

**Players, Stakes and Politics
Of Regulated Competition in
The Communications Infrastructure
of the Information Industry**

**Anthony G. Oettinger
with
Carol L. Weinhaus**

Part I of
Basic Data on the Politics and
Economics of the Information Evolution:
Telecommunications Costs and Prices
in the United States

Program on Information Resources Policy

Harvard University

**Center for Information
Policy Research**

Cambridge, Massachusetts

A publication of the Program on Information Resources Policy.

BASIC DATA ON THE POLITICS AND ECONOMICS OF THE INFORMATION EVOLUTION:
TELECOMMUNICATIONS COSTS AND PRICES IN THE UNITED STATES

Part 1: Players, Stakes and Politics of Regulated Competition in the
Communications Infrastructure of the Information Industry

Anthony G. Oettinger with Carol L. Weinhaus

Publication P-81-7

August 1981

The Program on Information Resources Policy is jointly sponsored by
Harvard University and the Center for Information Policy Research.

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Information Resources Policy, Harvard University, 200 Aiken, Cambridge,
MA 02138. (617) 495-4114. Printed in the United States of America.

Printing 5 4 3

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EXECUTIVE SUMMARY

From about 1920 to 1960 supplying telecommunications services in the United States was essentially the exclusive province of the traditional telecommunications industry, namely AT&T, its associated 20 or so Bell System operating companies and some 1500 independent companies. Operating as a monopoly within its geographic franchise area, each of these companies nowadays collaborates with all the others in the traditional industry to provide nationwide services that yielded total revenues for 1980 of about \$60 billion.

The post-World War II growth of merged computer-and-communications (communications) technologies and of the electronics industries based on these technologies created the potential for competition over a wide range of information products and services. Beginning about 1960, actions by regulatory agencies and the courts gradually opened up competition with the traditional telecommunications industries. These industries, like the transportation and energy industries are a basic social infrastructure.

The new competitive arenas presently include the supplying of:

1) voice and data transmission and switching facilities; 2) terminal equipment ranging from plain old telephones to elaborate computers; 3) services such as the resale of facilities or services bought wholesale from traditional suppliers with or without supplying "value-added" facilities or services as well; 4) information, ranging from time or weather information through directory advertising to queries from elaborate databases.

All four competitive arenas are reported to have great growth potential. But the transmission and switching arena is unique for one salient reason:

it is where most of the traditional industry's money is now. Current battles are principally over long-haul transmission and switching, although short-haul markets, local markets and the three other arenas are increasingly also at stake. Moreover, the distinctions among all four arenas are as blurry as the older distinctions among traditional information industries. Competitors over local markets, for example, include traditional telecommunications carriers, multipoint distribution services (MDS), cable "television" systems, radio and TV broadcasters, and distributors of information coming from the print tradition such as newspapers and postal services. And the competition is not limited to transmission, switching or any other function in "pure" form.

The long-haul business is highly concentrated. In 1976, about 4000 business and government customers accounted for \$5.6 billion or over 85 percent of revenues from all long-haul services (i.e., interexchange services under federal jurisdiction) to business and government and for over 50 percent of the total (\$11.4 billion) long-haul revenues from businesses and residences combined. Geographically, these revenues are concentrated along the spine of AT&T's routes from the East to the West Coast and its branches along each coast and from the Midwest to the Southwest.

This concentration was instrumental in transmuting a technological potential for better and cheaper concentrated long-haul services into competitive battles for the revenues from the business, government and residential customers along the main routes. By the mid-seventies, these battles had spilled over from regulatory and judicial proceedings into Congressional debates that were far from resolved at the beginning of 1981.

At stake are not only the eventual impacts on competing suppliers of the terms of competition for long-haul business. Transmission and switching facilities are a social infrastructure like roads and electrical power facilities. All three other competitive arenas depend on this infrastructure. Most important, the prices of transmission and switching services--long-haul, short-haul or local--affect every business and everyone's lifestyle. Whoever controls that infrastructure hence controls strategic high ground.

How everyone is ultimately affected is unlikely to be determined solely by some dramatic regulatory, judicial or legislative act. The crucial battles over the costs and prices of communications facilities and services will be won or lost, as they have been in the past, in the trenches of detail and over many years of arduous negotiations.

This stems from the fact that 80-90 percent of the costs of the traditional industry's plant are shared by local, short-haul and long-haul services, i.e., are joint and common costs. This trait can disappear only slowly, if at all. While economic theory gives some guidelines as to efficient pricing patterns, the theory is difficult if not impossible to apply in practice. Moreover, social equity, as perceived by regulators and suppliers, and not economic efficiency or profit alone, has been a significant factor in traditional telecommunications costing and pricing. It is likely to remain so in the future.

Communications costing and pricing is therefore likely to remain, as it has been, a matter of politics and policy not governed by market forces alone. The general groundswell of pro-competitive ideology and the interests of would-be competitors have rendered regulated monopoly untenable. Unfettered competition might be possible if each distinct

communications service were delivered by means of a distinct facility under distinct ownership dedicated to that service and no other at an acceptable level of efficiency. Absent such an extreme condition, unfettered competition is unpalatable to most affected parties. Hence regulated competition will govern the communications industries, with cost allocation and pricing practices continuing to be at the heart of the regulatory process.

By early 1981, the costing and pricing practices of the traditional industry had come under severe strains because they still served policies framed as compromises among political forces long since off their former balance and still in rapid flux.

Nationally, reapportionments following the 1962 Baker v. Carr decision have strengthened urban over rural constituencies. On the consumer side, the major forces still include large national enterprises principally concerned about long-haul services as well as terminal equipment; and they still include local interests--small businesses, professionals and residences--principally concerned about short-haul and local services as well as terminal equipment. Most of the business consumers' concerns have been centered on the costs of internal administrative communications services, which tend to be aggregated in the budgets of distinct or combined data processing and communications responsibility centers. Costs of local services in general, and of long-haul services used for marketing or other external functions are generally borne by numerous centers. Their aggregate value is generally unknown to top management, although spot checks suggest their amount is often considerably greater than the costs of the visibly budgeted internal services.

On the producer side, the traditional telecommunications industry, once alone in the ring, now finds itself in the midst of numerous large and small competitors from the computer and electronics industries, from the media and from other sectors--domestic and foreign.

The long-standing shared national goal of attaining universal basic telephone service has been largely reached, although less than 90 percent of Alabama, Arizona, Kentucky, Mississippi, New Mexico, South Carolina, and West Virginia households had telephone service in 1976 and Alaska, Hawaii, Puerto Rico and the Virgin Islands are still being integrated into the national cost and revenue pool. However, prospects for new services--sell, shop or pay by phone, teletex, etc.--are leading to a reinterpretation of that goal not only in terms of voice services as of old, but in terms of modern digital services and not in a monopolistic but a competitive context.

The old balance of forces supported a division of regulatory powers between federal and state authorities. One significant consequence of this division has been the "jurisdictional separation" of the joint and common costs of facilities shared by federally and state regulated services and the assignment of the separated cost shares to the respective jurisdictions for recovery through revenues from services regulated by the respective jurisdictions. All costs and revenues from directory advertising are under the jurisdiction of the 50 states.

In effect, this has meant defining the costs of local services "residually" -- sometimes explicitly, sometimes implicitly: first, costs as defined for federally regulated long-haul interexchange services and then costs as defined for state regulated interexchange services are taken off the top of the total aggregate revenue or

cost pool of the traditional telecommunications industry. What's left is essentially defined as the costs of local service.

The main thrust of policy from World War II to the present has been to move increasing proportions of joint and common costs away from the local service cost pool and into the federally or state regulated interexchange service cost pools. This has been reflected in relatively stable prices for basic local exchange services, especially for households and for rural areas. It has been reflected in flat-rate pricing schedules providing for a fixed charge regardless of the number or duration of local calls. And it has been reflected in the growth of the geographic areas covered by local service to the point where, for example, the Atlanta local service area--some 3,400 square miles--is as large as Delaware and Rhode Island combined.

The old balance of forces has also supported plant design, operating and pricing practices that provide for uniform prices for all interexchange services under federal jurisdiction and, within each state, for uniform statewide interexchange prices and uniform statewide schedules for basic local service prices. Thus, for example, the price of a call between any two points, while it may depend on the distance between the points and the duration of the call, does not depend on whatever cost might be assigned to the specific facilities actually used for that particular call. It reflects, if anything, the average cost assigned to all facilities under a particular jurisdiction, plus whatever pricing policies are followed to recover the aggregate of all costs under the particular jurisdiction from the aggregate revenues for all the services under that jurisdiction. For instance, the same price is charged for an interstate call from New York, NY to Washington, DC as from Des Moines, IA to Sioux Falls, SD (about 200

miles apart). Within California, the San Francisco to Sacramento and China Lake to Death Valley (about 80 miles apart) prices are equal to each other, but not necessarily to the prices for 80 mile calls within other states.

Finally, the old balance of forces has also supported revenue sharing arrangements--settlements--among the members of the traditional industry that reimburse each company for precisely the costs it has been defined to incur for interexchange services, whatever relationship these costs might have to the revenues that would have accrued under the applicable uniform price schedule. Coupled with the definition of local service cost as residual, this has enabled the smaller independent companies to charge prices for local services not too far out of line with Bell System prices in neighboring localities -- and, in some cases, substantially below those prices. It has also enabled them, for example, to install equipment necessary for nationwide direct dialing.

These practices have been destabilized by the advent of competitive forces. As competitors moved into the concentrated long-haul transmission and switching business, AT&T initially responded by lowering long-haul prices relative to short-haul prices, both interstate and state. This kept total revenues stable. The details of these price changes tended to alleviate a long-standing political problem resulting from the so-called "toll rate disparity" whereby it cost more, say, to call 50 miles into Missouri from a point on the Missouri border than to call 50 miles into a neighboring state. But the details of this price change also tended to introduce fresh political problems in the form of an "exchange-interexchange rate disparity" that stems from sharp upward jumps in the price for calling a point just outside a local exchange area relative to the price for

calling a point just inside the local exchange area. These moves can be interpreted as responding to competitive price pressures by lowering prices in the competitive long-haul arena, raising them in the monopolistic short-haul arena since this proved politically feasible, but holding them stable in the monopolistic local area, where price increases have been politically less palatable.

However, in spite of the continuing political sentiment to the contrary, upward pressures on local service prices continue to mount. While some states are holding the line on local ten cent coin box calls, refusing to permit charging for directory assistance, expanding the size of local calling areas or otherwise keeping local service prices stable, others are nowadays doing just the opposite.

AT&T has pointed to the history and the prospect of increasing allocations of joint and common costs to the interstate jurisdiction as evidence for its being forced by regulators to hold a price umbrella over competitors in order to support at least relatively stable prices for local services. At the same time, competitors have pointed to long-haul price decreases as evidence of predatory pricing on AT&T's part. And the customers of short-haul services see themselves caught in the middle as victims of unjustified monopolistic price increases. Oddly enough, the U.S. government, the Department of Defense in particular, is prominent among the latter. The U.S. military AUTOVON voice network, made up principally of short, highly interconnected links to increase its survivability under attack, has proved particularly vulnerable to increases in short-haul prices.

Since the cost allocations and the pricing policies on which the foregoing arguments rest are mainly the consequences of prior political

compromises, the essential question is not where some absolute economic or technological truth might lie, but what is the likely shape of future compromises. The local forces that have pressed for increasing cost allocations to interexchange services now face countervailing forces for decreasing these allocations. Discerning how an equilibrium might come about requires looking at additional detail.

Whatever the level of total costs assigned to any jurisdiction, how much of these total costs is recovered from the diverse services under that jurisdiction depends on the relative pricing of the services. In the past, little attention was paid to relating the prices of particular services to the cost of each of these services. But, when increasing competition raises questions about price umbrellas or predatory pricing, the service-by-service relationship of prices to costs is called into question. However, just as the allocation of joint-and-common costs to particular jurisdictions is inherently arbitrary, so is the allocation of these costs to particular services.

From a purely economic standpoint, all that can be said with some certainty, therefore, is that, whatever level of jurisdictional cost allocation might emerge, prices for competitive services will be subject to greater downward pressure and prices for non-competitive services to greater upward pressure than in the past. To the extent that this leads to actual price increases for presently non-competitive services, these will be increasingly attractive to competition. Eventually, cost allocation patterns will be developed to justify politically and judicially acceptable pricing patterns.

Who wins and who loses from changes in present pricing patterns will depend on both the pattern of competition among suppliers, and also on the

geographic location of suppliers and consumers and on the mix of services any particular consumer purchases.

Being present in all states except Delaware and Rhode Island, the 1500 independent companies are a widespread political force. The effects of change on these companies are not directly deducible from average nationwide effects, which are essentially equivalent to average Bell System effects. For example, the nationwide, traditional industrywide proportion of joint and common plant costs allocated to the interexchange and exchange services respectively is 30 percent interexchange: 70 percent exchange. On the average, a one percent decrease in the interexchange cost allocation would therefore, in the short run, require a .43 percent increase in the exchange cost allocation. But the proportions for independents are roughly 10 percent : 90 percent at one extreme and, at the other extreme, 90 : 10 percent, with corresponding exchange cost allocation increases of .11 percent and 9.0 percent respectively. The deviation in exchange cost allocations for independents thus ranges from 75 percent less than the average increase to 2000 percent more than the average increase. And, of the independents, only 8 percent would experience increases less than the average while 92 percent would experience increases greater than the average. Although the spread would be smaller, similar excursions from the average would be experienced by the individual Bell companies operating in different regions.

Present total cost allocations are proportioned roughly 50 percent interexchange to 50 percent exchange costs. On grounds no more extraordinary than any experienced and sanctioned by the electorate, the regulators and the courts in the last 50 years, one can estimate alternative allocations ranging from 30 percent interexchange: 70 percent exchange to 65 percent

interexchange: 35 percent exchange. A change to the former would, on the average, decrease interexchange costs by 40 percent and increase exchange costs by 40 percent. A business customer buying only interexchange services would therefore experience an average price decrease of 40 percent while a business customer buying only exchange services would experience an average price increase of 40 percent. How any given business customer would perceive such a policy change clearly depends on the mix of services he happens to be purchasing. At the other extreme, the level of change would be 25 percent, with increases and decreases switched around.

Taking into account the differential impacts of geographical deviations from the nationwide average, an interexchange service cost decrease of 40 percent for a business customer in either Maryland or Wyoming might be offset by local service cost increases of 25 percent in Maryland and of 95 percent in Wyoming. Considering the effects of being in the territory of an independent rather than a Bell Company could offset a decrease of 40 percent in interexchange costs with increases of 60 percent and 240 percent in exchange service costs in Maryland and Wyoming respectively.

All the foregoing assumes that the business customer is within a competitive market, namely one along the spine described earlier. Under plausible assumptions, the 40 percent cost decrease for interexchange services would turn into a 50 percent cost increase for a business customer in a non-competitive location off the spine, while the cost increase for local services would remain at 40 percent. Similar ranges can be estimated for residence customers.

- Borchardt, Kurt. *The Exchange Network Facilities for Interstate Access (ENFIA) Interim Settlement Agreement*, P-79-4, August 1979.
- Compaine, Benjamin M. *A New Framework for the Media Arena: Content, Process and Format*, P-80-3, February 1980.
- Ganley, Oswald H. *The Role of Communications and Information Resources in Canada*, P-79-1, June 1979.
- Ganley, Oswald H. *The United States-Canadian Communications and Information Resources Relationship and Its Possible Significance for Worldwide Diplomacy*, P-80-2, February 1980.
- Godbey, Robert D. *Revenue and Cost Allocations: Policy Means and Ends in the Railroad and Telecommunications Industries*, P-79-2, July 1979.
- Klie, Robert H. *Communications Network Management*, P-80-4, February 1980.
- Lipscomb, Greg. *Private and Public Defenses Against Soviet Interception of U.S. Telecommunications: Problems and Policy Points*, P-79-3, July 1979.
- Loeb, Guy H. *The Communications Act Policy Toward Competition: A Failure to Communicate*, P-77-3, October 1977.
- McLaughlin, John F., with Anne E. Birinyi, David Dominik and Eddie Muñoz-Perou, *Telephone-Letter Mail Competition: A First Look*, W-79-4, July 1979.
- McLaughlin, John F., with Anne E. Birinyi, *Mapping the Information Business*, P-80-5, July 1980.
- Oettinger, Anthony G., Berman, Paul J. and Read, William H. *High and Low Politics: Information Resources for the 80s* (Ballinger Publishing Company, Cambridge, Ma., 1977).
- Oettinger, Anthony G. and John C. LeGates. *Domestic and International Information Resources Policy--Congressional Testimony of Anthony G. Oettinger and John C. LeGates-1976-77*, WP-78-1, 1978.
- Oettinger, Anthony G. and Kurt Brochardt with Carol Weinhaus, *Basic Data on the Politics and Economics of the Information Evolution: Telecommunications Costs and Prices in the United States, Part 2: Stakes in Telecommunications Costs and Prices*, P-80-6, November 1980.
- Oettinger, Anthony G. with Carol Weinhaus. *Basic Data on the Politics and Economics of the Information Evolution, Part 3: The Federal Side of Traditional Telecommunications Cost Allocations*, P-80-1, January 1980.
- Oettinger, Anthony G. with Carol Weinhaus. *Basic Data on the Politics and Economics of the Information Evolution, Part 4: The Traditional State Side of Telecommunications Cost Allocations*, P-80-7, September 1980.
- Read, William H., *The First Amendment Meets the Second Revolution*, WP-79-2, March 1979.
- Seminar on Command, Control, Communications and Intelligence: Guest Presentations, I-80-6, December 1980.
- Seminar on Command, Control, Communications and Intelligence: Student Papers, I-81-1, January 1981.
- Seipp, David J., *Issues and Options in Telecommunications Competition: A Survey*, W-78-15, December 1978.
- Sichter, James W., *Separations Procedures in the Telephone Industry: The Historical Origins of a Public Policy*, P-77-2, January 1977.

Table A

Additional Background Documents

1. PLAYERS, STAKES AND POLITICS OF REGULATED COMPETITION IN THE COMMUNICATIONS INFRASTRUCTURE OF THE INFORMATION INDUSTRIES
 - A. Politics and Policy in Cost and Price Setting
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 2. Costs and prices
 - B. Strategic Control of Telecommunications Costs and Prices
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 - C. The States' Role: Local Exchange "Costs" as a Residual
 1. The state cost pool
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 - D. Tactics of Cost Allocation and the Role of the Courts
 1. Separations and settlements
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 - E. Reawakening Competition: Challenges to Traditional Costing and Pricing Policies
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 - 2. Interpreting adversary claims
- G. Potential Range of Fairness in Jurisdictional Cost Allocations
 - 1. Functional cost pools
 - 2. Latitude of cost allocation
 - 3. Implications for consumers and producers
- H. Far Out on the Cost Allocation Swing: Geopolitics and Industry Politics
 - 1. State-by-state variations
 - 2. Variations within the traditional telecommunications industry
 - 3. Implications of variations
- I. Cost-Definition and Price Deaveraging Responses to Competition: Geopolitics and Consumer Pressures
 - 1. Costing and pricing responses to competition
 - 2. High and low density: Pressures and counterpressures
 - 3. Implications for business and residential consumers
- J. Mounting Pressures on Traditional Pricing Policies: The Exchange/ Interexchange Disparity
 - 1. The limits of responses to pressures
 - 2. The federal-state toll disparity
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 - i. Hardware suppliers
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 - Resale and Shared Use (20097/80-54, and
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 - Competitive Carrier (79-252)
 - MTS/WATS Market Structure Inquiry (78-72)
 - Computer Inquiry (20828)
 - CATV Cross Ownership Waiver (78-219)
 - Local Exchange Substitutes/Facilities and
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 - Cellular Communications Systems
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 - Multi-Point Distribution Service (MDS)
and Direct Broadcast Satellite (DBS)
 - Spectrum Utilization: Digital Electronic
Message Services (DEMS)
 - Merger/Consolidation (GTE/TELENET 80-197)
 - C. Tariffs: Rate Structure and Pricing
Alternatives
 - Multi-Schedule Private Line Service
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 - Customer Premises Terminal Equipment
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 - Rate of Return/Earnings Interstate (AT&T
Interstate and Foreign Services, 79-63/187)
 - D. Accounting, Costing and Jurisdictional Separations
 - Federal/State Joint Board (80-286)
 - Cost Allocation Manual (AT&T/79-245)
 - Exchange Network Facilities for Interstate
Access (ENFIA) Access Charge (78-371)
 - Uniform System of Accounts (USOA 78-196)
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ACKNOWLEDGMENTS

Brooke Barr, Laura Brody, David Goldsberry, Paul Gottlieb, Francesca Fry, Vivina Ree and John Sylla ably assisted in the laborious tasks of data gathering, sifting and organizing. Special thanks are due to Anne Hunt and Jeff Dutton of the Harvard Laboratory for Computer Graphics and Spatial Analysis, for their collaboration in developing effective presentations of the state-by-state and price-distance data.

Special thanks are also due to many people within the Program's affiliates and to many others, often unknown to us, who responded to requests addressed to companies, trade associations, and government bodies. They reviewed the study plan, supplied data, or commented critically on drafts of this report. These persons and the Program's affiliates are not, however, responsible for or necessarily in agreement with the views expressed herein, nor should they be blamed for any error of fact or interpretation.

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PREFACE

Polarized rhetoric about the clear simplicities of ideal market mechanisms or of omniscient central planning has tended to shield us from the dark complexities of the combinations of market, administrative and political processes in the real economy.

As late as 1973, AT&T's board chairman thundered that ". . .the prospect confronting us is not free and open competition as an alternative to monopoly but rather a third alternative affording the virtues of neither and the disadvantages of both, and that is regulated competition--a division of the market place arbitrarily imposed and artificially maintained."¹ By 1979, his successor recognized that "vaguish as the notion of complete deregulation is, . . .regulated competition is what we've got and regulated competition is in all likelihood what we're going to get from here on out."²

Meanwhile, the FCC continued its policy of increasing competition and the ground rules for competition had become the subject of debates before Congressional committees. Both bodies groped about essentially in the dark. As a trade publication put it in August 1980, "When [Commissioner] Fogarty again complained about lack of economic analysis regarding competition; [Chairman] Ferris said there also was a lack of analysis on the impact of non-competition."³ And, in reporting its bill to amend the Communications Act of 1934, the accompanying House Report said that "the Committee has determined that no one knows precisely what the costs of various classes of service are, or the size or direction of subsidies."⁴

The pages that follow attempt to shed light on these matters.

1. PLAYERS, STAKES AND POLITICS OF REGULATED COMPETITION IN THE COMMUNICATIONS INFRASTRUCTURE OF THE INFORMATION INDUSTRIES

A. Politics and Policy in Cost and Price Setting

Even AT&T no longer contests that monopoly in telecommunications is dead. In principle, nearly everybody is for competition and all the good things it is supposed to bring to customers. But any customer whose prices might go up under renewed competition is less apt to like it in practice than a customer whose prices might go down. And, when a competing supplier's own chips are down, he often looks to government to assure "fair" competition; in short, to regulate competition. Extremist wind aside, regulated competition in telecommunications is thus more likely than either flipping back to the monopoly that J. Pierpont Morgan and Theodore Vail built or flopping back to the land where Adam Smith's invisible hand heals all market ills, a land, says Alfred Chandler, that never--well, hardly ever--was.⁵

Hence everyone with a stake in telecommunications costs and prices as either a supplier or a customer also has an interest in making regulation and competition work better hand in hand than either ever has worked alone anywhere but in the pristine precincts of pipe dreams. This paper presents the forces and trends that all players must contend with as they look after their own stakes.

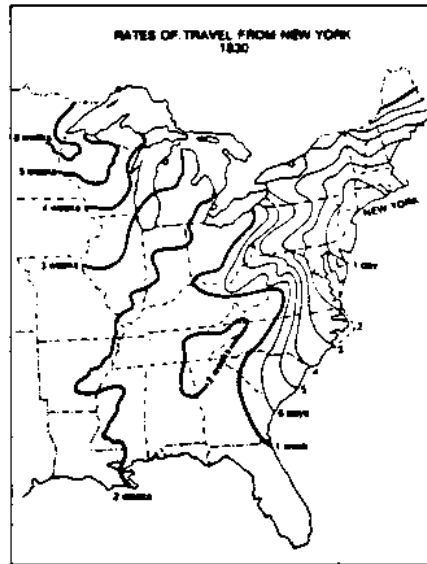
1. Stakes in Communications Prices

Whatever the fate of competing suppliers of communications (computer- and communications) products and services, the prices they charge are increasingly important to all their commercial, industrial and household

customers. As internal office automation and external electronic retail activities--such as selling, shopping or paying bills by phone--continue to grow in all enterprises, their share of expenses will grow not only in the administrative budget, but in the production and the marketing budgets as well. Hence it seems likely that the effects of telecommunications pricing policy will capture the attention of top managers throughout commerce and industry, just as mushrooming data processing costs and attendant organizational questions began to do a decade or so back. Similarly, postal costing and pricing policy continues to interest top managers in publishing, advertising, mail order and other enterprises highly dependent on postal distribution services.

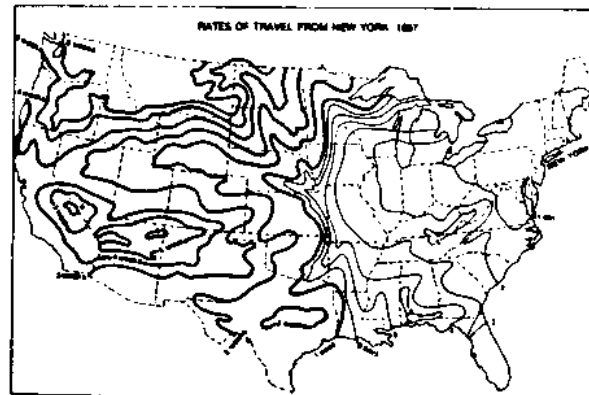
Most people recognize how important changing modes of transportation are for access to raw materials, energy, labor and markets, for the projection of military power or for the mobility of families. In transportation, the time to get there from here measures distance better than miles. Figure 1.1 shows how remarkably the United States changed by this criterion between 1830 when railroad construction had just begun and 1857 when rails linked New York and the eastern seaboard to Chicago and the Mississippi. It is therefore not surprising to find that not only the railroad and canal operators but also the merchants and the farmers of the late nineteenth century were preoccupied with political battles over railroad regulation, costing and pricing quite like today's battles over communications.⁶

As Figure 1.2 suggests, the price-induced changes in the telephonic shape of the United States between 1957 and 1977 are at least as dramatic as the time-induced changes in the transportation shape between 1830 and 1857. The maps of Figure 1.2 reflect, as shown in Figure 1.3, a pronounced bulging of prices at shorter distances for one type of telecommunications



1830 Rates of Travel
from New York City

(a)



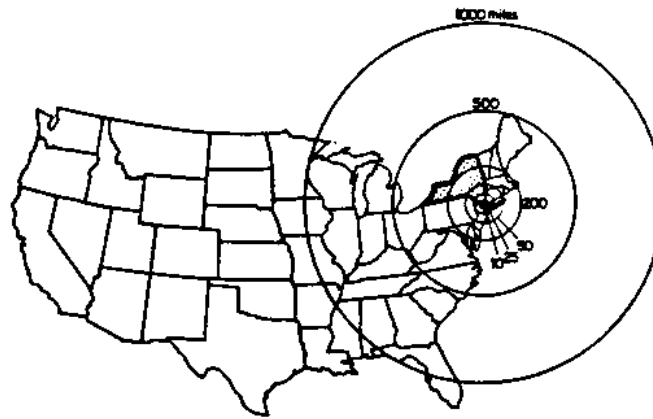
1857 Rates of Travel
from New York City

(b)

Figure 1.1

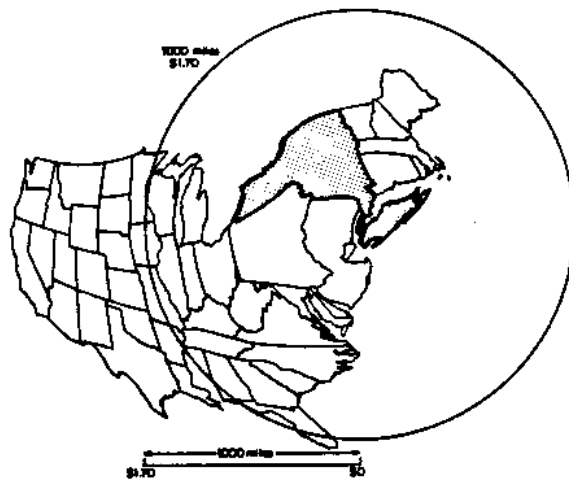
Effect of Railroads on Rates of Travel
in the United States

Source^{S1}



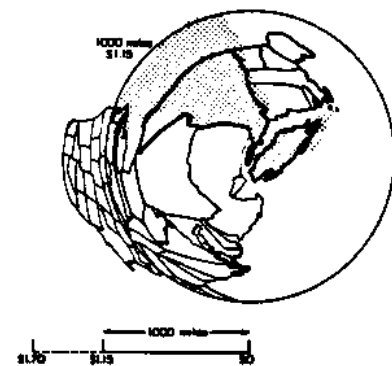
Geographic United States

(a)



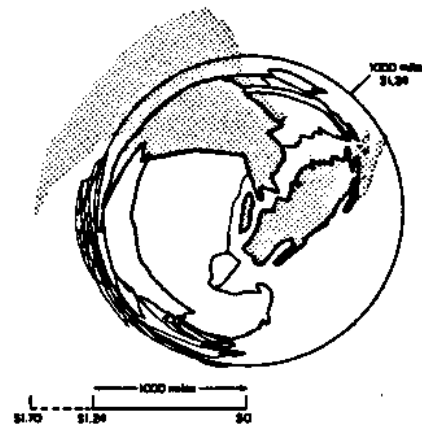
1957

(b)



1971

(c)



1977

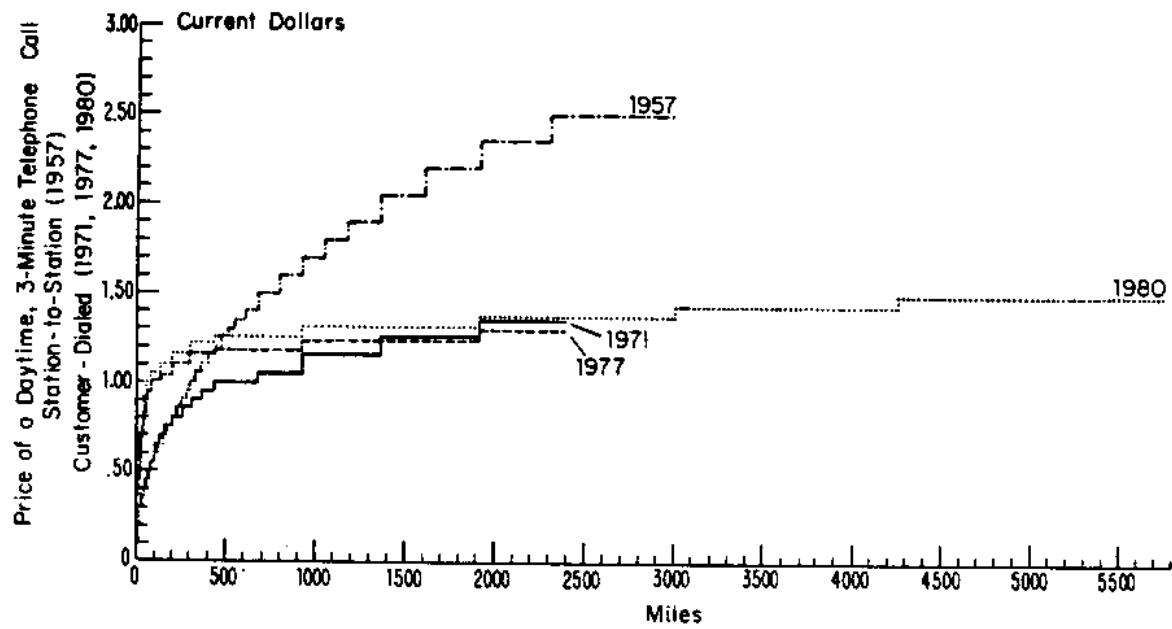
(d)

Telephonic United States

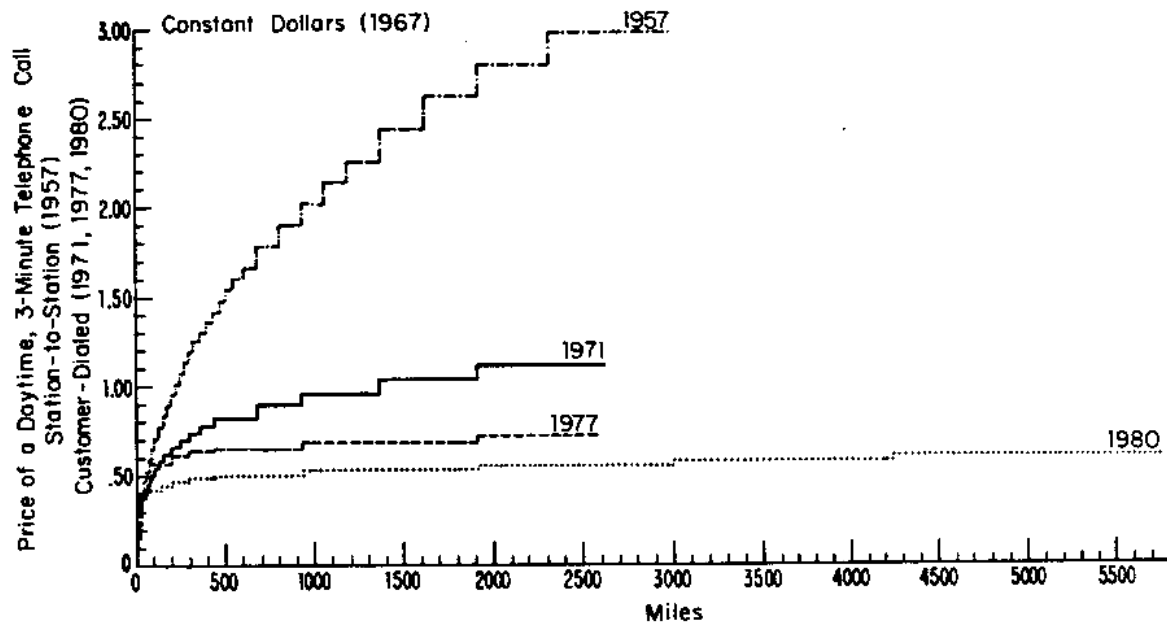
Figure 1.2

Geographic and Telephonic United States
Viewed from New York City

Source^{S2}



(a)



(b)

Figure 1.3

Evolution of Federally-Regulated Toll (Interexchange) Rates, 1957-1980

Source^{S3}

service, namely an ordinary dialed three-minute daytime call. This is only one example of what competition and other forces have done or are likely to do to other kinds of communications services. Before looking at details of the implications of several major forces for particular types of competing suppliers, for different categories of business or residential consumers, or for different regions of the United States, it is necessary to sketch in broad national terms how costing and pricing are done now and how competition is queering the old rules of the game.

In brief, competition contributes to the undermining of the delicate but outdated compromises that the cost allocation and pricing processes still nominally operative early in 1981 were designed to serve. These processes were tailored to administer suppliers and markets under fading political conditions conducive to a regulated telecommunications monopoly. Absent from the bargaining over these processes were the competing suppliers and customers now all exploiting the same chips off the modern communications technologies block. Still emergent when these processes were set up were the shifts in political power set in motion in 1962 by the one-man one-vote decision in Baker vs. Carr. Like a termite-riddled foundation an undermined political base can remain unseen while life seems unchanged. But sooner or later a new framework is needed.

This paper aims to portray the old political base and the processes which served it so that new processes serving an emergent and much wider base might be put in place without toppling the whole edifice on everybody--customers, suppliers and the nation as a whole.

Money, disguised as technocratic details of cost allocation and pricing processes, is at the heart of what is a profoundly political matter.

2. Costs and Prices

There is an old story about the chief executive officer who needed to know what's $2 + 2$ and called on his staff for help. His lawyer said he would look up the precedents in each of the states and see what might have come before the Supreme Court. His research and development chief told him that with a million dollars and a year to spend it he could come up with the prototype of an answer. His consulting economist wanted to know was he asking in the short run or the long run. Last to come in was the accountant, who locked the door, drew the blinds, leaned confidentially across the desk and whispered: "Boss, what do you want it to be?"

The knowing smirks that usually greet this punch line reflect a widespread view that lack of integrity is what is being spoofed. Or perhaps it is the blinders on staff specialists. But it is both reasonable and lawful to keep several sets of books or, more specifically, to reckon costs in various ways depending on one's purpose.

For example, suppose that you are at home on a Saturday insulating your attic and you run out of the staples you need to tack up the insulation. You get in your car, drive to the nearest hardware store, and buy a box of staples for three dollars.⁷

What did that box of staples "really" cost you? Obviously you paid three dollars for it. But how about the gas for the trip to the store? How much gas? Did you measure it? No, but you can estimate it from the average mileage of your car and the distance you drove. How much per gallon of gas? Okay--\$1.25. How about oil and tire wear? Estimate that, too--or ignore it. How about insurance, depreciation, registration and so on? Now you have a decision to make; after all, those costs would have been

incurred even if you had not made this particular trip. Do you include them or not?

Consider one more factor. Suppose your spouse asked you, since you were going downtown anyway, to buy a loaf of bread. It cost eighty-five cents or, rather, you paid eighty-five cents, but what did it cost? How about prorating the cost of using the car over the loaf of bread and the box of staples? You were going for the staples anyway so the bread shouldn't carry any car cost. Or maybe you should allocate the costs fairly to the staples and the bread! But on what basis? By a ratio of weight? Price? Volume? Something else?

As a further complication, suppose that, because you spend two hours getting bread and staples, you did not have time to mow your lawn and had to pay your kid five dollars to do that. That too is a cost that really should be charged to the bread and staples.

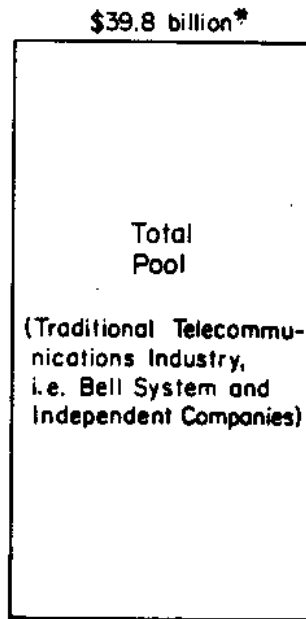
What did those staples "really" cost? It all depends on why you want to know. If it were just a family matter, the whole exercise would be silly. But suppose that you wanted to take an energy tax credit next April when you filled out your federal income tax forms. You would then have an obligation to keep careful records of what it cost you to insulate your attic and an incentive to reckon those costs as high as the law permits. Suppose you found out that your spouse used the bread to make sandwiches to donate to a church supper. You think you'll ask your tax accountant if that might be an allowable charitable deduction but, in the meanwhile, you wonder whether you'll be better off loading more of the car costs on the staples or on the bread.

Clearly there is no such thing as "real" cost, uniquely determined, although everyone has his preferences. Moreover, both the theoretical and

the practical difficulties of cost reckoning grow a lot when you try to allocate the cost of a single resource among more than one beneficiary of that resource. In addition to the difficulties in reckoning cost there is, as will be made evident in Section F, a tenuous relationship between telecommunications costs and prices. To choose cost collection and pricing methods is to practice political arts, not to submit mechanically to immutable natural laws. The arguments are not over the nature of prices as a medium for market signalling, but over the choice of the messages that prices are to convey.

At stake in the telecommunications industry are annual costs totaling about \$40 billion in 1976 or an estimated \$60 or so billion in 1980 (Fig. 1.4). Absent competition, how these costs were allocated to various services, who said so, and how costs were related, if at all, to the prices charged for services was of continuing concern mostly to the relatively small family of the traditional industry and its regulators. The matter drew attention only now and then from a few heavy business customers and occasional consumer activists.

In the 1980s, however, competition will continue to grow within the telecommunications industry and between it and the rest of the communications industry based on electronic digital technologies [Fig. 1.5(a)]. Postal services, newspapers [Fig. 1.5(b)] and other suppliers of information content and conduits now also see themselves both as competitors and as more and more savvy customers of the traditional telecommunications industry. This has fomented more and more controversy over telecommunications cost allocation and pricing. In the fray is a widening circle of competitors eager, according to their lights, to compete at all costs, to get under the shelter of a price umbrella or to keep from being eaten up by predatory

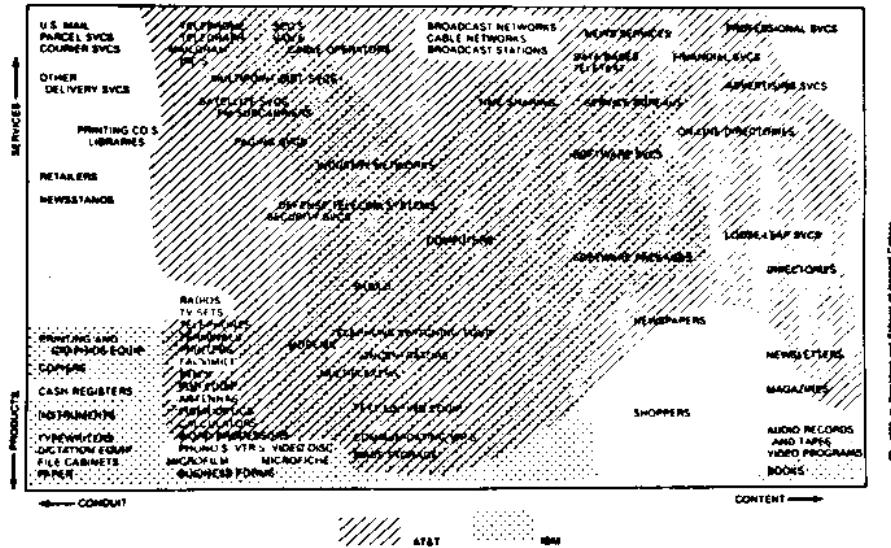


* 1976; for approximate 1980 figures
multiply by 1.6

Figure 1.4

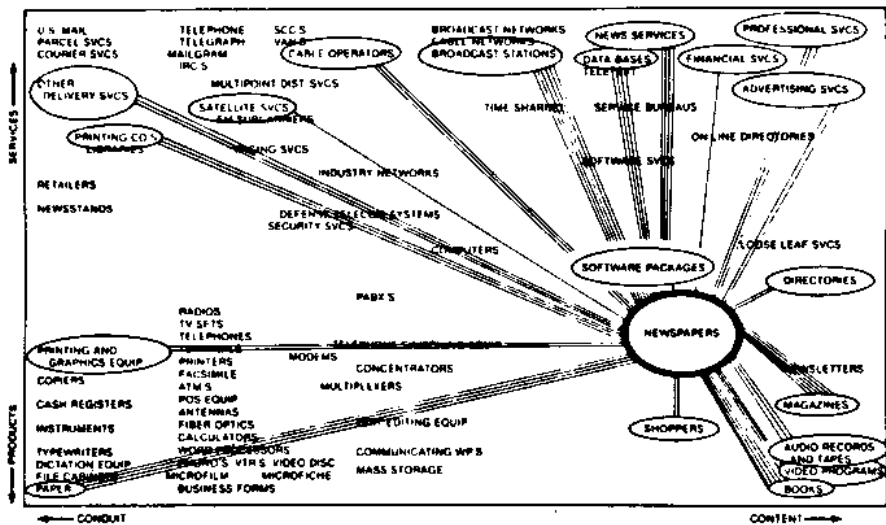
Domestic Traditional Telecommunications
Industry Total Costs, 1976

Source^{S4}



A Deregulated AT&T and IBM

(a)



Each line indicates entry into a particular field by one of the seven newspaper publishers cited.

Newspaper Diversification

(b)

Figure 1.5

Competition Among Information Industries

Source^{S5}

pricing. Communications cost allocation and pricing have ceased to be family matters.

For instance, commenting on what it called "one of the most sensible legislative efforts in the history of deregulation" underway in mid-1980, a Wall Street Journal editorial⁸ saw those efforts as "being sidetracked by some phony ideas about competition," to wit the argument that AT&T "will overwhelm its competition unless it is somehow handicapped." It called this "nonsense" and found it hard to "imagine AT&T easily vanquishing the likes of IBM, Xerox, Exxon, ITT, Hitachi and Siemens as well as all the feisty entrepreneurs" nowadays coming into the communications-based industries. The editorial concluded that "it would be foolish to deny [AT&T's] unregulated subsidiary and, more to the point, its customers the opportunity to benefit from these competitive advantages."

While the Wall Street Journal portrayed AT&T as just another panther among panthers, other newspapers saw it as the proverbial 800-pound gorilla. The Washington Post agreed that, in principle, "the more competition, the better."⁹ It also noted that it itself "probably has a commercial interest in the way this legislation turns out." And it then argued that Congress had not paid enough attention to "whether AT&T, which will design and own crucial switching and accounting equipment, will be competing on the same terms as everyone else." Said the Washington Post editorial: "It is never a simple matter to regulate a monopoly that is simultaneously engaged in an unregulated competitive business. It becomes unusually complex when the monopoly in question owns the network through which its competitors would have to operate."

Analogizing AT&T to a 2000-pound dinosaur might also be apt under conceivable circumstances. What indeed are the options and their implications?

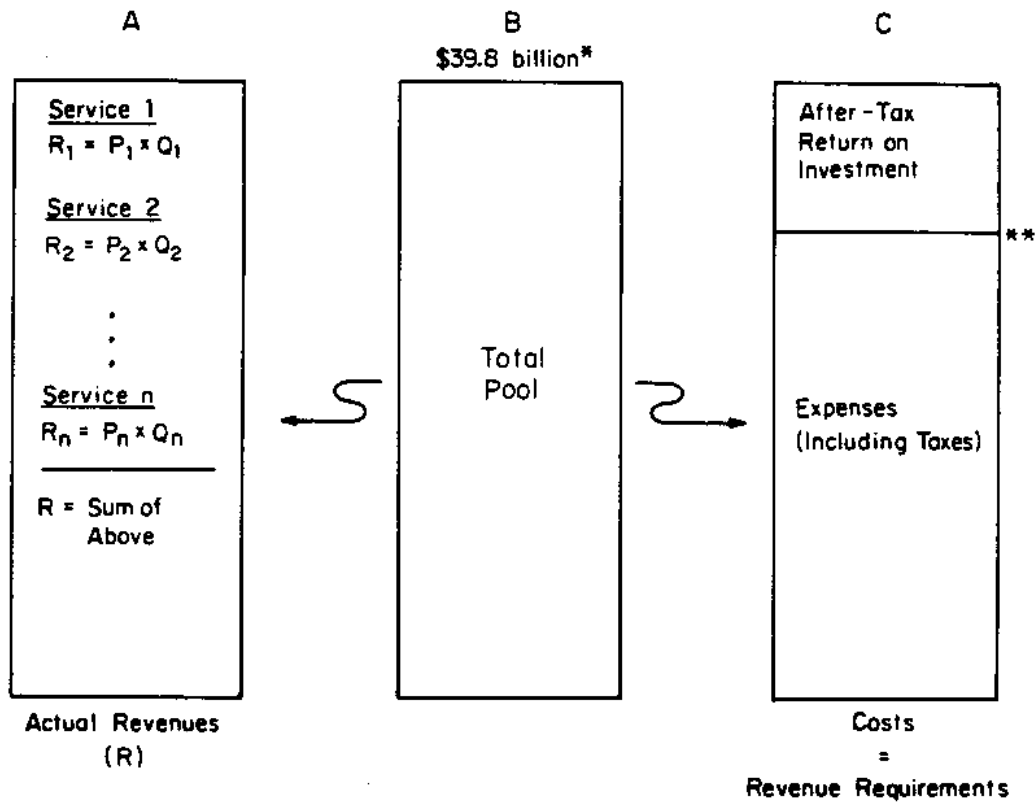
We will show how, at the heart of this never simple matter, are certain ineluctable questions: How are communications costs allocated, how do they relate to prices and, more fundamentally, in response to what and to whom?

B. Strategic Control of Telecommunications Costs and Prices

1. Cost and Price Relationships in Regulated Utilities

The traditional telecommunications companies are common carriers. Because they have also been monopolies, their revenues and expenses are also subject to a kind of government regulation that is common to many monopoly public utilities. This means that the 1976 cost of \$39.8 billion (shown in Figure 1.4) is self-consciously an artifact and not only the work of the invisible hand.

Figure 1.6 shows how regulators and regulated look at the \$39.8 billion total (B) in two distinctive ways. As total costs (C) it is made up of expenses, including taxes, and of an after-tax return on investment. The rate of return regulators allowed on investment (defined as book value of plant in service) was about nine percent in 1976. The costs so defined also define the revenues (A) required to meet expenses and achieve the allowed return. Neglecting, for simplicity's sake, the adjustments made if actual revenues or expenses differ from projections made for regulatory purposes, the revenues in A cover the costs (or revenue requirements) shown in C. These revenues are the product of price P times quantity Q summed over all the services offered by a carrier.



* 1976; for approximate 1980 figures multiply by 1.6

** not to scale

Figure 1.6

Relationship between Costs (Equated to Revenue Requirements) and Actual Revenues from Sales

Source^{S6}

Regulatory decisions beginning in the late 1950s reawakened competition in the traditional telecommunications industry where it had been dormant for about half a century. In the interregnum service prices bore little relationship to service costs other than through the obligation to bring total revenues (A) in approximate balance with total costs (C).

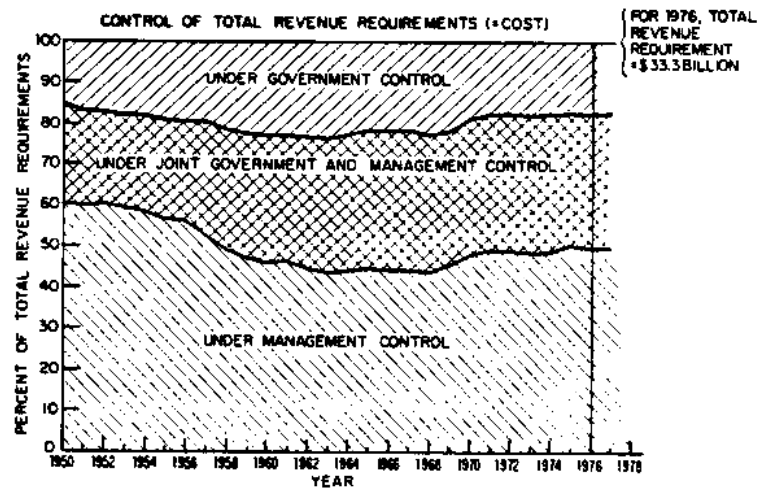
The carriers set their prices for particular services according to their judgments as to how the resulting market demands for these services would best enable them to realize their total revenue requirement. These management decisions, are, by law, subject first to broad review and ultimately to the setting of service definitions and of price schedules (tariffs) by the regulatory authorities. In practice, regulatory agencies generally set a zone of reasonableness for rates of return and only rarely prescribe actual prices. The Communications Act of 1934 permits diverse "just and reasonable" service classifications and prohibits only "unjust and unreasonable preference or advantage to any particular person, class of persons, or locality."¹⁰ Competition-induced scrutiny of category-by-category and even of service-by-service cost-price relationships is a more recent phenomenon.

2. Cost Pools: Jurisdiction and Control

Figure 1.7 summarizes the major controls over total costs = revenue requirements. Figure 1.7(a) shows the cost components that are under management, government and joint control. Figure 1.7(b) shows how the proportions of costs in these three categories have varied over the years in response to both variations in aggregate costs and negotiated migrations of particular costs between shared and sole control. Reckoning even so basic and apparently simple a number as total costs raises not only

Principally Management Controlled	Shared Management and Government Controlled	Principally Government Controlled
Maintenance Expenses	Depreciation and Amortization Expenses	Taxes
Traffic Expenses	Income Before Interest Deductions (ROI)	
Commercial Expenses		
Marketing Expenses		
General Office Salaries and Expenses		
Other Operating Expenses		

Control Categories
(a)



Proportions of the Categories of Control
(b)

Figure 1.7

Control over Total Costs, Hence
over Revenue Requirements

Source^{S7}

classical economic questions about demand and about production functions and labor or capital inputs; it also raises all the political and policy questions associated with setting depreciation rates, tax levels, asset valuations and rates of return on investment.

Note, for instance, the relatively long service lives (depreciation periods) in Table 1.1. One effect of such a depreciation policy is to reduce current expenses, hence current revenue requirements, thereby holding down current prices and deferring cost recovery to future generations. Another effect, when technological advances provide lower-cost alternatives, is to induce deferment of new investment to improve service or to meet competition in order to avoid a current write-off of large residual investments. Alternatively, stretching out depreciation may be interpreted as reflecting a desire to keep the rate base, hence return on investment higher longer. However interpreted, the \$39.8 billion total of Figures 1.4 and 1.6 is clearly a politico-economic number.

This basic pattern results from government interventions both common to all enterprises and specific to public utilities. Currently overlaid on this basic pattern is a legal structure which assigns to the respective jurisdictions a "fair share" of both the costs of facilities shared by federally regulated and state regulated services and the associated revenue requirements (Fig. 1.8). A so-called "jurisdictional separation" process splits the total [cost = revenue requirement = revenue] pool into 50 sub-pools simplified in Figure 1.8 into two, a federally regulated pool and an aggregate state regulated pool. These are supervised, respectively, by the Federal Communications Commission and by diverse bodies in the 50 states. The processes illustrated by Figures 1.6 and 1.7 take place in each of these jurisdictions. Domains of responsibility and the level and relative

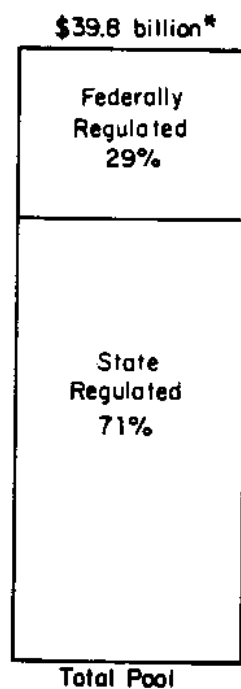
Account Number*	Subclass of Plant	Average Service Life (years)		
		NY (1977)	AZ (1976)	HI (1977)
212	Buildings		40.0	42.9
	Buildings	52.0		
	Buildings Fixtures	20.0		
221	Central Office Equipment			
	Manual	10.2	12.7	14.1
	Panel	8.8		
	Automatic Switching			20.3
	Step-by-step	12.3	14.6	
	Crossbar	21.0	19.9	
	Electronic	35.0	35.0	
	Automatic Message Recording			19.0
	Circuit	27.0	22.0	13.0
	Radio	20.0	14.3	13.6
	TransPacific Wholly Owned			22.8
	TransPacific Jointly Owned			22.8
	Submarine Cable Repeaters			22.8
231	Station Apparatus			
	Teletypewriter	13.0	8.9	15.1
	Telephone & Miscellaneous	10.4	13.1	12.1
	Radio	12.7	10.0	11.2
232	Station Connections	6.8	6.5	9.0
234	Large PBX	9.3	11.5	
	Telephone			11.1
	Switching & Signaling Devices			10.0
241	Pole Lines	32.0	27.0	29.7
242.1	Aerial Cable			25.2
	Subscriber or Exchange			
	Building	37.0	22.0	
	Other	34.0	22.0	
	Trunk or Toll	33.0	22.0	
242.2	Underground Cable			38.8
	Subscriber or Exchange	55.0	49.0	
	Trunk or Toll	53.0	29.0	
242.3	Buried Cable			30.7
	Subscriber or Exchange	32.0	36.0	
	Trunk or Toll	40.0	38.0	
242.4	Submarine Cable			23.8
	Subscriber or Exchange	35.0	31.0	
	Trunk or Toll	35.0	29.0	
243	Aerial Wire	10.4		13.1
	Exchange		11.8	
	Toll		26.0	
244	Underground Conduit		65.0	59.0
	Main	80.0		
	Subsidiary	55.0		
261	Furniture & Office Equipment			26.8
	Storeroom	25.0	28.0	
	Other	25.0	26.0	
	Computer & Automatic Machine			
	Accounting	8.1	6.1	
264	Vehicles & Other Work Equipment			
	Motor Vehicles	8.3	7.9	7.3
	Tools & Other Work Equipment	11.0	17.5	11.8
	Shop Equipment			9.0

* 47 CFR §31. Uniform System of Accounts for Class A and Class B Telephone Companies.

Table 1.1

Federally Prescribed Depreciation Practices as Applied to Bell Operating Property in New York, Arizona and Hawaii

Source^{S8}



* 1976; for approximate 1980 figures multiply by 1.6

Figure 1.8

Federally and State Regulated Portions of the
Total Traditional Telecommunications Industry
Cost = Revenue Requirements Pool

Source^{S9}

share of cost components such as depreciation allowances are subject to recurrent reviews and negotiations among the federal and state regulators and the industry.

How much is at stake is shown in Table 1.2. Most of the plant investment totaling about \$118 billion in 1976 (an estimated \$160-170 billion in 1980) is extensively shared between federally and state-regulated services. Only about 8 percent is solely in federal service with reasonably little doubt. For 92 percent the fact of sharing is not in doubt, but the proportions are very much at issue. Legislation aborted in the 96th Congress but likely to be reintroduced and regulations in the FCC mill in early 1981 might alter the extent, the proportions and the processes of sharing by redrawing jurisdictional boundaries or excluding terminals and other equipment from the rate base.

About 50 percent of the investment shown in Table 1.2 seems like a good guess at what will ultimately remain to be shared in some proportion barring an unforeseen and radical reconstruction of most of the nation's telecommunications networks. Cost sharing will therefore long remain, as it has been, a fact of life. It is the goals, the processes and the impacts of sharing that keep changing.

Historically, the coupling of local self-interests with a national goal of widespread diffusion of basic telephone service has been a major force for holding down the prices for local exchange services and thereby for shaping most other facets of the structure of the traditional telecommunications industry.¹¹ These historic forces and the costing practices they induced are described next. Newer counterforces for increasing local exchange service prices are described in Section I and J.

		State Services	Federal Services
Residence Terminals	4%	x	x
Business Terminals	11%	x	x
Inside Wiring	3%	x	x
Drops	3%	x	x
Loop	26%	x	x
Local Central Office Switch	22%	x	x
Non Traffic Sensitive	6%		
Traffic Sensitive	16%		
Tandem & Regional Switches	5%	x	x
Intra/InterExchange Trunks	18%	x	x
Long Lines Switches	2%		x
Long Lines Trunks	6%		x
Total 1976: \$118 billion			
1980: \$160-170 billion	100%		

Table 1.2

Proportions of Bell System Plant Investment, 1976

Source^{S10}

C. The States' Role: Local Exchange "Costs" as a Residual

1. The State Cost Pool

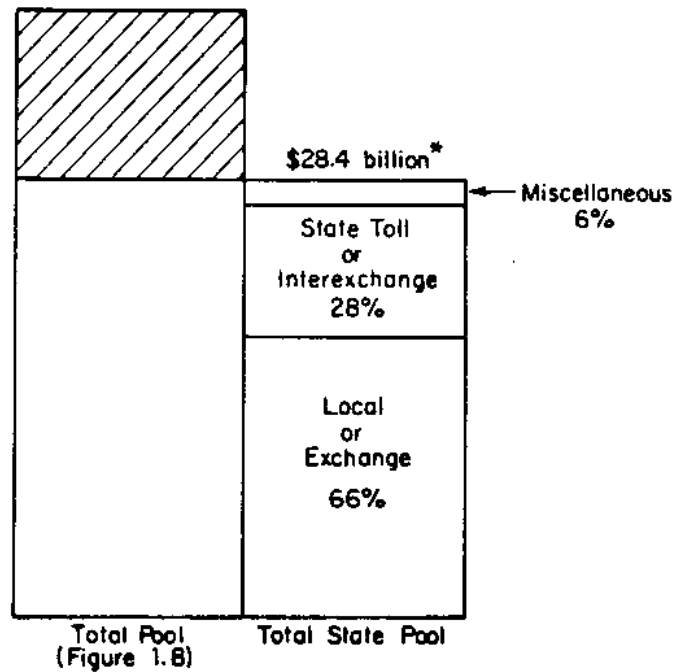
The total state pool depicted in Figure 1.8 encompasses two principal subpools and one miscellaneous pool (Fig. 1.9).

Revenues for directory advertising are the principal component of the subpool of miscellaneous revenues that accounts for six percent of the total state pool. Relatively insignificant and non-controversial in the past, these revenues and their potential for growth now figure importantly in the emerging competition between the mass media and the telecommunications industries reflected in the Washington Post editorial quoted earlier.

Strictly speaking, the two principal subpools (Fig. 1.10) are defined only as revenue pools (Fig. 1.6A), one the pool of revenues for state toll (interexchange) services, the other the pool of revenues for local or exchange services. With a few exceptions,¹² states do not formally separate state toll or interexchange from local exchange costs the way federal costs are formally separated from state costs. In practice, however, Bell System pricing practices in most states and the contractual processes for dividing revenues between Bell and Independent companies are such as to justify thinking of the subpools as cost pools (Fig. 1.6C) also, at least for purposes of economic and political analysis as distinguished from administrative and judicial due process.¹³

2. The Residual Local Exchange Pool

In any case, a statewide price schedule for state toll services is adhered to by all Bell and Independent companies within each of the 50 states. Whatever revenues are not earned (or, alternatively, whatever costs are not recovered) from state toll services define a residue to be covered

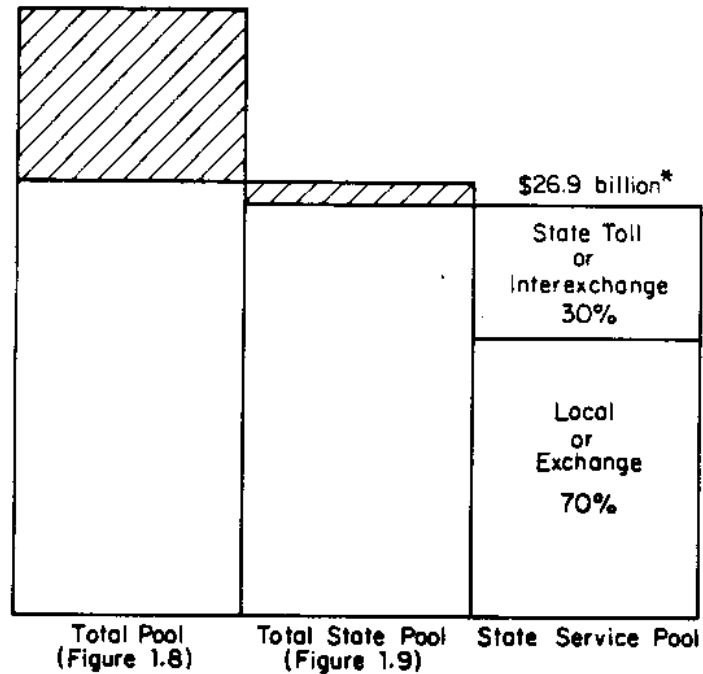


* 1976; for approximate 1980 figures multiply by 1.6

Figure 1.9

Proportions within State Regulated Cost
= Revenue Requirement Pool

Source S11



* 1976; for approximate 1980 figures
multiply by 1.6

Figure 1.10

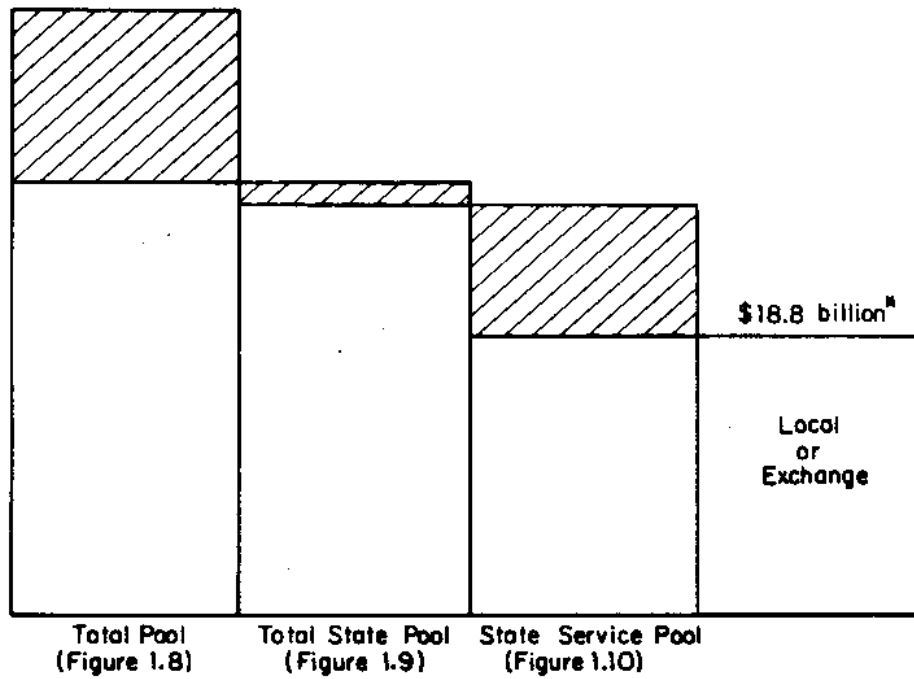
Proportions within Pool of State Regulated
Service Costs = Revenue Requirements

Source^{S12}

by revenues from local exchange services (Fig. 1.11).

The fact that aggregate local exchange revenues or costs are -- in essence if not always in administrative detail -- what is left over when aggregate federally-regulated and then state-regulated interexchange revenues or costs have been taken off the top of the total aggregate revenue or cost pool is the key manifestation of one major set of political forces that have influenced telecommunications pricing for several decades. Although ever-present but now increasingly significant counter-currents will become evident in Sections I and J, the main thrust of aggregate federal/state jurisdictional separations policy from World War II to the early seventies has been to move increasing proportions of shared costs away from the local exchange subpool into the state toll and federal (inter-state toll) subpools, thereby drawing a decreasing proportion of aggregate revenues from local exchange services (Fig. 1.12).¹⁴ Two principal forces account for this thrust.

The first of these forces stems from a perception shared by the industry and the state regulators, and at least acquiesced in by federal regulators, that some combination of the respective goals of business success and political survival was best served by relatively stable prices for basic local exchange services, especially to households and in rural areas (Fig. 1.13 and Table 1.3), wherever else the resulting chips might fall. Whether denoting a complementary goal or just an obfuscating code-word, the "universal service" label tagging the residual costing policy was derived from language in the preamble to the federal Communications Act of 1934 proclaiming it to be the Congress's purpose in creating the Federal Communications Commission "to make available, so far as possible, to all the people of the United States, a rapid, efficient, nationwide and worldwide wire and radio communication service with adequate facilities



* 1976; for approximate 1980 figures multiply by 1.6

Figure 1.11
The Residual Local or Exchange Pool

Source^{S13}

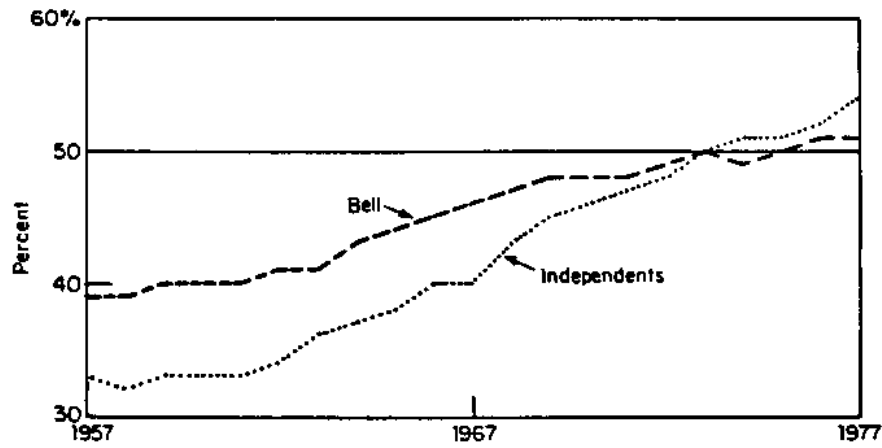


Figure 1.12

Total Toll Revenues as Percent of
Total Service Revenues

Source^{S14}

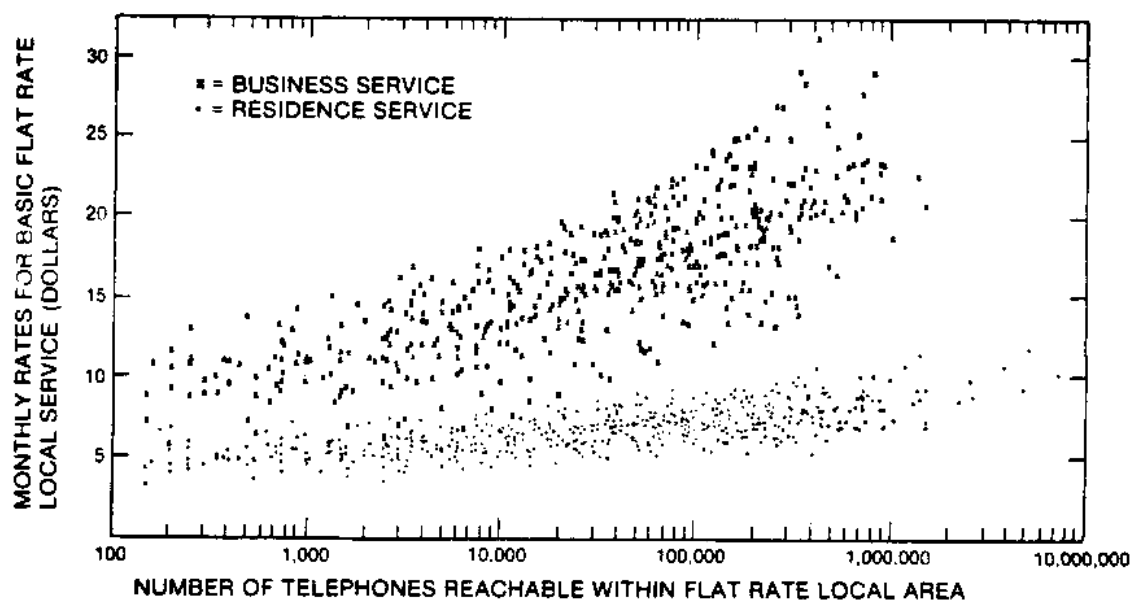


Figure 1.13

Variability in Basic Local (Exchange) Rates, 1974

Source^{S15}

Telephones in Local Service Area*		No. of** Exch.	Flat Rate Main Station Service								Message Rate Main Station Service							
			Business Service				Residence Service				Bus. Ind.				Res. Ind.			
			Ind.	2-Pty.	4-Pty.	Rural	Ind.	2-Pty.	4-Pty.	Rural	Min.	MIA	AMU		Min.	MIA	AMU	
			D	E	F	G	H	I	J	K	L	M	N		O	P	Q	R
1.	0	800	2	\$14.00	\$10.90	X	X	\$ 7.00	\$5.65	\$3.80	X	X	X	X				
2.	800	1,800	3	16.00	12.80	X	X	7.40	5.90	3.85	X	X	X	X				
3.	1,800	3,700	16	18.25	14.70	X	X	8.10	6.45	4.30	X	X	X	X				
4.	3,700	7,600	28	20.50	16.60	X	X	8.80	7.00	4.55	X	X	X	X				SERVICE
5.	7,600	19,000	34	23.00	X	X	X	9.50	7.55	4.90	X	\$13.25	\$5	10¢				NOT
6.	19,000	60,000	23	25.50	X	X	X	10.20	8.10	5.25	X	14.00	\$5	10¢				OFFERED
7.	60,000	200,000	68	28.00	X	X	X	10.90	8.65	5.60	X	14.75	\$5	10¢				
8.			170															

Exchanges Serving Cities of 50,000 Population or More (1970 Census)

Exchanges	Tels. in L.S.A.†													
9. Concord	(a) 45,506	\$25.50	X	X	X	\$10.20	\$8.10	\$5.25	X	\$14.00	\$5	10¢		SERVICE
10. Manchester	112,666	28.00	X	X	X	10.90	8.65	5.60	X	14.75	\$5	10¢		NOT
11. Nashua	115,180	25.50	X	X	X	10.20	8.10	5.25	X	14.00	\$5	10¢		OFFERED

X Service not offered.

(a) Concord was less than 50,000 population but is the State capital.

* Total terminals (main stations and P.B.X. trunks) as of June 30, 1976.

** Number of exchanges as of June 30, 1976.

† Total telephones as of April 30, 1976.

‡ In one exchange the monthly base rates include a premium charge for non-contiguous Extended Local Service.

Note 1. In one or more groups there are exchanges in which one or more of the group rates are not offered.

Note 2. The present Statewide grouping was designed as an objective of the Company and was accepted by the regulatory commission.

Note 3. The Commission's order authorized regrouping of exchanges when through natural growth or loss of telephones, for two consecutive annual study periods, they move out of their established terminal range.

In Nashua even though the number of telephones is 115,180, the flat rate charges are the same as those for areas in the 19,000 - 60,000 telephone range.

Manchester, which has 112,666 telephones, is charged a higher flat rate than Nashua. Also in one of the Manchester exchanges "the monthly base rates include a premium charge for non-contiguous Extended Local Service."

Rate Schedule in Effect June 30, 1976

(a)

Table 1.3

Monthly Local (Exchange) Service Telephone Rates:
New Hampshire, New England Telephone and Telegraph Company

Source^{S16}

RATE GROUP	UPPER LIMIT OF STATIONS	NO OF EXCH OR ZONE ^a	FLAT RATE MAIN STATION SERVICE								MESSAGE RATE MAIN STATION SERVICE								
			BUSINESS SERVICE				RESIDENCE SERVICE				BUSINESS IND			RESIDENCE IND			RES 2-PTY		
			IND	2-PTY	4-PTY	RURAL	IND	2-PTY	4-PTY	RURAL	MIN	MUA	AMU	MIN	MUA	AMU	MIN	MUA	AMU
A	800	2	14.00	10.90			7.00	5.65	3.80										
B	1,800	2	16.00	12.80			7.40	5.90	3.85										
C	3,700	18	18.25	14.70			8.10	6.45	4.20										
D	7,600	30	20.50	16.60			8.80	7.00	4.55										
E	19,000	37	23.00				9.50	7.55	4.90		13.25	85	.1000						
F	60,000	22	25.50				10.20	8.10	5.25		14.00	85	.1000						
G	200,000	7	28.00				10.90	8.65	5.60		14.75	85	.1000						

Exchanges Serving Principal Cities

Exchange	Rate Group
Concord	F
Manchester	G
Nashua	F

(a) Number of exchanges as of December 31, 1977.

Rate Schedule in Effect June 30, 1978

(b)

Table 1.3 (continued)

at reasonable charges."¹⁵ Since the interpretation of the limits of possibility and of such concepts as efficiency, adequacy and reasonableness remained largely discretionary, the legislation thereby left considerable administrative latitude, essentially subject only to judicial review.

The second force stems from the need to keep the peace and to manage for common goals within a traditional industry which, although dominated by the Bell System, also encompasses about 1500 (as of 1979) interconnecting and revenue-sharing Independent companies. That the Independents account for only 16 percent or so of domestic revenues¹⁶ understates their importance and their influence. Their presence in every state but Delaware and Rhode Island is significant to 100 United States senators if not necessarily to a majority of members of the House of Representatives. Even their geographic distribution, shown in Figure 1.14, understates their spread (39 percent of U.S. territory). The white spaces in the map of Figure 1.14 include not only Bell franchise areas (35 percent of U.S. territory) but also the unassigned areas (26 percent of U.S. territory) found principally in the West and in Alaska. Finally, the Independents' franchise areas include many of the suburban and rural areas where, as in the Sun Belt, recent economic growth has been the fastest.

Setting a uniform statewide toll price schedule and a statewide local exchange service price classification system based solely on the number of telephones reachable in a local exchange area avoided the invidious comparisons that neighbors could make at the State House when Independents with their facilities serving sparsely populated areas, at costs generally higher than the unit costs of Bell System facilities serving more favorably endowed areas, had to recover these higher costs through higher local exchange service prices. Defining costs as residual then brought them into

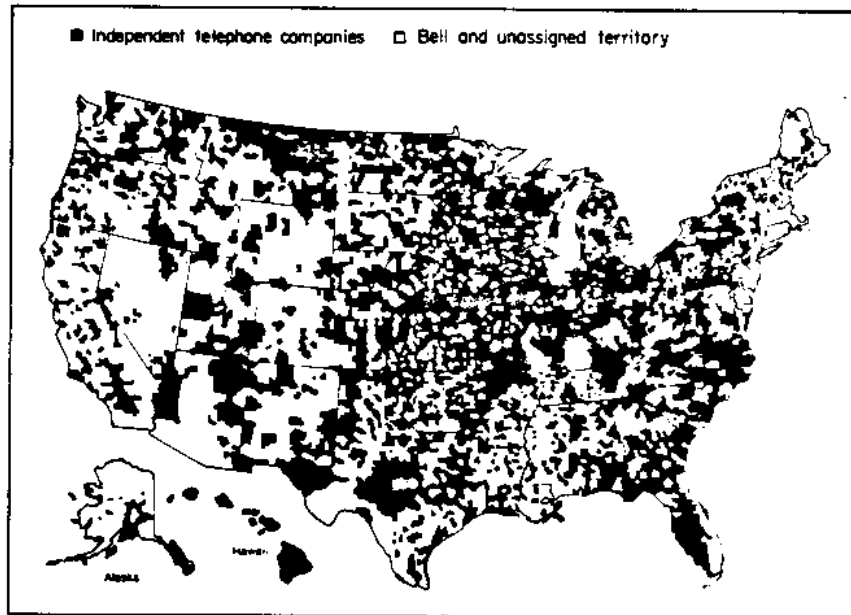


Figure 1.14
Operating Areas of Independent
Telephone Companies, 1972

Source^{S17}

rough relationship with prices and, for a time, prevented offending economic sensibilities. The sharing of toll revenues with Independents compensated them for local revenues lost by aligning their prices with the lower statewide--essentially Bell--local price schedule.

In addition, goals such as nationwide introduction of direct dialing could be achieved without disputes over the recovery of the attendant new investments in plant, by inducing Independents to cooperate through assured recovery of their investment from shares of toll revenues rather than from increased local exchange revenue requirements.

The administrative processes developed to support the policy of residual costing of local exchange services and the other policy goals sketched above are next described.

D. Tactics of Cost Allocation and the Role of the Courts

1. Separations and Settlements

Details on how the two principal traditional forces--the desire for low, stable local exchange prices and the need for coherent industry management--have manifested themselves to date are presented elsewhere.¹⁷ In summary, these forces act on both suppliers and customers principally through mechanisms for allocating the large amount of shared costs described in Table 1.2 and for sharing toll revenues among the suppliers. The cost allocation and revenue sharing mechanisms are closely linked through current revenue sharing practices.¹⁸

Where costs are incurred, where benefits fall, and where offsetting revenues are levied are often unrelated places. Many familiar income transfers, as through taxes, attest to that. Following Supreme Court decisions in the 1930s, certain telecommunications costs were shifted from

state to federal jurisdiction. At the same time an offsetting portion of revenues from state services was nominally federalized but nonetheless left to be collected from state service customers. This judicial legerdemain thus had no effect whatsoever on the prices that anyone anywhere paid. Beginning in the 1940s, by contrast, a dollar shifted from the state cost pool to the federal cost pool has, in the aggregate, meant a dollar less to be collected from customers of state-supervised services and a dollar more to be collected from customers of federally supervised services.

The short-hand name for the administrative mechanisms still prevalent early in 1981 is "separations and settlements." "Separations" refers to court-mandated jurisdictional (federal/state) cost separation processes and to the formulas for administering these cost separations processes. "Settlements" refers to the use, since 1971, of essentially the same formulas for administering the division of toll revenues among all the Bell and Independent companies in the traditional telecommunications industry. It is this joint process of separations-and-settlements that links costs to revenues and that enables identifying state toll and local exchange revenues with state toll and local exchange costs, despite the fact that the latter are but rarely compelled to be formally separated from one another as costs. In practice, costs are defined, if at all, essentially in proportion to revenues.

This dissonance between a detached view of administrative practice and the views of the law prevalent among players of the traditional telecommunications regulatory game accounts for the widely noted opacity and Alice-in-Wonderland flavor that separations-and-settlements formulas convey to outsiders and for the knowing smirks that usually greet mention of these formulas just as they do the punch-line of the "2 + 2" story recounted in Section A.

The concept of cost, to laymen as to economists, appears as bedrock, a concept as fundamental as mass or electrical charge is to classical physicists. Many laymen further believe that costs are also as unambiguously, accurately and precisely measurable as mass or charge. This is now widely understood to be false, especially with shared (joint or common) costs, but the courts have long held otherwise. They have also felt uncomfortable with indirect measurements of costs, especially with the circularity that appears when cost shares are defined in proportion to revenue shares, thus putting a commonsensical cart before a commonsensical horse.

One oft-cited articulation of this discomfort occurred in 1913, in the Minnesota Rate Cases. The U.S. Supreme Court emphasized the circularity it saw in using past railroad revenues to determine future rates and, ultimately, future revenues.

"If the return, as formerly allowed, be taken as the basis, then the validity of the State's reduction [in rates] would have to be tested by the very rates which the State denounced as exorbitant. And, if the return as permitted under the new rates be taken, then the State's action itself reduces the amount of value upon which the fairness of the return is to be computed."¹⁹

Some way had to be found, said the Court, to divide the property cost (and the associated return or revenue requirement) between passenger and freight rail services by a criterion independent of revenues. Not irrationally, it prescribed "the use that is made of the property"²⁰ as the appropriate criterion. In modern economic terms, however, use varies with price according to the price-elasticity of demand. The circle of reasoning is simply enlarged, but that either was not apparent to or else was ignored by the Court in 1913.

In 1930 came the Smith v. Illinois Bell Telephone Co. case that is still seen as governing the telecommunications practices of 1981. Here, the Court recognized that there might be practical difficulties in measuring use, but it held to the theoretical validity of "actual uses" as the criterion for cost allocation: "[w]hile the difficulty in making an exact apportionment of the property is apparent, and extreme nicety is not required, only reasonable measures being essential, it is quite another matter to ignore altogether the actual uses to which the property is put."²¹

That measuring uses need not cramp adaptation to political, economic, or other constraints has long been apparent. In the railroad world, a 1917 study²² reported a range from 20.6 percent to 60.7 percent in the proportion of expenses for maintenance of way and structures chargeable to passenger service according to measures ranging from revenue car miles (20.6 percent) to revenue train miles (60.7 percent) with fuel consumption of road and switch locomotives in between (40.6 percent).

2. "Deterrent Effects" as Policy Instruments

Cost allocation processes in the traditional telecommunications industry, culminating in the Ozark Plan²³ adopted in 1970 and still in effect in 1981, have been at least equally resourceful. This is well illustrated by the jurisdictional separation of the so-called "Non-Traffic-Sensitive Plant Related Costs" (\$20 billion) that amount to 60 percent or so of the total costs of message services, costs which amount to \$34.2 billion of the \$39.8 billion of Figure 1.4.²⁴ Non-Traffic-Sensitive (NTS) costs are allocated to the federal jurisdiction according to a Subscriber Plant Factor (SPF), derived by applying a prescribed multiplier to Subscriber Line Usage (SLU), one of many possible measures of use.

The definitional history of SLU and its multiplier epitomizes the mental tortures inherent in attempting the impossible cut in the price-cost circle. In 1967 the FCC reasoned that while "the actual use made of the subscriber plant is a relevant factor. . .additional factors must [also] be taken into consideration."²⁵ It noted that, in contrast to flat-rate local calling, long-distance rates were based on charges for each message, charges which increased with the duration of a call and the distance called. This it described as having "deterrent effects. . .on the actual use of subscriber plant." For regulatory purposes then, use was to be construed as what use would have been, had toll calls been priced at some flat rate instead of their actual time-and-distance-sensitive rates.

The FCC concluded with the understatement that "[a]dmittedly, the deterrent effects. . .cannot be quantified with exactitude. We are, thus, required to use our best judgment. . .as to the weight that should be accorded to these effects. Accordingly, it is our best judgment that a factor of 200 percent of the nationwide average interstate subscriber line usage (SLU) for the total telephone industry, to be added to the actual interstate SLU factor of each study area [state]. . ., is an appropriate allowance for these deterrent effects." With later refinements, this creative reasoning in bringing policy favoring low, stable local exchange prices in line with judicial mandates for usage measurement became the basis for the separations and settlement processes still used in 1981.

The tortuous tracks of the tortured tailoring of SPF, son of deterrent, are traced elsewhere²⁶ and need not trouble us here. It suffices, first, to note the evident correlation between the increasing proportion of total (federal and state) toll revenues to total (toll plus local

exchange) revenues shown in Figure 1.12 and the growth of the various historical federal allocation factors depicted in Figure 1.15, and with the specific history and projection of the Ozark Plan's federal SPF given in Table 1.4. Second, while state-by-state historical data equivalent to Figure 1.15 and Table 1.4 are not available, a cross-check of state-by-state total (state plus federal) toll revenues as a percentage of total (toll plus local exchange) revenues for 1976 with the state-by-state sums of federal and state SPF for 1976 shows a strong relation between total toll revenues and total allocations of NTS costs to toll services (Fig. 1.16). The historical growth of the proportion of total (federal and state) toll revenues to total (toll plus local exchange) revenues is therefore likely to be due to growth of both federal and average state SPF.

E. Reawakening Competition: Challenges to Traditional Costing and Pricing Policies

1. The New Competitors

Ironically, this staples-and-bread cost allocation story, writ large, started to end almost as it began. For, at just about the time when the Ozark Plan was adopted by the traditional telecommunications family, the first of the new outsiders--competitors for the long-haul transmission and the terminal businesses--got the Federal Communications Commission's green light and thereby brought fresh players onto the field. Barring a most unlikely disappearance of all deliveries of diverse services through common facilities and of particular services through facilities of more than one owner, the fundamental problems of cost allocation and of division of revenues will remain under a competitive regime. But regulatory, legislative and, increasingly, judicial mandates for competition mean changing

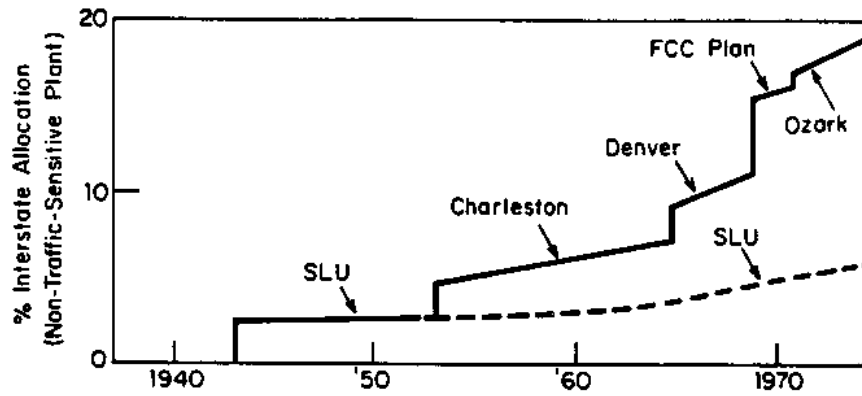


Figure 1.15

Effects on Non-Traffic Sensitive (NTS) Plant Cost
 Allocations of Successive Separations Plans
 (Bell System, 1947-1975)

Source^{S18}

		Bell System			Industry		
		①	②	③	④	⑤	⑥
Year		Federal SLU Factor (%)	Federal SPF (%)	Annual Growth (%)	Federal MTS & WATS Revenues Annual Growth (%)	Non-Traffic Sensitive Costs Annual Growth (%)	% of Revenues to Cover Federal NTS Costs
Actual	1972	5.47	18.00	-	-	-	27.7
	1973	5.80	19.08	6.0	17.0	17.1	27.7
	1974	5.94	19.54	2.4	11.6	16.4	28.9
	1975	6.01	19.77	1.2	12.8	18.0	30.3
	1976	6.19	20.37	3.0	15.3	20.6	31.6
	1977	6.47	21.29	4.5	12.9	18.5	33.2
	1978	6.85	22.54	5.9	11.8	15.6	34.3
1972-1978		-	-	3.8	13.6	17.7	-
Projected	1979	7.11	23.40	*	*	*	35.6
	1980	7.38	24.29	*	*	*	36.9
	1981	7.66	25.21	*	*	*	38.2
	1982	7.95	26.17	*	*	*	39.6
	1983	8.25	27.16	*	*	*	41.0

* the 1972-1978 growth projection is carried forward

Table 1.4

Impact of Growing Federal
Subscriber Plant Factor (SPF), 1972-1978

Source S19

Total Total	Toll as % Revenue	Total SPF	
Rank	State	State	Rank
1	MD	MD	1
2	IL	MD	2
3	NY	OH	3
4	OH	AL	4
5	MI	TN	5
6	DE		6
7	WI	IN	7
8	RI		8
9	IN	IL	9
10	MO	PA	10
11	VA	MN	11
12	AL		12
13	PA	WI	13
14	MN	RI	14
15	TN	MO	15
16		NY	16
17		MI	17
18			18
19		DE	19
20		VA	20
21			21
22		MS	22
23			23
24			24
25		AR	25
26		LA	26
27			27
28			28
29			29
30			30
31			31
32	NE	NE	32
33	OK		33
34	CA		34
35	HI	HI	35
36	IA	OR	36
37	OR		37
38	AR		38
39	MS	CA	39
40	HI	ND	40
41	ID	SD	41
42	NE	MS	42
43	SD	ID	43
44	VT		44
45	ND	VT	45
46	MT	MT	46
47	WY	NV	47
48	NV	WY	48

Ranked Lowest to Highest

Figure 1.16

State-by-State Relationship of Total Toll (Interexchange) Revenues
from Each State to Total Subscriber Plant Factor (SPF)

Source^{S20}

forces, a changing industry structure, changing markets, changing compromises and, ultimately, changed rules for the cost-allocation game.²⁷

The new competitive order is still emergent and far from stable. To discern the new forces it is helpful to categorize competitive arenas, however tentatively. The traditional telecommunications industry sees itself or is seen as actually or potentially competing in at least the four following arenas²⁸ (Fig. 1.17).

a. Long-Haul Transmission and Switching Facilities Supply. In this category are competitors for private-line services and, increasingly, for conventional switched message services, both in the traditional "analog" and the newer "digital" modes of transmission. These competitors have some transmission and switching facilities of their own, terrestrial or satellite, and they may or may not supplement these with transmission facilities leased from the traditional carriers.

b. Terminal Equipment Supply. Competitors in this category supply devices ranging from ordinary telephones through terminals or auxiliary devices (modems, "front ends," etc.) of varying degrees of complexity to entire computer systems. The common characteristic is that, whatever the device or system, it connects to the transmission and/or switching facilities of some carrier.

c. Service Supply. The service supplier typically leases facilities or services from a carrier, preferably at wholesale rates, and parcels them out by sharing, resale or other arrangements, with or without supplying additional services as well, and with or without competing with retail offerings of the carrier.

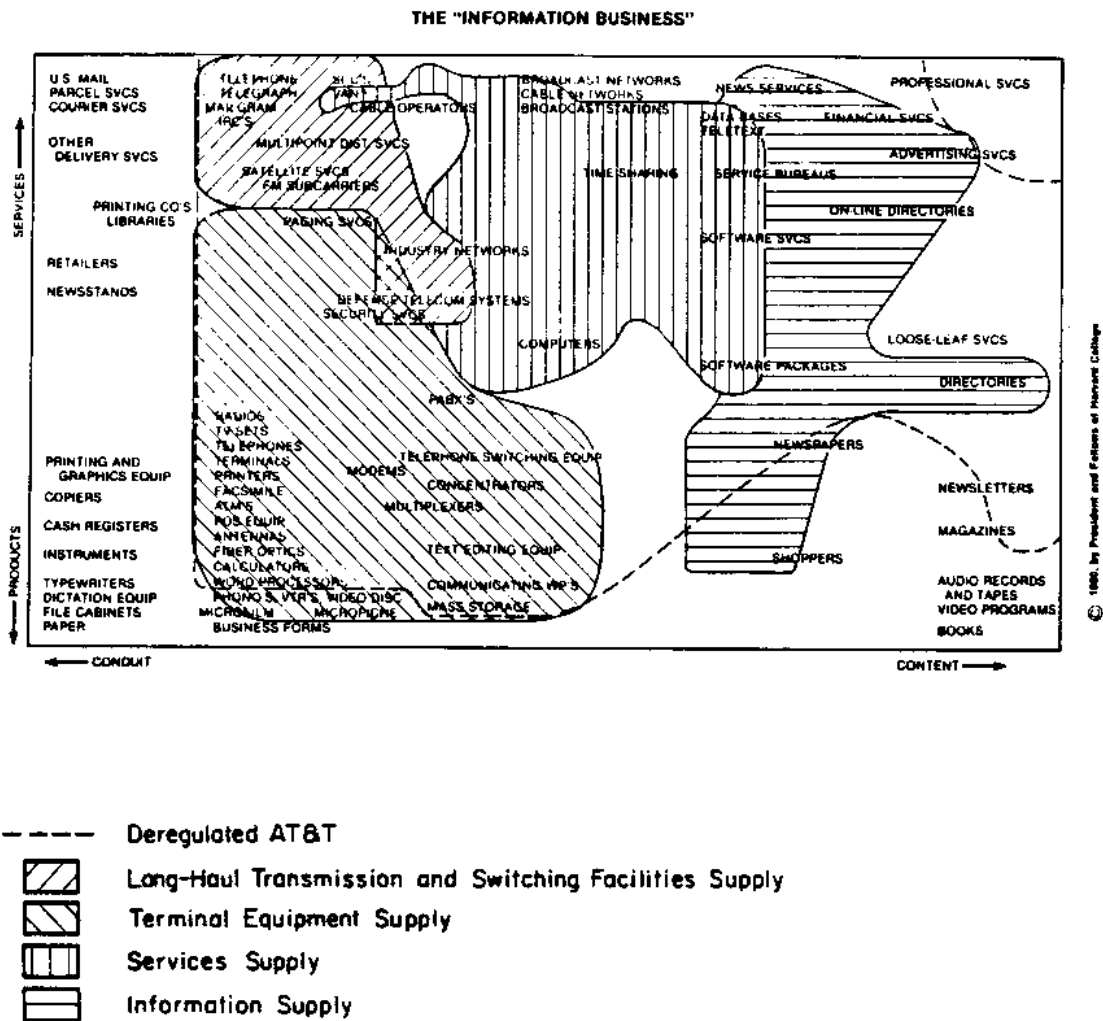


Figure 1.17

Competitive Arenas in the Information Business

d. Information Supply. In the preceding categories, competition is mainly over "conduits" or "media." Directory, directory advertising and "dial-a-joke" services, on the other hand, are examples of information supply arenas where competition is mainly over "content" or "messages." Competitors include the traditional carriers, newspapers and other database service suppliers.

Combinations of these four categories already are in evidence, either as distinct services supplied by a common corporate entity or as hybrids combining the traits of more than one of the four categories. Singly or in combination, these categories transcend traditional concepts of common carriage and traditional modes of economic regulation: a particular bundle of facilities and services may, for instance, incorporate a mix of cable and broadcast facilities, of regulated and unregulated services. The merit of these unstable categories therefore lies less in their compelling logic or intrinsic stability than in the familiarity of their origins in historically-held distinctions still widely used. Movements among these arenas keep producing new market forces that do not fit and therefore strain the traditional regulatory apparatus.

2. The Challenges of Competition

Common issues arise from competition in all four categories. Most fundamental are quarrels over fairness in cost/price competition. In sellers' terms, the new competitors allege that the traditional industry remains a monster monopoly that engages, will engage or at the very least can engage in perfidiously predatory pricing. This is said to stem from the traditional industry's ability to shift costs to and hence exact higher prices from its large residual of monopoly services in order to underprice

competitive services to force competitors out of business. The traditional industry counters that, on the contrary, the new competitors are cream-skimmers skulking under a price umbrella forced over the most lucrative services by the traditional industry's innate dedication to public service or by excessive cost allocations to these services compelled by politicians eager to protect constituencies unable or unwilling to pay for the services at or above their "true" cost.

In buyers' terms, the issue usually presents itself as a contrast between the interests of big businesses and government and the interests of small businesses, professionals and households, as a contrast between urban and rural interests, or both. Big business or urban customers are described as having had their prices inflated to subsidize the others or vice-versa. Some large businesses see setting up their own facilities to supply themselves as an alternative; some have actually done so under authority granted by the Federal Communications Commission in an early proceeding that foreshadowed the emergence of alternative suppliers.²⁹ The latter began to emerge in the late 1960s. They generally targeted the Fortune 500 market, at least at the start. Some, like SPCommunications and MCI Telecommunications have since offered retail services like the former's Sprint and the latter's Execunet services that compete with traditional dial-up interexchange calls.

Numerous subsidiary common issues present themselves over technical matters, diverse facets of industry structure, due process, etc. Important or not in their own right, they almost invariably entail questions of efficiency and fairness of costing and pricing. We therefore continue to focus on the latter.

Each of the four competitive arenas also stirs up its own distinctive issues. Questions about the scope of the First Amendment's application are associated exclusively with the supplying of information. Competition over service supply entails dealing with the questions that arise when a facilities supplier supplies his facilities both to his own services and to those of competitors. The problems of extricating from the regulated rate base the substantial investments in terminals and inside wiring (Table 1.2) made by the traditional telecommunications industry are peculiar to the terminal equipment arena. Finally, disputes over interconnection processes and over the permissibility or obligation to engage in joint through services (as in the railroad industry) are specific to the transmission supply arena. Except for an occasional example impinging on costing and pricing policy these distinctive issues will not be addressed here.

So long as any competitor operates, as seems likely, with a high proportion of joint and common costs, issues over efficiency and fairness of costing and pricing will remain. Given the bigness of the traditional industry and the quantity of its various regulators, judges, customers, competitors and other "constituencies," and given the inertias inherent in large institutions and in due process of law, the old rules of the game will not abruptly fade away. Understanding of the impact of these rules on the issues of fair and efficient costing and pricing therefore remains valuable to any supplier or customer who needs to chart a path for himself through the thickets of forthcoming transitions.

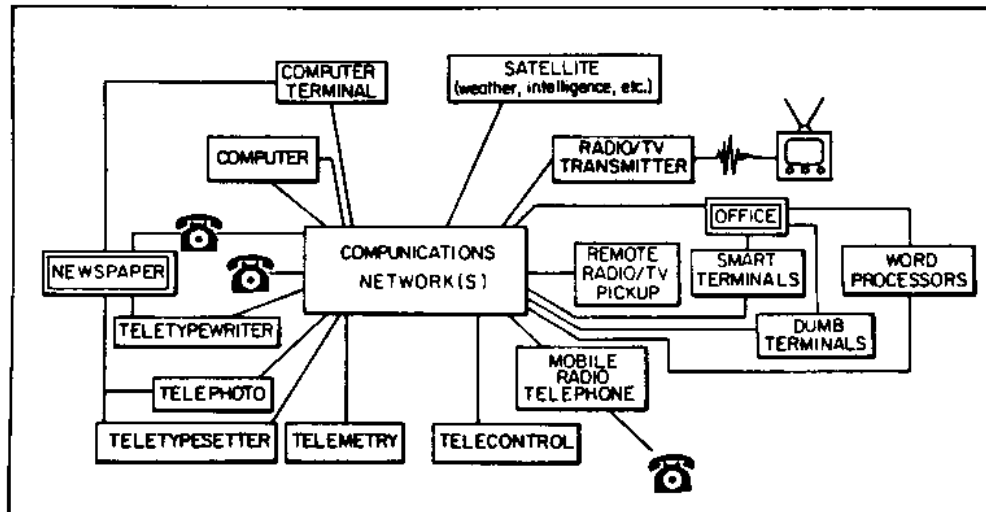
A distillation of the fundamental costing and pricing problems as distinguished from the accidents of outdated political compromises that remain embodied, for example, in the Ozark Plan should also be of value in developing and choosing among options still open for future rules of the

game and in anticipating pitfalls or opportunities implicit in such options as may already have been set either by legislative, regulatory or judicial dictate or else by private sector decisions. Although disagreements will persist over the desirable extent and nature of government intervention, the record of the seventies makes clear that the future lies with "administered competition" where, precisely because the affected free enterprises keep requesting them to do so, administrative agencies, the courts and the legislatures will keep at drawing the new boundaries and the rules for living with them.

All four competitive arenas are reported to have great growth potential. But the transmission and switching arena is distinguished from the three others by one salient fact: it's where most of the traditional industry's money--expenses and revenues--is now. While current competitive battles are engaged principally over long-haul transmission and switching, the short-haul and local markets are not immune to competition, for reasons given in Section J. And the terminal market is highly competitive.

The transmission and switching arena is unique from another, more fundamental standpoint. Transmission and switching facilities are a basic infrastructure, like roads and electrical power facilities (Fig. 1.18). All three other arenas depend on this infrastructure. Hence whoever controls it controls strategic but increasingly vulnerable high ground.

Finally, it is the joint use of common transmission and switching facilities which, in the first place, entails the fundamental cost allocation and pricing policy problems. Asserting this skirts the long-run question of whether economies of scale or economies of scope really justify facilities sharing. But facilities sharing is now so extensive and any contemplated transition to any other regime is likely to take so many years



As of 1979, telephones still predominated--176 million in the U.S., 29% of them extensions--but many other devices are now attached to (a) network(s) that has (have) become an infrastructure basic to most social functions including many that reach directly into the home. As computers and computer terminals have become increasingly pervasive over the last two decades, the network(s) has (have) taken on technical characteristics of an integrated computer/communications or communications network. Although shown as a single box--wherein the traditional telecommunications industries facilities still dominate--the network(s) now encompass(es) an increasing number of competing terrestrial and satellite networks whose patterns of interconnection remain controversial.

Figure 1.18

Social Infrastructure:
The Changing Telecommunications Network(s)

Source^{S21}

if not decades, that cost allocation and pricing policy will remain to be dealt with for the foreseeable future, even if it might eventually fade at least in significance if not altogether.

With monopoly politically untenable and the linkage of every service to its own unique and distinct facilities economically impractical, the search will continue for acceptable conceptual processes and structures--accounting methods, leaseback techniques, more or less separate corporate entities, etc.--to accommodate the possible and the desirable as seen by increasingly diverse parties.

3. Competition and Market Concentration

Not only is the traditional industry's money--expenses and revenues--now mostly in switching and transmission services, but the bulk of the revenues also comes from highly concentrated sources. The percentages of message service traffic under federal jurisdiction accounted for by the hundred largest U.S. cities are shown in Table 1.5(a).

As indicated by Table 1.5(b), revenues from businesses are even more highly concentrated. The total revenues from businesses for message services under federal jurisdiction were about \$5.5 billion in 1976 (Table 1.11), hence the 144 largest metropolitan areas that yield 7/8 of these revenues [Table 1.5(b)] amount to about \$4.8 billion or 12.5 percent of total service revenues.

Table 1.6 shows that in 1975 about 4000 business and government customers accounted for \$5.6 billion of the total interexchange service revenues under federal jurisdiction. The latter increased in 1976 to about \$6.5 billion. Since these total revenues were less in 1975 than in 1976, the 4000 largest customers accounted for over 85 percent of all revenues from

Cities	% Of Total Interstate Traffic (Minutes)	
	Business	Residence
25	35%	15%
50	50%	30%
100	75%	50%

Geographic Market Concentration:
Federally Regulated MTS and WATS

(a)

Proportion of Interstate Business MTS and WATS Revenues Generated by Largest Metropolitan Areas	
Calls Among Largest Metropolitan Areas	Proportion of Total Revenue
16	1/3
32	1/2
144	7/8
400	9/10

Proportion of Federally Regulated Business
MTS and WATS Revenues Generated by
Largest Metropolitan Areas

(b)

Table 1.5

Message Telecommunications Service (MTS) and
WATS Market Concentration and Revenues, 1976

Source^{S22}

Number of Customers	%	Cumulative %		Approximate Annual Interstate Revenues, 1975 (in \$ millions)	%	Cumulative %	
25	.6	.6	100.0	\$850	15	15	100
100	2.4	3.0	99.4	\$1000	20	35	85
1000	24.2	27.2	97.0	\$1600	30	65	55
3000	72.8	100	72.8	\$2000	35	100	35
Total 4125	100			\$5600	100		

Table 1.6

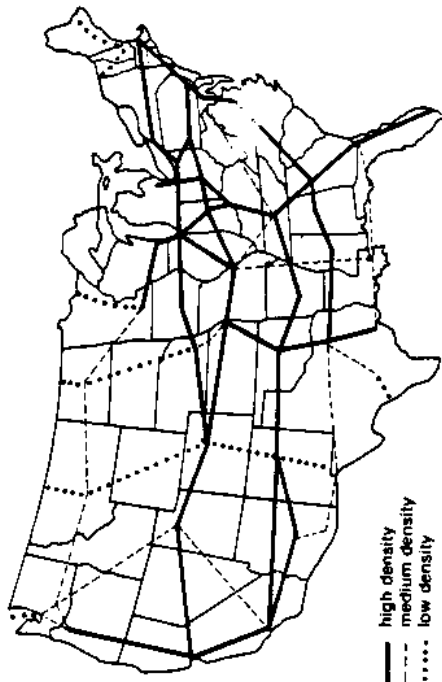
Proportion of Federally Regulated Business MTS, WATS
and Private Line Service (PLS) Revenues Generated
by Largest Customers, 1976

Source^{S23}

business and government customers, and for over 50 percent of the total (\$11.4 billion) revenues for all interexchange services under federal jurisdiction for business and residences combined (Table 1.11).

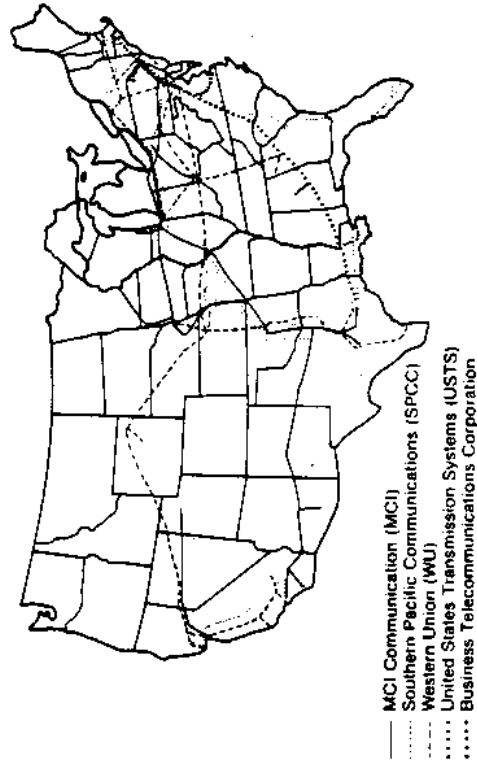
The import of both the geographic and the institutional concentration has not been lost on either the traditional industry or its competitors. The placement of AT&T's major terrestrial interexchange routes [Figure 1.19(a)] is consistent with it. So is the placement of major competing terrestrial routes [Figure 1.19(b), (c)], especially when overlaid with the cities where the terrestrial competitors offer services "like" the ordinary MTS (Figure 1.20). Even the proposed layout of Satellite Business System's MTS "equivalent" (Figure 1.21), albeit unconstrained by any sunk investment or by available rights-of-way, conforms to the pattern. In its planning for its proposed XTEN Service, the Xerox Corporation explicitly linked the geographic and institutional concentrations (Figure 1.22). This mirrors the pattern used by the now traditional industry from its inception through the first two decades of the 20th century.

Tables 1.5 and 1.6 along with Figures 1.19 - 1.22 make it plain why the traditional industry would tag the new entrants' strategy as cream-skimming under cover of a price umbrella. The basis for the new entrants' charges of predatory pricing on the traditional industry's part is more subtle. It can be understood only by taking a closer look at cost allocation and pricing relationships.



Major AT&T Terrestrial
Interexchange Routes

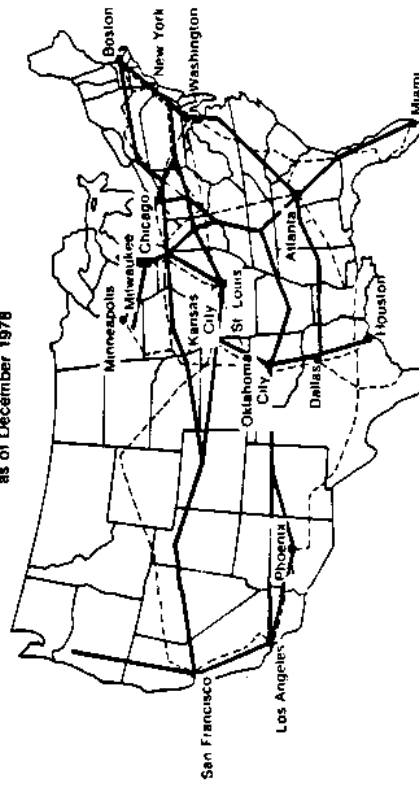
(a)



Major Competing Terrestrial
Interexchange Routes

(b)

— Major AT & T Interchange Routes
- - - Major Competing Terrestrial Routes
as of December 1978



Major Terrestrial Interexchange Routes

(c)

Figure 1.19

Major Terrestrial Interexchange Routes (as of December 1978)

Source S24

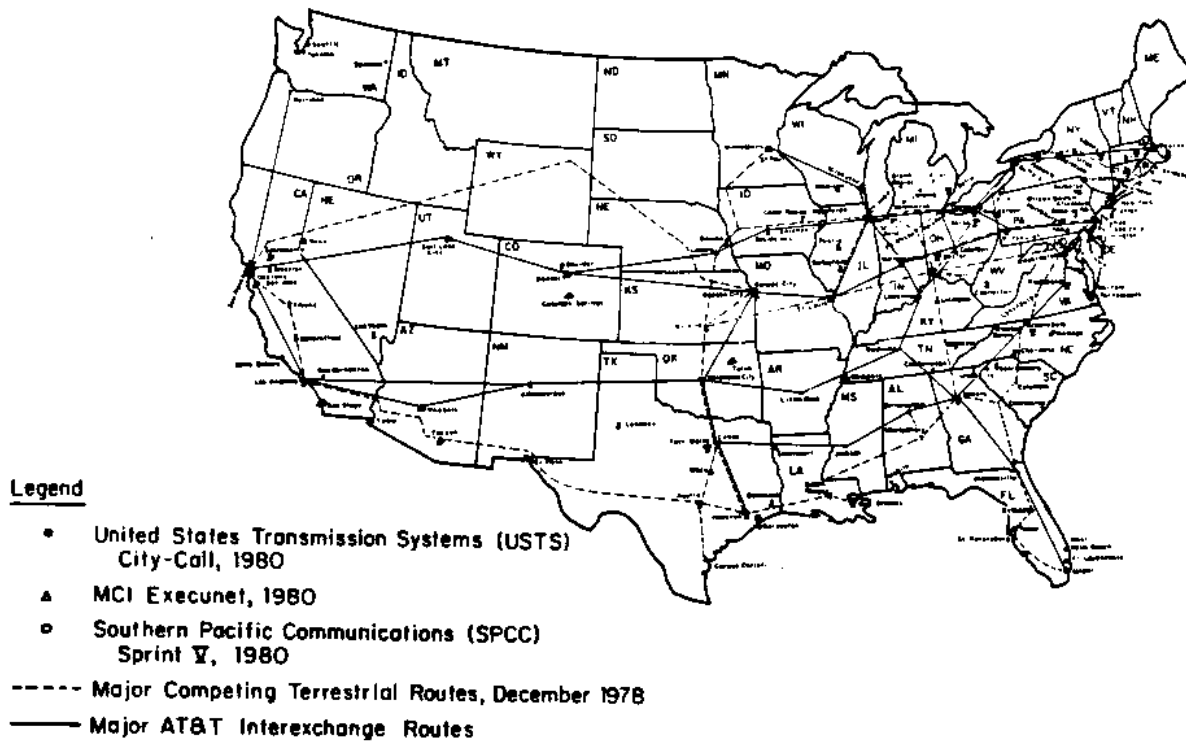


Figure 1.20

Cities Served by Terrestrial MTS-Competitors
(as of January 1, 1980)

Source^{S25}

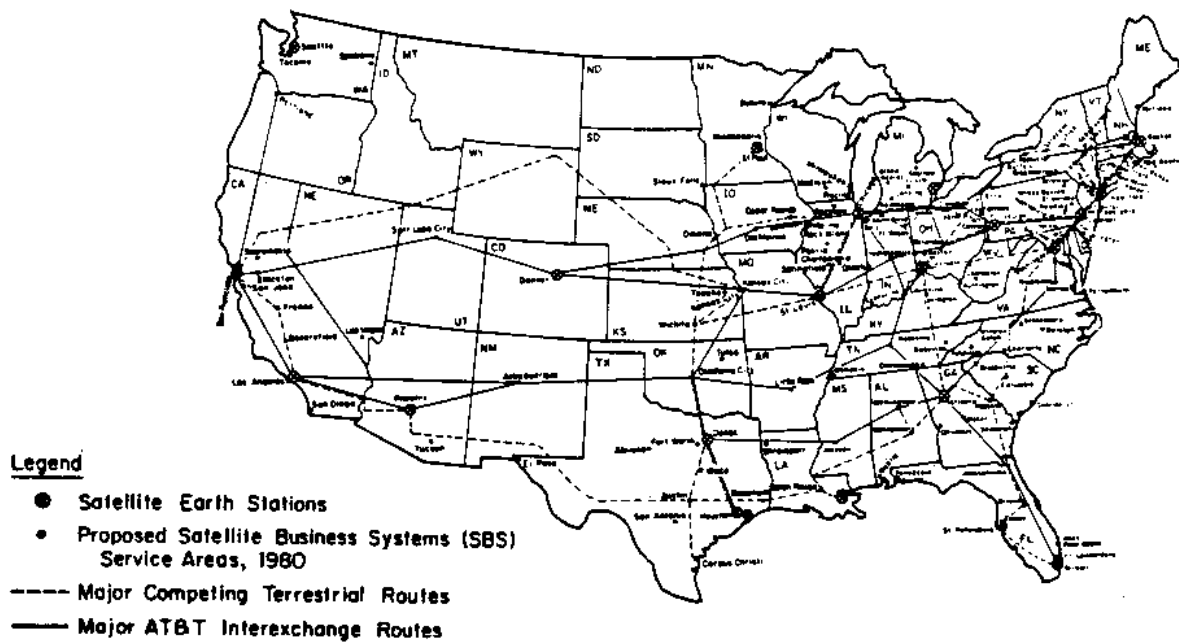


Figure 1.21

Cities Proposed for MTS-Competitive Satellite
Business Systems Service (as of June 11, 1980)

Source^{S26}

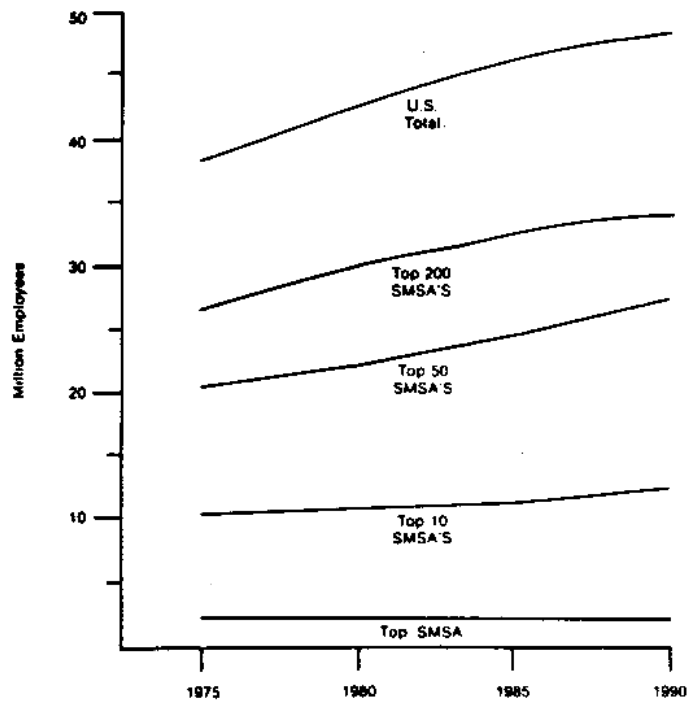
F. Predatory Pricing or Price Umbrella? Cost-Based Pricing or Subsidies?

1. Interplay of Costing and Pricing Decisions

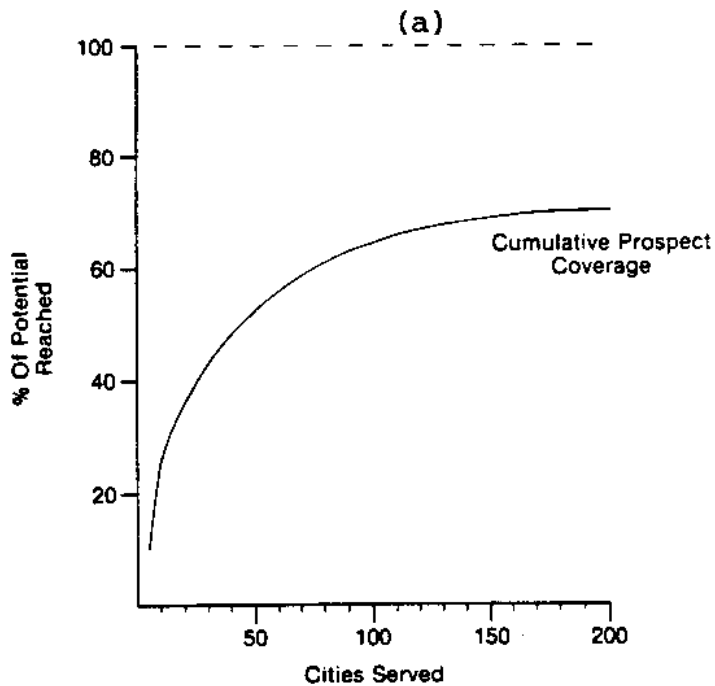
Table 1.7 illustrates the impact on customers and competitors of pricing choices coupled with alternative jurisdictional cost allocations by examining the supply of business terminals (B.T.) and its relationship to the pricing of basic telephone service to little old ladies in tennis shoes (L.O.L.).

To focus on essentials, let us temporarily make what Figure 1.7 has shown to be an unwarranted assumption that the "real" total cost at stake in Table 1.7 is unquestionably \$200, made up of an unquestionable "real cost" of \$100 for supplying service to L.O.L.s and an unquestionable "real cost" of \$100 for B.T.s. The top of Column A in Table 1.7 reflects a policy that considers it fair to allocate all these costs to the state jurisdiction and none to the federal jurisdiction. Column B illustrates a policy that considers it fair to put \$180 in the state cost pool and \$20 in the federal cost pool. The federal part is, in addition, specifically earmarked as fairly having come out of only the \$100 of "real" B.T. costs. These two illustrative fair allocations were chosen because they are fair according to rationales or rationalizations in actual use.

We focus next on the pricing decision within the state, paying no further attention to the federal side. To do so, we make another simplifying assumption, namely that the pricing strategy is to recover the total costs of \$200 (Column A) or \$180 (Column B) exclusively from B.T. or L.O.L. heedless of any other costs of other services sharing facilities within the state jurisdiction. For each of the two illustrative patterns of jurisdictional cost separation (Column A and Column B), there is a continuum



Qualified Prospect Employees in Standard Metropolitan Statistical Area Groupings



Expansion of Prospective Market for Information Services as a Function of Cities Served (1980 Projections)

(b)

Figure 1.22

Xerox XTEN Markets: Economic Attractiveness

Source^{S27}

Jurisdictional Cost Separation Decisions:
State and Federal Cost Shares

		(A)		(B)	
		State	Federal	State	Federal
Cost Shares:	Total Costs Business Terminals (B.T.)/ Little Old Ladies (L.O.L.)	0-A		0-B	
		\$200	\$0	\$180	\$20
		100/100	0	80/100	20

Pricing Decisions: Business Terminal Prices	{		1-A		1-B	
		① \$60	60/140	0	60/120	20
		② \$80	80/120	0	80/100	20
		③ \$100	100/100	0	100/80	20
		④ \$120	120/80	0	120/60	20

Table 1.7

Relationships between Cost Allocation
and Pricing Decisions

of possible price ratios that will recover costs assuming one unit of demand for each product. Rows 1 through 4 of Table 1.7 illustrate some possible pricing policies. In Column A, for instance, a decision to price B.T. at \$60 (Row 1) fixes the price for L.O.L.s at \$140 (Cell 1-A).

The impacts on competing suppliers and their customers of pricing decisions coupled with jurisdictional cost allocation decisions are now more clearly discernible. If indeed cells 0-A and 0-B reflect fair shares of real costs, then only cells 3-A and 2-B reflect economically efficient and competitively fair cost-based pricing. The cells above these in their respective columns may be interpreted as predatory pricing in the competitive B.T. market at the expense of the L.O.L.s captive of a monopoly. Conversely, cells below 3-A and 2-B in their respective columns may be interpreted as raising an economically inefficient price umbrella over B.T.s that subsidizes L.O.L.s while also sending specious price signals to induce inefficient competitors to enter the B.T. market. Relative to Column A, all of Column B may be interpreted either as a fair recognition of proper costs or as a federal subsidy of state services. Winners and losers among suppliers and customers vary according to row positions.

2. Interpreting Adversary Claims

Loud but baffling shouting matches on and off the record over precisely the point illustrated by Table 1.7 are the daily stuff of administrative and judicial proceedings and of legislative testimony. For instance, according to AT&T:

"intrastate rates for telephone company provided terminal equipment are generally designed to recover costs without reduction to reflect the portion of such costs allocated to the interstate

jurisdiction. Thus intrastate terminal equipment tariffs generate enough revenues to cover the full costs of providing the equipment. In addition to these intrastate revenues, allocation of a portion of these costs to the interstate jurisdiction provides interstate separations support. It should be noted that the difference between the remainder of costs of terminal equipment after the allocation to interstate and the full costs recovered in intrastate tariffs, will generally be the same amount as the costs allocated to the interstate jurisdiction."³⁰

According to an FCC staff report, on the other hand, we "have the anomalous condition whereby a portion of the terminal costs (approximately 20 percent in practice) has been made a part of the interstate revenue requirement--with no associated revenue from that source. Conversely, on the state side of the jurisdictional boundary, all revenues are attributable to state but they only have to cover 80 percent of the actual costs.

The net effect is to create a subsidy for the terminal user which is made up by an increase in the interstate revenue requirement which is equivalent to the costs absorbed from the state jurisdiction. In practice the subsidy is picked up by an increase in interstate. . . rates."³¹

What is one to make of this ritual Gilbert and Sullivan patter? Consider \$100 of "real" terminal costs. It is agreed in these arguments, as it is assumed in Table 1.7, Column B, that \$20 goes to the federal jurisdiction to be recovered through the pricing of some or all federally regulated services. It is further agreed that \$80 remains in the state

cost pool (Cell 0-B). If, as AT&T argues explicitly, state terminal pricing generates enough revenues to cover the full \$100, then \$20 of total state revenues (equal, indeed, to the costs allocated to the federal jurisdiction) need not be recovered from other services under state jurisdiction. For total state revenues to equal total state costs, this implies that these other services may, in the aggregate, be priced at less than cost defined as state pool total less state terminal costs. AT&T's argument then appears to claim, first, that interstate users unjustifiably pick up \$20 of state costs. Unjustifiably, because \$20 of costs of the same equipment seem to be covered by \$20 of revenues in each of the two jurisdictions. In fact they are not, since state revenues collected for terminal services must be offset by revenues not collected for other services to keep total costs in balance with total revenues in each jurisdiction. AT&T's argument appears to claim, second, that by paying the full \$100, thereby relieving other state users of the need to cough up \$20, the terminal users further subsidize other state users, within the scope of a total state pool as already reduced by the \$20 of costs transferred to the federal jurisdiction, for a total benefit of \$40 to these other users. If correctly deciphered, this argument amounts, in terms of Table 1.7, to comparing cell 3-B with cell 2-A.

The FCC staff argument, on the other hand, appears to imply that state terminal pricing merely covers the \$80 remaining in the state pool. Hence the terminal users get the benefit of the \$20 transfer to the interstate cost pool and the other state users get nothing at all. Implicitly, this compares cell 2-B with cell 3-A.

Since, in practice, the equivalents of many of the cells of Table 1.7 reflect actual policy in some jurisdiction, both the arguments are grounded

in defensible if inconsistent views of "truth." In fragmented adversary proceedings before regulatory bodies or the courts, and even in legislative fact-finding, the commissioners, judges, legislators and reporters or other bystanders faced with such free-floating arguments only rarely have the mandate or the resources to tether them to common ground with assumptions made as explicit as in Table 1.7.

Small wonder then that an appellate court might find, as the U.S. Court of Appeals for the District of Columbia did in June 1980,³² that the Federal Communications Commission's cost allocation practice "points to irrationality," a finding fair only on the assumption that purely economic logic is all there is at issue when, in fact, procedural means are also tailored to meeting political and policy ends while conforming to standards of judicial review.

A compromise among differing criteria established by economic theory, by the canons of jurisprudence and by the concepts of equity held by diverse interested parties may well appear irrational when the conditions under which the compromise was made have vanished. But the underlying problem cannot be resolved by appeals to disparate logics. The problem is intrinsically political and must, in the end, be addressed through political processes. Describing such a situation as "political" in a pejorative sense either misses this crucial point or is a cynical attempt to tar and feather one's opponents.

How much political maneuvering room is there in making the choices illustrated by Table 1.7? How fair or efficient are the choices that have been made? These are questions we can now turn to.

G. Potential Range of Fairness in Jurisdictional Cost Allocations

1. Functional Cost Pools

To begin to shed light on these basic questions, Figure 1.23 recasts the cost pool of Figure 1.4 into a more functional form--by service type--distinct from the principally jurisdictional forms of Figures 1.8 - 1.11. The local exchange subpool appears both here and in Figures 1.9 - 1.11. This suggests a solid functional and jurisdictional status for local exchanges which, albeit more apparent than real,³³ is accepted for now. Together with the message toll pool (which incorporates MTS, WATS, PBX, and PABX services), the local exchange pool constitutes the message services pool which has about 86 percent of the money in it and where SLUs and SPFs swim.

The Long Lines subpool encompasses the cost of AT&T facilities wholly dedicated to long-haul interstate and foreign service, thereby apparently beyond pale of jurisdictional disputes. Historically, however, cost allocations for these facilities have in fact been disputed in ways too arcane to detail here.³⁴ Suffice it to say that these allocations remain debatable.

Private lines are facilities drawn from the general pool of the facilities owned by the traditional carriers. What makes them private is their dedication to the service of a single customer, usually a large customer, who wants to use them on a more or less continuous basis and who sees an economic and/or a functional advantage in having them constantly at his disposal instead of dialing-up for each use. More precisely, what the customer buys is a private line service that looks to him like dedicated facilities. In fact, the underlying facilities may shift from time to time without the customer knowing or caring so long as everything works when he

needs it. Many particular transmission or switching facilities might, however, be in the private line service at one time and in the message service at another. The relative proportions of truly fungible facilities, with the attendant cost allocation problem, and of permanently dedicated facilities, with their possible inefficiency of use are and will remain a subject of debate.

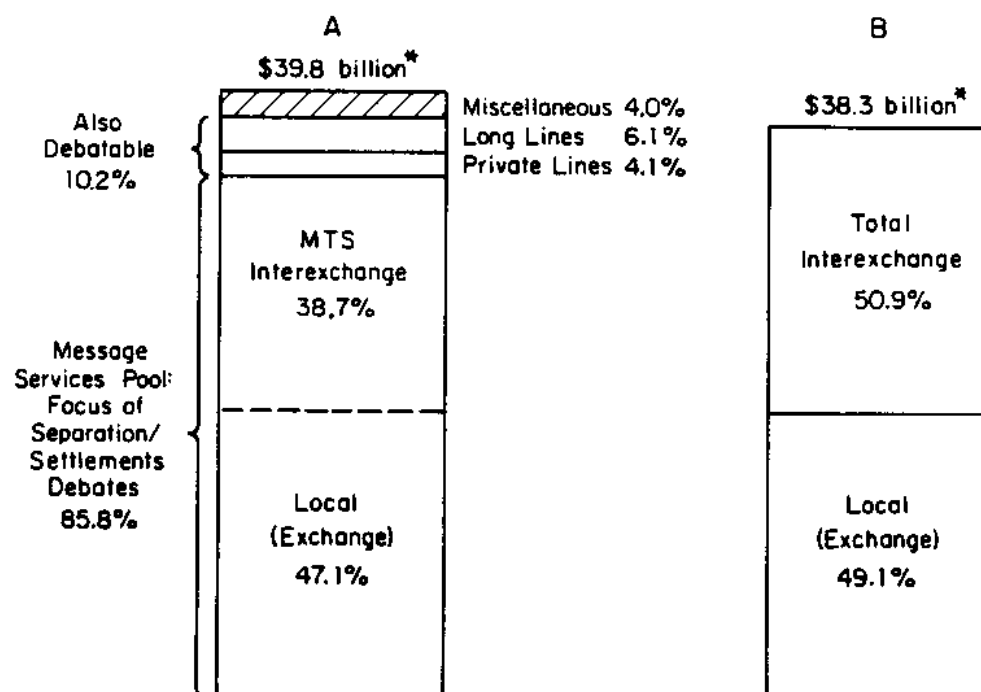
For present purposes, the crucial point is that "use" is reckoned differently for a facility in private line service from "use" when the same facility is in the message services.³⁵ The policy implications of this obscure technico-judicial detail will be drawn in Section I.

The miscellaneous subpool of Figure 1.23A appeared also in Figure 1.9. Here as there, we ignore it for now. That leaves a pool of \$38.3 billion (Fig. 1.23B) made up of the local exchange subpool (49 percent) and an interexchange toll pool (51 percent) made up of the message toll, private line and Long Lines subpools. By now we can view these subpools indifferently as revenue or cost pools.

2. Latitude of Cost Allocation

Figure 1.24 brings us to the heart of the question of the fairness of current outcomes of public and private cost allocation and pricing policy and of the question of available latitude. The revenue proportions of Figure 1.12 reflect and are reflected by the cost allocations depicted in Figure 1.23B. These proportions, like the proportions in Figures 1.8 - 1.11 are created by circular interactions where price determines use and use determines cost allocation and division of revenues. And costs, at least in the aggregate, loosely influence prices.

Overlaid on Figure 1.24B for message services only is the hard core of joint and common costs, namely the non-traffic sensitive (NTS) costs³⁶ mentioned in Section D. These amounted to about \$17 billion in 1976 (or

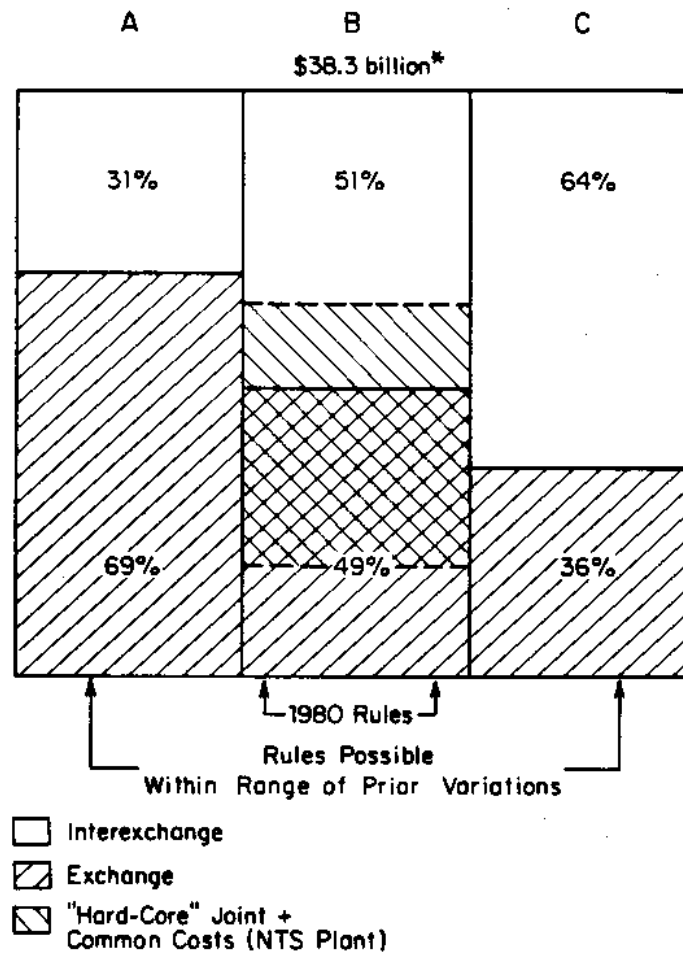


*1976; for approximate 1980 figures multiply by 1.6

Figure 1.23

Cost Definitions for Broad Service Categories

Source^{S28}



*1976; for approximate 1980 figures multiply by 1.6

Figure 1.24

Politico/Judicial Latitude in
Non-Traffic Sensitive Cost Allocation

Source^{S29}

an estimated \$27 billion in 1980). The processes sketched in Section D³⁷ allocate about 30 percent of the \$17 billion or \$5 billion to the inter-exchange toll services and the remaining \$12 billion to the local exchange services. The dashed lines in Figure 1.24B show what the relative sizes of the interexchange and exchange pools would be if it were national policy to allocate the joint and common costs wholly one way or wholly the other.

The extent of allocation is wholly discretionary, subject only to man-made constraints. Economists propose that the right way to do it is according to what their trade calls Ramsey pricing or the inverse-elasticity rule (the latter usually in postal contexts) and what laymen call charging what the traffic will bear. Economically "right" means to maximize efficiency as defined by economic theory. Even if it is granted that the difficult demand measurements required to determine the Ramsey price could be made, the matter would not end there. Equity, unlike efficiency, is a political not an economic issue. A really applicable economic theory could help to measure the social costs of deviations from maximum economic efficiency so that these might be balanced against perceived social gains in equity. But the ultimate choice is nonetheless politically discretionary.

Figure 1.24A and 1.24C therefore also estimate the outer limits of discretion as suggested by historical variations in political perceptions of what is right and what is possible.³⁸ At one estimated limit (Figure 1.24A) interexchange revenue requirements would decrease by about 40 percent from their present level and exchange revenue requirements increase by 40 percent over their present levels. At the other estimated limit (Figure 1.24C), the swings would be about 25 percent. These estimates differ from the swings indicated by the dashed lines in Figure 1.24B for three reasons.

First, costs considered in A and C include costs other than those in the hard core depicted in B. Second, B illustrates extremes; A and C illustrate historically plausible limits. Third, the estimating techniques differ and may entail different errors. But, for our purposes as for the Court's, extreme nicety is not required.

3. Implications for Consumers and Producers

Several preliminary inferences of significance to various players may now be drawn. These are sharpened in Section I.

First, no customer can hope to assess the consequences of alternative cost allocation policies for his own affairs without considering the entire mix of services he buys. For instance, in terms of Figure 1.24, a customer who purchases only interexchange services can only gain from Alternative A and only lose from Alternative C, and conversely for one who purchases only exchange services.

Second, no public or private policy maker can assess the consequences of alternative cost allocation policies without knowing what mix his constituents or customers buy.

Third, where a customer might wish to stand on the question of the fairness of the cost allocations of Figure 1.24 depends on what mix he sits in and on how much he worries about where which other customers sit.

Fourth, as we described in Section F, how you interpret the schema of Table 1.7 depends on what row and column you're looking at and what other cell you choose for comparison. The cost allocation pattern of Figure 1.24B is a 1976 snapshot of the history and the projections displayed in Figure 1.15 and Table 1.4. It also corresponds to the federal jurisdiction cost allocation of Column B of Table 1.7, chosen because of its correspondence,

on the average, with actual practice. By focusing on the effects of the forces, described in Section C, for shifting ever increasing proportions of the joint and common costs to the federal jurisdiction (i.e., shifting from Column A of Table 1.7 to Column B of Table 1.7), the traditional industry can reasonably claim that public policy has imposed on it a practice once tolerable under monopoly conditions, but now intolerable because it unfurls price umbrellas inviting unfair and inefficient competition. By focusing on Column B of Table 1.7 and the latitude in pricing practices available within that column, the competitors can reasonably allege predatory pricing (cells above 2-B) or else the traditional industry can point to precise cost-based pricing (cell 2-B) or to inefficient and unfair price umbrellas (cells below 2-B) depending on what jurisdiction is chosen for examination on what date.

Fifth, a costing process that invokes "deterrent effects" (Section D) can be described as inexorably determined by scientific, technological, economic or other more or less natural laws only by an inveterate technician, a fool or a knave. The process is only the fossil record of a once meaningful compromise among parties whose perceptions, interests and numbers have since shifted.

Sixth, fairness to competitors and to customers is a shifting thing. What's fair is relative to costs as defined by the fundamentally politico-judicial process we have described. The arguments over the schema of Table 1.7 (Section F) rested in part on the question of no allocation of B.T. costs to the federal jurisdiction versus allocation of 20 percent of those costs to that jurisdiction. As already noted under the fourth point, the latter is, in fact, the average 1976 allocation of NTS costs to the federal jurisdiction. Should fiat change this percentage tomorrow, then cells in

Table 1.7 that look fair today might look unfair tomorrow and vice-versa. Having created a major counterforce to the forces, described in Section C, for shifting joint and common costs from local exchange to interexchange services, the pressures of reawakened competition induce pushes by the traditional industry for just such fiats.

Seventh, swings of at most 40 percent (Figure 1.24A and 1.24C), while painful to some and pleasant for others, hardly seem the stuff of revolution, especially if stretched out over several years in an inflationary economy.

What, then, accounts for the shrillness of ongoing controversy?

First, the shrillness is not universal. Many participants in the "rewrite" of the Communications Act of 1934 have lamented over the apathy of the general public.

Second, if you think your cream is being skimmed you'll scream and if you think your prices are being unfairly undercut you'll scream. As we have seen, there are reasonable grounds for both perceptions at the same time.

Third, the swings portrayed in Figure 1.24 account for only part of potential swings.

a) Some of the factors in Figure 1.7 are controllable in the short run; all of them are alterable in the long run. They can either dampen or accentuate the swings of Figure 1.24. Fear of either also induces screaming.

b) The aggregate picture painted so far portrays average effects. Customers or competitors off the average may be leveraged into greater than average pain or pleasure. Understandably they will react more intensely than the average.

c) Whatever swings may be willed in cost allocations, swings in prices may also be willed more or less independently of the swings in costs and, again, either dampen or accentuate the swings of Figure 1.24.

Fourth, all the foregoing assumes a stable structure. But witting customers and competitors react also to the portent if not the actuality of profound structural changes and attendant uncertainties.

Fifth, as perceptions of change ripple wider, now peaceful oxen will charge like bulls if and when they think themselves gored. This has happened repeatedly in the history of the ongoing regulatory and legislative battles and likely will continue to happen as the unstable boundaries of Figure 1.17 succumb to continuing pressures from many sides.

We will therefore examine off-average effects of cost adjustments, price swings and structural trends. We forego for now analysis of alternative patterns of the important depreciation, taxation, corporate cost-saving and other policies and practices portrayed in Figure 1.7.

H. Far Out on the Cost Allocation Swing: Geopolitics and Industry Politics

1. State-by-State Variations

Figure 1.23B, like Figure 1.24B, shows total interexchange costs = revenue as 51 percent of total costs = revenue and local exchange as 49 percent of the total for the entire traditional industry.

Data fine-grained enough to illustrate the leveraging effects of off-average positions on a statewide state-by-state basis are at hand only for the Bell System, and only for the message services (MTS and WATS) portion of the interexchange services, as shown in Figure 1.25 and Table 1.8.

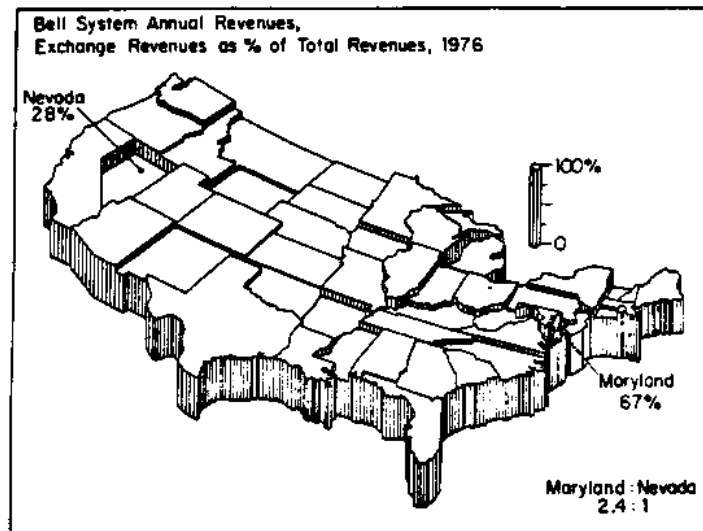
Rounded off, the nationwide proportions of message service interexchange

revenues to local exchange revenues for the Bell System are 45 : 55. Likewise rounded off, so are the industry-wide, nationwide proportions calculated from Figure 1.23A net of miscellaneous, Long Lines and PLS costs-revenue requirements ($38.7\%/85.8\% = 45.1\%$; $47.1\%/85.8\% = 54.9\%$). The closeness stems from the fact that Bell System total revenues of \$33.7 billion account for 85 percent of the \$39.8 billion of Figure 1.23A while total Independent revenues of \$6.1 billion amount to only 16% of the \$39.8 billion.³⁹ The 45 : 55 proportion and the Bell System data of Figure 1.25 and Table 1.8 are therefore a reasonable baseline for looking at off-average swings without extreme nicety.

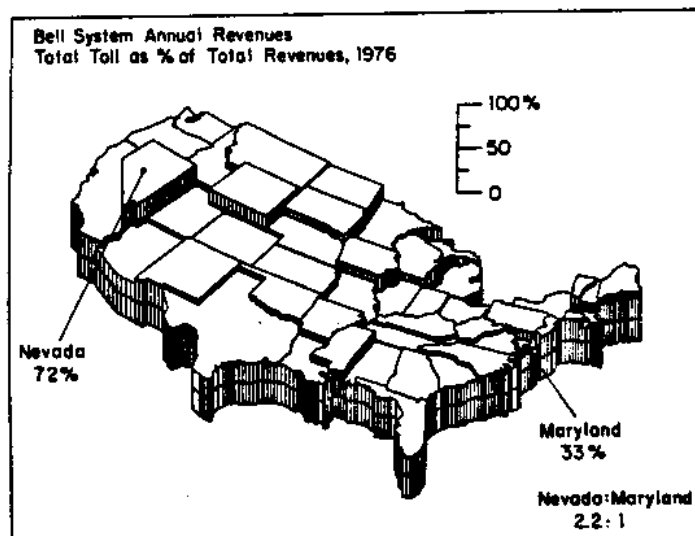
It is clearly evident from Figure 1.25 and Table 1.8 that there are indeed pronounced swings around the average 45 : 55 proportion. At the extremes, the proportions are 33 : 67 for Maryland and 72 : 28 for Nevada.

We can, furthermore, estimate the extremes of pain or pleasure relative to the average by considering the effect, however induced, of a one percent change in the interexchange cost allocations of Figure 1.24B or, more precisely, Figure 1.23A. Since Nevada exhibits anomalies that need not concern us here, Maryland and Wyoming (instead of Nevada) will be compared to the average.

Given the 45 : 55 nationwide average proportion, a one percent decrease in costs allocated to interexchange services produces a 0.81 percent increase in the local exchange cost allocation. For Maryland, the corresponding effect is an increase in the local exchange cost allocation of 0.48 percent, rather than 0.81 percent. Since 0.48 percent is itself only about 60 percent of 0.81 percent, the average statewide increase of the Maryland local exchange cost allocation is 40 percent smaller than the average nationwide increase. For Wyoming, the result is an increase of the average local



(a)



(b)

Figure 1.25

Bell System State-by-State Exchange Revenues and
Total Interexchange Revenues as Percent of
Total Revenues, 1976 (Message Services)

Source^{S30}

				Ranked			
% of Total Revenues				% of Total Revenues			
Exchange & Other		Total Toll		Exchange & Other		Total Toll	
AL	56.73	AL	43.27	MD	67.43	NV	71.67
AZ	55.32	AZ	44.68	IL	66.51	WY	65.69
AR	47.24	AR	52.76	NY	62.21	MT	62.22
CA	48.33	CA	51.67	OH	61.31	ND	59.90
CO	52.11	CO	47.89	MI	59.98	VT	59.63
CT	50.48	CT	49.52	DE	58.87	SD	59.60
DE	58.87	DE	41.13	WI	58.84	ME	56.51
FL	54.64	FL	45.36	RI	58.73	ID	55.70
GA	54.33	GA	45.67	IN	58.49	NH	55.59
ID	44.30	ID	55.70	MO	58.07	MS	53.77
IL	66.51	IL	33.49	VA	56.81	AR	52.76
IN	58.49	IN	41.51	AL	56.73	OR	52.21
IA	48.13	IA	51.87	PA	56.44	IA	51.87
KS	49.60	KS	50.40	MN	56.06	NM	51.70
KY	52.80	KY	47.20	TN	55.99	CA	51.67
LA	53.99	LA	46.01	BELL SYS	55.35	OK	51.55
ME	43.48	ME	56.51	AZ	55.32	NE	51.13
MD	67.43	MD	32.57	MA	54.81	KS	50.40
MA	54.81	MA	45.19	FL	54.64	NC	49.65
MI	59.98	MI	40.02	GA	54.33	CT	49.52
MN	56.06	MN	43.94	SC	54.02	NJ	48.88
MS	46.23	MS	53.77	LA	53.99	UT	48.40
MO	58.07	MO	41.93	WV	53.35	CO	47.89
MT	37.78	MT	62.22	TX	53.32	KY	47.20
NE	48.87	NE	51.13	WA	53.27	WA	46.73
NV	28.33	NV	71.67	KY	52.80	TX	46.68
NH	44.41	NH	55.59	CO	52.11	WV	46.65
NJ	51.12	NJ	48.88	UT	51.60	LA	46.01
NM	48.30	NM	51.70	NJ	51.12	SC	45.98
NY	62.21	NY	37.79	CT	50.48	GA	45.67
NC	50.35	NC	49.65	NC	50.35	FL	45.36
ND	40.10	ND	59.90	KS	49.60	MA	45.19
OH	61.31	OH	38.69	NE	48.87	AZ	44.68
OK	48.45	OK	51.55	OK	48.45	BELL SYS	44.65
OR	47.79	OR	52.21	CA	48.33	TN	44.01
PA	56.44	PA	43.56	NM	48.30	MN	43.94
RI	58.73	RI	41.27	IA	48.13	PA	43.56
SC	54.02	SC	45.98	OR	47.79	AL	43.27
SD	40.40	SD	59.60	AR	47.24	VA	43.19
TN	55.99	TN	44.01	MS	46.23	MO	41.93
TX	53.32	TX	46.68	NH	44.41	IN	41.51
UT	51.60	UT	48.40	ID	44.30	RI	41.27
VT	40.37	VT	59.63	ME	43.46	WI	41.16
VA	56.81	VA	43.19	SD	40.40	DE	41.13
WA	53.27	WA	46.73	VT	40.37	MI	40.02
WV	53.35	WV	46.65	ND	40.10	OH	38.69
WI	58.84	WI	41.16	MT	37.78	NY	37.79
WY	34.31	WY	65.69	WY	34.31	IL	33.49
BELL SYS	55.35	BELL SYS	44.65	NV	28.33	MD	32.57

Table 1.8

Bell System State-by-State Exchange Revenues and
Total Interexchange Revenues as Percent of
Total Revenues, 1976 (Message Services)

Source^{S31}

exchange cost allocation of 1.91 percent or 236 percent of the nationwide average increase of 0.81 percent. Thus the average statewide increase of the Wyoming local exchange cost allocation is about 140 percent greater than the average nationwide increase.

It should now be clear why a potential increase of local exchange cost allocation barely worthy of national attention might leave Maryland customers or regulators sound asleep while it might make Wyoming customers or regulators stand at attention. By the same token, what might barely be noticed at AT&T corporate headquarters, might altogether escape the attention of Chesapeake & Potomac Telephone Company of Maryland management, but make folks sit up and take notice at the Mountain States Telephone and Telegraph Company.

2. Variations within the Traditional Telecommunications Industry

Overlaid on the statewide state-by-state deviations from national average are further geographic and industry deviations stemming from the territorial measles portrayed in Figure 1.14 and the relative structures and revenue shares of Bell System and Independent companies.

Table 1.9 shows differing plant-related cost and NTS cost and federal cost allocation patterns for Independents and AT&T.⁴⁰ Figure 1.26 shows a wide spread in interexchange (MTS and WATS) versus exchange NTS cost allocations across Independent companies. And, finally, Figure 1.27 shows wide variations in the proportions of interexchange to local exchange revenues across elements of the traditional industry.

Since, as noted for Figure 1.24, NTS plant-related costs are the hard core of joint and common costs, it is instructive to look at off-average swings as they affect the industry's NTS cost picture and, with some fuzzing

	Total					
	Independent		Bell		Industry	
	\$ billion	%	\$ billion	%	\$ billion	%
NTS	3.179	67.4	13.722	63.8	16.901	64.4
Other	1.539	32.6	7.788	36.2	9.327	35.6
Total	4.718	100.0	21.510	100.0	26.228	100.0

(a)

	Federally Regulated					
	Independent		Bell		Industry	
	\$ billion	%	\$ billion	%	\$ billion	%
NTS	0.684	68.2	2.858	57.9	3.542	59.6
Other	0.319	31.8	2.082	42.1	2.401	40.4
Total	1.003	100.0	4.940	100.0	5.943	100.0

(b)

Table 1.9

Non-Traffic-Sensitive Portions of
Plant-Related Costs, 1976 (Message Services)

Source^{S32}

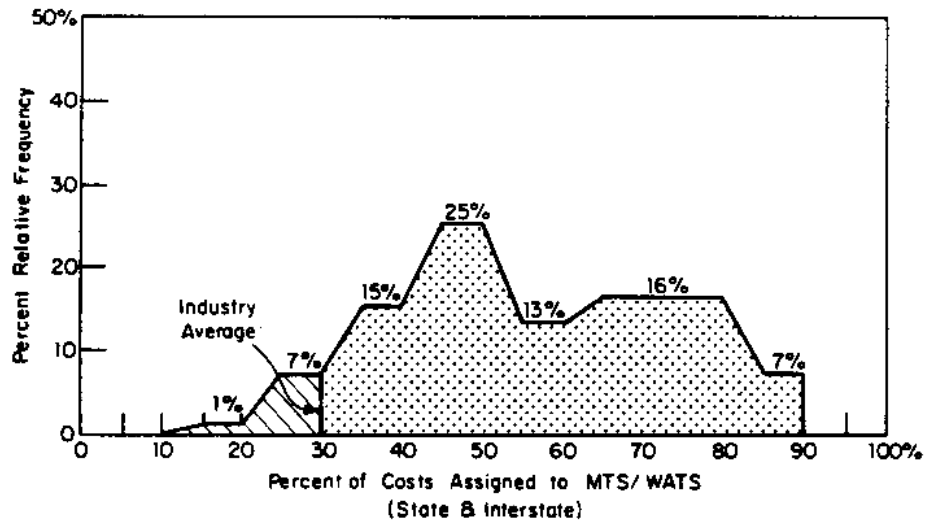


Figure 1.26

Ozark Plan Independent Company Interexchange Assignment
of Non-Traffic-Sensitive Message
Service Costs, 1976

Source^{S33}

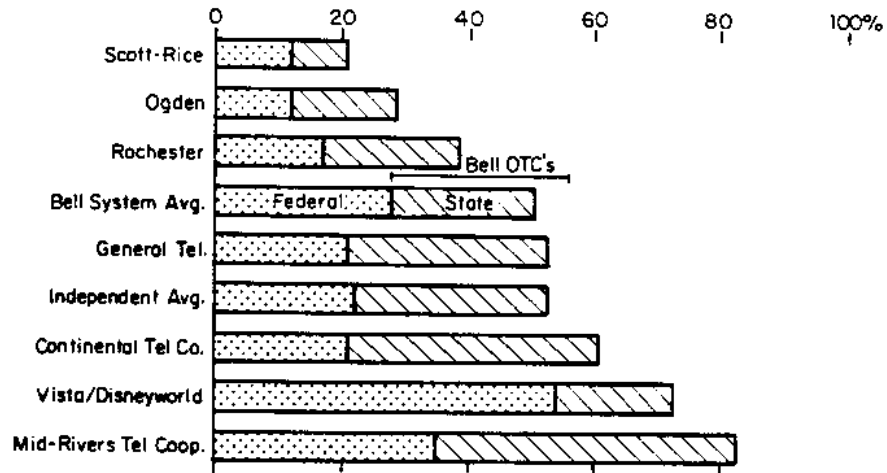


Figure 1.27

Interexchange Revenues as Percent of
Total Service Revenues, 1977

Source^{S34}

in translation, affect the pricing patterns customers would see as a consequence.

The industry-wide allocation of NTS costs is 30 percent to interexchange message (MTS and WATS) services and 70 percent to local exchange services, a 30 : 70 ratio. The extremes, as shown in Figure 1.26, are roughly 10 : 90 and 90 : 10.

A one percent decrease in NTS costs allocated to interexchange message services leads, on the industrywide average 30 : 70 proportion, to a 0.43 percent increase in NTS costs allocated to local exchange services. At the 10 : 90 extreme, the same one percent decrease corresponds to a 0.11 percent increase. At the 90 : 10 extreme the increase is 9.0 percent. Thus, as summarized in Table 1.10, at the 10 : 90 extreme the increase is 75 percent less than the average and, at the 90 : 10 extreme, the increase is 2000 percent more than the average.

3. Implications of Variations

The foregoing supports the following inferences.

First, making cost allocation policy solely on the basis of nationwide averages is reasonable and politically wise only if it turns out that no one will lose or, more practically or cynically, that the winners will outweigh the losers. The first possibility is ruled out within the microcosm of the isolated cost data analyzed here, although one might luck out through compensating cross effects in a broader context. The second possibility requires pure luck, even in the microcosm. Better to assess the relative strengths of the outliers on both sides of the average, assuming that the effects are large enough to cross the threshold of anyone's attention.

A 1% decrease in Interexchange (IX) message service (MTS and WATS) cost allocations leads to increases in Exchange (X) costs which vary with the baseline Interexchange/Exchange cost ratio:

	Average [*]	Extremes	
IX/X cost ratio	30/70	10/90	90/10
% increase	0.43%	0.11%	9.00%
deviation from average	0%	-75%	+2000%

^{*} 8% of Independent telephone companies fall below and 92% above the average interexchange/exchange cost ratio.

Table 1.10

Effects of Changes in Non-Traffic-Sensitive Costs
= Revenue Requirements

Second, even if 40 percent swings in cost allocations (Section G) arouse no one on the average, they may well arouse outliers who fear or sense effects multiplied by 2 or by 20. Hence, effects which seem small on the average may, however, be large enough to attract the attention of outliers. Since those threatened are more likely to be vocal, at least at first, than those who are favored, the losers have a tactical advantage, especially since blocking action is often easier to achieve than consensus for action, as in the last minute referral to the House Judiciary Committee of the "reregulation" legislation that failed in the 96th Congress late in 1980.

Third, there are differential impacts on Bell System and Independent managements, since the latter tend to be further from the averages hence more likely to be aroused than the former. Focusing on AT&T therefore tends to blind one to the geographic and political dispersion not only of the Bell System but, even more so, of the Independents and, in both cases, of their customers. And competition or internecine warfare within the traditional industry, smoldering under the cover of the compromises embodied in the separations and settlements processes, seems likely to flare up. How this geographic dispersion will balance with both market concentration (Section E) and increasing voter concentration (Section A) remains in question.

I. Cost-Definition and Price Deaveraging Responses to Competition: Geopolitics and Consumer Pressures

1. Costing and Pricing Responses to Competition

The Federal Communications Commission's "Above 890" decision in 1959 permitted heavy users of telecommunications to build microwave facilities of their own and to operate them at costs lower than the prices then charged

by the traditional carriers. In 1969, the MCI decision⁴¹ opened the way for non-traditional facilities suppliers. These were authorized to build facilities initially described as specialized to digital services--e.g., high volume computer-to-computer transmission--then thought to be subject to a rapidly growing demand. As it happened, the growth was overestimated, and what growth there was has been met by not only the transmission and switching facility suppliers, but also by the services suppliers. How and when perceived potentials will manifest themselves remains speculative both intellectually and financially as Satellite Business Systems, for example, bets investments in satellites on the hypothesis that the availability of appropriate services will draw out latent demand.

To date, therefore, the story is still principally one of competition over voice transmission, whether by the older analog or the newer digital technologies. Initially, also, the principal competition was over the customers of the traditional industry's private line services, to whose needs the "Above 890" and "MCI" decisions were responsive.

While not negligible, the size of the private line (PLS) market--\$1.6 billion or 4 percent of 1976 revenues (Figure 1.23)--nonetheless understates the structural significance PLS owes to its growing attraction over the last decade not only as an operationally advantageous alternative to MTS but also increasingly as a pricing alternative to MTS. The customers of PLS are among the geographically, institutionally and economically concentrated customers described in Section E. The potential leverage of their moves from the PLS services of traditional carriers to equivalent services of their own or of competing suppliers, or from the MTS services of traditional carriers to anyone's PLS services or MTS-"equivalents" is therefore

understandably something that would evoke strong responses from the traditional carriers.

One type of response was various approaches to lowering PLS prices to meet the competition first from self-supplying large customers, later from external competitors.

Since PLS is a distinctive and visible service category of long-standing, it also has a distinctive costing structure, even though some of the facilities it draws upon are, as noted in Section G, essentially those used for MTS as well. Also noted in that section was the fact that "use," hence cost, for a facility in private line service is reckoned differently from "use" when the same facility is in the message service. The net effect of the difference is to assign lower costs to particular facilities when in the wholesale private line service than when the same facilities are in the retail message telecommunications service.⁴²

So long as self-supplying customers were the only competition, a price reduction by the traditional carriers that might save the customers from the bother of internal supplying was likely to be welcome, however achieved.

But the tone changed upon entry of competing third-party suppliers. What the traditional industry and its regulators could treat as a "just and reasonable" wholesale service classification different from retail services and without "unjust and unreasonable preference or advantage" to anyone could also be challenged by the new competitor, MCI Telecommunications, Inc., in the following terms: "Because of the built-in system of subsidies which the Bell System supplies to its large business and TV private line customers, the average small business and residential user of telephone service has been required by Bell to pay substantially higher rates than would have been required in the absence of such subsidy."⁴³ This argument has merit if the

cost allocation of Figure 1.24B is taken as fixed and attention is focused only on pricing within a fixed cost pool. The traditional industry supports its argument that the compulsion to "subsidize universal service" by defining local exchange costs as residual costs provides a price umbrella for long-haul competitors by pointing to the hard-core (NTS) joint and common costs assigned to the federal jurisdiction (Figure 1.24B) and to the historical growth of the portion so assigned (Figure 1.15). The competitors can focus exclusively on the federal interexchange cost pool and point to the interexchange PLS/MTS costing and pricing differentials within that pool to support their argument that MTS users "subsidize" PLS users.

The traditional industry's countermoves have not been limited to cost adjustments. The changing MTS rate tapers shown in Figure 1.3, with their pronounced flattening at the longer distances may be interpreted as a competitive response, given a competitive threat more pronounced in the realm of concentrated long-haul traffic than in dispersed short-haul traffic (Figures 1.19, 1.20, 1.21).

Since Figure 1.28 shows AT&T's MTS rates to be flatter than even their own PLS rate, we can infer a dilemma imposed on the traditional industry by the increasing strength of conflicting pressures. Any diversion of facilities and of (a constant volume of) traffic from MTS to PLS induces lower use measures hence lower cost assignments = revenue requirements = revenues in the interexchange service hence, at least in the short run (and assuming a constant rate of return) induces if not the actuality then at least pressure toward a higher residual local exchange cost and revenue requirement.

Thus, under pressure to meet competition in PLS, the traditional industry finds itself not only competing against its own MTS business but, because of the traditional cost allocation process, also under pressure to

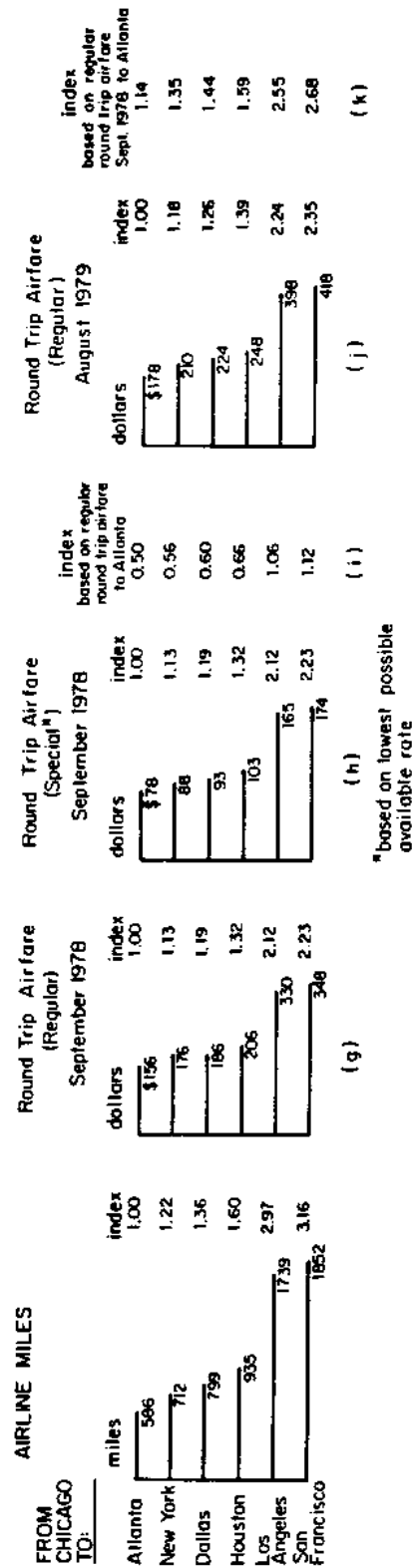
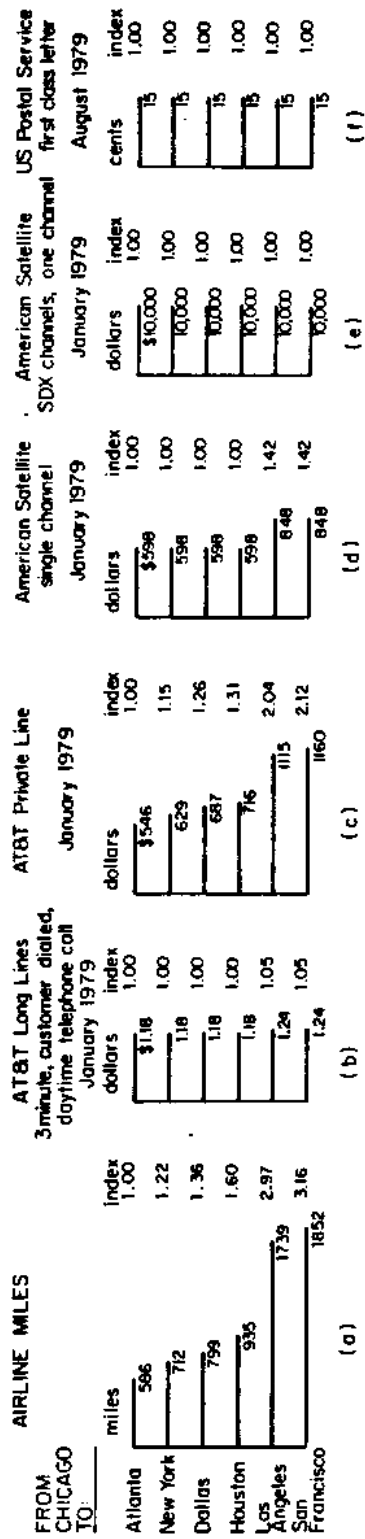


Figure 1.28
Comparison of Telecommunication, Postal and Airline Rates
versus Distance, Late 1970's

Source S35

slow down and possibly to reverse the historic trend toward higher cost allocations to the interexchange services (Figure 1.15 and Table 1.4).

This puts the traditional industry between the rock of interexchange competition and the hard place of local exchange interests where, in spite of a continuing monopoly, it remains under the traditional political pressures to hold basic services prices down. As of early 1981 there are evident moves to increase local exchange prices in various direct and indirect ways in spite of these pressures. Not unexpectedly, such moves are justified by the traditional industry as moves back toward the cost-based pricing that local interests have resisted; competitors describe them as milking monopoly customers to permit undercutting competition in the competitive markets. The structural implications of these problems of responding to traditional pressures in a competitive environment are described in Section J.

The problems are compounded by another aspect of the competitive game. Originally, the competition from both self-supplying customers and new suppliers was described as limited to PLS, a substantial but far from dominant service category (Table 1.11). But, as is plain from Figures 1.20 and 1.21, by 1980 the actual and prospective competitive arena had avowedly begun to encompass MTS as well.

Like the PLS competition, this MTS competition is highly concentrated not only geographically and institutionally but also in heavily-used long-haul facilities--of all competitors--whose technological unit costs (Figure 1.29) are appreciably lower than the costs of more sparsely traveled shorter haul facilities.

		Jurisdictions**						
Functional Service Types***		Federal			State			
	Total	Business	Residence	Total	Business	Residence	Total	
	Dial-up: MTS	16.0	4.0	4.9	8.9	3.3	3.8	7.1
	Wide Area: WATS	2.0	1.5	0	1.5	0.5	0	0.5
	Private: PLS	1.5	1.0	0	1.0	0.5	0	0.5
	Interexchange Toll	19.5	6.5	4.9	11.4	4.3	3.8	8.1
	Local Exchange	18.8			0	?	?	18.8
	Service Total	38.3			11.4			26.9
	Miscellaneous Directory Advertising	1.6			0			1.6
	Total	39.9			11.4			28.5

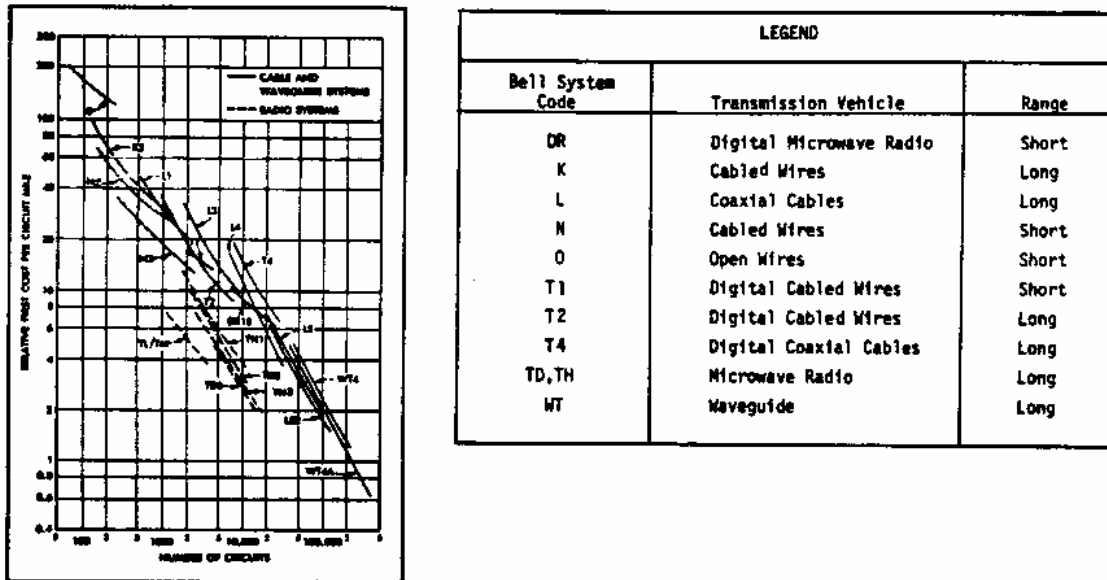
Table 1.11

Revenues by Major Customer Categories* (\$ billion)

Source^{S36}* 1976; for approximate 1980 figures
multiply by 1.6

** Figure 1.8 - 1.11

*** Figure 1.23 - 1.24



Cost trends for short- and long-haul transmission are down while carrying capacity is up, both by several orders of magnitude. Each of the vehicles illustrated here is capable of carrying simultaneously many conversations or other types of information. This includes the "O" system that improves on the classical open wires. The increase in the handling capacity of the several vehicles represent development over time as well as technical improvements. Line termination, switching and personnel costs are among the additional elements that enter into the cost of complete telecommunication systems. Present cost proportions and price patterns are such that a pair of wires carrying but one conversation is still generally the vehicle for local conveyance from an individual telephone toward the nearest exchange, where many conversations heading the same way are bundled for further short or long haul. Optical technologies are becoming an important contender with the terrestrial technologies illustrated here along with satellite facilities.

Figure 1.29

Short- and Long-Haul Transmission Technological Costs

Source^{S37}

2. High and Low Density: Pressures and Counterpressures

Competition sets up counterpressures for market--and price--differentiation against long-standing forces for uniform pricing in the interexchange services. PLS prices once were independent of whether the endpoints of a private line lay on the heavily traveled major routes of Figure 1.19 or off in the blank spaces of that map. The extent and details of differential pricing for services over high-density or low-density routes remain at controversy. As of early 1981 MTS prices are still independent of location. Thus, quite independent of the allocations of joint and common costs as depicted in Figure 1.24B, and entirely within the scheme that these practices define (Figure 1.23), the traditional industry has practiced uniform pricing and, implicitly, cost averaging within the interexchange pool.

As of early 1981, one price schedule applied to essentially all interexchange services under federal jurisdiction and, within each state, one price schedule applied to all interexchange services within that state's jurisdiction. Although sensitive to distances between points and to other factors, such as the duration of a call, these price schedules are insensitive to the location of points.

That the forces for averaging are not dead is attested to by ongoing efforts to bring Alaska, Hawaii, Puerto Rico and the Virgin Islands into the federal averaging fold and by continuing controversies over disparities between the federal average and the averages of the several states. These disparities are considered further in Section J.

But while some pro-averaging forces continue to be alive and well, increasing competition has engendered increasing counterpressures. For example, these pressures manifested themselves in PLS through the introduction

of the so-called Hi-Lo and MPL tariffs which, in essence, priced private lines on high-density routes lower than the average and private lines on low-density routes higher than the average. A competitor for dense routes using average cost as a yardstick would understandably call such a move predatory pricing. A traditional carrier might understandably describe the move as furling a price umbrella by moving high-density prices closer to "true" costs. Here again, the traditional carriers are between the rock of competitive pressures and the hard place of pressures for averaging.

Additional factors contribute to pressures against density averaging. The Communications Act of 1934 has as one declared purpose "promoting safety of life and property."⁴⁴ Long permitted to share private lines under these provisions of the law, and finding shared lines less expensive as well as more convenient than either MTS or unshared private lines, have been air carriers, electric utilities, stock and commodity exchanges, the United States Postal Service, federal, state and local government agencies as well as the expected subunits and subsidiaries of any particular customer.⁴⁵

By 1974 the FCC had initiated an inquiry (Docket 20097) into broadening the range of those privileged to share private line services or resell them to others. The list of the customers and would-be resellers who intervened in this proceeding is shown in Table 1.12. This record, like most others, shows interventions principally by the traditional cast of competing suppliers, regulators, professional consumer activists and representatives of that sector of the big business and government community with a stake in lower prices for massive traffic, namely the middle-level telecommunications managers of very large organizations, or industry and trade associations principally responsible for private line services or equivalent.

- Aeronautical Radio, Inc.
- Aerospace Industries Association of America, Inc.
- Air Transportation Association of America
- Altair Airlines
- ★American Facsimile Services Corp.
- American Newspaper Publishers Association
- American Satellite Corp.
- American Telephone and Telegraph Co.
- American Trucking Associations, Inc.
- Associated Press
- Association of American Railroads
- Bank Wire
- ★Boeing Computer Services, Inc.
- ★Bunker Ramo Corp.
- Central Committee on Telecommunications of the American Petroleum Institute
- Citicorp
- Commodity News Services, Inc.
- Computer and Business Equipment Manufacturers Association
- Data Transmission Company
- Dow Jones & Company, Inc.
- ★Graphnet Systems, Inc.
- GTE Service Corp.
- ★International Business Machines
- ITT World Communications Inc.
- MCI Telecommunications Corp.
- National Association of Manufacturers
- National Association of Motor Bus Owners
- National Retail Merchants Association
- ★National Data Corp.
- North American Telephone Association
- Orlando Communications Club, Inc.
- ★Packet Communications Inc.
- RCA Global Communications, Inc.
- ★Remote Data Processing Services
- Section of Adapso, Inc.
- Satellite Business Systems, Inc. (formerly CML Satellite Corp.)
- Securities Industry Automation Corp.
- Southern Pacific Communications Co.
- ★Telenet Communications Corp.
- ★Tymshare, Inc.
- United Press International, Inc.
- United Systems Service, Inc.
- Utilities Telecommunications Council
- ★Wells National Services Corp.
- Western Union International, Inc.
- Western Union Telegraph Company
- ★Xero-Fax, Inc.
- Department of Health, Education and Welfare
- Department of Justice
- Office of Telecommunications Policy

●Customers

★Resale Service Suppliers

Table 1.12

Intervenors in Docket 20097
(Shared Use and Resale of Private Lines)

Source^{S38}

Fifteen years later, by June of 1977, following Federal Communications Commission authorization of broader shared use and of resale of private line services, the previously favored customers had become part of a larger pool that could avail themselves of the services of the traditional industry, the competing transmission and switching facility suppliers and now also of new competing service suppliers. By buying PLS at prices hitherto available only to large customers with enough traffic volume to justify PLS, these brokers (resale carriers and "value-added" carriers) offer PLS and MTS-"like" services with or without additional services to less large customers in dense areas at prices between PLS and MTS prices, thereby increasing at least the potential for more diversion of MTS customers into PLS, even if indirectly.

3. Implications for Business and Residential Consumers

As of early 1981, MTS prices remained differentiated by jurisdiction, but otherwise independent of details of location. The traditional telecommunications industry charges the same price for an interstate call from New York, NY to Washington, DC as from Des Moines, IA to Sioux Falls, SD (about 200 miles apart). Within California, the San Francisco to Sacramento and China Lake to Death Valley (about 80 miles apart) prices are equal to each other, but not necessarily to the prices for 80 mile calls within other states. But, since the pressures toward competitive cost-based pricing responses in MTS, as in PLS, are getting stronger, it is helpful to bracket the possible consequences of exercising this option.

We limit consideration to interexchange services under federal jurisdiction, since these are most immediately at stake. We draw from Table 1.5(b) the estimate that 7/8 of federal MTS and WATS revenues from businesses

came from the 144 largest metropolitan areas of Figures 1.20 and 1.21, and we draw from Table 1.6 the hypothesis that the 4000 or so largest customers are in those locations. Table 1.11 and Table 1.6 tell us that total revenues from business for MTS and WATS were about \$5.5 billion. On the assumption that PLS revenues are at least as concentrated, we apply the 7/8 estimate also to the \$1 billion of PLS revenues under federal jurisdiction, for a total of \$6.5 billion \times .875 = \$5.7 billion. At risk for deaveraging pricing response is therefore \$5.7 billion of revenues under federal jurisdiction and remaining in the interexchange pool under federal jurisdiction is \$0.8 billion of residual revenues from businesses along with the entire \$4.9 billion of revenues from residences or, respectively 50 percent, 7 percent and 43 percent of the total pool.

To bracket possible consequences of deaveraging, we consider a one percent diversion of revenues from the \$5.7 billion subpool at risk, and two alternatives as to how the diversion might be absorbed by increased prices in the remainder of the federal pool on the assumption that costs are fixed in the short run and demand stays constant. The first considers it fair to load the diversion entirely on the residual business customers. The other considers it fair to load the diversion on both the residual businesses and all residence customers. In the first case, the residual businesses would suffer a 7 percent price increase and residences no direct pain at all. In the second case, the combined residual businesses and residences would suffer a one percent price increase. If 50 percent of revenues were diverted from the \$5.7 billion subpool at risk, the corresponding figures would be a 350 percent price increase and a 50 percent price increase.

What might be a reasonably realistic estimate of diversion? Without extreme nicety, Table 1.2 can be used to suggest that the principal costs

at competitive risk are those labelled "Tandem & Regional Switches" and below, or 30 percent of costs. Taking competition for terminal equipment into account would increase this "at risk" percentage. Since the costs of Table 1.2 are investments unallocated to jurisdictions, the link between those "costs" and jurisdictional costs = revenue requirements is not at all that nice, but 30 percent also lies between one percent and 50 percent! The effect of loading a 30 percent diversion entirely on residual businesses and not at all on residences would be respectively a 214 percent increase and no pain at all. The effect on residual businesses combined with all residences would be a 30 percent increase. Since there is evidence that, in the daytime, when most business calling is done, 70 percent of direct distance dialing MTS revenues come from businesses and 30 percent from residences,⁴⁶ one might, in the spirit of inventing "deterrents," argue that it is fair to allocate, of the 30 percent diversion, 70 percent to the residual businesses and 30 percent to all residences. The resulting pain allocation would be a 150 percent price increase for residual businesses and 10.4 percent for residences.

Whatever numbers seem appealing, they must be combined with the potentials for shifting joint and common cost allocation described in Section G. Tables 1.13 and 1.14 illustrate combined effects based on the pricing policy illustrated in the preceding paragraph. Also illustrated are the effects of the state-by-state differentials shown in Figures 1.16 and 1.25 and of Bell System-Independents differentials shown in Figure 1.26.

Whatever numbers one picks, some likely consequences of deaveraging emerge clearly.

First, on the supplier side, deaveraging will be called fair cost-based pricing by the traditional industry and predation by the new competitors.

User's Purchase Mix		Cost Allocation Policy Changes: Nationwide Industrywide Average			
		Overall Pressures		Some Services; Some Jurisdictions	
		IX : -40% X : +40%		IX : +25% X : -25%	
Inter-Exchange (IX)	Exchange (X)	Competitive Market	Monopoly Market*	Competitive Market	Monopoly Market*
100%	0%	-40%	50%	25%	210%
80	20	-24	48	15	160
50	50	0	45	0	90
20	80	24	42	-15	20
0	100	40	40	-25	-25

* Certain losses in the competitive market made up in the monopoly market (pricing policy change).

(a)

User's Purchase Mix		Cost Allocation Policy Changes: Overall Pressures, Competitive Market			
		IX : -40% X : 40%			
		Nationwide Industrywide Average	Certain Independents	2 Extreme States: MD and WY	Certain Independents and 2 Extreme States: MD and WY
Inter-exchange (IX)	Exchange (X)				
100%	0%	-40%	-55%	-40% (MD + WY)	
80	20	-24			
50	50	0			
20	80	24			
0	100	40	100	25% (MD) 95% (WY)	60% (MD) 240% (WY)

(b)

Underlying assumptions:

1. Short run: fixed capital, fixed labor, i.e., fixed total costs = total revenue requirement.
2. Ignores changes in policy regarding terminals ("customer premises equipment").

Table 1.13

Implications of Cost Allocation Policy
Changes for Business Customers

User's Purchase Mix		Cost Allocation Policy Change: Nationwide Industrywide Averages *	
Inter-exchange (IX)	Exchange (X)	IX : -40% X : +40%	IX : +25% X : -25%
100%	0	-34%	37%
80	20	-20	25
50	50	3	6
20	80	25	-13
0	0	40	-25

* Certain losses in the competitive market made up in the monopoly market (pricing policy).

Nationwide Industrywide
(a)

Nationwide Industrywide Average = +40%		All Federal Message Cost Allocations for IX Share of NTS Joint and Common Costs Revert to Exchange = +100%	
	Bell	Certain Independents	
MD	25%	60%	60%
WY	95	240	240

Based on the assumptions that the user's purchase mix is IX = 0% and X = 100% and the cost allocation policy is IX = -40% and X = +40%.

Two Extreme States: Maryland and Wyoming
(b)

Underlying assumptions:

1. Short run: fixed capital, fixed labor, i.e., fixed total costs = total revenue requirement.
2. Ignores changes in policy regarding terminals ("customer premises equipment").

Table 1.14

Implications of Cost Allocation Policy
Changes for Residential Customers

Second, on the customer side, deaveraging will add fuel to several traditional fires. Given the concentrations we have described, deaveraging can be painted as pitting big business against small business, or urban business against rural business, especially if the diversion is charged entirely against the residual businesses.

For residences, the most dire consequence that we have sketched so far is an average 50 percent price increase, spread across the board, urban, rural, rich, poor, black, white and all. If a price increase approaching that magnitude is noticed, it might well trigger demands by residential customers for price reductions, similar to the pressures from large businesses on PLS prices and eventually on MTS prices. This is especially true given the beginnings, observed in 1979-80, of competitive marketing of MTS-"like" services to residential customers in cities among those depicted in Figure 1.20. And it would be especially true of any group subject to off-average leverage, like the urban residential consumer whose numbers are concentrated in the locations marked in Figure 1.20 and 1.21 and whose votes, since Baker v. Carr, have increasingly been concentrated there as well.

The result of residential service diversion would be pressures for deaveraging within the entire cost pool of \$11.4 billion under federal jurisdiction. Whatever residue of businesses and residences were left in the federal cost pool after the resulting diversion would experience price increases greater than the 7 - 350 percent range illustrated for business-only diversion.

At some point in such a range the pressures could not be contained within the federal cost pool and the entire jurisdictional cost allocation process, along with the definition of local exchange costs as a residue,

would be called into question. This, indeed, has already happened in legislation proposed but not passed in the 96th Congress.

Where to go? History from the reintroduction of competition to the present gives some clues as to both the possibilities under present rules and the limitation of these rules.

J. Mounting Pressures on Traditional Pricing Policies: The Exchange/Interexchange Disparity

1. The Limits of Responses to Pressures

As of early 1981, the forces, described in Section C, for defining local exchange costs as residual costs had not abated.⁴⁷ But, as portrayed in the preceding section, they faced mounting counterpressures.

Indeed, far from abating, pressures for holding down local exchange prices were manifesting themselves also as continuing pressures for enlarging the geographic extent of local exchange areas, which already encompassed an entity like the Atlanta local exchange, of an area the size of Delaware and Rhode Island combined.⁴⁸ Such expansions gobble up territory hitherto part of the interexchange pool, hence shift traffic, costs and revenue requirements from interexchange services to local exchange services, a shift amplified by the SLU 'n SPF process. This pressure "from below" thus combines with the pressures of long-haul competition "from above" to tend to reduce the costs recovered through revenues from the interexchange services, thereby tending to increase the residual costs in the local exchange pool. In the short run at least, opposing pressures for not adding compensating revenues through increased local rates produce a revenue squeeze while also exacerbating frictions within the traditional industry where off-average Independents are potentially harder hit than Bell System companies.

To some extent, the changing price tapers of Figure 1.3 helped absorb some of the pressure by doing multiple duty. Already noted in Section A is the flattening of long-haul prices to meet competition. The bulge on the short-haul end may be interpreted both as a move to increase revenues collected from short-haul customers who have fewer, if any, other places to go than the long-haul customers and as a reflection of the fact that, in the short haul, fixed termination costs dominate over distance-related transmission costs.

2. The Federal-State Toll Disparity

The bulge may also be interpreted as an effort to alleviate the disparities, already indicated in Section I, between the uniform nationwide MTS prices under federal jurisdiction and the state MTS rates which, albeit uniform within a state, vary considerably across states according, among other factors, to differing views in different states as to an acceptable balance between MTS pricing and the residue left to be covered by local exchange revenues. These so-called toll-rate disparities long were a thorn in the sides of both the traditional industry and its regulators and also a factor in legislative efforts in the 96th Congress to extend federal jurisdiction to all interexchange services, leaving only local service to state regulators.

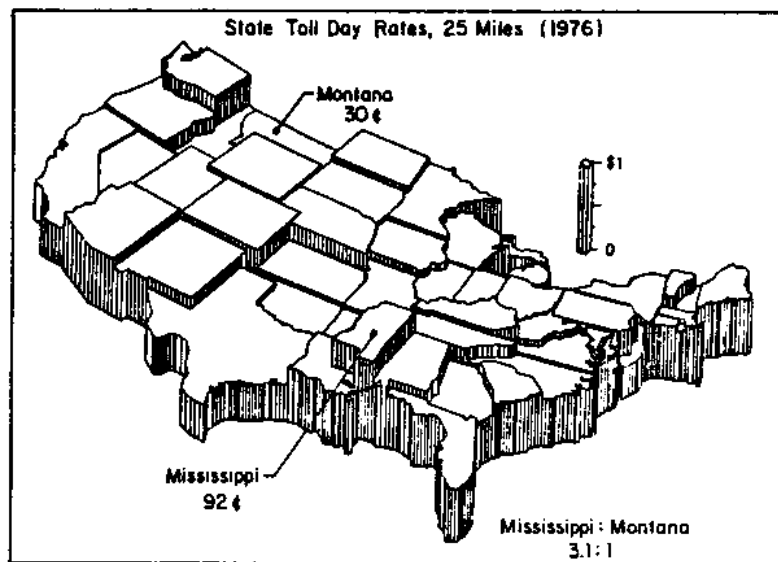
Figure 1.30 and Table 1.15 display the wide variations in 1976 state MTS pricing. At the extremes, an Ohio customer paid almost four times as much as a Kansas resident for a 25-mile, customer-dialed, three-minute, night-time state call.

We have no evidence that these rate variations across states have been either widely perceived or controversial until fairly recently. Over the

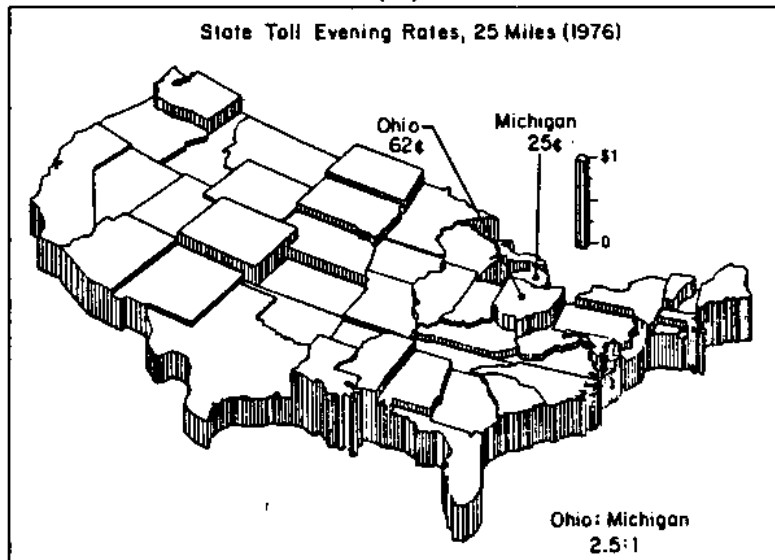
years, attention and debate have focused rather on the widely perceived differences between state and federal interexchange rates, differences especially evident to consumers near the borders. One manifestation of these differences is the revenue disparity illustrated for 1977 in Figure 1.31 and Table 1.16.

Revenue disparity is defined as the difference between revenues from state interexchange calls as priced according to state tariffs and what those revenues would have been had the same calls been priced at the corresponding federal rates. At the extremes, in 1977, Floridians paid the most dollars for state calls over what they would have paid for similar federal calls (New Yorkers had that honor in 1976); Californians paid the least in both years. Had the state interexchange calls been priced at federal rates in 1977, people in Mississippi would have had to pay 35 percent less than they actually did for the aggregate of state interexchange calls, and Floridians 21 percent less. Conversely, New Jersey state interexchange users would have had to pay 60 percent more and Californians 20 percent more in 1977. Between 1970-71 and 1977 California had migrated from the position of highest revenue disparity to that of least.⁴⁹

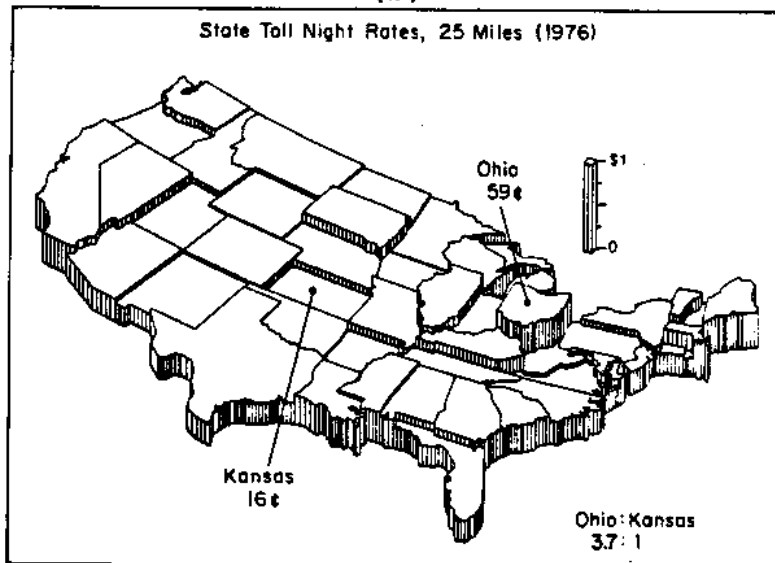
Revenue disparity reflects the aggregate effect of rate disparities, deviations of state rates from federal rates, with magnitudes usually dependent on the distance called. Figure 1.32 illustrates rate disparities at the distances from Jefferson City, Missouri to the Missouri border. To call a place to the Missouri border from Jefferson City, you pay Missouri state interexchange rates. In 1957 these were higher than federal rates. This is shown by the border of the shaded Missouri. With federal rates, you could reach a point just outside the black (interstate) border of Missouri at less than what it cost to reach a point just inside the shaded



(a)



(b)



(c)

Figure 1.30

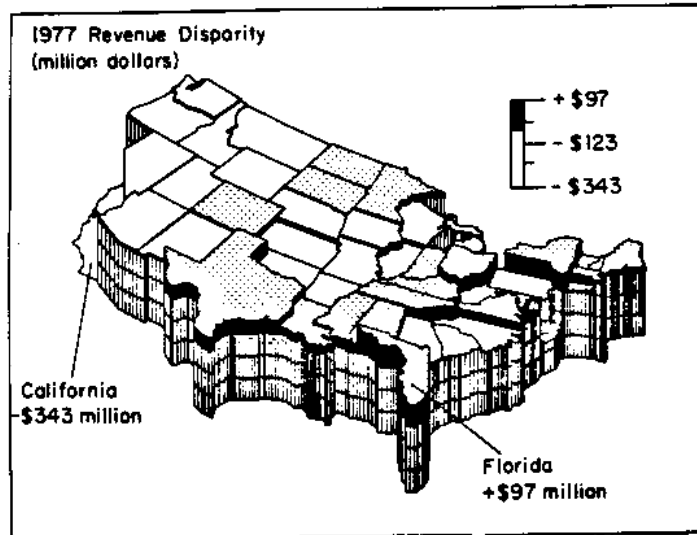
Message Telecommunications Service (MTS) Rates for a Customer-Dialed
3-Minute, 25 Mile State Telephone Call, 1976

(In Dollars)			Ranked		
	Day	Evening	Night		
AL	0.69	0.48	0.33	MS	0.92
AZ	.65	.42	.26	VT	.75
AR	.44	.33	.22	KY	.74
CA	.43	.38	.35	TN	.69
CO	.62	.50	.25	AL	.69
CT	.61	.40	.24	ND	.67
DE	.65	.42	.26	OH	.67
FL	.60	.39	.24	NY	.66
GA	.51	.38	.33	WA	.65
ID	.30	.30	.30	WV	.65
IL	.49	.47	.47	WY	.65
IN	.63	.49	.36	AZ	.65
IA	.57	.37	.23	PA	.65
KS	.41	.26	.16	DE	.65
KY	.74	.45	.40	IN	.63
LA	.61	.61	.33	ME	.63
ME	.63	.50	.42	CO	.62
MD	.61	.45	.30	MA	.62
MA	.62	.48	.41	CT	.61
MI	.33	.25	.25	SC	.61
MN	.61	.39	.24	SD	.61
MS	.92	.59	.36	LA	.61
MO	.48	.38	.31	MN	.61
MT	.30	.30	.30	NE	.61
NE	.61	.39	.24	MD	.61
NV	.41	.35	.35	FL	.60
NH	.59	.43	.35	UT	.60
NJ	.36	.33	.27	NH	.59
NM	.55	.36	.22	VA	.58
NY	.66	.52	.33	IA	.57
NC	.55	.41	.27	RI	.56
ND	.67	.54	.27	NC	.55
OH	.67	.62	.59	NM	.55
OK	.37	.28	.24	GA	.51
OR	.47	.35	.23	WI	.51
PA	.65	.42	.26	IL	.49
RJ	.56	.36	.21	MO	.48
SC	.61	.43	.32	OR	.47
SD	.61	.48	.36	AR	.44
TN	.69	.38	.28	CA	.43
TX	.42	.31	.25	TX	.42
UT	.60	.39	.24	KS	.41
VT	.75	.60	.50	NV	.41
VA	.58	.36	.22	OK	.37
WA	.65	.48	.32	NJ	.36
WV	.65	.42	.26	MI	.33
WI	.51	.37	.25	ID	.30
WY	.65	.42	.26	MT	.30
				OH	0.62
				LA	.61
				VT	.60
				IL	.47
				ME	.42
				MA	.41
				KY	.40
				MS	.36
				SD	.36
				IN	.36
				NV	.35
				NH	.35
				CA	.35
				LA	.33
				AL	.33
				NY	.33
				GA	.33
				WA	.32
				SC	.32
				MO	.31
				ID	.30
				MT	.30
				MD	.30
				TN	.28
				ND	.27
				NC	.27
				NJ	.27
				WV	.26
				WY	.26
				AZ	.26
				PA	.26
				DE	.26
				MI	.25
				CO	.25
				WI	.25
				TX	.25
				CT	.24
				NE	.24
				FL	.24
				UT	.24
				MN	.24
				OK	.24
				IA	.23
				OR	.23
				VA	.22
				NM	.22
				AR	.22
				RI	.21
				KS	.16

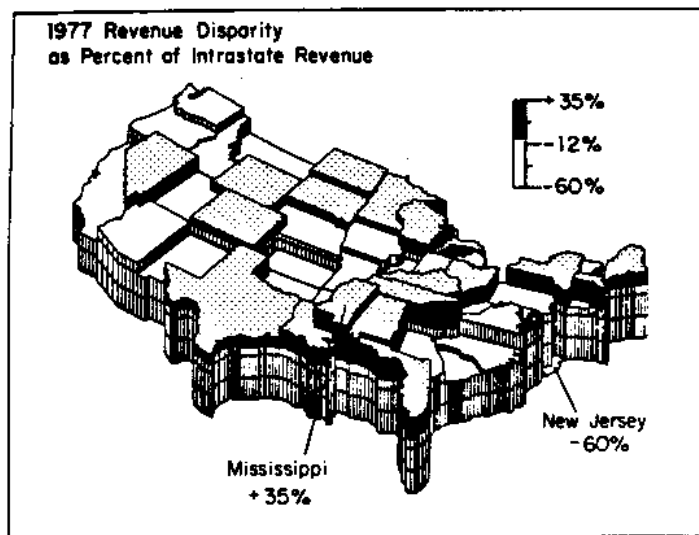
Table 1.15

Message Telecommunications Service (MTS) Rates for a Customer-Dialed
3-Minute, 25 Mile State Telephone Call, 1976

Source^{S40}



(a)



(b)

Figure 1.31

State-by-State Interexchange Revenue Disparity, 1977

Source^{S41}

Ranked						
Revenue Disparity \$Millions		Percent of of Intrastate Revenue	Revenue Disparity \$Millions		Percent of of Intrastate Revenue	
AL	33.9.	26.1	FL	96.6	MS	34.8
AZ	-0.8	-1.3	NY	76.5	TN	27.3
AR	-4.4	-5.9	OH	65.5	AL	26.1
CA	-342.9	-19.7	TX	53.4	KY	25.8
CO	4.0	4.2	MA	43.4	FL	21.0
CT	-5.8	-4.8	TN	41.1	MA	18.4
DE	-0.2	-2.9	MS	34.4	LA	15.7
FL	96.6	21.0	AL	33.9	NY	14.3
GA	-3.9	-2.4	KY	28.9	OH	12.7
ID	-1.6	-4.6	LA	25.5	IN	12.0
IL	-36.7	-11.4	IN	21.2	ME	10.7
IN	21.2	12.0	VA	14.0	NV	10.6
IA	-1.1	-0.9	WA	7.0	WI	10.2
KS	-23.2	-23.4	NM	7.0	VT	9.5
KY	28.9	25.8	ME	4.6	ND	8.3
LA	25.5	15.7	CO	4.0	TX	6.6
ME	4.6	10.7	ND	2.5	VA	6.3
MD	0.0	0.0	VT	1.8	MN	5.0
MA	43.4	18.4	NV	1.5	CO	4.2
MI	-62.8	-16.1	SD	0.7	WA	3.8
MN	7.0	5.0	NH	0.6	WY	3.5
MS	34.4	34.8	MD	0.0	SD	2.5
MO	-10.3	-5.7	DE	-0.2	NH	2.3
MT	-7.4	-19.1	WY	-0.7	MD	0.0
NE	-3.7	-6.1	AZ	-0.8	IA	-0.9
NV	1.5	10.6	IA	-1.1	AZ	-1.3
NH	0.6	2.3	RI	-1.3	GA	-2.4
NJ	-187.6	-59.5	ID	-1.6	OR	-2.8
NM	-4.8	-13.9	WV	-1.8	DE	-2.9
NY	76.5	14.3	UT	-2.0	PA	-3.5
NC	-26.5	-10.7	OR	-3.3	WV	-3.9
ND	2.5	8.3	NE	-3.7	ID	-4.6
OH	65.5	12.7	GA	-3.9	CT	-4.8
OK	-18.2	-13.9	AR	-4.4	UT	-5.4
OR	-3.3	-2.8	NM	-4.8	MO	-5.7
PA	-14.2	-3.5	CT	-5.8	AR	-5.9
RI	-1.3	-9.3	MT	-7.4	NE	-6.1
SC	-12.3	-15.0	MO	-10.3	RI	-9.3
SD	0.7	2.5	SC	-12.3	NC	-10.7
TN	41.1	27.3	PA	-14.2	IL	-11.4
TX	53.4	6.6	WI	-15.7	NM	-13.9
UT	-2.0	-5.4	OK	-18.2	OK	-13.9
VT	1.8	9.5	KS	-23.2	SC	-15.0
VA	14.0	6.3	NC	-26.5	MI	-16.1
WA	7.0	3.8	IL	-36.7	MT	-19.1
WV	-1.8	-3.9	MI	-62.8	CA	-19.7
WI	-15.7	10.2	NJ	-187.6	KS	-23.4
WY	-0.7	3.5	CA	-342.9	NJ	-59.5

Table 1.16

State-by-State Interexchange Revenue Disparity, 1977

Source^{S42}

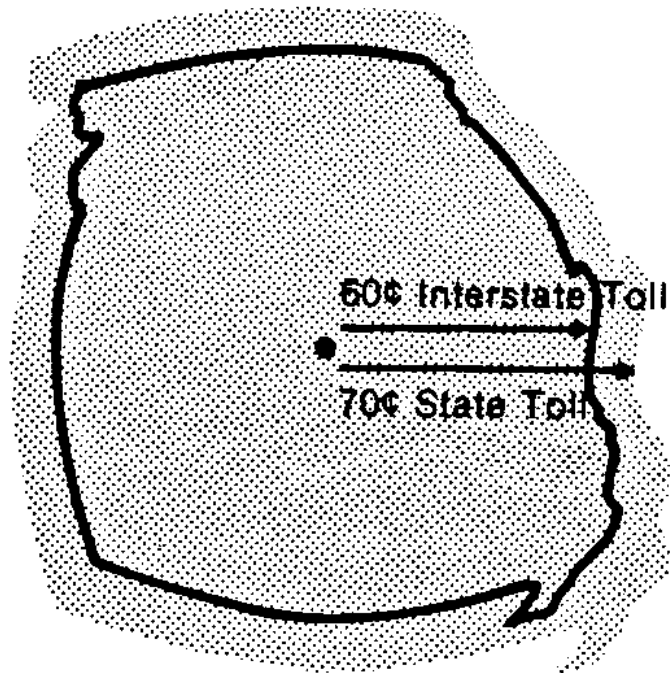


Figure 1.32

Missouri 1957 Interexchange Rate Disparity

Source^{S43}

border at state interexchange rates. This example thus illustrates positive interexchange rate disparity. That's especially noticeable to folks along the border, since it means they pay more to call, say, 25 miles into Missouri than 25 miles into the United States.

Figure 1.33 shows how the pattern of interexchange rate disparity changed between 1971 and 1977. In 1971, ten states had interexchange rates higher than federal rates for all distances; two had pegged state rates at precisely the federal level; and only six had rates uniformly lower than federal rates. By 1977, 11 states had lower-than-federal rates, six had equal rates, and only three had uniformly higher rates.

The remaining states exhibited more complicated patterns, with relationships to federal rates depending on distance. 1977 Iowa state interexchange rates, for example, were lower than federal rates below about 25 miles calling distance, equal between about 25 and 100 miles, and higher above 100 or so miles.

The shift of state interexchange rates relative to federal rates illustrated in Figure 1.33 occurred in the period of significant change in federal rates shown in Figure 1.3.

Figure 1.34 illustrates the impact of all these changes on South Dakota. State rates there increased at short distances and decreased at longer distances, with the most pronounced effects at the extremes, as shown in Fig. 1.34(a). As federal rates also shifted, South Dakota moved from a uniformly positive rate disparity (and hence a positive revenue disparity) in 1971 to uniformly negative rate and revenue disparities in 1977. Comparing Fig. 1.33(a) with Fig. 1.33(b) shows South Dakota to be the only state with so dramatic a rate shift in this period, although California had the most pronounced revenue shift.

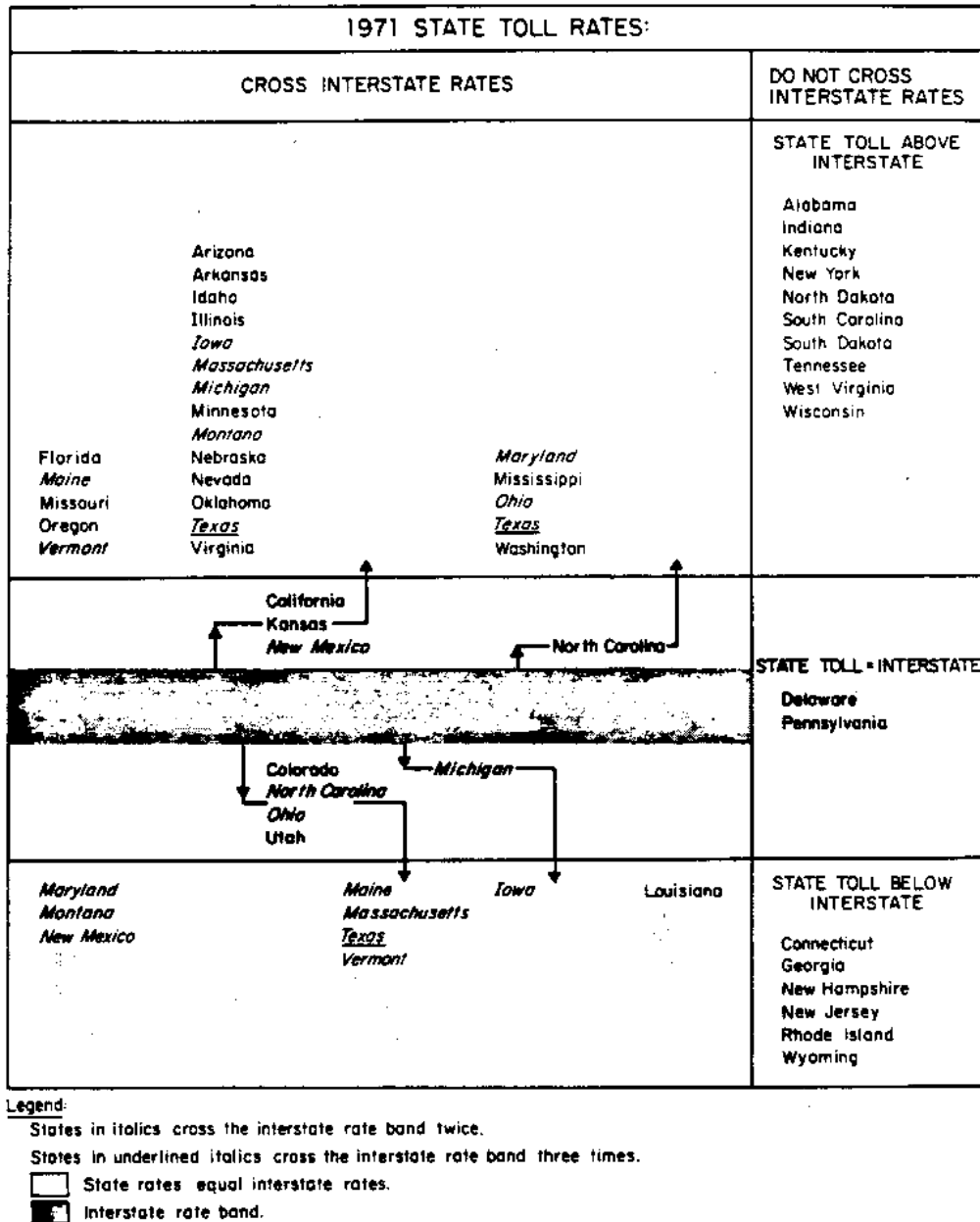
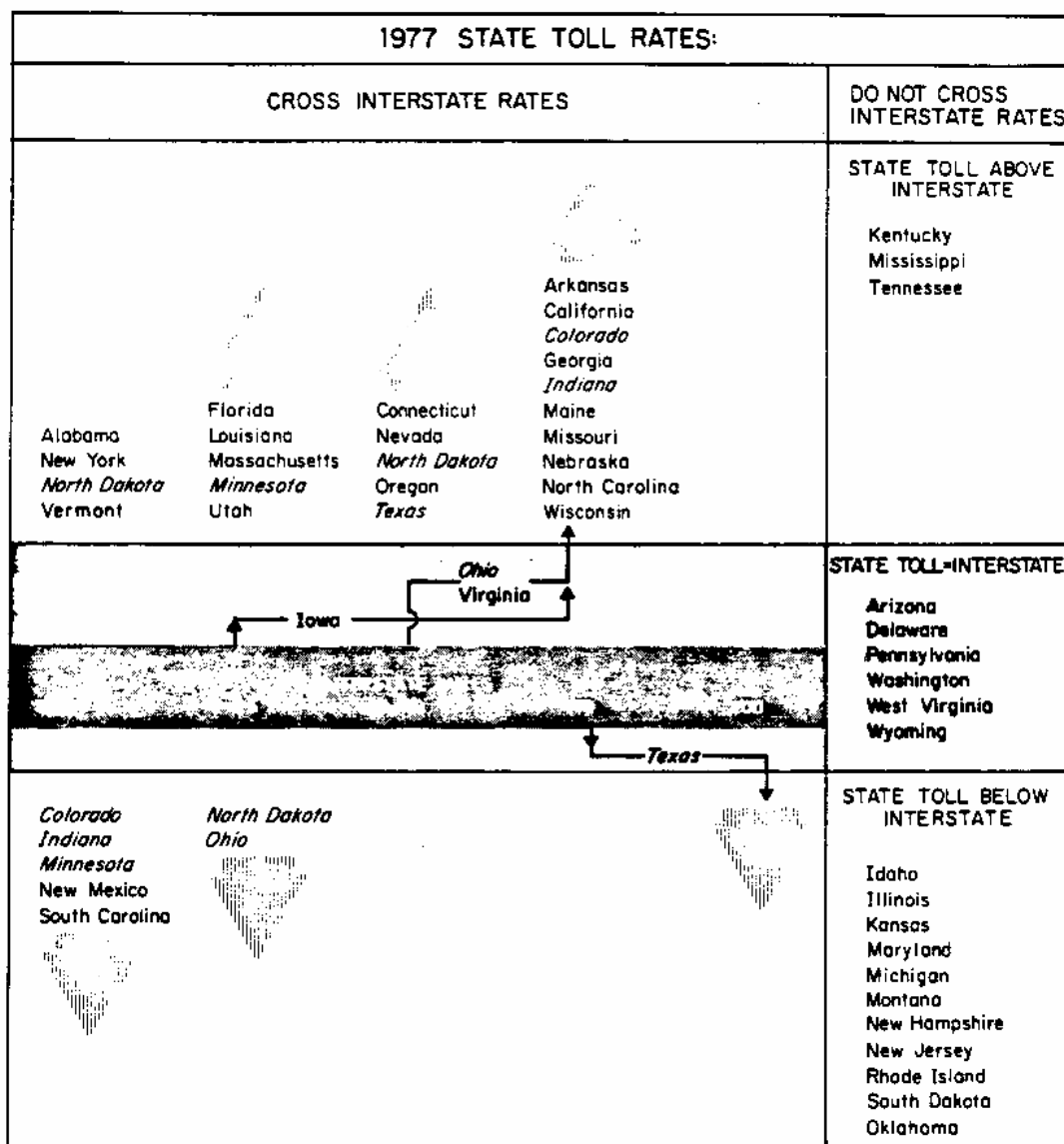


Figure 1.33

1971 and 1977 Interstate and State Interexchange Rates
for a Daytime, 3-Minute Telephone Call*

Source^{S44}

*1971 rates are for customer-dialed calls in the 17 states where this option was available and for station-to-station calls in all others. All 1977 rates are for customer-dialed calls.



Legend:

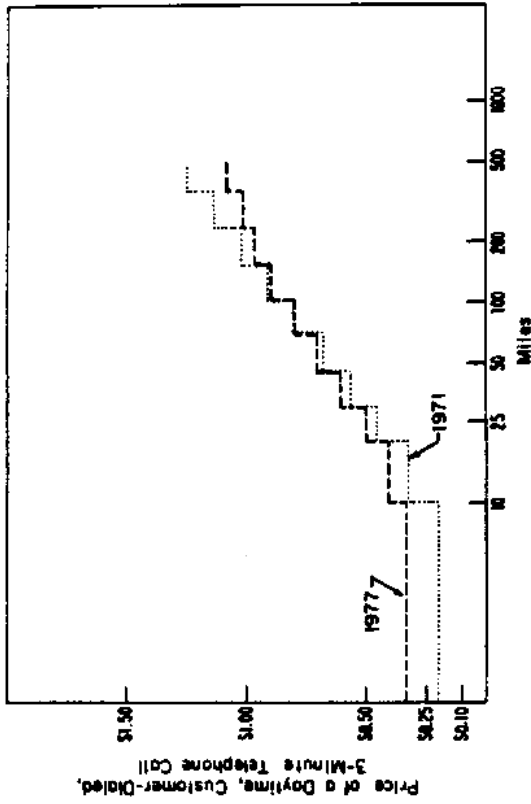
States in italics cross the interstate rate band twice.

State rates equal interstate rates.

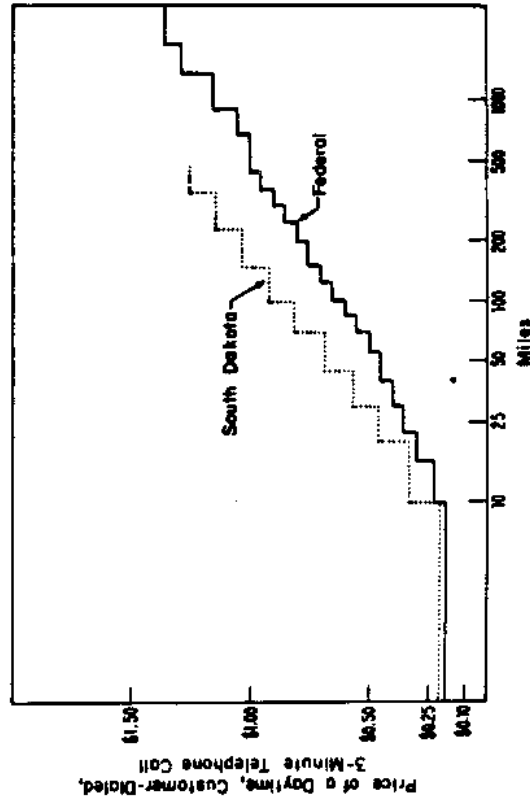
Interstate rate band.

(b)

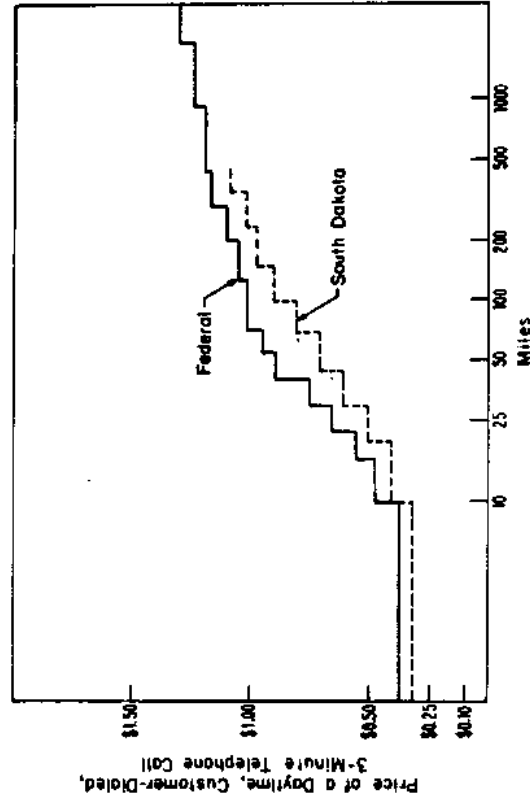
Figure 1.33 (continued)



1971 and 1977 South Dakota State Toll Rates
(a)



1971 Federal and South Dakota
State Interexchange Rates
(b)



1977 Federal and South Dakota
State Interexchange Rates
(c)

Figure 1.34

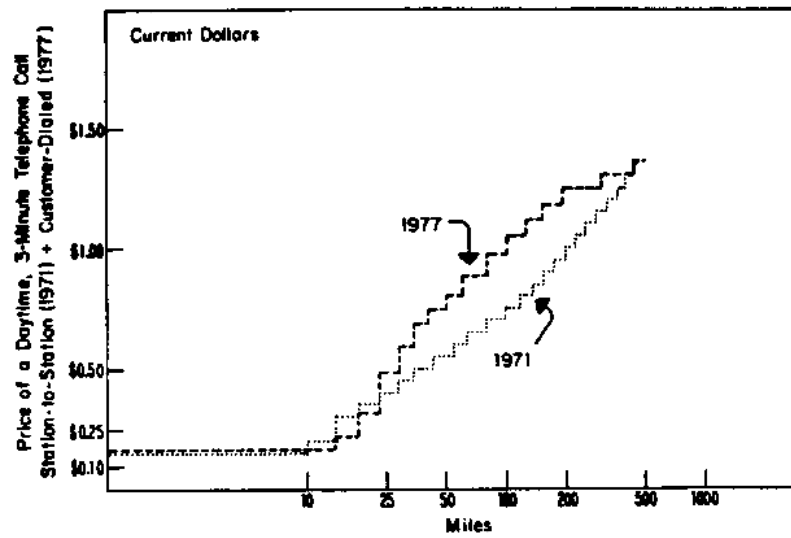
1971 and 1977 Federal and South Dakota State Toll Rates

Source S45

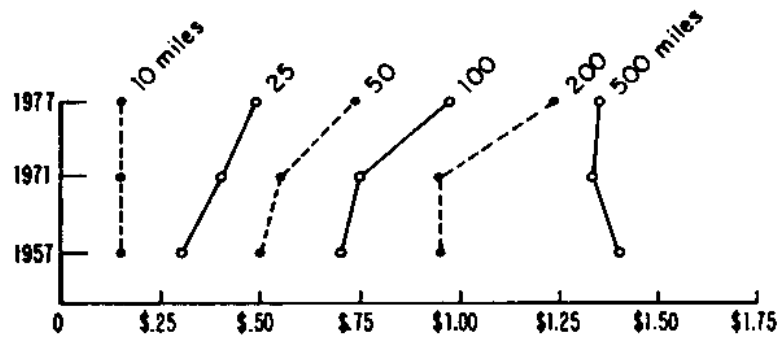
In most states, as in Missouri (Figure 1.35), the moves were mixed. As Figure 1.35 shows, Missouri's state rates were raised everywhere but around the 10-25 mile band. The Missouri state rate curve exhibits the same pronounced shift in shape as the federal rate curve (Figure 1.3). In 1971 Missouri's interexchange rate disparity was generally positive [Fig. 1.35(c)]; by 1977 it had turned negative below 100 miles and positive above. This shift was sufficient, however, to turn Missouri from the state with the fourth highest positive revenue disparity in 1971 to one with a pronounced negative revenue disparity by 1977. The significance of holding the line for 10-mile prices [Fig. 1.35(b)] will be examined shortly. Figures 1.36(b) and 1.36(c) are telephonic maps of Missouri. Whereas the geographic map [Figure 1.36(a)] shows actual shapes with the circles showing miles, the telephonic maps show costs, not distances, from St. Louis.

3. The State Toll Bulge

The map of Figure 1.36(b) shows how much it cost in 1971 to call from St. Louis to any place in Missouri during the day and talk for three minutes. This means that all places that cost the same to call from St. Louis lie on a circle around St. Louis. A telephonic map therefore looks distorted, since inches on the picture are proportional to the price of telephone calls, not to geographic distance. In 1971 it cost 75¢ to call 100 miles station-to-station through an operator. There was as yet no price differential for dialing it yourself. In 1977 telephonic Missouri looked like Figure 1.36(c). It cost 97¢ to dial yourself to call 100 miles. It is clear that the region immediately around St. Louis has grown substantially relative to more distant parts of the state. Figure 1.2 shows similar ballooning effects around New York.



1971 and 1977 Missouri State Interexchange Rates
(a)

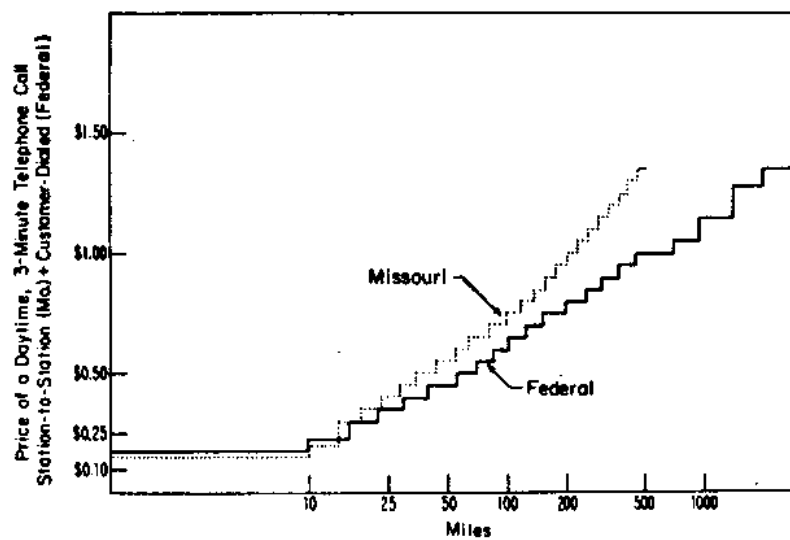


Missouri Holds the 10-Mile Fort, 1957-1977
(b)

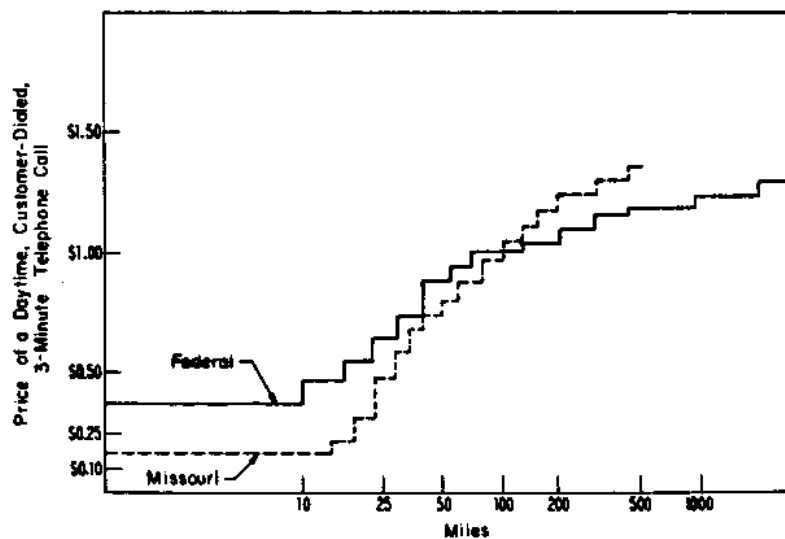
Figure 1.35

Missouri Interexchange Rate Structures, 1957-1977

Source^{S46}

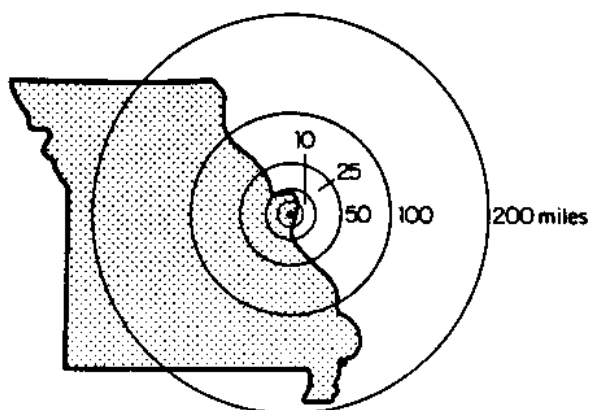


1971 Missouri Interexchange Rate Disparity
(c)



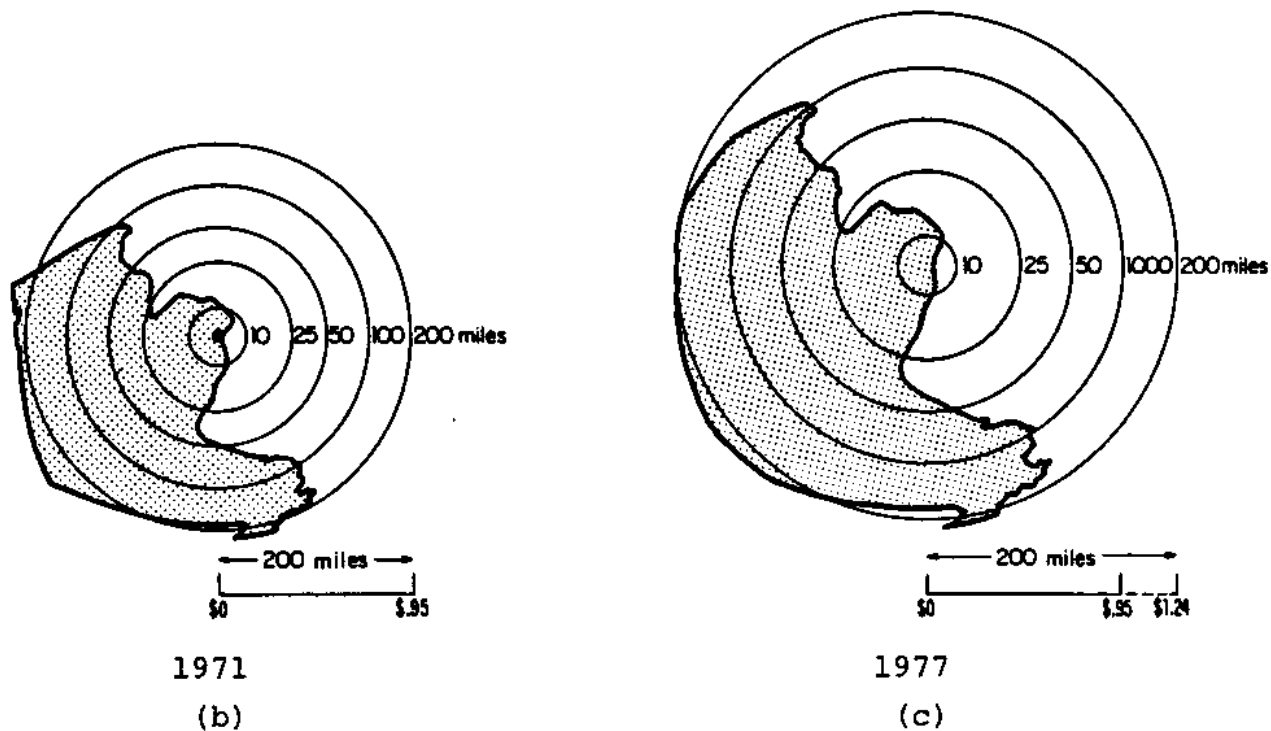
1977 Missouri Interexchange Rate Disparity
(d)

Figure 1.35 (continued)



Geographic Missouri

(a)



Telephonic Missouri

Figure 1.36

Geographic and Telephonic Missouri
Viewed from St. Louis

Source^{S47}

Figure 1.37 puts Missouri in the context of the United States, as seen from Jefferson City, Missouri. As in Figure 1.32, the black Missouri border shows how much it costs to reach a point just outside that border at interstate toll rates. The shaded Missouri border again illustrates toll rate disparity by indicating the cost of reaching a point just inside the Missouri border at state toll rates. In 1957 it cost \$1.70 to call (station-to-station) 1,000 miles [Figure 1.37(b)]. In 1971 interstate direct dialing had become available in Missouri at \$1.15 for 1,000 miles, and it cost a good deal more to call New York City than to call Cleveland. By 1977 [Figure 1.37(c)] the telephonic Missouri had grown substantially relative to the telephonic United States. Also, it made little difference whether you were calling New York or Cleveland. Similar effects, as seen from New York, are displayed in Figure 1.2.

The rate changes between 1971 and 1977 have had the following effects:

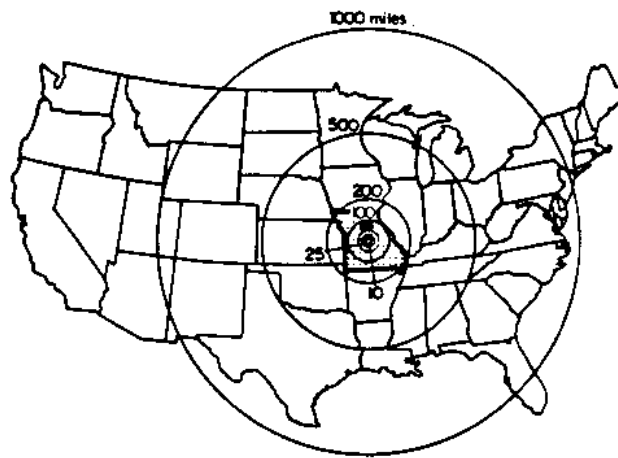
1. Revenue disparities were generally reduced, although positive rate disparities remained, but mostly for the longer distances where distance from the state border made them less widely noticeable.

2. The relative reduction of very long distance interstate rates shrank the dimensions of the telephonic United States as compared with those of telephonic states.

3. The relative increase of short distance state rates ballooned the telephonic state area immediately surrounding any locality in the state relative to the rest of the state.

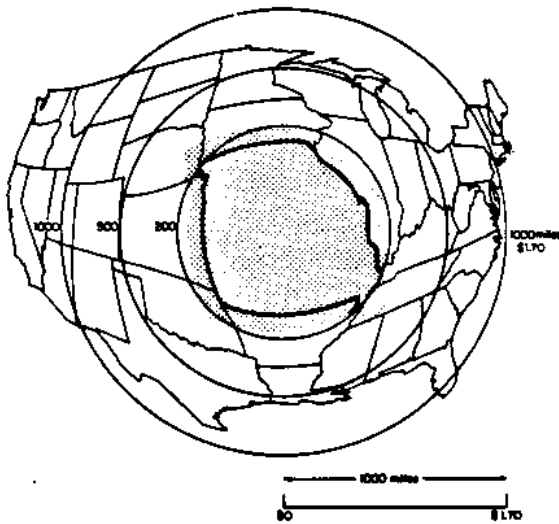
4. The Exchange-Interexchange Disparity

This last phenomenon is tantamount to having introduced a toll/local or interexchange/exchange disparity by the very time when



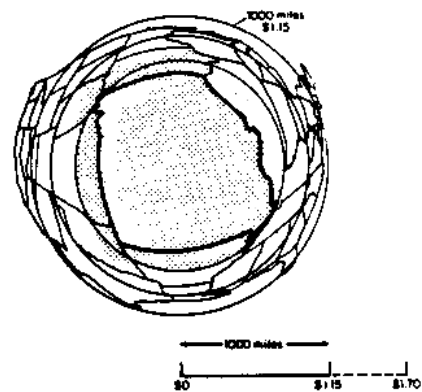
Geographic United States

(a)



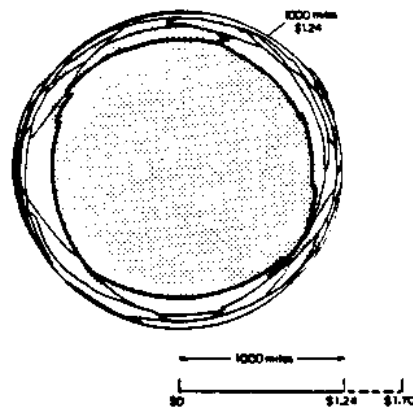
1957

(b)



1971

(c)



1977

(d)

Telephonic United States

Figure 1.37

Geographic and Telephonic United States
Viewed from the Center of Missouri

legislation contemplated shifting the federal/state jurisdictional boundary from state borders to the borders of local exchange areas. What happens in Manhattan at the interface between local area service and interexchange service is illustrated in Table 1.17.

In contrast to Manhattan, where no flat rate service was offered at all in 1977-78, Boston residents could choose, in 1978, between a basic usage-sensitive service, and a variety of flat rate services. Figure 1.38 shows the municipalities in the vicinity of Boston. Shaded are the Boston Central Exchange, the town of Reading, at the northern extreme of the Boston Metropolitan Local Service Area, and the towns of Lincoln and Concord, the former within the local service area, the latter outside. Table 1.18 displays the interexchange/exchange rate disparity between Lincoln and Concord. From a residence in the Boston Central Exchange calling a location just inside Concord, a toll call costs at least 35 percent more during the day than calling a location just inside Lincoln at local rates. Daytime calls of 3-10 minutes' duration exhibit an interexchange/exchange rate disparity range from 90 percent to 70 percent. These rate disparities are generally positive and over 10 percent, except for one or two minute calls between 11 p.m. and 7 a.m., when a 7 percent negative disparity obtains.

Since the 1971-1977 toll rate structure changes in general sharply increased short-distance toll rates--state and federal--Missouri's clinging to a fixed 10-mile toll rate for two decades (Figure 1.35) and its swinging to a sharp reduction of short-distance state interexchange rates relative to federal toll rates can be interpreted as an attempt to get out of the frying pan of federal/state disparity without falling into the fire of interexchange/exchange disparity.

Manhattan Zone 2 to:	3 min.	% difference	6 min.	% difference	Type of Call
Farmingdale	\$.49	94%	\$.74	146%	Local EAS v. State Interexchange
Deer Park	.95		1.82		
Zone 2	.08	250%	.08	475%	Contiguous: Local (PCA) v. Federal
Jersey City, NJ	.28		.46		
Zone W9	.33	73%	.57	74%	Non-Contiguous: Local EAS v. Federal
Greenwich, CT	.57		.99		

EAS: Extended Area Service

PCA: Primary Calling Area

Table 1.17

The Manhattan Local/Interexchange Interface:
3-Minute, Customer-Dialed, Daytime Telephone Call, 1977

Source^{S49}

The occasional Concord caller who takes measured or unlimited local service is clearly disadvantaged relative to the occasional Lincoln caller. More subtle comparisons are required under the alternative forms of local service, since the average price of a call can depend on the amount of calling.

For instance, Metropolitan service provides for unlimited calling from the Boston Central Exchange to Lincoln for a monthly price differential of $\$16.34 - \$10.96 = \$5.38$. At 9.3¢ per message unit, a subscriber would have to make at least $\$5.38 / \$0.093 = 58$ message units' worth of calls outside the primary calling area but within the extended local area (including Lincoln) to warrant taking Metropolitan service. A three-minute daytime call to Concord is priced at 53¢ under state interexchange rates. A Metropolitan service subscriber who has made at least the 58 units of calls necessary to justify taking the service would see the average price for a three-minute call to Lincoln as $3 \times 9.3¢ = 28¢$ or less, hence an interexchange/exchange disparity of at least $(53¢ - 28¢) / 28¢ = 90$ percent.

A heavy Concord caller would therefore find Bay State service advantageous since the entire state becomes his local calling area for a monthly differential of $\$25.31 - \$16.34 = \$8.97 / 120 = 7.475¢$ per minute for two hours of calls. At that level of usage, a three-minute daytime call to Concord would cost 22¢ with an interexchange/exchange rate disparity of $53¢ - 22¢ / 22¢ = 141$ percent. At the overtime rates of 30¢ for each six minutes the disparity for a three-minute call is $(53¢ - 30¢) / 30¢ = 77$ percent. and, for a six-minute call, it is $98¢ - 30¢ / 30¢ = 227$ percent.

One consequence of the interexchange/exchange rate disparity is therefore considerable pressure to keep extending local service areas precisely at a time when counterpressures have developed for increasing the share of

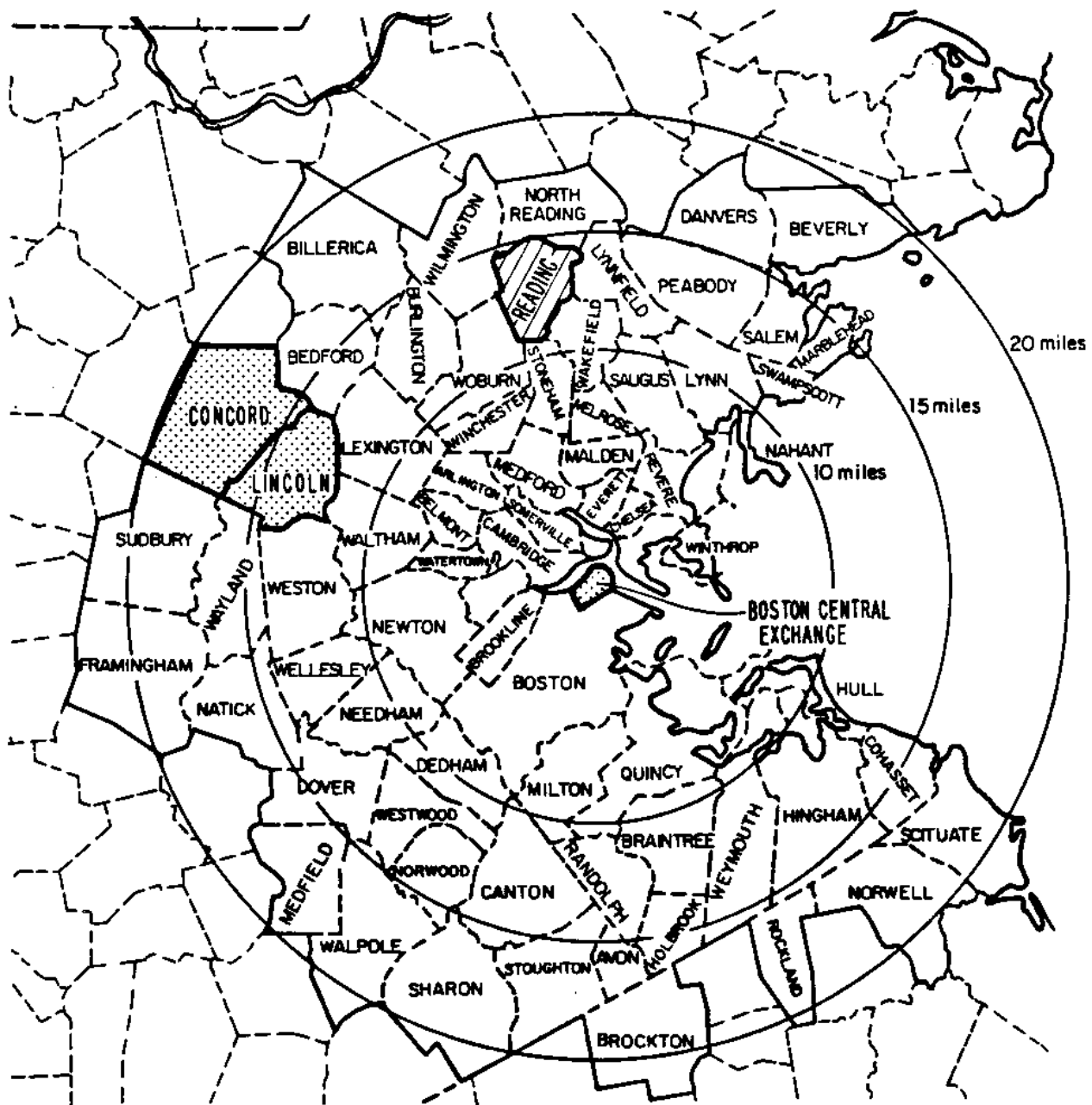


Figure 1.38

The Boston Metropolitan Area

Source^{S50}

Daytime (7 AM to 7 PM):

Length of Call (in minutes)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25
Lincoln	\$.28	.28	.28	.37	.47	.56	.65	.74	.84	.93	1.02	1.12	1.21	1.30	1.40	1.86	2.33
Concord	\$.38	.38	.53	.68	.83	.98	1.13	1.28	1.43	1.58	1.73	1.88	2.03	2.18	2.33	3.08	3.83
Difference	\$.10	.10	.25	.31	.36	.42	.48	.54	.59	.65	.71	.76	.82	.88	.93	1.22	1.50
% Difference	35.7%	35.7	89.3	83.8	76.6	75.0	73.8	73.0	70.2	69.9	69.6	67.9	67.8	67.7	66.4	65.6	64.4

(a)

Late Night (11 PM to 7 AM):

Length of Call (in minutes)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25
Lincoln	\$.28	.28	.28	.37	.47	.56	.65	.74	.84	.93	1.02	1.12	1.21	1.30	1.40	1.86	2.33
Concord	\$.26	.26	.36	.46	.56	.66	.76	.86	.96	1.06	1.16	1.26	1.36	1.46	1.56	2.06	2.56
Difference	\$ -.02	-.02	.08	.09	.09	.10	.11	.12	.12	.13	.14	.14	.15	.16	.16	.20	.23
% Difference	-7.1%	-7.1	28.6	24.3	19.1	17.9	16.9	16.2	14.3	14.0	13.7	12.5	12.4	12.3	11.4	10.8	9.9

(b)

Night (7 PM to 11 PM):

Length of Call (in minutes)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25
Lincoln	\$.28	.28	.28	.37	.47	.56	.65	.74	.84	.93	1.02	1.12	1.21	1.30	1.40	1.86	2.33
Concord	\$.31	.31	.43	.55	.67	.79	.91	1.03	1.15	1.27	1.39	1.51	1.63	1.75	1.87	2.47	3.07
Difference	\$.03	.03	.15	.18	.20	.23	.26	.29	.31	.34	.37	.39	.42	.45	.47	.61	.74
% Difference	10.7%	10.7	53.6	48.6	42.6	41.1	40.0	39.2	36.9	36.6	36.3	34.8	34.7	34.6	33.6	32.8	31.8

(c)

Rates apply to measured service (assuming the 30 message unit credit is used up by other calls) or unlimited local service.

Table 1.18

Residential Rate Comparison at the Boundary of the Boston Metropolitan Area: Customer-Dialed Telephone Call from the Boston Central Exchange to Lincoln or Concord, 1979

Source S51

total costs and revenues borne by the residual local service pool.

Parallel to services like the Metropolitan and Suburban services offered in communities like Boston and Reading (Figure 1.38), communities outside the Boston Metropolitan Area have access to such variants as "Expanded Community Calling" which, for an additional \$1 per month, provides "directly-dialed calls totaling one hour of conversation time to certain nearby exchanges formerly reached on a toll basis." In some Massachusetts areas, a "Circle Calling" service "allows unlimited calling on direct-dialed calls to Massachusetts exchanges served by New England Telephone that are within a 20-mile radius." Similarly to the restriction on Bay State service, Expanded Community Calling originally did not apply between 9 a.m. and noon.

In November 1979 the Massachusetts Department of Public Utilities (DPU) ordered that the restriction period of 9 a.m. to noon be removed; that two hours of conversation time be allowed instead of one; and that Expanded Community Calling not be limited to contiguous towns or exchanges. This was the regulatory response to a petition filed by 100 subscribers from the town of Sudbury five years earlier in September of 1974. In response to telephone company arguments that the provision of expanded service in Sudbury was not possible at that "time due to the inability of the equipment handling the increased traffic and the cost of the equipment is much too high," the DPU order provided that "if the elimination of this time restriction causes usage to increase to such an extent as to cause a serious deterioration in the quality of service, the Company may petition the Department for an emergency stay of this order." There were also elaborate provisions for tracking the cost and revenue consequences of the order.

Figure 1.39 shows how the Denver "local" area expanded to its 2,500 square mile size as of 1979 in the two decades between 1947 and 1965. We

have previously noted that the Atlanta "local" area, covering about 3,400 square miles, is the area of Delaware and Rhode Island combined.

5. The New Instabilities

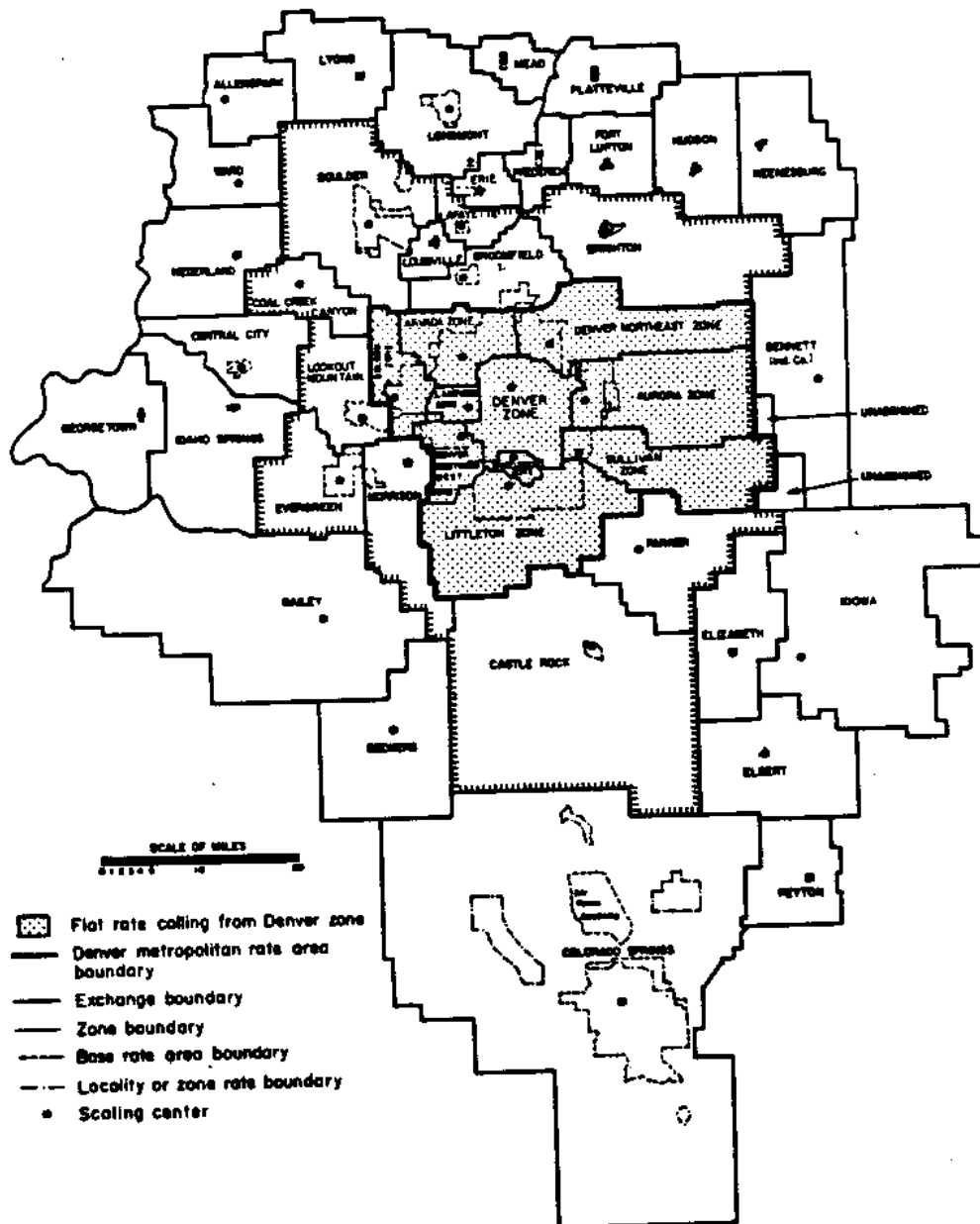
In attempting, fairly successfully, to solve the old problem of inter-exchange rate disparity and to address the new problems of competition for long-haul traffic, the growing bulges at the short-haul end of the federal and state MTS price structure have created three fresh problems.

First, there is the increasingly visible interexchange/exchange disparity and the resulting pressures for growing local exchange areas. The latter, as noted at the beginning of this section, only exacerbate the problem.

Second, the growing bulge itself may set the stage for an eventual replay, at the short-haul, low-density end of the MTS scale (principally now under state jurisdiction) of the destabilizing deaveraging processes illustrated in Section I with reference to federally-regulated services, but now with the \$7.1 billion of state-regulated MTS services and the \$1 billion of state-regulated WATS and PLS services also at stake.

Third, to the extent that local service prices are increased--as through the various usage-sensitive, distance-sensitive, flat-rate-at-a-premium pricing methods now beginning to spread more widely in spite of traditional pressures against them--to that extent local service itself will become increasingly attractive to competition, especially in the most highly concentrated and lucrative markets.

Having met at the exchange/interexchange disparity boundary, at the deaveraging pass and in the cost allocation swamp, the conflicting pressures for competition and for residual costing of local services are now head on.



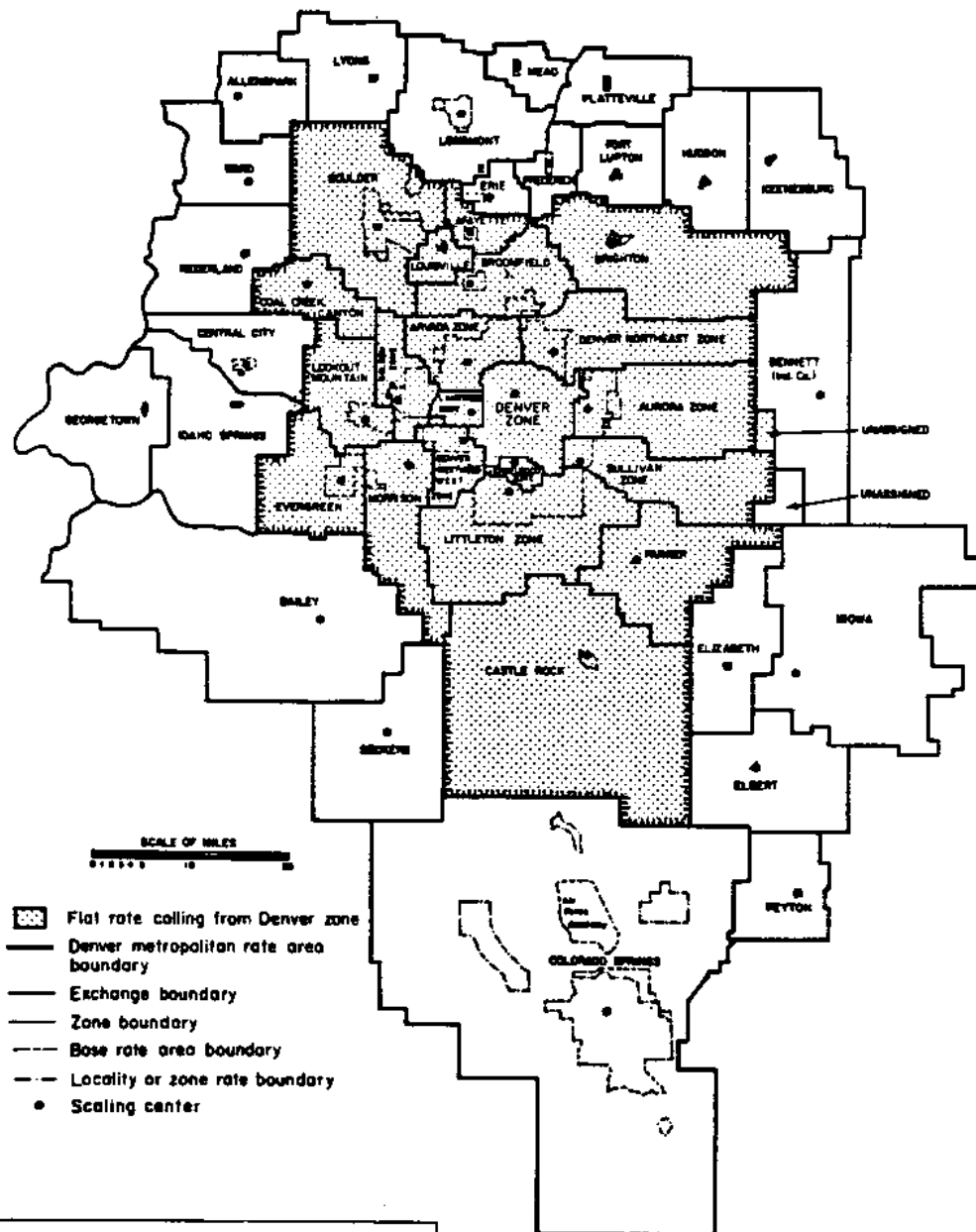
1947

(a)

Figure 1.39

Denver Zone: Extended Area Service

Source^{S52}



1979

(b)

Figure 1.39 (continued)

NOTES

1. Telecommunications Reports, Vol. 39, No. 38, September 24, 1973, p. 5.
2. Brown, Charles L. A New Realism, a talk before the National Telephone Cooperative Association, Atlanta, Ga., February 23, 1979.
3. Telecommunications Reports, Vol. 46, No. 31, August 4, 1980, p. 41.
4. U.S. Congress. House Committee on Interstate and Foreign Commerce. Report, Telecommunications Act of 1980, to accompany H.R. 6121, August 25, 1980, p. 71.
5. Chandler, Alfred D., Jr. The Visible Hand: The Managerial Revolution in American Business, the Belknap Press of Harvard University Press, Cambridge, Mass., 1977.
6. Denson, Lee. Merchants, Farmers & Railroads: Railroad Regulation and New York Politics--1850-1887, Harvard University Press, Cambridge, Mass., 1955.
7. Example inspired by statement of Edward Goldstein, U.S. Congress. Senate Committee on Commerce, Science and Transportation, Subcommittee on Communications. Hearings. Amendments to the Communications Act of 1934, Part 2, U.S. Government Printing Office, Washington, D.C., April 27, 30 and May 1, 2, 3 and 9, 1979, p. 1091.
8. The Wall Street Journal, June 10, 1980.
9. The Washington Post, June 24, 1980.
10. 47 U.S.C. (1970) §201(b) Common Carriers, Services and Charges; §202(a) Common Carriers, Discriminations and Preferences. For history prior to 1934, evidence of conflicting forces still at play and the role of 14th Amendment see Baird, Edward Graham. Telephone Rate Making:

Judicial Restrictions Upon Commission Distribution of the Telephone Price Burden, Brown Publishing Co., Blanchester, Ohio, 1934.

11. For history, see Sichter, James W. Separations Procedures in the Telephone Industry: The Historical Origins of a Public Policy, Program on Information Resources Policy, Harvard University, Cambridge, Mass., Publication P-77-2, 1977. For current status, see Basic Data on the Politics and Economics of the Information Evolution: Telecommunications Costs and Prices in the United States:

Part 2: Oettinger, Anthony G. and Kurt Borchardt with Carol L. Weinhaus. Stakes in Telecommunications Costs and Prices, Program on Information Resources Policy, Harvard University, Cambridge, Mass., Publication P-80-6, 1980.

Part 3: Oettinger, Anthony G. with Carol L. Weinhaus. The Federal Side of Traditional Telecommunications Cost Allocations, Program on Information Resources Policy, Harvard University, Cambridge, Mass., Publication P-80-1, 1980.

Part 4: Oettinger Anthony G. with Carol L. Weinhaus. The Traditional State Side of Telecommunications Cost Allocations, Program on Information Resources Policy, Harvard University, Cambridge, Mass., Publication P-80-7, 1980.

12. Oettinger, op. cit., Part 4, Table 4.19, p. 134-135.
13. For a detailed exposition, see Ibid., Part 4, Sections F and G.
14. Figure 1.15 shows that this results in part from increasing usage of toll services, but mainly from cost allocation policy. Details are given in Section D.

15. 47 U.S.C. §151 (1970), Creation of the Federal Communications Commission.
16. Oettinger, op. cit., Part 3, Figure 3.1, Box 18, p. 2.
17. Sichter, op. cit. Oettinger, op. cit., Parts 2, 3, and 4.
18. The linkage is detailed in Oettinger, op. cit., Part 4, Section G.
19. Minnesota Rate Cases, 230 U.S. 461 (1913).
20. Ibid.
21. Smith v. Illinois Bell Telephone Company, 282 U.S. 150-151 (1930).
22. Cunningham, William J. "The Separation of Railroad Operating Expenses Between Freight and Passenger Services," Quarterly Journal of Economics, Vol. XXXI, 1917, p. 238.
23. NARUC-FCC Committee on Communications. Separations Manual: Standard Procedures for Separating Telephone Property Costs, Revenues, Expenses, Taxes and Reserves, National Association of Regulatory Utility Commissioners, Washington, D.C., February 1971. See also Oettinger, op. cit., Part 3.
24. Details in Oettinger, op. cit., Part 3, Table 3.25, p. 90.
25. 9 FCC 2d 108-109 (1967), Docket Nos. 15011 and 16258, Interim Decision and Order. Details in Oettinger, op. cit., Part 3, Sections D and E.
26. Oettinger, op. cit., Part 3, Section D.
27. Negotiations over the first Exchange Network Facilities for Interstate Access (ENFIA) interim settlement agreement (Borchardt, Kurt. The Exchange Network Facilities for Interstate Access (ENFIA): Using Governmentally Sanctioned Negotiating Processes to Coordinate Telecommunications Facilities and Services, Program on Information Resources Policy, Cambridge, Mass., P-79-4, 1979) illustrate the handling of this perennial problem under changing conditions.

28. Details in Oettinger, op. cit., Part 2.
29. 27 FCC 359 (1959), FCC Docket No. 11866, Proceedings, Allocation of Frequencies in the Bands Above 890 Mc.
30. American Telephone & Telegraph. Comments, March, 1979, on 43 Fed. Reg. 58204 (1978). Federal Communications Commission, Docket No. 20981, Proposed Rulemaking and Creation of Federal-State Joint Board.
31. Federal Communications Commission. FCC Comments on AT&T Legislation, Section VII B-F, 1976.
32. Telecommunications Reports, Vol. 46, No. 26, p. 2. Aeronautical Radio Inc. v. Federal Communications Commission, ___ F 2d ___ (D.C. Cir., 1980). Cert. Denied 49 U.S.L.W. 3789, 1981.
33. Oettinger, op. cit., Part 2, Sections D and E.
34. Oettinger, op. cit., Part 3, Section B-3.
35. Ibid., Part 3, Section B-4.
36. Details in Oettinger, op. cit., Part 4, Section H, particularly Table 4.24, p. 154 and Table 4.25, p. 157.
37. Details in Ibid., Part 4, Section H.
38. Details in Oettinger, op. cit., Part 3 and Part 4, Section A.
39. Ibid., Part 3, Figure 3.1, Box 18, p. 2.
40. Details in Oettinger, op. cit., Part 4, Section H.
41. 18 FCC 2d 953 (1969), Docket Nos. 16509 and 16510-16519, Decision.
42. For details and for side effects divisive within the traditional industry, see Oettinger, op. cit., Part 3, Sections B-4 and B-5.
43. MCI Telecommunications, Inc. Submission to FCC on Docket No. 20003, p. 4.
44. 47 U.S.C. §151 (1970), Creation of the Federal Communications Commission.

45. AT&T Tariff F.C.C. No. 260, §2.2.1; February 10, 1977.
46. Oettinger, op. cit., Part 2, Table 2.7, p. 46.
47. Details in Oettinger, op. cit., Part 4, Section D.
48. Details in Oettinger, op. cit., Part 4, Section E.
49. Oettinger, op. cit., Part 4, Table 4.7, p. 31 and Table 4.8, p. 33.

Source Notes

- S1 : Alfred D. Chandler, Jr. *The Visible Hand: The Managerial Revolution in American Business*, The Belknap Press of Harvard University Press, Cambridge, Massachusetts and London, England, 1977, p. 84.

Charles O. Paullin, *Atlas of the Historical Geography of the United States*, Washington, D.C., Carnegie Institution and American Geographical Society, 1932, plate 138A,B,C.

- S2 : All telephone calls based on 30-minute, day rates. 1971 and 1977 rates are customer-dialed; 1957 rates are station-to-station.

Based on data from:

National Association of Regulatory Utility Commissioners (NARUC).

Long Distance Message Toll Telephone Rates, Washington, D.C., June 30, 1971 Table 25, p. 66 and Table 51, p. 79.

American Telephone & Telegraph Company (AT&T), December 1978.

AT&T. Federal-State Joint Board, Request No. JB-50, April 1, 1977.

- S3 : Based on data from:
AT&T.

NARUC. *Op cit.*, December 31, 1977, Table 51, and June 30, 1971, Table 52, p. 80.

U.S. Department of Labor, Bureau of Labor, Bureau of Labor Statistics. Personal communication, January 1979 and December 1980.

- S4 : Does not include about \$1 billion foreign and independents not reporting to USITA (0.6% of total).

Federal Communications Commission (FCC), Common Carrier Bureau figures (personal communication) based on actually reported 1979 data show a 55% growth of total operating revenues between 1976 and 1979. A more detailed breakdown is as follows:

Total Operating Revenue:		55%
Interstate		60
State		50
Total WATS		100
Interstate	95	
State	100	
Other Revenue		80
Total PLS		60
Toll	55	
Local	85	
Total MTS		62
Total Local	45	
Interstate	35	
State	45	

Based on data from:

Oettinger, Anthony G. with Carol Weinhaus. *Basic Data on the Politics and Economics of the Information Evolution: Telecommunications Costs and Prices in the United States, Part 3: The Federal Side of Traditional Telecommunications Cost Allocations*, Program on Information Resources Policy, Cambridge, Mass., P-80-1, January 1980, Figure 3.1, Box 18, p. 2.

- S5 : John F. McLaughlin with Anne E. Birinyi. *Mapping the Information Business*, Program on Information Resources Policy, Cambridge, Mass., P-80-5, July 1980, Fig. 21, p. 25 and Fig. 30, p. 33.
- S6 : Oettinger. *Op cit.*, Fig. 3.1.
- S7 : Based on data from:
AT&T.
- S8 : FCC. *Prescriptions of Percentages of Depreciation Pursuant to Section 220(b) of the Communications Act of 1934, as Amended*, FCC Order No. 77-14, January 11, 1977; FCC Order No. 78-40, February 16, 1978; and FCC Order No. 78-42, February 16, 1978.
- S9 : Oettinger. *Op cit.*, Fig. 3.1, Box 15.
- S10: Based on data from:
AT&T.
- S11: Oettinger. *Op cit.*, Fig. 3.1, Box 15.
- S12: *Ibid.*
- S13: *Ibid.*
- S14: AT&T.
- S15: Based on data from:
NARUC. *Exchange Service Telephone Rates*, Washington, D.C., June 30, 1974.
- S16: *Ibid.*, June 30, 1976, Table 33 and June 30, 1978, Table 34.
- S17: Telecommunications Industry Task Force. *The Dilemma of Telecommunications Policy*, Washington, D.C., December 1, 1977, Section V-B-1, Exhibit 5B.
- S18: AT&T.
- S19: AT&T. Comments to the Federal-State Joint Board, CC Docket No. 20981, Impact of Customer Provision of Terminal Equipment on Jurisdictional Separations, March 1, 1979, Appendices B and C.
- S20: Based on data from:
AT&T. Federal-State Joint Board, Request No. JB-37, July 5, 1977; and Request No. JB-41, March 22, 1977.

S21: AT&T.

S22: AT&T.

Telecommunications Policy Task Force. *Op cit.*, Section V-B-1, Exhibit 8, Table 2.

S23: Based on data from:
Ibid., Table 3.

S24: Based on data from:
AT&T.

S25: Based on data from:
AT&T.

FCC. CC Docket No. 79-72, *In the Matter of MTS and WATS Market Structure*, AT&T comments, March 3, 1980, p. A-20-A23.

S26: Based on data from:
AT&T.

Satellite Business Systems (SBS). *Application*, Switched Voice and Private Line Services, June 11, 1980, Attachments B and I.

SBS. *Application for Supplemental Authority*, Off-Network Calling Feature Option, June 11, 1980, Attachments A and B.

S27: Xerox Corporation. *Petition for Rulemaking*, FCC Docket No. General 79-188, November 16, 1978, Appendix C, p. 15c, 17c.

S28: Oettinger, *Op cit.*, Fig. 3.1.

S29: *Ibid.*

S30: Based on data from:
AT&T. Federal-State Joint Board, Request No. JB-37, July 5, 1977.

S31: Based on data from:
Ibid.

S32: Oettinger. *Part 4: The Traditional State Side of Telecommunications*, P-80-1, 1980, Table 4.24, lines 1 and 13.

S33: AT&T.

S34: AT&T.

S35: Based on data from:
American Satellite Corporation.

AT&T. Federal State Joint Board, Request No. JB-50, April 1, 1977.

Civil Aeronautics Board.

Reuben H. Donnelly Corporation. *Official Airline Guide*, January 1, 1979, p. 302, 308, 214, 218, 323, 330.

- S36: Oettinger. *Op cit.*, Part 3, Fig. 3.1. Also see source note S4 for additional detail.
- S37: Eugene F. O'Neill. "Radio and Long-Haul Transmission," *Bell Laboratories Record*, January 1975, p. 55.
- S38: Based on data from:
FCC Docket 20097, *Resale and Shared Use of Common Carrier Services and Facilities*, January 1975.
- S39: Based on data from:
AT&T. Federal-State Joint Board, Request No. JB-50, April 1, 1977.
- S40: *Ibid.*
- S41: AT&T. Federal-State Joint Board, Request No. JB-51, October 4, 1977.
- S42: *Ibid.*
- S43: Based on data from:
AT&T.
- S44: Based on data from:
NARUC. *Long Distance Message Toll Telephone Rates*, December 31, 1977 and June 30, 1971.
- S45: *Ibid.* December 31, 1977, Tables 41 and 51, and June 30, 1971, Table 41, p. 75 and Table 51, p. 80.
- S46: Based on data from:
AT&T. Federal-State Joint Board, Request No. JB-50, April 1, 1977, and update.

NARUC. *Op cit.*, December 31, 1977, Table 51, and June 30, 1971, Table 52, p. 80.

U.S. Department of Labor, Bureau of Labor Statistics. Personal communication, January 1979.
- S47: All telephone calls based on 3-minute, day rates. 1971 rates are station-to-station; 1977 rates are customer-dialed.

Based on data from:
AT&T. Federal-State Joint Board, Request No. JB-50, April 1, 1977.

NARUC. *Op cit.*, June 30, 1971, Table 25, p. 66.
- S48: All telephone calls based on 3-minute, day rates. 1977 rates are customer-dialed; 1971 interstate is customer-dialed; 1971 Missouri is station-to-station.

Based on data from:
AT&T. December 1978.

AT&T. Federal-State Joint Board, Request No. JB-50, April 1, 1977.

NARUC. *Op cit.*, June 30, 1971, Table 25, p. 66 and Table 51, p. 79.

S49: Based on data from:
AT&T.

S50: Based on data from:
Commonwealth of Massachusetts, Department of Community Affairs, Form
151, 1M-8-77-142383.

S51: Based on data from:
New England Telephone and Telegraph Company. *Boston White Pages*
Directory, 1978, p. 8, 14-15.

Economics and Technology, Inc. *Telephone Rate Reports, Northeast*
Region, Boston, Mass., p. MA-248(0) 4.5.1.

S52: Based on data from:
AT&T.

Appendix

Abbreviations of State Names used in Tables

AL	Alabama	NE	Nebraska
AZ	Arizona	NV	Nevada
AR	Arkansas	NH	New Hampshire
CA	California	NJ	New Jersey
CO	Colorado	NM	New Mexico
CT	Connecticut	NY	New York
DE	Delaware	NC	North Carolina
FL	Florida	ND	North Dakota
GA	Georgia	OH	Ohio
ID	Idaho	OK	Oklahoma
IL	Illinois	OR	Oregon
IN	Indiana	PA	Pennsylvania
IA	Iowa	RI	Rhode Island
KS	Kansas	SC	South Carolina
KY	Kentucky	SD	South Dakota
LA	Louisiana	TN	Tennessee
ME	Maine	TX	Texas
MD	Maryland	UT	Utah
MA	Massachusetts	VT	Vermont
MI	Michigan	VA	Virginia
MN	Minnesota	WA	Washington
MS	Mississippi	WV	West Virginia
MO	Missouri	WI	Wisconsin
MT	Montana	WY	Wyoming

