint and common costs of the group of services. Since revenue inflows and outflows will occur at different periods of time, both streams will need to be placed on a net present value basis. If the net present value is positive and the other

conditions are satisfied as well, then the service is not being cross-subsidized, the firm is recovering its costs and making a reasonable profit consistent with the 1996 Act, then the price(s) satisfies the tests.

It is important to recognize that services provided by a local exchange company as well as new entrants are subject to economies of both scope and scale, with very large amounts of common costs present. This factor alone demonstrates that the pricing of services provided out of this common plant should not be examined in piece-parts. The presence of economies of scope and scale also imply that it **will simply not be possible to price all services simultaneously equal to incremental costs and to have the firm break even financially.** Rather prices must depart from their optimal first-best prices in an economic sense. This of course involves questions as to what is the most efficient source for generating such contribution, bringing in the demand side of the marketplace. The brief answer on the demand side will be that those services subject to the greater competitive pressures will make less of a contribution to generating revenues to covering the firm's common costs while services subject to less competitive pressure will make more of a contribution. This is certainly a change from historical policies pursued in the United States, where historically those services, such as toll and access which have generated the most contribution to common costs, also exhibit the greatest elasticity of demand. Obviously this cannot continue in light of the competitive entry which has and continues to occur.

Cost and demand variations require that rate levels also vary on a geographic basis. At a minimum, density pricing zones should be considered.

To the extent that cost conditions do vary by geography, and there is ample evidence that they do vary significantly, a rate structure and rate levels which did not account for such variations would be most inefficient and discriminatory. Thus, there can be little argument that prices should be geographically deaveraged.

The deaveraging of prices should not be restricted to interconnection and unbundled features. As pointed out previously, the pricing of services in the presence of common costs is very much a holistic exercise. The pricing of unbundled features and functions, as well as interconnection rates must be done

along with prices to end user customers. If done on a piece-part basis, then given the variation of costs by geography and the statewide averaging of local prices, it is readily possible to see, for example, unbundled loops priced substantially above the price of a bundled retail service containing such a loop and other services, especially in higher cost areas. The resulting relative prices are a result of historical patterns of pricing in a closed marketplace. With the elimination of barriers to entry, prices must be restructured and geographically deaveraged to avoid the situation just described. Since one of the functions for which there is likely to be substantial demand is unbundled loops, the concept of density zones as contained in the Expanded Interconnection report and Order is a sound starting point. This is because the special access circuits contained in GTE's tariffs look very much like "unbundled loops." That is, a special access circuit is designed to provide a dedicated circuit to a customer to transport that customer's traffic from point A to point B; a "local loop" does the exact same thing. It transports the customer's usage from his premise to a point at the local switching center - point A to point B. Since such a deaveraging mechanism already exists in the Commission's bag of tools, I suggest that density zone pricing is a sound starting point for rate deaveraging for unbundled services as well as interconnection elements.⁴

Closely related to the issue of deaveraging is the issue of price discrimination. The FCC asks if the 1996 Act intends to prohibit all price discrimination, such as density zone pricing and volume discounts. The answer is clearly "no." First, density zone pricing is not price discrimination. I point out that price discrimination occurs not only where prices vary and costs do not, but where costs vary and prices do not. Today's geographically averaged pricing mechanisms are inherently discriminatory. With density zone pricing, we are moving away from one form of price discrimination. Likewise, Sections 251 and 252 of the 1996 Act should not be viewed as prohibiting volume and term discounts, nor should such mechanisms necessarily be viewed as discriminatory. To the extent that both volume and term discounts reflect

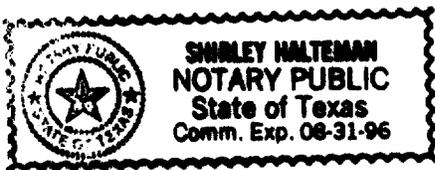
⁴ Deaveraging of wholesale rates should only occur in connection with the deaveraging of retail rates.

differences in the cost of providing services to customers, they are not discriminatory mechanisms, so long as they are made available to all similarly situated customers.

Further, in the presence of substantial common costs in an efficiently designed telecommunications network, departures from incremental cost pricing will be absolutely required of ALL carriers. However, with the requirements for resale and unbundling in the 1996 Act, the historical reliance on customer identity and/jurisdictional nature of the traffic is not sustainable. In this affidavit, I have set out the type of rate structure (and its approximations) and costing standards which will be required to compete in the future. Such a structure replaces customer identity and jurisdictional concerns with quantity of services demanded (volume and term) and relevant cost characteristics, LRIC, TSLRIC and total costs. Not only should the FCC allow such pricing as a matter of policy, it must actively encourage such pricing policies as a matter of public policy. Since the states and the interstate jurisdiction must cooperate in implementing the 1996 Act, such policy coordination is a requirement to achieve the 1996 Act's objectives of encouraging competitive market development.

Edward C. Beauvais
Edward C. Beauvais

Subscribed and sworn to before me this 15th day of May, 1996.



Shirley Halteman
Notary Public

An Empirical Analysis of Pricing Under Sections 251 and 252 of the Telecommunications Act of 1996

Michael J. Doane†
J. Gregory Sidak††
Daniel F. Spulber†††

EXECUTIVE SUMMARY

PROFESSIONAL QUALIFICATIONS

INTRODUCTION

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EXECUTIVE SUMMARY

This empirical report, prepared at the request of GTE Corporation, shows why the Commission should rule in Docket CC No. 96-98 that the public interest requires that new sections 251 and 252 of the Communications Act, added by the Telecommunications Act of 1996, be interpreted to incorporate efficient and compensatory pricing of resale and unbundled network services.¹ Prices should provide incentives for efficient entry and competition while allowing incumbent LECs to recover their economic cost. The economic cost of selling inputs to competitors equals the total of direct costs and opportunity costs. In its notice of proposed rulemaking, the Commission expressed serious reservations about prices based on economic costs and tentatively rejected the efficient component-pricing rule (ECPR). Our examination of local exchange markets demonstrates that the FCC can achieve Congress' objective of establishing "a pro-competitive, deregulatory national policy framework" only if prices are based on economic costs.

The FCC has recognized the need for consistent pricing rules for interconnection and unbundled elements. The Commission has raised a number of important questions about pricing methodologies, their implementation, and their effects on competition. Our empirical analysis of local exchange telecommunications addresses the Commission's concerns about pricing based on economic costs. We demonstrate that the vigor of actual competition and the strength of potential competition in local exchange telecommunications is sufficient to guarantee competitive pricing of retail services, as well as wholesale and network services. The ECPR allows the establishment of price caps that yield revenues covering the firm's incremental and joint and common costs, while reducing or eliminating cross subsidies in regulated rate structures. As a consequence of competitive pricing, continuing competition and entry will reduce prices below their initial caps. That is, the ECPR implies that an incumbent LEC's price for an unbundled network element should equal its long-run incremental cost plus its opportunity cost, *but only to the extent that competition constrains the latter*. It therefore bears emphasis that, because competition reduces the price the incumbent may charge relative to the initial price cap, the rule is not *fully* compensatory. To compensate the LEC fully for its past investment additional charges must be imposed.

Empirical analysis of the ECPR using data on competition in California and data from a representative unbundling proceeding before the Florida Public Service Commission reveals why the FCC's conclusion is insupportable. The ECPR provides a dynamic and flexible pricing method that accommodates entry and adjusts in response to competitive forces. Our empirical analysis of competition demonstrates the following points:

1. The large number of companies that are seeking or have received certification as resellers -- including many large, established firms, such as interexchange carriers -- demonstrates the strength of resale competition in local exchange markets. Such competition will put downward pressure on retail prices. Setting wholesale prices by discounting retail prices, as mandated by the 1996 Act, therefore provides a mechanism that allows prices to fall under competition.
2. The large number of companies that are have established transmission facilities, or that are in the process of doing so, demonstrates the strength of facilities-based competition in local exchange markets. Such competition will put downward pressure on prices for unbundled network elements. Using the ECPR to set price caps for unbundled network elements therefore provides a mechanism that would allow prices for unbundled services to fall under competition.

1. Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, Notice of Proposed Rulemaking, CC Dkt. No. 96-98 (released Apr. 19, 1996) [hereinafter *NPRM*].

3. The ECPR provides a unified pricing system for establishing the prices of wholesale services and unbundled network elements. That pricing methodology is consistent with the Telecommunications Act of 1996. The pricing methodology is operational because opportunity costs are measurable (using regulated rates, price caps set up under incentive regulation, and market prices for competing services). As competition reduces prices, the ECPR automatically adjusts and thus allows lower prices for retail, wholesale, and network services.
4. The local exchange carriers have significant joint and common costs. The pricing of unbundled services at incremental cost will prevent the recovery of those joint and common costs.
5. The regulated rate structure contains cross subsidies across classes of services. Maintaining such cross subsidies will distort incentives and reduce the potential benefits of competition. Application of the ECPR improves the efficiency of pricing because the incumbent LEC receives prices based on economic costs (incremental costs plus opportunity costs). Resale and facilities-based competition necessarily diminish the flow of subsidies embodied in the incumbent LEC's existing rate structure.
6. The ECPR is compensatory in the sense that it covers the incumbent LEC's direct economic costs and opportunity costs. However, the pricing rule is not fully compensatory. The presence of facilities-based entry, and the possibility that entrants may purchase services under existing retail rates that are substitutes for the unbundled network elements of the incumbent LEC, reduce the likelihood that the LEC will recover its total costs.
7. The state regulator should consider rate rebalancing before imposing a system of prices for wholesale services and unbundled network elements. Unbundling is inconsistent with the presence of cross subsidies across classes of services and geographic areas.
8. If the state regulator chooses not to rebalance rates, then, to preserve the existing flow of subsidies in the incumbent LEC's rate structure, a system of end-user charges must accompany the pricing of wholesale services and unbundled network elements. If such a system of end-user charges is not put in place, the incumbent LEC's prices for mandatory network access will ensure that the firm will earn negative economic profit. That result would not be "just and reasonable" and, a fortiori, would not include a "reasonable profit." In that circumstance, the Commission's implementation for prices of unbundled service elements would violate the Telecommunications Act of 1996.

In short, if the Commission were to give a statutory interpretation to pricing under sections 251 and 252 that embraced economic cost, the agency would advance the public interest by promoting efficient entry into local telecommunications markets and eliminating any incentive for the incumbent LEC to discriminate against competing telecommunications carriers. Moreover, that agency interpretation of the 1996 Act would prudently avoid the creation of a constitutional controversy over whether the prices that state regulators mandate for network access under sections 251 and 252 effect a taking of property in violation of the Takings Clause of the U.S. Constitution and similar provisions of state constitutions.

PROFESSIONAL QUALIFICATIONS

A. Michael J. Doane

I, Michael J. Doane, am Vice President and Principal of Analysis Group Economics, Inc., an economic research and consulting firm. I am manager of the firm's San Francisco office and director of the firm's energy and telecommunication practice areas. My expertise is in applied microeconomics and econometrics, and I have over fourteen years of consulting experience in regulatory economics.

I have conducted economic research and prepared expert testimony on a variety of antitrust and regulatory issues in the electric power, natural gas, oil pipeline, and telecommunications industries. My research includes econometric analyses of demand; studies of public utility pricing and rate design, including optional tariffs; cost and productivity measurement; analyses of alternative regulatory approaches; analyses of competition and industry performance; and analyses of the financial implications of the transition to competition in regulated markets.

I have published articles on regulatory subjects in a number of academic journals, including the *Hume Papers on Public Policy*, the *Journal of Law and Economics*, the *Journal of Law, Economics & Organization*, and the *Quarterly Journal of Economics*.

B. J. Gregory Sidak

I, J. Gregory Sidak, hold the F.K. Weyerhaeuser Chair in Law and Economics at the American Enterprise Institute for Public Policy Research (AEI), where I direct AEI's Studies in Telecommunications Deregulation. I am also a senior lecturer at the Yale School of Management, where I teach a course on telecommunications regulation with Professor Paul W. MacAvoy. I served as Deputy General Counsel of the Federal Communications Commission from 1987 to 1989, and as Senior Counsel and Economist to the Council of Economic Advisers in the Executive Office of the President from 1986 to 1987.

My academic research concerns telecommunications regulation, antitrust policy, and constitutional law issues concerning economic regulation. I have published three books concerning pricing, competition, and investment in regulated network industries: *Toward Competition in Local Telephony* (MIT Press & AEI Press 1994), co-authored with William J. Baumol; *Transmission Pricing and Stranded Costs in the Electric Power Industry* (AEI Press 1995), also co-authored with William J. Baumol; and *Protecting Competition from the Postal Monopoly* (AEI Press 1996), co-authored with Daniel F. Spulber. My fourth book, *Foreign Investment in American Telecommunications*, is forthcoming in 1997 from the University of Chicago Press. With Professor Spulber, I have recently finished a fifth book-length manuscript entitled *Deregulatory Takings and the Regulatory Contract*, which analyzes the relationship between the pricing of network access and the Takings Clause of the Constitution in situations where regulators mandate unbundling in network industries. A portion of that work will be published in the fall of 1996 in the *New York University Law Review*.² I have previously published scholarly articles in the *Journal of Political Economy*, *California Law Review*, *Columbia Law Review*, *Cornell Law Review*, *Duke Law Journal*, *Georgetown Law Journal*, *Harvard Journal on Law & Public Policy*, *New York University Law Review*, *Northwestern University Law Review*, *Southern California Law Review*, *Yale Journal on Regulation*, and elsewhere. A number of those articles analyze access pricing and related legal issues in network industries.³

2. J. Gregory Sidak & Daniel F. Spulber, *Deregulatory Takings and the Regulatory Contract*, 71 N.Y.U. L. REV. (forthcoming 1996).

3. E.g., William J. Baumol & J. Gregory Sidak, *The Pricing of Inputs Sold to Competitors: Rejoinder and Epilogue*, 12 YALE J. ON REG. 177 (1995); William J. Baumol & J. Gregory Sidak, *The Pricing of Inputs Sold to Competitors*, 11 YALE J. ON REG. 171 (1994); William J. Baumol & J. Gregory Sidak, *Pricing of Services Provided to Competitors by the Regulated Firm*, 3 HUME PAPERS ON PUBLIC POLICY, No. 3, at 15 (1995); Robert W. Crandall & J. Gregory Sidak, *Competition and Regulatory Policies for Interactive Broadband Networks*, 68 S. CAL. L. REV. 1203 (1995); J. Gregory Sidak, *Telecommunications in Jericho*, 81 CAL. L. REV. 1209 (1993).

I have testified before the U.S. Senate and House of Representatives on regulatory and constitutional law matters. My writings have been cited by the Supreme Court, by the lower federal courts, and by state and federal regulatory commissions. I have been a consultant on regulatory and antitrust matters to the Antitrust Division of the U.S. Department of Justice, to the Canadian Competition Bureau, and to companies in the telecommunications, electric power, natural gas, mail delivery, and computer software industries in North America, Europe, Asia, and Australia.

C. *Daniel F. Spulber*

I, Daniel F. Spulber, am the Thomas G. Ayers Professor of Energy Resource Management and Professor of Management Strategy at the J.L. Kellogg Graduate School of Management, Northwestern University, where I have taught since July, 1990. I received my B.A. in Economics from the University of Michigan, and my M.A. and Ph.D. in Economics from Northwestern University. Before joining the faculty of Northwestern University, I was Professor of Economics and Professor of Economics and Law at the University of Southern California. I have also taught economics at Brown University and the California Institute of Technology. I have conducted extensive research over the last eighteen years in the areas of regulation, industrial organization, microeconomic theory, and energy economics. In a ranking of economists published in the April 1996 issue of *Economic Inquiry*, I was ranked as the sixth most productive economist in the United States based on publications in the top economics journals. In my scholarly research and consulting work, I have studied issues of regulation and competition in network industries, including telecommunications. I am the author of *Regulation and Markets* (MIT Press, 1989), and coauthor with J. Gregory Sidak of *Protecting Competition From the Postal Monopoly* (AEI Press, 1996). I have published over 50 articles on regulation, pricing and related topics in numerous academic journals, including the *Yale Journal on Regulation*, *The New York University Law Review*, the *Journal of Economic Theory*, the *Quarterly Journal of Economics*, the *Rand Journal of Economics*, *The Review of Economic Studies*, and the *American Economic Review*. I am the founding editor of the *Journal of Economics & Management Strategy*, published by MIT Press.