The Federal Side of Traditional Telecommunications Cost Allocations

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with

Carol L. Weinhaus

Part 3 of
Basic Data on the Politics and
Economics of the Information Evolution:
Telecommunications Costs and Prices
in the United States

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EXECUTIVE SUMMARY

Whatever the outcome of legislative proposals before the 96th Congress, the structure of the telecommunications industry and of its computer, postal and other neighbors is being debated and will continue to be debated in numerous regulatory proceedings, court cases, federal and state legislative initiatives and international negotiations.

Central to these discussions are "proper costs" and their relationships not only to prices but also to other benefits or burdens. Costs have been allocated in the traditional telecommunications industry mainly by a two-stage process. First, explicit jurisdictional separations have allocated costs hence revenue requirements among the federal and all the state jurisdictions. Second, pricing rather than costing policy has determined the further incidence of benefits and burdens in the general absence of explicit sub-allocations of costs within the pools of costs assigned to the broad aggregates of interstate and state services. This part deals mainly with the first stage. The second is detailed in Part 4.

In 1930 the U.S. Supreme Court mandated that total costs be apportioned among the jurisdictions according to the "actual uses" made of facilities. The precise definition of "actual uses," however, rests on the invention of criteria and processes that have varied according to the changing stakes of conflicting interests. Therefore, within the scope of that broad court dictate and of the Communications Act of 1934, it is varying interpretations of "actual uses" that have determined the proportions of interstate and state costs.

Examination of the various elements of aggregate interstate costs such as AT&T's long lines and local lines and dial switching facilities, and of their relationship to the pricing of services, principally private

line and message services, points up inescapable tensions between the ideal of economic efficiency which underlies competition and the ideal of equity which underlies cost averaging and the prevailing uniform and non-uniform pricing patterns.

The various cost allocation methods used in early 1980 are based on a combination of disparate elements such as Subscriber Line Use (SLU), Composite Station Rate (CSR), Subscriber Plant Factor (SPF), Weighted Minutes of Use (WMOU), etc. How these apparently technical factors have been chosen and applied is shown to reflect the accommodations that the diverse players described in Part 2 have reached over their respective stakes in response to evolving market, political and technological forces.

Over the last decade, the interstate share of costs (hence the share of total revenues from interstate customers) has risen sharply, thus lowering the relative share of costs to be borne by state customers. This is only partly due to increased usage as measured by SLU. It also reflects the role, set at the start of the decade, of CSR and SPF in altering the SLU-based definition of usage in order to increase the interstate percentage. In addition, "usage" is influenced by the freezing of the CSR factors for the Bell System as they have increased for the Independent companies.

Such broad trends, however, tell only part of the story. There are significant state-by-state and industry-segment-by-industry-segment differentials reflecting the influence on cost allocation and price setting of the diverse compromises politically feasible in different jurisdictions.

It emerges clearly that in telecommunications, as in rivers and harbors, welfare or military procurement, federal, state, regional and local interests are tightly intertwined as they interplay with diverse consumer and supplier stakes and with changing technological possibilities.

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Table A

Additional Background Documents

TABLE B

BASIC DATA ON THE POLITICS AND ECONOMICS OF THE INFORMATION EVOLUTION: TELECOMMUNICATIONS COSTS AND PRICES IN THE UNITED STATES, PARTS 1-5

TABLE B (CONTINUED)

2. STAKES IN TELECOMMUNICATIONS COSTS AND PRICES

A. Introduction

B. Consumers: Players and Stakes

1. Business and Residential Geographic Concentration

2. Principal Types and Stakes

a. Big Business

b. Small Business and Professional

c. Urban Householders

d. Rural Householders

e. Government

3. Stakes in Growing Compunications Competition

4. Relative Consumption of Services and Contributions to Revenues

C. Traditional Services

1. Traditional Services Definitions

2. Traditional Service Differentiations: Time, Distance, Implementation

3. Relative Service Revenues

D. Producers: Players and Stakes

1. Principal Types and Stakes

a. Telecommunication Companies

b. International Carriers

c. Computer Companies

i. Hardware Suppliers

ii. Software Suppliers

iii. Compunication Service Companies

2. Telecommunications Companies

a. Bell System

b. Independents Reporting to USITA

c. Rural Telephone Borrowers

d. Competitors of the Traditional Telecommunications Industry

e. Geographical Coverage

E. Facilities

F. Labor

G. Capital

H. Jurisdictions

I. Prices, Revenues and Costs--The Loose Linkages

1. Economics Review

2. Relation of Regulated Telco Prices to Costs

TABLE B (CONTINUED)

3. THE TRADITIONAL FEDERAL SIDE OF TELECOMMUNICATIONS COST ALLOCATIONS

   A. Separations - The Judicial "Actual Uses" Criterion

      1. Jurisdictions: Federal and State Costs

      2. Facilities: Categories of Plant and Expenses

   B. Aggregate Costs: Main Elements

      1. Facilities: Local Dial Switching Equipment and Its Context

      2. Services: Directory Advertising

      3. Facilities: AT&T Long Lines and the Politics of Cost Averaging

      4. Private Line Services: Who Benefits from Economics of Scope?

      5. Jurisdictions: Incidence of Benefits and Burdens and the Choice of Cost Allocations

      6. Message Services

   C. Jurisdictional Cost Allocations: Local Dial Switching Equipment

   D. The Ozark SPF Formula

      1. From SLU to SPF: The Technicalities of 6% to 20%

      2. Deterrent Effects as Actual Use: Political Reality

      3. The Birth of 0.85: Residual as Actual Use

      4. The CSR Ratio: Weighted Deterrence and Averaging

      5. State-by-State Incidence of SPF-Based Interstate Allocations

   E. Weighted Minutes of Use

   F. State-by-State Incidence of Interstate Allocations

TABLE B (CONTINUED)

4. THE TRADITIONAL STATE SIDE OF TELECOMMUNICATIONS COST ALLOCATION

   A. Relation of Federal to State Cost Pools

   B. Federal/State Toll Revenue and Rate Disparities

   C. The Geography of Toll Rate Structures 1971-1977

   D. The Local Exchange in Historical Perspective

   E. Contemporary Local Exchange Price Structures

   F. Politico-Economic Linkages between Exchange and Toll Pricing

   G. Outline of Division of Revenues and Settlements

   H. Outcomes of Settlement Processes

   I. Rationale for Separations and Settlements Processes

TABLE B (CONTINUED)

5. FEDERAL COMMUNICATIONS COMMISSION COMMON CARRIER POLICY APPROACHES TO SELECTIVE MARKET ENTRY AND ALTERNATIVE PIPELINES

1. Background: Market Entry Options in a Changing Regulatory Environment

2. Entry and Industry Structure Policy Integration

Resale and Shared Use (20097/80-54, and WATS 80-765)

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 Services for Transmission and Switching and Alternative "Pipelines"

Cellular Communications Systems (79-318/18262)

Multi-Point Distribution Service (MDS) and Direct Broadcast Satellite (DBS)

Spectrum Utilization: Digital Electronic Message Services (DEMS)

Merger/Consolidation (GTE/TELENET 80-197)

3. Tariffs: Rate Structure and Pricing Alternatives

Multi-Schedule Private Line Service (MPL/AT&T/20814)

Customer Premises Terminal Equipment (20981/20828)

Rate of Return/Earnings Interstate (AT&T Interstate and Foreign Services, 79-63/187)

4. 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)

Straight-Line Equal Life Group Depreciation (Capital Recovery and Remaining Life) (20188)

Station Connections, Customer Provided Equipment and Related Capital Costs (79-105)

5. Depreciation Policy Directions for a New Regulatory Environment

TABLE B (CONTINUED)

TABLE OF CONTENTS

* Source citations of the form JB-XX refer to responses by AT&T to the questions numbered xx posed by a federal-state joint board created under FCC Docket 20981, for which the Notice of Inquiry is in 63 FCC 2d 202-205.

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Continued)

3. THE TRADITIONAL FEDERAL SIDE OF TELECOMMUNICATIONS COST ALLOCATIONS

A. Separations - The Judicial "Actual Uses" Criterion

1. Jurisdictions: Federal and State Costs

Costs of the traditional telephone industry totalled $41.1 billion in 1976[1] (Figure 3.1, Box 1). Leaving aside $1 billion incurred by international carriers and $247 million incurred by Independents not reporting to USITA,[2] $39.9 billion are here accounted for. Of this total, $25.1 billion (63%) is operating expenses and $14.8 billion (37%) is pre-tax return on plant investment[3] (Box 2). Bell system companies account for 85.6% of expenses and Independents for 14.4%; for pre-tax return on investment the proportions are 82.9% and 17.1% respectively[4] (Boxes 3,4). Pre-tax return as a percent of year-end book value of plant is 12.5% overall, 12.8% for Bell and 11.36% for Independents (Boxes 2,4). For the Bell System, post-tax return on plant book value net of depreciation reserve is 8.8%, comparable to the nominal 9% figure used in the detailed revenue requirement calculations presented in subsequent sections.[5] 81.2% of plant investment is Bell's and 18.8% belongs to Independents (Box 4).

The variations in Bell/Independent proportions reflect the current balance of perennial negotiations among the companies and their regulators over the setting of fair values of the myriad factors that combine to produce these observed results. In this part, we shall look in detail only at certain selected factors.

Growing competition with the traditional telephone industry has focused attention on the association of costs with specific services. Varied cost allocation processes have been proposed and debated throughout

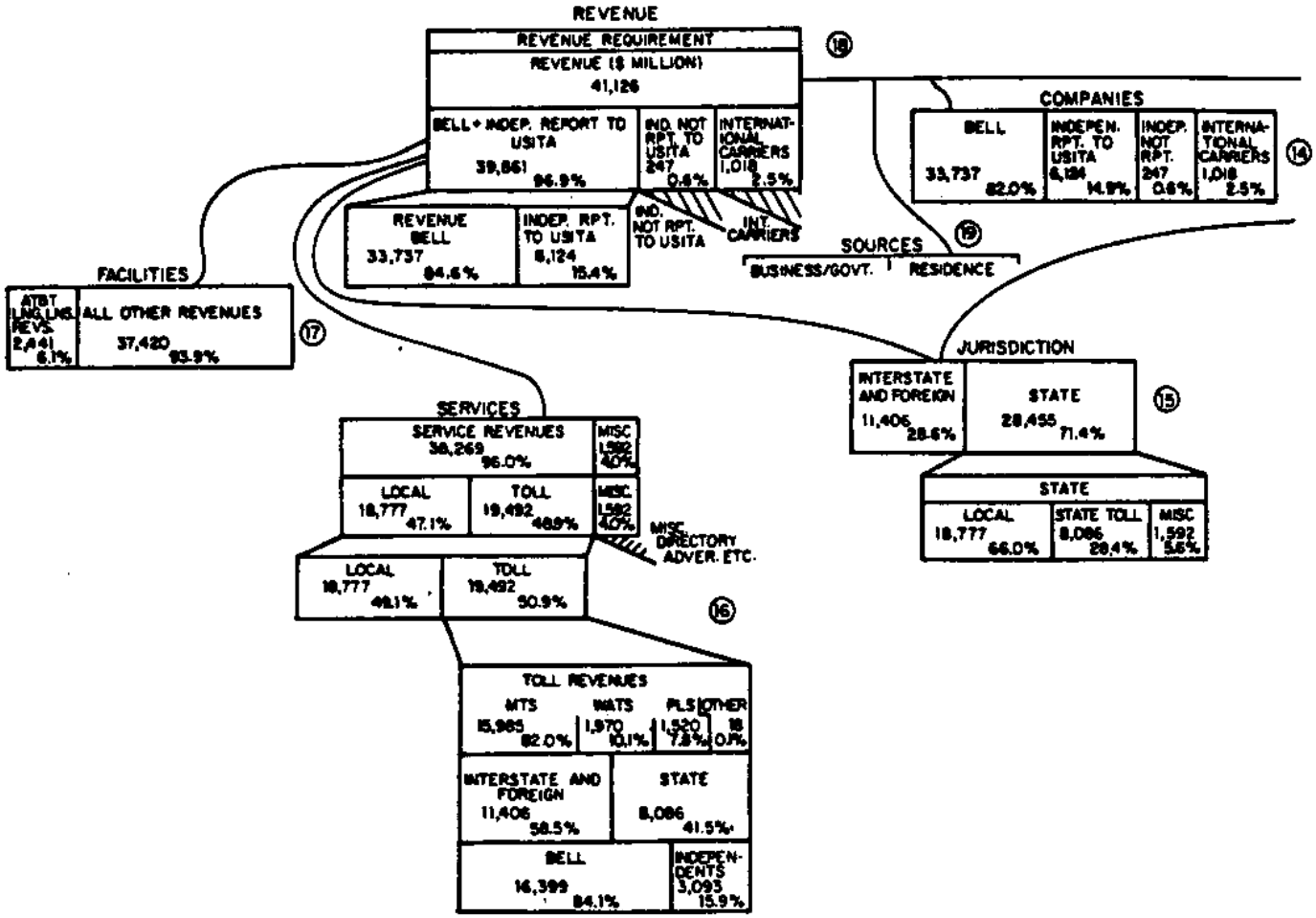


Figure 3.1

Telephone Industry Costs and Revenues, 1976

Source[S1]

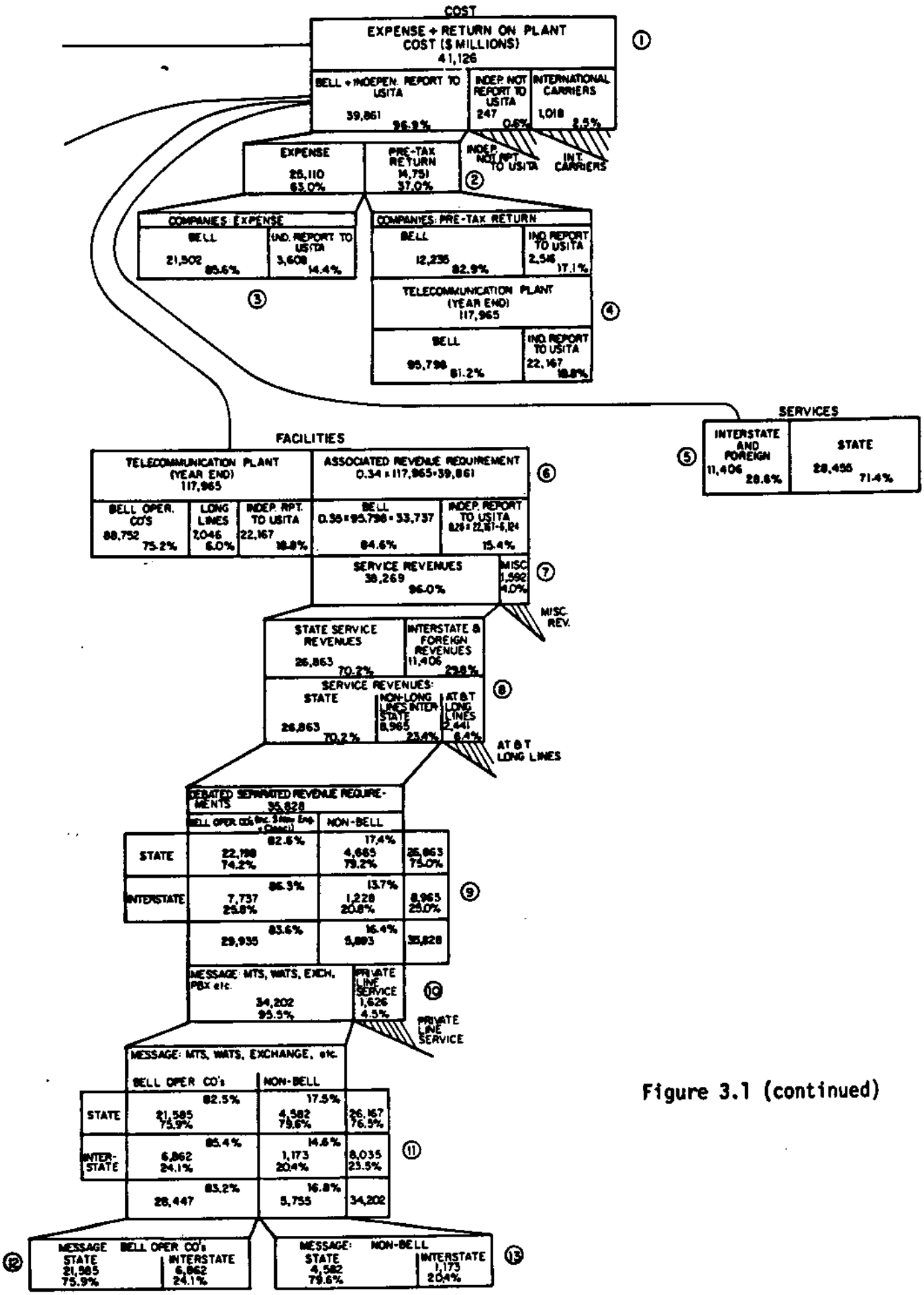


Figure 3.1 (continued)

numerous federal and state regulatory, judicial and legislative proceedings. All are based on suballocations within pools of costs assigned, in the first instance, to the broad categories of federally-regulated and state-regulated services. The present analysis focuses on that underlying separation of federal from state costs. Given any jurisdictional boundary--and so long as court-ordained jurisdictional separation and concomitant allocation of costs to jurisdictions persists--the methods for making these allocations will underlie the determination of costs of more refined service categories under each jurisdiction, hence cast doubt on the validity of any economic analysis built on that base, regardless of what labels might be applied or pricing policies followed.

As of mid-1979, the federal jurisdiction encompassed interstate and foreign calls only, all others being subject to each state's jurisdiction. In 1976 interstate costs were $11.4 billion (28.6%) and state costs were $28.6 billion (71.4%)[6] (Box 5).

The U.S. Supreme Court, in 1930, mandated that total costs be apportioned to each jurisdiction according to the uses made of facilities. "The separation of the intrastate and interstate property, revenues and expenses of the Company is important not simply as a theoretical allocation to two branches of the business," said the Court; "[it] is essential to the appropriate recognition of the competent governmental authority in each field of regulation."[7] The Court found that "[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."[8]

At issue was who "will bear an undue burden," granted that "to what extent is a matter of controversy," and understood that further consideration

was needed "to the end that by some practical method the different uses of the property may be recognized."[9] That issue remains with us. Over the years, construing "actual uses," far from being an exercise in routine measurements by technicians, has led to many an inventive interpretation of "reasonable measures" and of "some practical method," each tailored to accommodate the stakes as conflicting interests perceived them from time to time.

Economists tend to agree with Alfred Kahn's observation that no problem of "defining (as contrasted with actually measuring and applying) marginal cost" including "the prevalence of common and joint costs raises any difficulties in principle about the economically efficient price." But, after considering "tempering principle with practicality--or one principle with another,"[10] Kahn also points out that the theory applies "where buyers and sellers of every good and service are infinitely numerous, have perfect knowledge and foresight and act rationally on it, and where resources are perfectly mobile and fully employed. But obviously these conditions do not and cannot prevail in the real world."[11]

As an aid to discerning contemporary real world interests and stakes, the accommodations reached as of mid-1979, the forces stabilizing or destabilizing these accommodations and the distance between economic theory and the real world, we turn to a detailed analysis of how interpretations of "actual uses" determine the level and the incidence of the costs of state and interstate telephone facilities and of related expenses.

2. Facilities: Categories of Plant and Expenses

Laconic rules for the game are set forth in the Code of Federal Regulations (Part 67 of the Federal Communications Commissions's rules and regulations)[12]: "'principles and procedures' for jurisdictional separations are to be found in the 'Separations Manual' [which] is published by the National Association of Regulatory Utility Commissioners [NARUC]."[13] These principles and procedures are schematized in Table 3.1, excerpted from the Separations Manual. The entire version in effect since January 1, 1971 and still as of mid-1979 is generally referred to as the "Ozark Plan", although that term occasionally is used to refer more narrowly to the modifications, effective in January 1971, that mainly dealt with the so-called "non-traffic sensitive plant" defined in Section 3-C.

Plant (facilities) is assigned to major and subsidiary plant categories (Table 3.1(a), column 2) by means that range from direct assignment of single-purpose facilities to the apportionment of jointly--used facilities according to various "measures" reflecting policy accommodations to judicial "actual uses."

The treatment of "[p]oles on equivalent wire load" under the "Outside Plant" category illustrates the process. A given pole may carry wires or cables belonging to several subcategories of Outside Plant. Measuring "equivalent wire load" for each category is meant to provide a rough and ready means for spreading pole costs across the categories of wires hanging on common poles. The costs and accuracy of bookkeeping, if nothing else, limit the "nicety" of assignment.

As for "identification from records," these records are generally kept in classes prescribed by the FCC's Uniform System of Accounts,[14]

classes sometimes in ambiguous correspondence with the Separations Manual categories. As of mid-1979, the Uniform System of Accounts itself was under revision. It seems necessary at least to assess the significance and importance of any impact on benefits or burdens concomitant with the present or any proposed refinement or coarsening of the record-keeping that underlies assignment to categories, but this task is not undertaken here. It is, however, critical, since the practical and economical administration and the integrity of any system of cost allocation depend on its congruence with routine record-keeping processes.

B. Aggregate Costs: Main Elements

1. Facilities: Local Dial Switching Equipment and Its Context

The whole job of examining the apportionment among the state and interstate operations (services) is beyond our means, so we focus principally on the Local Dial Switching Equipment (LDSE) subcategory of Central Office Equipment (COE). As will be made evident, investment in this category is substantial. Moreover, the Subscriber Plant Factor, one of the two bases for apportioning LDSE, is of wider interest. The Subscriber Plant Factor is used also in apportioning both Outside Plant-Subscriber Line (the wires leading from home or work to a telephone exchange) and the Station Equipment-Other subcategory which encompasses not only ordinary telephones at home but also PBX's, the "private branch exchanges" or switchboards used within large organizations. Both these subcategories include large investments and they have been at the heart of controversies over competition.

① *Major Categories*	② *Bases of Assignment to Categories*	③ *Bases of Apportionment Among the Operations*
Land and Buildings		
Operating Room and Central Office Equipment Space	On square feet of space used for each category or by identification from records	Weighted Cost of Central Office Equipment
Operators' Quarters		Traffic Units
Office Space		
(a) General Traffic Supervision		Traffic Expense
(b) Commercial		Commercial Expense
(c) Revenue Accounting		Revenue Accounting Expense
(d) General Office		General Expense
Space used by another company for Interstate Operations		Assigned Interstate
Garages, Storerooms, Warehouses and Pole Yards		Cost of Station Equipment, Outside Plant and Material and Supplies, Combined
Space constructed for another Co. for Interstate Operations		Assigned Interstate
Space Rented to Others		Consistent with the associated Rent Revenues
Antenna Supporting Structures		Costs of Antennae Supported
Outside Plant	By direct assignment or apportionment of plant used jointly for more than one category as follows: cable on conductor cross section; poles on equivalent wire load; conduit on cost of underground cable	
Exchange		
Wideband Exchange Trunk and Loop		Direct Assignment or Relative Minutes-of-Use
Exchange Trunk Excluding Wideband		Direct Assignment or Relative Minutes-of-Use
Subscriber Line Excluding Wideband		Relative TWX Minutes-of-Use, Direct Assignment, or Subscriber Plant Factor
Interexchange		Assigned Interstate
Plant Furnished to another Co. for Interstate Use		
Wideband Services		Direct Assignment or Relative TWX Message Minute Miles
All Other		Direct Assignment, Relative Conversation Minute Miles or Relative TWX Connection Minute Miles
Central Office Equipment	In general, by identification from records	
Manual Switching Equipment		Traffic Units
Dial Tandem Switching Equipment		Minutes-of-Use
Intertoll Dial Switching Equipment		Minutes-of-Use
Automatic Message Recording Equipment		Minutes-of-Use and/or Messages Involved
Other Toll Dial Switching Equipment		Minutes-of-Use
Local Dial Switching Equipment		Weighted Minutes-of-Use or Subscriber Plant Factor
Special Services Switching Equipment		Direct Assignment or Relative TWX Minutes-of-Use, or Traffic Units
Circuit Equipment		Generally Follows Apportionment of Outside Plant as Outlined above
Station Equipment	By identification from records	
TWX Equipment		Relative TWX Minutes-of-Use
Private Line Equipment		Direct Assignment
Station Identification Equipment		Number of Messages Recorded
Wideband		Relative Minutes-of-Use
Other		Subscriber Plant Factor
Furniture and Office Equipment	By identification from records	
Data Processing Equipment		Work Functions Performed
Other		Wage Portion of Maintenance, Traffic, Commercial and Revenue Accounting Expenses
Vehicles and Other Work Equipment		Cost of Outside Plant, Station Equipment and Material and Supplies, Combined

Plant
(a)

Table 3.1

Illustrative Apportionment Bases

Source[S2]

① *Major Items*	② *Bases of Apportionment Among the Operations*
Maintenance and Depreciation	Cost of Related Plant
Traffic	
(a) General Traffic Supervision—Engineering	Cost of Central Office Equipment and Interexchange Outside Plant Combined
(b) Service Inspection and Customer Instruction	
(1) PBX	Current Billing
(2) Customer Instruction and Miscellaneous	Subscriber Line Minutes-of-Use
(c) All Other	Generally Traffic Units
Commercial	
(a) Advertising, Sales and Connecting Company Relations	Analyses of Current Billing and Settlements
(b) Local Operations	Number of Service Users—With Message Toll User Portion on Business Office Contacts
(c) Public Telephone Commissions	Study of Commissions Paid
(d) Directory Expenses	Analysis of Prepaid Directory Expenses
(e) General Administration	Accounts 643, 644 and 645, Combined
(f) Other	All Other Commercial Expenses Combined
Revenue Accounting	Analysis of Work Operations
General Expenses	Separation of Wage Portion of Maintenance, Traffic, Commercial and Revenue Accounting Expenses or Plant in Service
Relief and Pensions and Social Security Taxes	Separation of Wage Portion of Maintenance, Traffic, Commercial and Revenue Accounting Expenses
Property and Miscellaneous Taxes	Separation of Cost of Plant in Service
Gross Earnings Taxes	Separation of Receipts, etc., on Which Levied
Income Taxes	Taxable Income for Each Operation

Expenses
(b)

Table 3.1 (continued)

The apportionment of expenses derives in the main from the apportionment of related plant.

To enable us to see the cost of Local Dial Switching Equipment in proper perspective, we shall first sketch its relation to aggregate costs. Doing this with available data entails tracing costs in the form of (equivalent for this purpose; see Section 2-I) revenue requirements that encompass both return on plant investment and operating expenses.

In the aggregate, plant investment alone may be translated into revenue requirements by applying a "carrying charge" which, in recent years, has been stable in the neighborhood of .30 as empirically determined by the formula:

$$\textit{Investment} \times \textit{Carrying Charge} = \textit{Revenue Requirement}$$

as shown in Box 6.[15] Major plant ownership categories are also illustrated in Box 6.

2. Services: Directory Advertising

We established in Section 2-I how, in a retrospective analysis, actual revenues may be equated to revenue requirements, hence to costs. The total 1976 revenue requirement (39.9 billion) derived in Section 3-A1 has revenues derived from services and miscellaneous revenues (Box 7)[16] as its two principal components. Miscellaneous revenues are mainly from directory advertising. Where prices are regulated at all, they fall wholly under state jurisdiction. In general, directory costs and revenues enter only into the overall rate-of-return calculations of state regulators. Directory operations are of some policy interest, especially as they relate to postal services and to the media. They are further analyzed in Part 5.

3. Facilities: AT&T Long Lines and the Politics of Cost Averaging

We are now left with $38.3 billion in revenue requirements to consider, $26.9 billion (70.2%) of which were derived from state services and $11.4 billion (29.8%) from interstate operations (Box 8).[17] An alternative breakdown of the $38.3 billion shows that $2.4 billion (6.4%) came from the operations of AT&T's Long Lines Division as distinct from Bell or Independent operating companies. Long Lines operates solely as an interstate and foreign carrier. Hence its costs fall under the federal jurisdiction by definition and they are not explicitly subject to the separations process.

Implicitly, however, Long Lines Plant and expenses are intimately linked to separations questions. One linkage is through joint ownership of various facilities by AT&T and its subsidiary or associated Bell System Companies. The proportions of joint ownership (e.g., of microwave relay towers, of the equipment in them and of the land they stand on) bear on separations matters. Whether or not that linkage is significant, a second one clearly is. The state/interstate distinction is logical and legal but of limited geographical significance, since interstate land lines for transmission are necessarily built on state soil. The record shows that this physical collocation has been exploited in separations history and it remains of contemporary interest.

The "Modified Phoenix Plan" for separations was in effect from 1956 to 1969. Under this plan "the book costs of Long Lines plant which terminates in [a] State are combined with the book costs of associated company terminating plant, even though such Long Lines plant is used exclusively for interstate calls originating or terminating in the State.

The combined book costs are then apportioned on the basis of relative use measured by the relative number of state and interstate conversation-minute-miles occupying the combined plant." The point was that "[t]his treatment averages the Long Lines lower cost per [conversation-minute-mile] with the higher unit cost of associated company plant, thereby assigning a larger amount of costs of this plant to interstate."[18]

In July 1967 the FCC rejected Bell arguments against this "over-assignment of costs to interstate,"[19] as well as Western Union and Independent proposals that would have, it said, "equalized costs and usage on a nationwide basis and thus would ignore the actual economic conditions existing in each jurisdiction."[20] It accepted the NARUC's argument for continuing the plan for reasons that included its effect of "spread[ing] the benefits of Bell System research and development, which have been directed toward maximum economies for telephone service as a whole, but which have produced the greatest toll lines economies on heavy routes and larger circuits which are predominantly interstate."[21] It concluded that it "would not be justified in overturning a separations principle which has endured for the past 11 years,"[22] rejecting in particular "the proposal to eliminate broad averaging [as] contrary to the averaging principle we have heretofore found to be acceptable in connection with the 'Modified Phoenix Plan'."[23]

Eighteen months later, in January 1969, the FCC changed its mind. It accepted, among others, the argument that the Modified Phoenix Plan "results in an artificial overstatement in interstate book costs of about

$500 million currently and the amount is increasing. Moreover, the plan produces an erratic and inequitable distribution in benefits among the States (i.e. 70 percent of the benefits inure to 12 states which would otherwise account for only 40 percent of the book costs). This disproportion is also increasing with time."[24]

Supporting rationale included a finding that "Under the previous [1967] proposal,costs would be determined separately for line haul and terminal equipment. The present proposal...contemplates continuation of the broad averaging of the line haul and terminal costs of interexchange plant in each study area [state]." Moreover, "[t]he previous proposal was opposed by the NARUC whereas the present proposal is supported by the NARUC and, hence, the majority of the State commissions. The previous proposal shifted $175 million in revenue requirements from interstate to intrastate. By the present proposal, this amount is reduced to $118 million."[25]

The extent of cost averaging--across geographic regions and across types of facilities and technologies--and its differential impact on the incidence of benefits and burdens was then and continues to be a principal issue of telecommunications policy, as it has been and continues to be in postal services, transportation and similar infrastructures of the economy and the social order. In this instance, a traditional political compromise on who gets what, when and how shifted the labeling of a "principle which ha[d] endured for...11 years" from "reasonable measure" to "artificial overstatement."

We shall have repeated occasions to emphasize how the ideals of competition and concomitant marginal cost pricing for economic efficiency can be at odds with the ideals of equity that underlie cost averaging and uniform

pricing, whether of telephone calls or of stamps for first-class mail. The FCC of 1969 foreshadowed the debates of a decade later in concluding that:

> "with the rapid development and advancement of new and competing technologies, it is important that the separation procedures used for determining the interstate and intrastate revenue requirements not obscure the true economic facts and advantages of each technology. The artificial assignment of costs to one service or another, as occurs under the Modified Phoenix plan, tends to obscure the basis for objective comparison. This is of more than theoretical concern today as we expect to be confronted in the near future with the problems of making sound determinations as to where and how, if at all, the satellite facilities to provide domestic communications services would be feasible and economical, having in mind, among other things, the total costs of alternative means of supplying similar services over like distances."[26]

Whatever the prospective significance of cost allocation processes as they affect the benefits and burdens of producers or consumers, the matter is not pursued further in this part.

4. Private Line Services: Who Benefits from Economies of Scope?

Setting Long Lines aside leaves $35.8 billion of 1976 revenue requirements to examine. The totality of these revenues, the proportionate shares derived from state and interstate services, and the proportionate shares of Bell System and Independent companies have all been at issue in the debates of the seventies and likely will continue to be at issue in the eighties. We therefore show how the $35.8 billion is spread across these categories (Box 9).[27] To proceed further, we must now distinguish between two broad

classes of services from which telephone companies have traditionally derived their revenues.

Private line services (PLS) are principally used by large organizations with traffic substantial enough to adequately fill up bulk facilities dedicated to their sole use, hence "private." 1976 revenues associated with principal types of private line services are shown in Table 3.2. In bare essence, a private line is constantly available for its subscriber's use without repeated dial-up, even though it is carved out, in substantial part, of common facilities which, if not dedicated to one user, would be available to another or to the general public. The price per message of a private line is attractive relative to the price of a dialed-up message only when "enough" messages are likely to flow between the two points linked up by the line. As of late 1978, $400's worth of individual messages per month gave a reasonable order-of-magnitude approximation to what is "enough" to warrant buying AT&T private line service between two points.

The second broad class of services--message services--encompasses Message Telecommunications Service (MTS), the ordinary dial-up state or interstate long distance call; Wide Area Telecommunications Service (WATS), exemplified by free-to-the-caller calls to "300" area-code numbers; Exchange Service (ES) which, in its various manifestations, is for dialing-up in a local area; Private Branch Exchanges (PBX), and other subcategories of narrower interest.

It can be argued that in principle, PLS, like Long Lines, is not at issue in jurisdictional separations. If the two end points of a private line are within the local calling area, within the state, or in two different states, apportionment of the associated costs to the corresponding jurisdiction seems an obvious principle.

Type of Service	Interstate		Intrastate		Total	
	$ thousand	%	$ thousand	%	$ thousand	%
Telephone	294,765	52.2 / 28.4	270,901	47.8 / 47.3	565,666	100 / 35.1
Teletypewriter	54,110	62.7 / 5.2	32,219	37.3 / 5.6	86,329	100 / 5.4
Data Phone Digital Service	4,928	96.5 / 0.5	178	3.5 / 0.0	5,106	100 / 0.3
Multi-Purpose Wideband-Telpak	428,929	85.4 / 41.4	73,468	14.6 / 12.8	502,397	100 / 31.2
Multi-Purpose Wideband-Others	11,071	95.4 / 1.1	528	4.6 / 0.1	11,599	100 / 0.7
Telegraph and Other	160,165	46.2 / 15.4	186,754	53.8 / 32.6	346,919	100 / 21.5
Program Transmission	82,999	90.2 / 8.0	8,991	9.8 / 1.6	91,990	100 / 5.7
Private Line Service Total	1,036,967	64.4 / 100.0	573,039	35.6 / 100.0	1,610,006	100.0 / 100.0

Row / Column

Table 3.2

Private Line Service Revenues, 1976

Source[S3]

Indeed, under the Ozark Plan the product of the cost of a local loop dedicated to interstate private line service, times the number of such loops, is directly and wholly assigned to the interstate jurisdiction's revenue requirements. This product is also subtracted from the total cost of all lines, as is the cost of all local loops dedicated to state private line service, which is directly assigned to the state jurisdiction. (For these purposes, the unit cost of a local loop is taken as the average over all loops, whatever jurisdiction or type of service they may be active under.) The remaining cost is then further allocated between the jurisdictions according to relative uses of the remaining local loops for state and intrastate calls made in the message services.

From an unsympathetic viewpoint, this process can be seen as a play on the words "actual uses." For MTS lines, actual use is expressed in "how much" terms based on a Subscriber Line Usage (SLU) factor which, for present purposes, it will suffice to characterize as follows:

$$\text{Interstate (Toll) SLU Factor} = \frac{\text{Interstate (Toll) Minutes of Use (MOU)}}{\text{Interstate (Toll) MOU} + \text{State (Total) MOU}}$$

For PLS service, the dedication of a local loop to that service is sufficient for direct assignment to the appropriate jurisdiction. "How" instead of "how much" is the criterion for PLS "actual use" as contrasted with MTS "actual use."

From a sympathetic viewpoint, the difference in criteria is seen as justified by virtue of the fact that revenues from dedicated end-to-end private lines are not produced by usage-sensitive billing, hence allocating their cost on the basis of minutes of use would, in the words of a reviewer of an earlier draft, "appear to be inconsistent with the cost-causation/demand relationship."

Suppose, for simplicity's sake, that the price to a customer of a local loop used in interstate private line service is equal to the cost of that loop, as assigned to the interstate jurisdiction. Under the Ozark Plan's "how" interpretation of PLS actual use, that cost is the average cost of a local loop. Under one conceivable application of a "how much" interpretation of PLS actual use, the cost of all local loops might be prorated to each jurisdiction according to the ratio of total service time under one jurisdiction to total service time under the other jurisdiction. The cost of our particular local-loop-used-in-interstate service might then be its share of interstate costs prorated according to the ratio of its service time to the total interstate service time.

Since that hypothetical "how much" PLS costing corresponds to present MTS costing, a "rational economic" customer would switch to PLS only if the present "how" costing (equal to price, under our simplifying assumption) of PLS is lower than the "how much" costing of MTS. Let us therefore assume that this is so. At the point where this interstate customer switches over--without him or anyone else altering their usage levels--his own price drops, the interstate share of costs drops equally, offset by a rise in the intrastate share of costs, the latter spread somehow across the intrastate customers and their suppliers. The suppliers, indeed, would face the choice of offsetting the intrastate cost increase with decreases in operating expenses or in their rate of return or by increasing prices paid by intrastate customers.

This qualitative argument lends credence to the notion that, under the Ozark Plan, intrastate (including local) suppliers or customers "subsidize" interstate customers, just as the example of the Modified Phoenix Plan (Section 3-B3) and the actuality of other features of the

Ozark Plan (Section 3-D) lend credence to the contrary notion that interstate customers and suppliers "subsidize" intrastate customers.

It would be premature to attempt to verify and net out these alleged flows. The simplified example can reliably help us discern no more than how the choice of a particular cost allocation system can matter and to whom.

Determining how much such a choice might matter requires more extensive analysis. The following hypothetical example illustrates what is entailed.

Consider a telephone company that operates 100 local loops to its exchange to connect 100 customers all of whom are lined up along one street passed by a single 100-pair cable from which individual pairs are dropped to connect each of them. The average cost per loop is $1 and total cable cost and revenue requirement is $100. No one has a private line. Out of 1000 minutes of use (10 minutes per customer), 60 are interstate minutes (6% interstate SLU factor) and 940 are state minutes (94% state SLU factor). Hence 6% of the cost ($6) is allocated to the interstate jurisdiction, leaving the remaining 94% ($94) to be covered by revenues derived from state services (Table 3.3(a), column 1). Prices are equal to costs and at the same level (10¢ per minute) for all customers in both jurisdictions.

Now one of the 100 customers changes to an interstate private line. Under the Ozark Plan's "how" interpretation of PLS actual use the $1 average cost of that local loop is directly and wholly assigned to the interstate jurisdiction, leaving $99 to be apportioned according to the Ozark Plan's "how much" interpretation of MTS actual use. Assume further that the 6% interstate usage of the cable is the average of 99 customers each spending 5.5% of their 10-minute talking time talking interstate,

	① No Private Line	②	③	④
		1 Private Line		
		Basic SLU Plan	Alternative Plan A	Alternative Plan B
Interstate Cost	$ 6	$ 6.43	$ 6	$ 6.43
State Cost	$ 94	$ 93.57	$ 94	$ 93.57
Total	$100	$100.00	$100	$100.00

SLU-Based Allocation
(a)

	① No Private Line	②	③	④
		1 Private Line		
		Real Ozark Plan	Alternative Plan A	Alternative Plan B
Interstate Cost	$ 20	$ 19.09	$ 20	$ 21.43
State Cost	$ 80	$ 80.91	$ 80	$ 78.57
Total	$100	$100.00	$100	$100.00

SPF-Based Allocation
(b)

Table 3.3

Effects of Alternative Private Line Costing Schemes

and of one user who spends 55% of his 10-minute talking time (5.5 minutes) in interstate conversations with a single phone number across the country. That, of course, is why that one customer went to an interstate private line.

With that one customer out of the picture, the residual $99 would thus be allocated--under a basic SLU variant of the Ozark Plan's "how much" interpreation of MTS actual use--on the basis of 5.48% interstate and 94.52% state usage, since the interstate usage shifted to private line is no longer measured, hence the interstate SLU factor for the remaining local loop lines is now 5.48%. (In order not to complicate the example unduly, we assume here that our odd user got one of the other 99 lines for his intrastate calling from someone who moved away, and that his employees sneak in a few personal interstate calls, so that total intrastate calling time remains the same as before, although concentrated on 99 lines, and the amount of interstate calling on each of the 99 lines remains the same as before.) Hence $1 for the private local loop plus .0548 x $99 = $5.43 for a total of $6.43 is now allocated to the interstate jurisdiction. .9452 x 99 = $93.57 is to be covered within the state (Table 3.3(a), column 2).

This new situation leads to instructive interpretations. If we construe the intrastate use as all toll, then 940 minutes for $93.57 can be seen as a price <u>reduction</u> to $93.57/940 = 9.954¢ <u>per minute</u>. Each of the 99 customers, however, is now calling 940/99 = 9.495 minutes intrastate, as contrasted to 940/100 = 9.40 minutes. Hence his total outlay of 9.954¢/minute x 9.495 minutes is 94.51¢ which is greater than 10¢/minute x 9.40 minutes = 94.00¢, absent the private line. If we construe the intrastate

use as all local, with flat rate pricing independent of usage, the focus is not on time but on total outlay of \$93.57/99 = 94.51¢ per customer, which can now be seen as a price increase for untimed service.

As for the private line customer, he is now paying \$1 for his 5.5 minutes, i.e., 18.2¢ a minute, where before he paid 10¢ a minute for a total of 55¢. This is not "rational economic behavior", absent a prospect for rapid usage increase past the 10 minute breakeven point with the former metered rate.

Consider Alternative A to this basic SLU variant (Table 3.3(a), column 3). Under Alternative A, the "how much" interpretation of actual use is applied to the cable as a whole, the private line included. Under our prior assumptions the interstate SLU factor for the whole cable remains at 6%. Were usage of the private line to increase, however, the interstate cost would stay fixed under the basic SLU Plan but increase under the Alternative A.

In the real Ozark Plan the interstate SLU factor is not applied directly to costs to get the interstate share. It is first multiplied by another factor which, at present, we will take to be 3.333. A more detailed accounting of the origins of this factor is given in Section 3-D1. For now, suffice it to say that 3.333x 6% = 20%. Adding this modified interstate SLU factor, called the Subscriber Plant Factor (SPF) to the state SLU factor of 94% would give 114%. But the original state SLU usage factor is not used. What is substituted for it as the allocation factor for state usage is the residual 100% - 20% = 80%, and 20 + 80 clearly equals 100.

In the case where no one has a private line, the real Ozark Plan would therefore allocate 20% (\$20) to interstate revenue requirements, not 6% (\$6). It would allocate 80% (\$80) to state revenue requirements, not 94% (\$94) (Table 3.3(b), column 1).

In the case where there is one private local loop, the real Ozark Plan still assigns $1 to interstate costs for that private line since no usage-weighting factor is applied. But the interstate SLU factor of 5.48% is now transmogrified into SPF = 3.333 x 5.48 = 18.27%, so 18.27% of the $99 dollars remaining, or .1827 x $99 = $18.09 is assigned interstate, for an interstate total of $19.09. The 94.52% state allocation factor is redefined as 100% - 18.27% = 81.73%, hence .8173 x $99 = $80.91 is the state revenue requirement. We note that $19.09 + $80.91 = $100, i.e., neither more nor less than the total costs have been apportioned (Table 3.3(b), column 2).

Under our hypothetical Alternative A to the Ozark Plan the interstate SLU factor remains 6% as before, yielding a SPF of 3.333 x 6 = 20%. The state allocation is therefore again 100% - 20% = 80% (Table 3.3, column 3).

Under Alternative B, the "how much" interpretation of actual use is applied to all pairs in the cable, as under Alternative A, but pair by pair rather than in the aggregate. Thus the private line has 100% interstate usage, each of the others 5.48%. The resulting allocations are shown in Column 4 of Table 3.3.

All these variants of aggregate cost allocations also lend themselves to more detailed analyses of price and other impacts on suppliers and consumers, analyses such as the alternative price interpretations outlined for the variant of Table 3.3(a), Column 2. We forego undertaking these explicitly, since it should by now be evident that the choice of cost allocation methods--broadly or even within such apparently narrow bounds as set by the "actual uses" dictum--can leverage diverse interests in many subtle ways with widely varying impacts and great dependence on numerous assumptions.

It is easy to get mesmerized by such technical detail, which amounts to no more than ringing changes on one basic tune without straying too far from interpretations of Smith v. Illinois Bell likely, if challenged, to be acceptable to the courts. Still other alternative "reasonable measures" for not ignoring altogether the actual uses to which the property is put have been set forth in support of alternative goals. Gabel's Development of Separations Principles in the Telephone Industry cites one such alternative measure proposed in the early forties by the then assistant chief engineer of the FCC, Manfred Toeppen.

Like a contemporary TVA cost allocation process, Toeppen's scheme interpreted actual use in terms of the proportionate use of joint plant as defined by the proportions that the costs of hypothetical separate toll and exchange lines would bear to the total cost of such separate facilities.[28] The effect would have been to allocate a larger proportion of joint costs to toll lines (including interstate private lines) than the Ozark Plan does, thereby favoring those believing it to be fairer to have exchange services gain more from the scope economies of shared plant than the toll services. By Gabel's account Toeppen's testimony was criticized as "hypothetical" and "academic."[29] But the accepted processes are not immune to precisely the same criticism, indeed self-criticism, as when the FCC ordered a change in the handling of Long Lines costs (Section 3-B3).

With reference to rate-making, the Supreme Court has pointed out in Federal Power Commission v. Hope Natural Gas Co.[30] that a regulator is "not bound to the use of any single formula or combination of formulas" adding that "under the statutory standard of 'just and reasonable' it is the result reached not the method employed which is controlling," that "[i]t is not theory but the impact...which counts."[31]

In further analyzing details of the present methods, our interest is likewise in the methods not for their own sake, but as means to ends, and as aids in discerning those ends.

What is allocated to which jurisdiction clearly matters differentially to those customers who make lots of out-of-state calls as contrasted to those who make mainly local or in-state calls. An increase in interstate allocations must clearly increase the revenues of some if not all interstate services over what they would be were the allocation not increased. To a first approximation, this does not matter to the Bell System as a whole, since it merely shifts money from one pocket to another. On looking at a finer grained picture, however, that is not wholly accurate. Since Independents traditionally have relied on the Bell System for long-distance services--indeed had little alternative until the seventies--it matters in terms of relative revenue shares and rates of return of Bell and Independents. Also, it matters in terms of relations between the Bell System and regulators, those in fifty states and the FCC for interstate matters. And it matters in terms of the pricing responses of the traditional telephone industry to competition for private line services.

Thus, all this clearly matters as low politics. How much it matters as high politics is a question to be deferred until we have outlined the dimensions of the real real world as contrasted with those of the hypothetical world of our examples. To do this, we leave aside further consideration of PLS to concentrate on the second broad class of services, namely the message services: MTS, WATS, and the others.

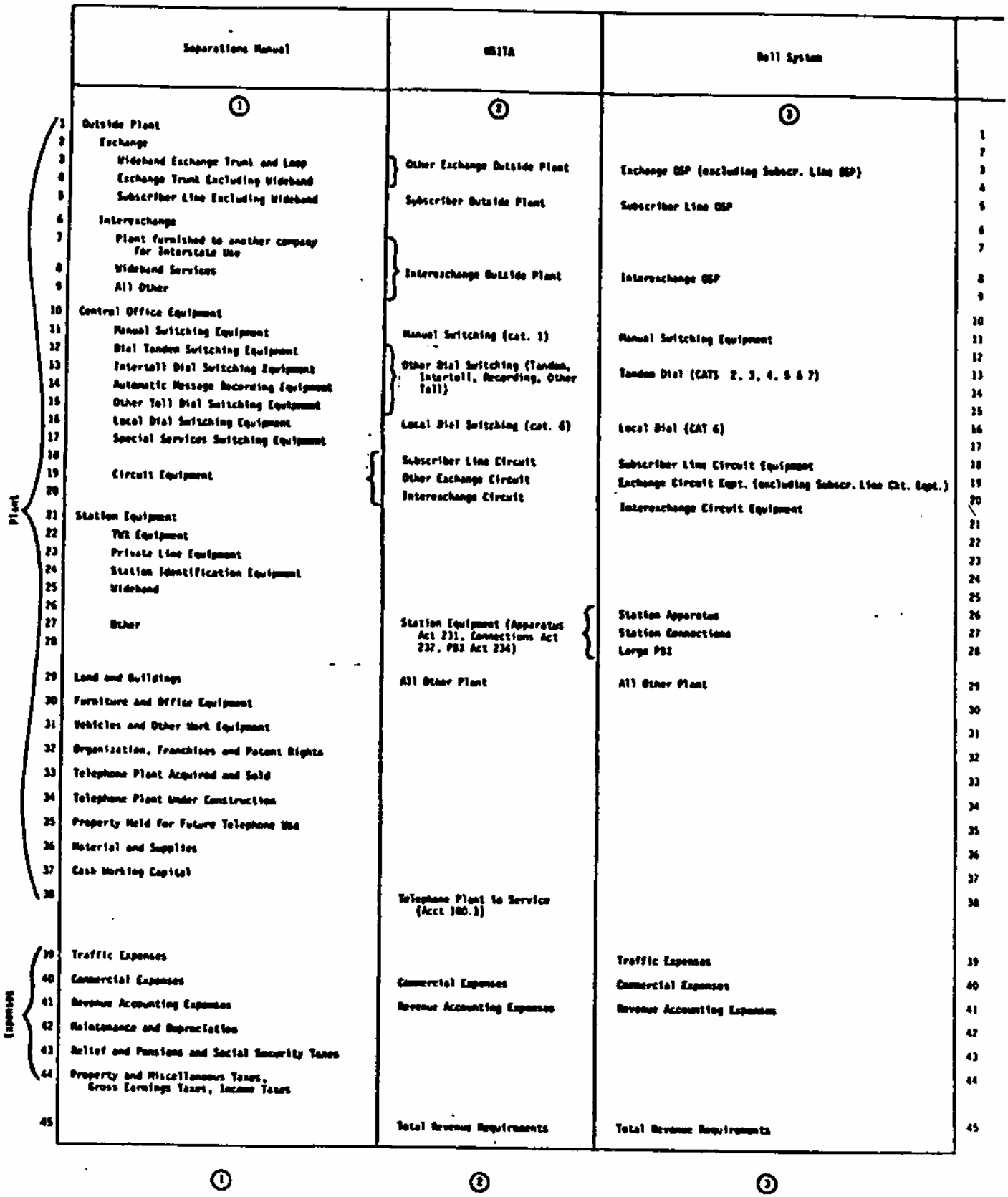
6. Message Services

Setting aside $1.6 billion of PLS costs leaves $34.2 billion to be accounted for in the message services (Figure 3.1, Box 10).[32] Box 11[33] shows the breakdown of the $34.2 billion between state and interstate jurisdictions and between Bell operating Companies and Independent Companies. The detailed analysis that follows will focus on both the Bell System's $28.4 billion share (Box 12) and the Independents' $5.8 billion share.

The major categories of plant and the major items of expense recognized under the Ozark Plan for separations were displayed in Table 3.1. Column 1 of Table 3.4 reproduces these headings, adding some plant categories (lines 32-37) listed in the Separations Manual[34] but not in the table reproduced here as Table 3.1.[35]

How much of the $34.2 billion of costs or revenue requirements are ascribed to which of these categories? How much of the costs, category by category, are assigned to the interstate and state jurisdictions? Within the state jurisdiction, how are costs apportioned, if at all, between state toll and local exchange services? How does all this depend on the particular compromises reflected in the Ozark Plan? Of what significance, if any, is all this to prospective policymaking?

Data useful in addressing these two questions were found in two sources corresponding to the major industry categories also used in Figure 3.1, namely the Bell System and Independent Companies reporting to USITA.[36] The correspondences among the headings used in these sources (Columns 2 and 3) and those used in the Separations Manual are inexact. However, the brackets in Table 3.4 establish the relationships required for consistent interpretation of the data.



		Separations Manual	NSITA	Bell System	
		①	②	③	
Plant	1	Outside Plant			1
	2	Exchange			2
	3	Wideband Exchange Trunk and Loop	Other Exchange Outside Plant	Exchange OSP (excluding Subscr. Line OSP)	3
	4	Exchange Trunk Excluding Wideband			4
	5	Subscriber Line Excluding Wideband	Subscriber Outside Plant	Subscriber Line OSP	5
	6	Interexchange			6
	7	Plant furnished to another company for interstate Use			7
	8	Wideband Services	Interexchange Outside Plant	Interexchange OSP	8
	9	All Other			9
	10	Central Office Equipment			10
	11	Manual Switching Equipment	Manual Switching (cat. 1)	Manual Switching Equipment	11
	12	Dial Tandem Switching Equipment			12
	13	Intertoll Dial Switching Equipment	Other Dial Switching (Tandem, Intertoll, Recording, Other Toll)	Tandem Dial (CATS 2, 3, 4, 5 & 7)	13
	14	Automatic Message Recording Equipment			14
	15	Other Toll Dial Switching Equipment			15
	16	Local Dial Switching Equipment	Local Dial Switching (cat. 6)	Local Dial (CAT 6)	16
	17	Special Services Switching Equipment			17
	18		Subscriber Line Circuit	Subscriber Line Circuit Equipment	18
	19	Circuit Equipment	Other Exchange Circuit	Exchange Circuit Eqpt. (excluding Subscr. Line Ckt. Eqpt.)	19
	20		Interexchange Circuit	Interexchange Circuit Equipment	20
	21	Station Equipment			21
	22	TWX Equipment			22
	23	Private Line Equipment			23
	24	Station Identification Equipment			24
	25	Wideband			25
	26				26
	27	Other	Station Equipment (Apparatus Act 231, Connections Act 232, PBX Act 234)	Station Apparatus Station Connections	27
	28			Large PBX	28
	29	Land and Buildings	All Other Plant	All Other Plant	29
	30	Furniture and Office Equipment			30
	31	Vehicles and Other Work Equipment			31
	32	Organization, Franchises and Patent Rights			32
	33	Telephone Plant Acquired and Sold			33
	34	Telephone Plant Under Construction			34
	35	Property Held for Future Telephone Use			35
	36	Material and Supplies			36
	37	Cash Working Capital			37
	38		Telephone Plant in Service (Acct 100.1)		38
Expenses	39	Traffic Expenses		Traffic Expenses	39
	40	Commercial Expenses	Commercial Expenses	Commercial Expenses	40
	41	Revenue Accounting Expenses	Revenue Accounting Expenses	Revenue Accounting Expenses	41
	42	Maintenance and Depreciation			42
	43	Relief and Pensions and Social Security Taxes			43
	44	Property and Miscellaneous Taxes, Gross Earnings Taxes, Income Taxes			44
	45		Total Revenue Requirements	Total Revenue Requirements	45
		①	②	③	

Table 3.4

Proportionate Jurisdictional Assignment of Plant Categories: Message Services, 1976

Source[S4]

	Bell System: % of 1976 RR	Interstate $ of Category RR			State $ of Category RR		State Toll & Local $ of RR			
							% of Total RR		% of State RR	
		Bell	WSTA	United	Bell	WSTA	State Toll	Local	State Toll	Local
	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
1										
2										
3	1.4	9.3	5.3	} 24.1	90.7	94.7	6.1	88.6	6.4	93.6
4										
5	16.3	20.7	19.8		79.3	80.2	27.8	57.4	28.4	71.6
6										
7										
8	1.1	50.5	29.1	42.7	49.5	70.9	50.9	29.0	71.8	28.2
9										
10										
11	1.6	37.3	33.1		62.7	66.9	49.6	17.3	74.1	25.9
12										
13	2.2	38.2	32.6	37.5	61.8	67.4	84.7	12.7	81.2	18.8
14										
15										
16	15.1	12.4	12.8	15.4	87.6	87.2	16.9	68.3	21.7	78.3
17										
18	3.4	20.7	20.0	} 15.1	79.3	80.0	22.3	57.7	27.9	72.1
19	2.5	10.0	4.5		90.0	95.5	6.6	88.9	6.9	93.1
20	5.8	61.7	30.5	47.9	48.3	69.5	44.2	23.3	66.5	33.5
21										
22										
23										
24										
25										
26	9.4	20.8	} 19.8	} 24.8	79.2	} 80.2	} 21.2	} 59.0	} 26.4	} 73.6
27	11.5	21.0			79.0					
28	3.8	21.1			78.9					
29	.6	100.0	18.2	N.A.	0	81.8	27.7	54.1	33.9	66.1
30										
31										
32										
33										
34										
35										
36										
37										
38										
39	10.7	34.1	N.A.	N.A.	65.9	N.A.	N.A.	N.A.	N.A.	N.A.
40	12.0	22.9	15.5	N.A.	77.1	84.5	20.6	63.9	24.4	75.6
41	2.6	27.2	16.0	N.A.	72.8	84.0	46.9	37.1	55.8	44.2
42										
43										
44										
45	99.9	24.3	20.0	24.7	75.7	80.0	36.7	63.3	33.4	66.6
	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

Table 3.4 (continued)

wires to the exchange and the mouth and ear of the customer. Although it is not obvious from either Table 3.4 or Table 3.1, Station Equipment is subdivided into Station Apparatus, Station Connections and Large PBX's (Accounts 231, 232 and 234) by the Uniform System of Accounts. From each of these accounting categories, equipment used exclusively for TWX, PL, Station Identification or Wideband services is assigned to those separations subcategories (Lines 22-25). All station equipment not exclusively used for those services, is assigned to the "Other" Separations subcategory, which therefore encompasses MTS and WATS (Separations Manual §25.123).

In the aggregate, lines 5, 16, 26, 27 and 28 on Table 3.4 account for 55.3 percent or $15,906 million of the $28,763 million revenue requirements for the message services. A glance at Table 3.1 shows that the SPF is used in apportioning a part of each of these categories.

Subscriber Lines, however, may also be directly assigned with consequences that have been analyzed in the description of PLS separations in Section 3-A4. Except for equipment used on private lines, which is treated like the private lines themselves (and except for the special services of Lines 22, 24 and 25) station equipment is apportioned solely according to the SPF. We single out Local Dial Switching Equipment (LDSE) for detailed analysis because the dollars involved (15.1% or $4.35 billion) are significant and because of the opportunity for considering the interplay of the SPF and Weighted-Minutes-of-Use, the other factor used in apportionment of LDSE.

As for the expenses of Lines 39-41 (an aggregate of 25.3% or $7,277 million), only General Traffic Supervision-Engineering (Table 3.1(b)) is related to the SPF through the central office equipment allocation base.

Year	Depreciable Telephone Plant ($ billion)
1950	9.2
1955	13.7
1960	23.3
1965	34.1
1970	51.8
1975	83.6
1976	90.2
1977	97.5
1978	106.2

Bell System Depreciable Telephone Plant
(a)

Table 3.5

Depreciable Plant and Depreciation Practices

Source[S5]

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 CRF §31. Uniform System of Accounts for Class A and Class B Telephone Companies.

Depreciation Practices: Federal, as Applied to Bell Operating Property in New York, Arizona and Hawaii

(b)

Table 3.5 (continued)

	Total	Interstate	State
Manual Switching Eqpt	$ 450	$ 168	$ 282
Local Dial (Cat 6)	4,350	538	3,812
Tandem Dial (Cats 2,3,4,5,&7)	927	354	573
Subscriber Line Ckt Eqpt	992	206	786
Exchange Ckt Eqpt (Excl Subscr Line Ckt Eqpt)	724	72	652
Interexchange Circuit Eqpt	1,585	819	766
Station Apparatus	2,701	561	2,140
Station Connections	3,317	697	2,620
Large PBX	874	184	690
Subscriber Line OSP	4,685	970	3,715
Exchange OSP (Excl Subscr Line OSP)	414	38	376
Interexchange OSP	321	162	159
All Other Plant	170	170	--
Traffic Expense	3,067	1,046	2,021
Commercial Expense	3,438	787	2,651
Revenue Acct'g Expense	748	204	544
Total Revenue Requirements	$28,763	$6,976	$21,787

Table 3.6

Bell System Annual Revenue Requirements at 9% Rate of Return: Message Services, 1976 ($ million)

Source[S6]

The other subcategories of Lines 39-41 encompass some traffic sensitive and some non-traffic sensitive expenses (as defined next in Section 3-C), but with allocation bases other than SPF (Table 3.1(b)).

C. Jurisdictional Cost Allocations: Local Dial Switching Equipment

Line 16 of Table 3.4 shows that, in the Bell System, LDSE accounts for 15.1% ($4.35 billion) of message service revenue requirements (Column 4). Of this amount, 12.4% ($.54 billion) is assigned to the interstate revenue requirement of the Bell System (Column 5). Corresponding amounts for Independents Reporting to USITA are shown in Column 6 (12.8%) and for a particular Independent, United Telecommunications, in Column 7 (15.4%).[38] The corresponding state amounts for Bell (87.6% = $3.81 billion) and for USITA are given in Columns 8 and 9 respectively. How the Ozark Plan apportions the state revenue requirement between state toll service (long-distance calls) and local exchange service (local calls) and what this further apportionment signifies is examined in Part 4. Proportions reported by USITA are displayed in Columns 10-13 as percents of the total LDSE revenue requirement (Columns 10 and 11) and as percents of the state revenue requirement (Columns 12 and 13).

For now, we focus our attention on the factors that determine the assignment of 12.4% of total LDSE requirements to the interstate revenue requirement, leaving 87.6% to the state jurisdictions. As indicated in Table 3.1, LDSE is apportioned according to two factors, Weighted Minutes of Use (WMOU) and the Subscriber Plant Factor (SPF). Table 3.7 details how these factors are applied.[39]

	Plant Book Values		
	Total	Non-Traffic Sensitive	Traffic Sensitive
1. LDSE Gross Book Costs to be Apportioned	14,492	3,843	10,649
2. (1) + Share of Gross Space Book Costs	17,299	4,587	12,712
3. Net Book Costs	12,641	3,337	9,304
	Revenue Requirements		
4. Post-Tax Return on Net LDSE Plant (9% of (3))	$ 1,137 26.1%	$ 300	$ 837
5. Maintenance	1,030 23.7	273	757
6. Depreciation & Amortization	679 15.6	182	497
7. Traffic Expense	41 .9	11	30
8. General Expense	156 3.6	41	115
9. Other Expenses (Excluding Taxes)	336 7.7	89	247
10. Taxes	1,032 23.7	273	759
11. Other Income	(62) (1.4)	(16)	(46)
12. Total LDSE Revenue Requirement	$ 4,349 99.9%	$ 1,163=26.9% of Total	3,196=73.8% of Total
13. Interstate Revenue Requirement (12)a{ SPF = .2073 for Non-Traffic Sensitive; MPCU = .093 for Traffic Sensitive }		13(a) $ 239=44.6% of (14) 13(b)	$ 297=55.4% of (14)
14. Total Interstate LDSE Revenue Requirement (13(a) + (13(b))	536 = 12.3% of (12)		
15. Total State LDSE Revenue Requirement (12) - (14)	3,813 = 87.7% of (12)		

Table 3.7

Bell System (Excluding Long Lines) Revenue Requirements for Local Dial Switching Equipment, 1976 ($million)

Source[S7]

The figures to which the factors are applied are themselves the product of an elaborate process where economic, accounting, technological, marketing, legal, political and other managerial and regulatory judgments enter at numerous places. For present purposes, we will skim lightly over this process, although a closer look might well make explicit leverage points of greater consequence than those examined here in detail.

Book costs of plant (Table 3.7, Line 1) themselves reflect a wealth of legislative, regulatory and judicial precedent both as to what belongs in the category and as to its valuation. Like every other element of Table 3.7, these costs are influenced by the level of detail from which they are aggregated, by the accuracy of accounting or estimating, and by judgments as to the appropriate form of accounting and as to appropriate methods of estimating. In this case, the book costs are also divided between costs of so-called "non-traffic sensitive" and "traffic sensitive" equipment. The Separations Manual defines the cost of non-traffic sensitive equipment as follows:

> "The cost of non-traffic sensitive equipment comprises the cost of those items of equipment used jointly for both exchange and toll services, the quantities of which are determined as a function of the number of subscriber lines terminated and which in no way are a function of the busy hour or total volumes of attempts, calls, or messages offered to or switched by the office, together with a share of the cost of common equipment items, such as aisle lighting, ladders and ladder racks and framing, test equipment, power plants, etc., determined in the manner described in Par. 24.131. The cost of traffic sensitive equipment comprises the cost of all other local dial switching equipment, including its share of the cost of common equipment items.[40]

That multiple judgments are involved in this process is plain. We note merely that technological change is an element in these judgments and that, as of early 1979, the new electronic switching systems in increasingly wide service were still segregated between the two types of plant by the processes derived for their electro-mechanical predecessors, although studies were under way to derive processes tailored to the characteristics of the new technologies.

The intent of the definitions is to segregate those portions of the plant whose short-run costs are arguably fixed and joint costs from those whose short-run costs are arguably variable and dependent on the proportions of state and interstate use. At stake in applying the definition is the fact that, under the Ozark Plan, $1 of non-traffic sensitive revenue requirement yields about 20¢ of interstate revenue requirement while $1 of traffic sensitive revenue requirement yields only 9¢ of interstate revenue requirements. The movement of $1 from one side to the other thus about doubles or halves its associated interstate revenue requirement.

Costs of space are added to those of LDSE (Line 1) to obtain a total LDSE-related gross book cost (Line 2). Net of depreciation reserve (Line 3), this is translated into revenue requirements (Line 4) by applying a rate of return factor here 9%, nominally, after taxes (see Section 3-A1). That factor is the quintessential regulatory factor which, since this is not a rate-setting regulatory proceeding, will not be explored further here.

No essentially new issues are raised by the handling of the various items on lines 5 through 11. We note merely that depreciation (Line 6) and taxes (Line 10) are primarily the result of government policy decisions, while maintenance mainly reflects management judgments as to appropriate relationships between labor and capital inputs and the resulting quality of service.

Line 12 shows the total LDSE revenue requirements to be apportioned between the jurisdictions, with the results given on lines 13-15. We note that lines 12, 14, and 15 are consistent with line 16 of Table 3.4 and with the LDSE line of Table 3.6. The effects of judgments and factor definitions now may therefore be seen in the full context of the path leading from the total industry 1976 revenue requirements of $40.1 billion (Figure 3.1, Box 1) to the LDSE component we have chosen to examine in detail. To complete the picture, it now remains to examine the definitions of the SPF and the WMOU factor.

D. The Ozark SPF Formula

1. From SLU to SPF: The Technicalities of 6% to 20%

In mind-boggling fashion, the SPF is defined in the Separations Manual as the sum of two elements:

(a) Interstate subscriber line use (SLU), representing the interstate use of subscriber plant as measured by the ratio of interstate holding time minutes of use to total holding time minutes of use applicable to traffic originating and terminating in the study area, multiplied by the nationwide ratio of (1) subscriber plant costs assignable to the exchange operation per minute of exchange use to (2) total subscriber plant cost per total minute of use of subscriber plant, plus

(b) Twice the interstate subscriber line use ratio for the study area multiplied by the [CSR] ratio of (1) the nationwide, industrywide average interstate initial 3 minute station charge at the study area average interstate length of haul to (2) the nationwide, industrywide average total toll initial 3 minute station charge at the nationwide average length of haul for all toll traffic for the total telephone industry.[41]

In slightly plainer terms, since January 1971 and still as of mid 1979:

SPF = .85xSLU + 2xSLUxCSR Ratio

or SPF = (.85+2xCSR Ratio)xSLU

The net effect is to multiply the SLU factor by the other factor in parentheses.

To steady the boggling mind, we first note that, as of 1978, the interstate SLU factor (defined above on p.) had an average value, for Bell System companies, of about .06 or 6%. The resulting SPF value was about .20 or 20%, as applied in Table 3.7. The value of the factor multiplying the SLU factor was therefore $\frac{.20}{.06}$ = 3 1/3. These are the values used in constructing the examples of Table 3.3 that described the interaction of various apportionment schemes with shifts in PLS and MTS usage.

Before examining the origins of this formula as well as the details of its elements, we note that it is merely one of a series, the one introduced in 1970 and still in effect early in 1979. Table 3.8 shows the effects of successive plans from 1947 to 1978. Changes on the way from a pristine SLU-factor-only allocation in 1947 to the SPF, beginning in Jan. 1971, are most clearly evident in lines 1 and 5, which are least contaminated by plant allocated according to other factors. The differences between 23.96%

on line 1, 24.09% on line 5, and the 20% Bell System average stems from the facts that Table 3.8 is based on data from United Telecommunications, not Bell, and that the categories are a composite of the categories used in Table 3.4, as the brackets in Column 7 of that chart make plain.

Line 4 of Table 3.8 shows the combined effects of the SPF and WMOU allocations as applied in detail in Table 3.7. Since line 4 of Table 3.8 corresponds directly to line 16 (LDSE) of Table 3.4, the Ozark entry in the former and the Column 7 entry of the latter are identical. The Ozark entry in Line 4, Table 3.8 differs from the corresponding Bell entries (Table 3.4, Line 16, Column 5; Table 3.7, Lines 13 and 14) because of company and geographic differences, about which more later.

Figure 3.2 shows how, on the average, SLU became SPF over the years. The data are for the Bell System and are, to the best of our knowledge, uncontaminated by other allocation factors. The actual SPF values applied to plant depend, as illustrated by Figure 3.3, on the average number of miles traveled by calls using that plant.[42]

2. Deterrent Effects as Actual Use: Political Reality

The mature SPF of 1971 emerged in fledgling form in what Table 3.8 and Figures 3.2 and 3.3 label as the FCC plans of 1967 and 1969, as outlined in FCC decisions in Docket 16258 in July 1967[43] and Docket 17975 in January 1969.[44]

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."[45] 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."[46]

	1973 Total Investment ($ Millions)	Interstate Allocation (% of Total Investment in category as allocated to interstate costs according to successive separations plans)						
		1947	Charleston 1952-57	1957	Denver 1966	FCC-16258 1967	FCC-17975 1969	Ozark 1971
1. Station Equipment	322.7	6.91	11.66	12.11	10.41	18.79	21.50	23.96
2. Exchange Circuit Equip.	43.3	4.48	6.89	12.35	7.05	11.25	12.61	15.15
3. Toll Switching Equip.	3.1	6.91	6.89	37.46	37.46	37.46	37.46	37.46
4. Local Dial Switching Equip.	258.2	6.91	6.89	6.89	9.47	9.47	9.47	15.43
5. Exchange Outside Plant	545.2	6.83	11.66	11.82	10.04	18.11	20.71	24.09
6. Interexchange Outside Plant	33.1	42.67	42.67	42.67	42.67	42.67	42.67	42.67
7. Interexchange Circuit Equip.	119.8	47.91	47.91	47.91	47.91	47.91	47.91	47.91
	1,325.4							*24.72

* weighted average

Table 3.8

Effects of Successive Separations Plans for an Independent Telephone Company, 1947-1971

Source[S8]

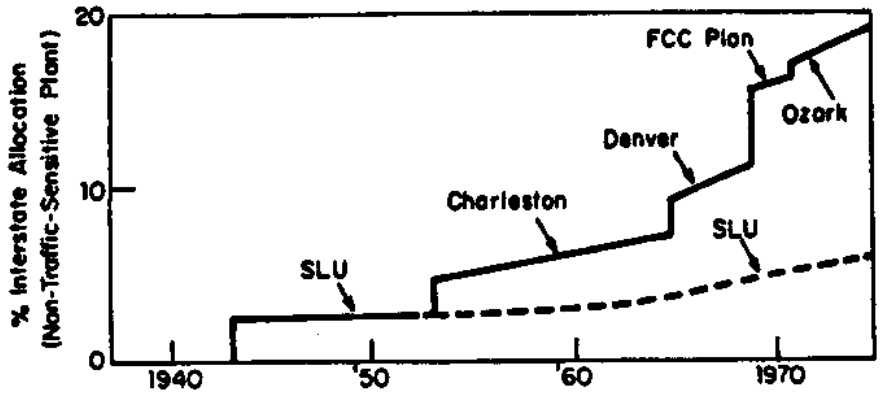


Figure 3.2

Effects on Non-Traffic Sensitive Plant Allocations of Successive Separations Plans for the Bell System, 1947-1975

Source[S9]

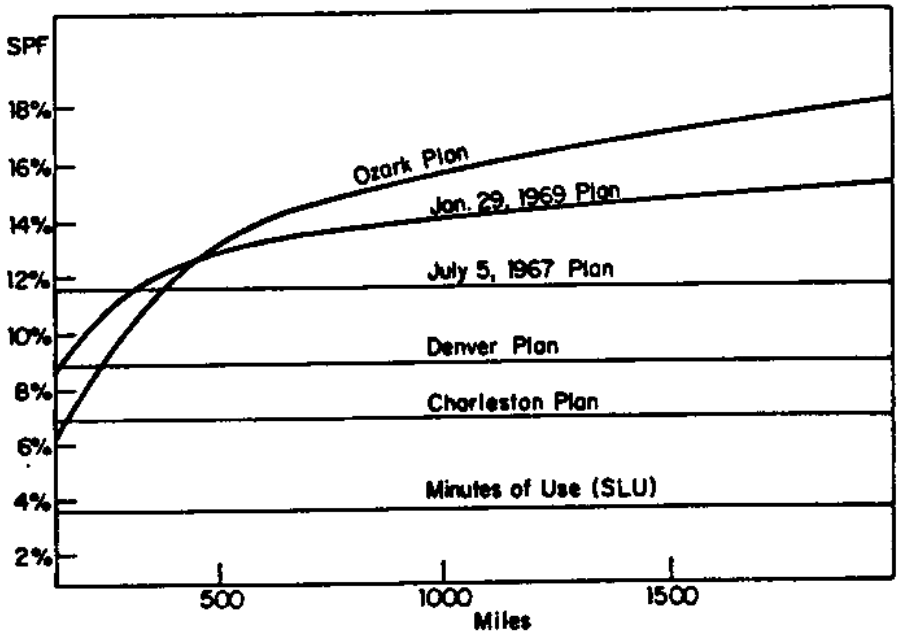


Figure 3.3

Illustrative Subscriber Plant Factors (SPF) for Use in Telephone Cost Separations

Source[S10]

It concluded 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."[47] The addition of a uniform nationwide factor to a base varying according to actual use state-by-state ("study area," roughly) was justified on the ground that "the deterrent features...tend to operate in a similar fashion from study area to study area."[48]

From a judicial viewpoint, given a well-constructed record, that 1967 conclusion might perhaps still be within the bounds of not ignoring "altogether the actual uses to which the property is put."[49] But, by 1969, other objections to the plan had arisen, among them the allegation that it ignored each study area's "geographical location and community of interest with other parts of the Nation,"[50] producing "inequitable results among the States."[51] Other objections alleged failure to adequately reflect "the increasing deterrent effect...as the calling distances increase"[52] and the lack of "incentive for the development of additional interstate business in a given study area."[53] This combination of geopolitical and fairness-among-suppliers arguments underlies continuing debates over the structure of the communications-based industries.

The FCC rejected an alternative proposal of the Bell System, supported by the NARUC, finding it in one part inconsistent with the deterrent rationale[54] and criticizing the "arbitrary and contrived nature"[55] of another part that it characterized as "premised primarily, if not solely, on the position that it would improve the results...as among the various States."[56] Nonetheless, the FCC concluded that the deterrent effect did increase with distance called, thereby deterring the Midwest, for example, less than the Coasts and that "subscribers in large population centers located close to each other, but separated by State boundaries, would tend to have a high[er] calling rate between them...than subscribers located in large population centers at greater interstate distances from other population centers."[57]

Consequently, the plan adopted by the FCC in January 1969 incorporated a distance-sensitive additive factor foreshadowing the CSR Ratio element of the Ozark SPF formula. On the whole, as shown in Table 3.8 and Figures 3.2 and 3.3, both the 1967 and 1969 decisions continued a trend toward higher interstate shares of a joint plant costs. We defer analysis of state-by-state effects pending the conclusion of our analysis of the Ozark Plan's SPF formula.

3. The Birth of 0.85: Residual as Actual Use

In Section 3-B4, we described the SLU factor without differentiating the state component of usage as between state toll usage and local area calling. This differentiation plays a role in rate-setting in some states and in all the arrangements for revenue sharing among telephone companies described in Part 4. It is also necessary to an understanding of the Ozark SPF formula. This differentiation is reflected in the following formula for the SLU factor:

$$\left.\begin{matrix}\text{Interstate Toll}\\ \text{State Toll}\\ \text{Local}\end{matrix}\right\} \text{ SLU Factor } = \frac{\left.\begin{matrix}\text{Interstate Toll}\\ \text{State Toll}\\ \text{Local}\end{matrix}\right\} \text{ MOU}}{\text{Interstate Toll MOU+State Toll MOU+Local MOU}}$$

When the Ozark Plan was being formulated in 1970, discussion focused on SLU factors for the Bell System with the average 1969 values listed in Table 3.9.[58]

The modifications to the FCC plan (Section 3-D2), as described by AT&T in 1969, defined the average Bell System deterrent additives as 2xSLUx1.22 = 11.956% for interstate toll and as 2xSLUx.59 = 5.664% for state toll, for a total deterrent additive of 11.956% + 5.664% = 17.62%. 1.22 and .59 were the respective nationwide average CSR Ratios at the time.

The residual 100%-17.62% = 82.38% was rounded to 85% and substituted for 90.3% (Table3.9) as the "nationwide ratio of (1) subscriber plant costs assignable to the exchange operation per minute of exchange use to (2) total subscriber plant cost per total minute of use of subscriber plant" in the Separations Manual's definition of the SPF as quoted in Section 3-D1.[59] As of early 1979, this 85% value remained in the SPF formula (SPF = .85 SLU +2xSLUxCSR Ratio).

Interstate Toll	4.9%
State Toll	4.8%
Local	90.3%

Table 3.9

Bell System 1969 SLU Factors

Source[S11]

	① SLU	② .85 SLU	③ 2xSLUxCSR Ratio	④ SPF
Interstate Toll	4.9%	4.2%	12.0%	16.2%
State Toll	4.8%	4.1%	5.7%	9.8%
Local	90.3%	76.8%	---	76.8%
Total	100.0%	85.1	17.7%	102.8 / 102.8

Table 3.10

The SPF Formula Applied to 1968 Bell Data

Source[S12]

	① SLU	② .85 SLU	③ 2xSLUxCSR Ratio	④ SPF
Interstate Toll	5.8%	4.9	14.9%	19.8%
State Toll	12.0%	10.2	12.8%	23.0%
Local	82.2%	69.9	--	{Residual} { 57.2% }
Total	100.0%	85.0	27.7	112.7 / 100%

Table 3.11

The SPF Formula Applied to 1976 USITA Data

Source[S13]

In 1968 the .85 value made everything add up properly as shown in Table 3.10 where the two totals in Column 4 differ from 100% only because of the rounding of .8238 to .85. As usage has shifted, however, the constancy of the .85 factor yields 100% only if local use is defined as the residue of total use less toll use as adjusted by the deterrent factor. This is illustrated in Table 3.11.[60]

Indeed, for SLU values within the observed 1976 ranges shown in Table 3.12, the residual local use can go negative, a phenomenon avoided in practice only by putting a ceiling of 85% on the combined interstate and state SPF's, hence a floor of 15% on residually defined local use.

The SLU values depend, of course, on how minutes of use are measured. Without having inquired into the details of measurement, we merely note that the generic questions of the nature of sampling, the level of aggregation and averaging, etc., outlined in Section 3-C, manifest themselves in ways particular to each kind of measurement.

As of mid-1979, for instance, calls made around the clock during the whole week were taken into account in developing SLU factors. But the average number of minutes per toll call (holding time) used in developing toll minutes of use (MOU) was, in the Bell System, derived exclusively from weekday calls; GT&E procedures specify an adjustment which reflects weekend usage as well.[63] As of mid-1979, study area SLU factors were computed and applied monthly. Prior to 1971, various running averages had been in use.[64]

	Interstate				State			
	SLU (%)		SPF (%)		SLU (%)		SPF (%)	
	Largest	Smallest	Largest	Smallest	Largest	Smallest	Largest	Smallest
Bell	16.16 (NV)	4.06 (MI)	53.17 (NV)	13.44 (MI)	15.60 (NJ)	2.04 (DE)	24.40 (MT)	3.90 (DE)
Continental	37.32 (CO)	3.88 (MI)	56.05 (MT)	12.51 (TN)	36.74 (NJ)	5.32 (TN)	53.02 (MI)	10.89 (TN)
GT&E	14.49 (ID)	4.14 (CA)	44.77 (ID)	14.92 (MI)	17.34 (IA)	5.42 (NM)	31.35 (MI)	11.48 (WV)
United	16.99 (CA)	2.67 (TX)	42.31 (CA)	9.58 (TX)	28.12 (NJ)	4.07 (TN)	45.28 (NJ)	4.70 (OR)

Table 3.12

Range of 1976 SLU Factor and SPF Values

Source[S14]

4. The CSR Ratio: Weighted Deterrence and Averaging

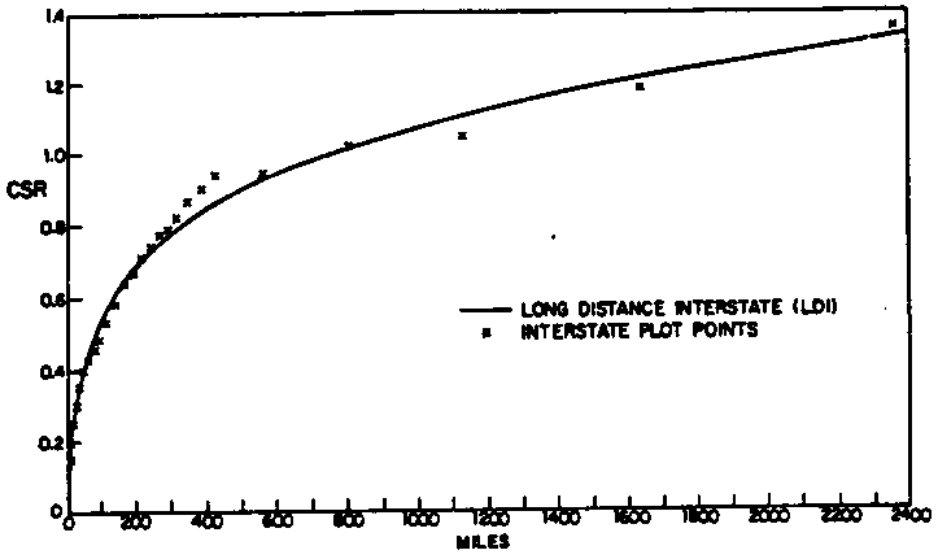
CSR stands for Composite Station Rate, and a CSR Ratio is the ratio of two CSRs that incorporates both national averaging and study area specificity to reflect compromises such as were reached in debates like those described in Section 3-D2. We now turn to a concrete description of the CSRs as defined in the Separations Manual (Section 3-D1).

The interstate CSRs are read from curves (Figure 3.4(b)) fitted to points plotted as follows.[61] One point was plotted for each mileage band in the interstate rate schedule, the 26 interstate mileage bands as of 1968 ranging from 1-10 miles to 1911-3000 miles (Figure 3.4(a)). The numbers of orginating day, evening, and weekend station-to-station calls in October 1968 were estimated using data from a nationwide sampling study. Let these numbers be d, e, and w, respectively. To each such call there corresponds a price p_d, p_e, and p_w, respectively, for a 3-minute station-to-station call within the mileage band. Whatever the actual duration of calls might have been, these 3-minute prices were used to calculate an average rate per call r, according to the formula:

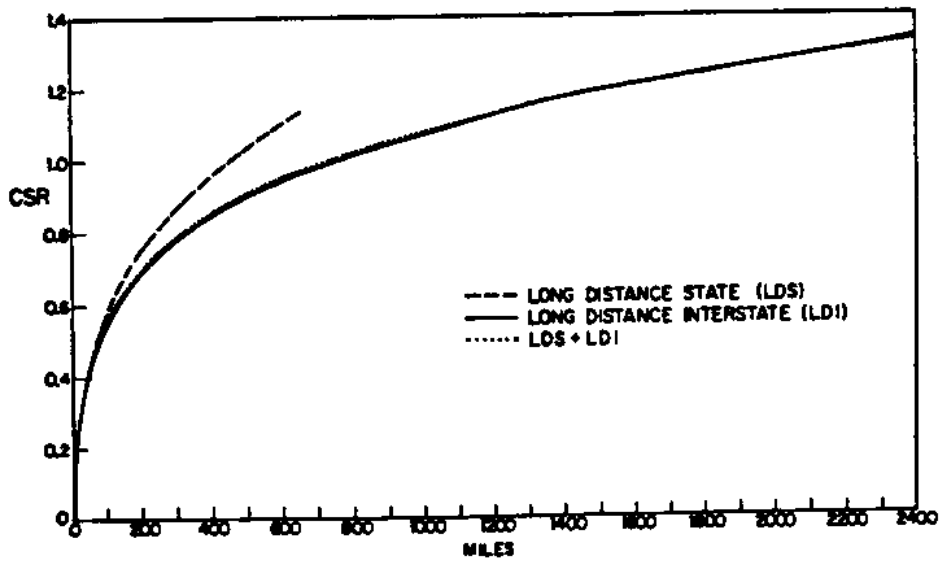
$$r = \frac{d \cdot p_d + e \cdot p_e + w \cdot p_w}{d + e + w}$$

Where along the distance (length of haul or LOH) axis within the rate band each value of r is actually plotted is determined by an average distance (ALOH) determined from sampled distances d_i by the formula:

$$\text{ALOH} = \frac{\Sigma\, n_i d_i}{\Sigma\, n_i}$$



Plot Points and Fitted "A + B (ALOH)^{C_u} Formula
(a)



CSR Curves
(b)

Figure 3.4

Composite Station Rate (CSR) as a Function of Length of Haul (LOH) (based on October 1968 data)

Source[S15]

where n_i is the number of calls at distance d_i. For example r for the 1-10 mile band was plotted at 7 miles and r for the 1911-3000 mile band at 2321 miles.

The LDI (Long Distance-Interstate) curve of Figure 3.4 was then obtained by fitting the 26 points with a curve of the form:

$$CSR = A + B(ALOH)^C \quad .$$

The Separations Manual description of the numerator of the interstate CSR Ratio, namely as the "nationwide, industrywide average interstate initial 3-minute station charge at the study area average interstate length of haul" may now be concretely interpreted. For each study area an average interstate length of haul from that study area is calculated from a sample like that which yielded the LDI curve. That study area ALOH is then used to determine a point along the LOH scale. The corresponding point on the CSR scale according to the LDI curve is the numerator of the interstate CSR Ratio for that study area.

The process for obtaining the denominator of the interstate CSR ratio is similar, except that data for intrastate calls sampled from all states (except, as of mid-1979, Alaska and Hawaii) are combined with the interstate data in calculating and plotting points for an "LDS + LDI" curve. The averaging processes involved are not detailed here.[62] Fitting another curve of the form $CSR = A + B(ALOH)^C$ yielded the LDS + LDI curve of Figure 3.4(b).

The denominator of the interstate CSR Ratio is defined by the Separations Manual as "the nationwide, industrywide average total toll initial 3-minute station charge at the nationwide average length of haul

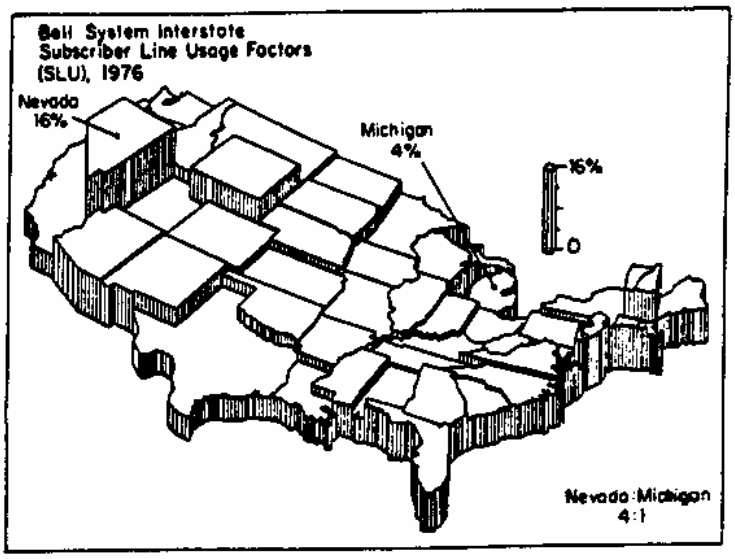
for all toll traffic for the total telephone industry." From the 1968 sample, that "nationwide...average length of haul..." was determined to be 208 miles. The CSR value, $0.711, which corresponds to 208 miles on the LOH scale according to the LDS + LDI curve is the denominator used in every state. From the same sample, the entire Bell System's 1968 interstate toll ALOH was determined to be 437 miles, corresponding according to the LDI curve to a CSR of $0.866. The Bell System's interstate toll average CSR ratio is therefore 0.866/0.711 = 1.22, the value noted in Section 3-D3.

The state CSR Ratio requires one additional curve, the LDS curve of Figure 3.4(b). The total state data used for determining the LDS + LDI curve are used for this purpose, in a manner analogous to what has been described for the LDI and LDS + LDI curves, but without commingling and averaging any of the interstate data. The intrastate ALOH for a given state is used to enter the LDS curve to get a CSR for the numerator of the intrastate ratio for that state. The denominator of the intrastate CSR ratio is the same, $0.71, as the interstate denominator.

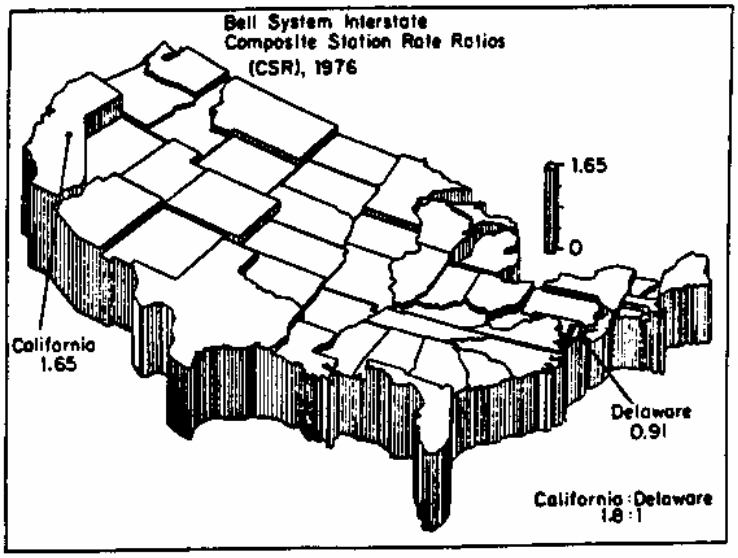
5. State-by-State Incidence of SPF-Based Interstate Allocations

Figure 3.5 and Table 3.13 display interstate SLU, CSR Ratio and SPF values state by state.

The SLU factor measures actual usage within the limitations sketched in Section 3-D3. On the average, as already noted, applying the formula with the .85 and the CSR Ratio in it reinterprets actual interstate usage from the 6% SLU level to the 20% SPF level. The higher the SPF is, the greater is the proportion of the costs--and, under current practices,



(a)



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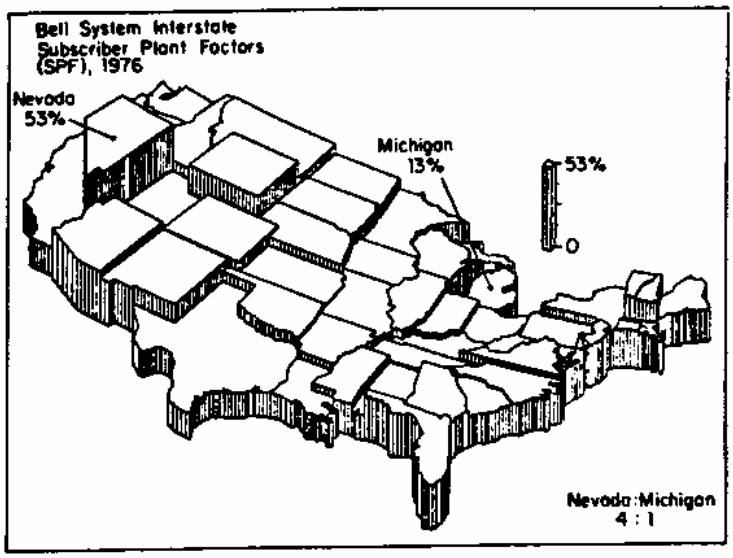


(c)

Figure 3.5

State-by-State Values of Interstate SLU, CSR Ratio and SPF, 1976

Source[S16]

	SLU %	CSR Ratio	SPF %
AL	4.83	1.21	15.79
AZ	8.53	1.47	32.33
AR	6.46	1.17	20.61
CA	4.45	1.65	18.42
CO	7.89	1.40	28.80
CT	8.41	1.03	24.47
DE	10.34	0.91	27.61
FL	7.27	1.47	27.55
GA	6.92	1.24	23.04
ID	9.15	1.26	30.86
IL	6.38	1.20	20.68
IN	5.78	1.16	18.26
IA	6.48	1.17	20.67
KS	6.63	1.21	21.68
KY	5.01	1.11	15.36
LA	4.67	1.27	15.83
ME	6.57	1.16	20.83
MD	5.67	1.11	17.41
MA	6.62	1.14	20.72
MI	4.06	1.23	13.44
MN	5.67	1.30	19.56
MS	6.35	1.17	20.26
MO	6.36	1.19	20.54
MT	8.94	1.36	31.92
NE	8.27	1.22	27.21
NV	16.16	1.22	53.17
NH	12.70	0.92	34.16
NJ	9.98	0.92	26.85
NM	8.02	1.32	27.99
NY	7.15	1.16	22.67
NC	6.36	1.16	20.16
ND	7.97	1.21	26.06
OH	4.62	1.19	14.92
OK	6.79	1.26	22.88
OR	6.67	1.32	23.66
PA	5.76	1.05	16.99
RI	8.05	0.98	22.62
SC	6.01	1.15	18.93
SD	8.49	1.19	27.42
TN	5.31	1.19	17.15
TX	4.46	1.39	16.16
UT	6.69	1.36	23.88
VT	12.33	1.00	35.14
VA	7.11	1.20	23.11
WA	5.66	1.38	20.43
WV	6.02	1.04	17.64
WI	5.51	1.17	17.58
WY	12.69	1.23	42.00

Ranked

SLU %		CSR Ratio		SPF %	
NV	16.16	CA	1.65	NV	53.17
NH	12.70	AZ	1.47	WY	42.00
WY	12.69	FL	1.47	VT	35.14
VT	12.33	CO	1.40	NH	34.16
DE	10.34	TX	1.39	AZ	32.33
NJ	9.98	WA	1.38	MT	31.92
ID	9.15	MT	1.36	ID	30.86
MT	8.94	UT	1.36	CO	28.80
AZ	8.53	NM	1.32	NM	27.99
SD	8.49	OR	1.32	DE	27.61
CT	8.41	MN	1.30	FL	27.55
NE	8.27	LA	1.27	SD	27.42
RI	8.05	ID	1.26	NE	27.21
NM	8.02	OK	1.26	NJ	26.85
ND	7.97	GA	1.24	ND	26.06
CO	7.89	WY	1.23	CT	24.47
FL	7.27	MI	1.23	UT	23.88
NY	7.15	NV	1.22	OR	23.66
VA	7.11	NC	1.22	VA	23.11
GA	6.92	ND	1.21	GA	23.04
OK	6.79	AL	1.21	OK	22.88
UT	6.69	KS	1.21	NY	22.67
OR	6.67	VA	1.20	RI	22.62
KS	6.63	IL	1.20	KS	21.68
MA	6.62	SD	1.19	ME	20.83
ME	6.57	TN	1.19	MA	20.72
LA	6.48	OH	1.19	IL	20.68
AR	6.46	MO	1.19	IA	20.67
IL	6.38	WI	1.17	AR	20.61
NC	6.36	LA	1.17	MO	20.54
MO	6.36	MS	1.17	WA	20.43
MS	6.35	AR	1.17	MS	20.26
WV	6.02	NY	1.16	NC	20.16
SC	6.01	IN	1.16	MN	19.50
IN	5.78	ME	1.16	SC	18.93
PA	5.76	NC	1.16	CA	18.42
MD	5.67	SC	1.15	IN	18.26
MN	5.67	MA	1.14	WV	17.64
WA	5.66	MD	1.11	WI	17.58
WI	5.51	KY	1.11	MD	17.41
TN	5.31	PA	1.05	TN	17.15
KY	5.01	WV	1.04	PA	16.99
AL	4.83	CT	1.03	TX	16.16
LA	4.67	VT	1.00	LA	15.83
OH	4.62	RI	0.98	AL	15.79
TX	4.46	NH	0.92	KY	15.36
CA	4.45	NJ	0.92	OH	14.92
MI	4.06	DE	0.91	MI	13.44

Table 3.13

State-by-State Values of Interstate SLU, CSR Ratio and SPF, 1976

Source[S17]

of the revenue requirements--of jointly used plant that is allocated to the federal jurisdiction and the less the share of combined state toll and local revenue requirements.

Applying the SPF formula to the interstate SLU factor not only boosts the average level of federal costs but it also has differential effects on the states, altering their usage rankings as shown in Table 3.13 and Figure 3.6. Intrastate factors, their variation and their significance are discussed in Section 4.

California provides an instructive example. Its interstate SLU factor of 4.45 is the second lowest, only Michigan having a lower value (Table 3.13). But, since California's CSR Ratio of 1.65 is the highest, the resulting SPF of 18.42 is thirteenth from the bottom, thus boosting California's share of costs--and revenue requirements--transferred to the federal jurisdiction over what it would be, relative to other states, under a SLU-based allocation.

Among its several objections to the Ozark Plan as proposed in 1970, California charged that "distribution of revenue requirement benefits by states is very erratic, with a number of states negative and disporportionately large benefits to several smaller states."[65] California also described the CSR Ratio as "deficient in that it assumes that the deterrent to interstate usage is directly proportional to the interstate rates alone and the CSR ratio squared provides a better correlation to the traffic deterrence index than the first power of the CSR ratio."[65]

The FCC dismissed the first contention as base "on the invalid premise that the Ozark Plan subscriber plant procedures were designed to uniformly increase interstate revenue requirements rather than to meet the objectives

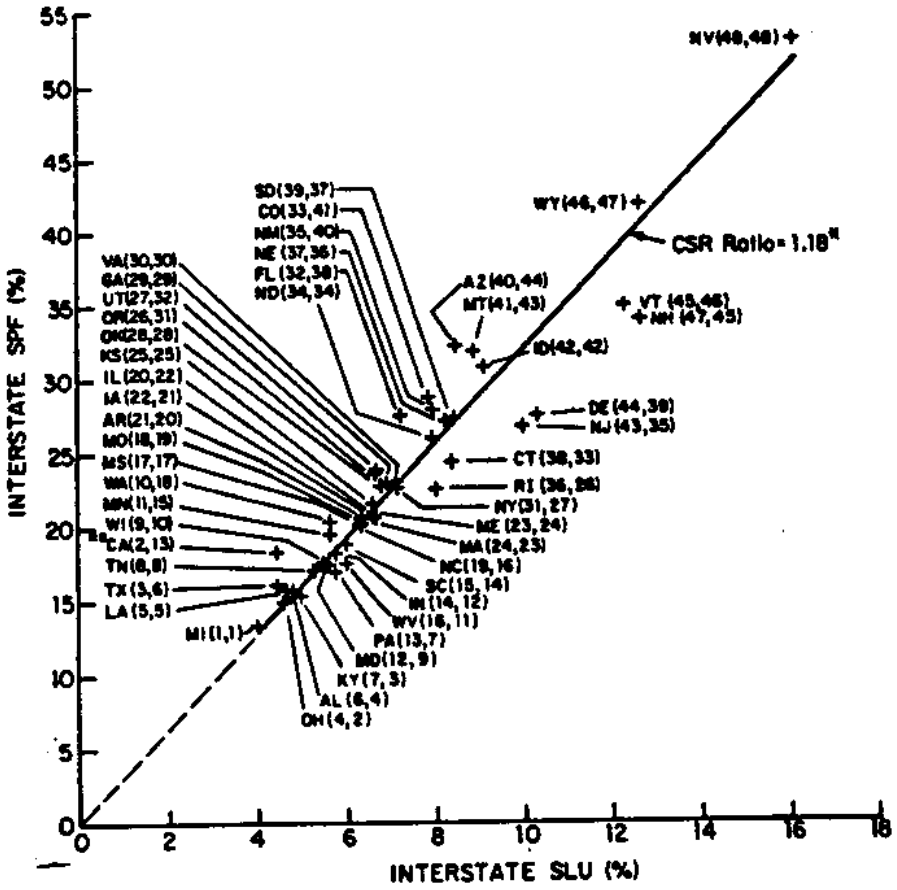


Figure 3.6

Impact of CSR Ratio on Ranking of Interstate Usage, 1976

Source[S18]

* SPF = 3.20 SLU (Least-Squares Fit)
= (0.85 + 2 x 1.18) SLU

** CA (2,13) refers to rank and not to coordinates. It means that California (CA), which ranks second from the bottom among state SLU factors, ranks thirteenth from the bottom in interstate SPF.

discussed in the Commission's Notice."[67] The Notice said that the need for revision of the 1969 rules described in Section 3-D2 was based on the following considerations:

> "(1) the present procedures tend to inflate the costs of short haul toll traffic and understate the costs of long haul traffic because of the way in which the "deterrent" additive in the present procedures is applied; (2) the present procedures do not appropriately reflect the widely varying deterrent effect of the toll rate schedules as the distance changes; (3) the present procedures, because they tend to inflate costs of short haul toll traffic, cannot appropriately be used for the separation of intrastate operations between exchange and intrastate toll nor for the ascertainment of legitimate toll costs of the various carriers for settlement purposes; and, (4) the present procedures fail to give appropriate recognition to the fact that a significant portion of the local dial switching equipment is nontraffic sensitive and, therefore, should be revised to accord such portion the same principle of allocation as is applied to subscriber plant."[68]

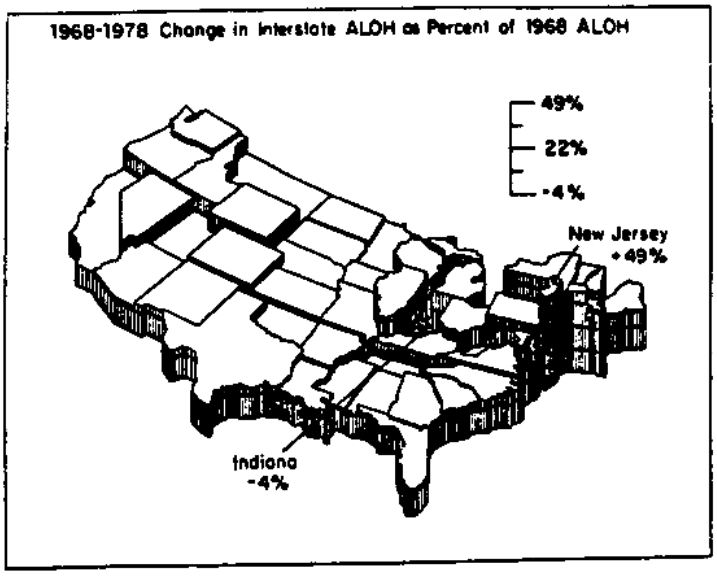
Since interstate CSR ratios (Table 3.13) are generally greater than unity, only four having values between .9 and 1, squaring them would generally increase their value. Since California's 1.65 is already the largest, 12% greater than Arizona's or Florida's 1.47, squaring the values would both change that 12% differential to a 26% differential and also increase the average SPF above the Ozark 20% level. "From the comments submitted in the proceeding," the FCC said, "it is apparent that this suggested approach is subject to substantial questions as to its validity."[69] It referred the matter to be "appropriately evaluated by and reported on by the Staff Committee for consideration and action of the Joint Board."[70]

The CSR curves of Figure 3.4 depend on prices both directly through the price terms in the formula for the plot points of Figure 3.4(a) and

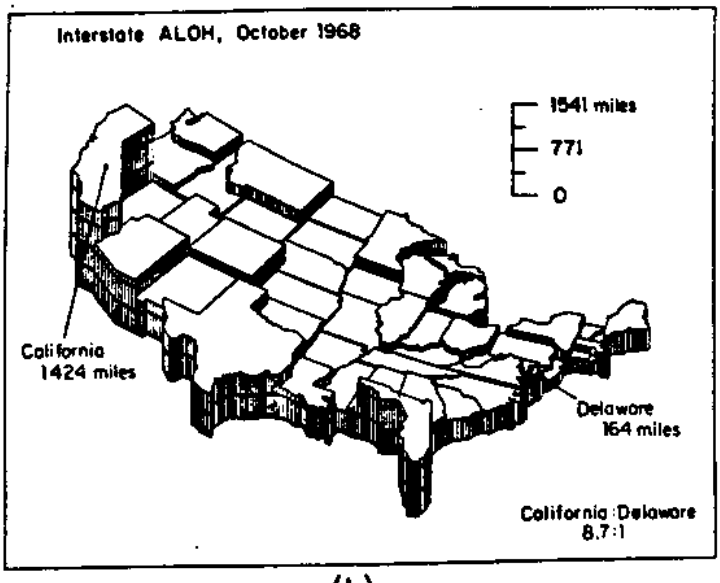
indirectly as the relationship between price and demand influences the relative numbers of day, evening and night calls also entering into that formula. To the extent that relative demand is influenced by factors other than price, the plot points might change even if prices stayed fixed. CSR curves fitted to samples other than those taken in October 1968 might therefore differ from those in Figure 3.4. As of mid-1979, however, CSR ratios for the entire industry were still derived from precisely the curves shown in Figure 3.4.

The CSR values entering into a CSR ratio depend not only on the curves used to evaluate both numerator and denominator, but also on the ALOH values used to read off corresponding CSR values. Bell System CSR ratios as of mid-1979 were still based on ALOH values as of October 1968, as well as on the curves of Figure 3.4, a total freeze. At least some Independents, however, while adhering to the frozen curves of Figure 3.4 and the frozen denominator, enter the frozen curves for numerator values with current study area ALOH values. Both practices are consistent with reasonable readings of the Separations Manual definitions of numerator and denominator of the CSR ratio.

Figure 3.7 and Table 3.14 indicate that, on the whole, interstate haul lengths have increased over a decade by percentages ranging from about 6% for Tennessee to about 50% for New Jersey. Only Indiana shows a negative change (-4.3%). With frozen CSR curves and a frozen denominator, entering the LDI curve for a denominator from anywhere but Indiana with a current ALOH yields a total interstate allocation increased over what it would be with a frozen ALOH; and, given the Bell System's total freeze, thus yields a share of that allocation increased relative to the Bell System's.



(a)



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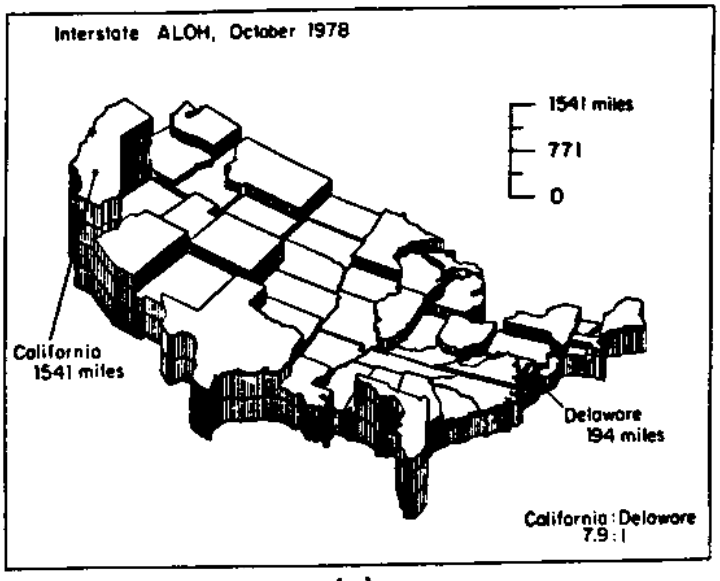


(c)

Figure 3.7

Changing Interstate Bell System ALOH, 1968-1978

Source: S19

	1968-1978 % Change in ALOH	Interstate ALOH October 1968	Interstate ALOH October 1978
AL	8.27	423	458
AZ	11.43	901	1,004
AR	13.68	380	432
CA	8.22	1,424	1,541
CO	15.71	732	847
CT	42.86	245	350
DE	18.29	164	194
FL	10.63	894	989
GA	11.73	469	524
ID	19.40	500	597
IL	25.24	424	531
IN	-4.30	372	356
IA	11.64	378	422
KS	12.59	429	483
KY	14.15	311	355
LA	11.94	511	572
ME	18.70	369	438
MD	22.61	314	385
MA	31.79	346	456
MI	20.58	452	545
MN	8.39	548	594
MS	9.87	375	412
MO	15.33	398	459
MT	10.79	658	729
NE	10.54	446	493
NV	16.93	443	518
NH	36.63	172	235
NJ	49.12	171	255
NM	13.61	595	676
NY	42.31	364	518
NC	14.60	370	424
ND	10.65	432	478
OH	20.10	398	478
OK	9.90	495	544
OR	19.20	578	689
PA	27.59	261	333
RI	27.75	209	267
SC	13.81	362	412
SD	9.65	404	443
TN	5.75	400	423
TX	13.62	712	809
UT	8.86	655	713
VT	37.95	224	309
VA	16.30	411	478
WA	21.44	695	844
WV	8.66	254	275
WI	17.28	382	448
WY	19.56	450	538

Ranked

1968-1978 % Change in ALOH		Interstate ALOH October 1968		Interstate ALOH October 1978	
NJ	49.12	CA	1,424	CA	1,541
CT	42.86	AZ	901	AZ	1,004
NY	42.31	FL	894	FL	989
VT	37.95	CO	732	CO	847
NH	36.63	TX	712	WA	844
MA	31.79	WA	695	TX	809
RI	27.75	MT	658	MT	729
PA	27.59	UT	655	UT	713
IL	25.24	NM	595	OR	689
MD	22.61	OR	578	NM	676
WA	21.44	MN	548	ID	597
MI	20.58	LA	511	MN	594
OH	20.10	ID	500	LA	572
WY	19.56	OK	495	MI	545
ID	19.40	GA	469	OK	544
OR	19.20	MI	452	WY	538
ME	18.70	WY	450	IL	531
DE	18.29	NE	446	GA	524
WI	17.28	NV	443	NV	518
NV	16.93	ND	432	NY	518
VA	16.30	KS	429	NE	493
CO	15.71	IL	424	KS	483
MO	15.33	AL	423	ND	478
NC	14.60	VA	411	OH	478
KY	14.15	SD	404	VA	478
SC	13.81	TN	400	MO	459
AR	13.68	MO	398	AL	458
TX	13.62	OH	398	MA	456
NM	13.61	WI	382	WI	448
KS	12.59	AR	380	SD	443
LA	11.94	IA	378	ME	438
GA	11.73	MS	375	AR	432
IA	11.64	IN	372	NC	424
AZ	11.43	NC	370	TN	423
MT	10.79	ME	369	IA	422
ND	10.65	NY	364	MS	412
FL	10.63	SC	362	SC	412
NE	10.54	MA	346	MD	385
OK	9.90	MD	314	IN	356
MS	9.87	KY	311	KY	355
SD	9.65	PA	261	CT	350
UT	8.86	WV	254	PA	333
WV	8.66	CT	245	VT	309
MN	8.39	VT	224	WV	276
AL	8.27	RI	209	RI	267
CA	8.22	NH	172	NJ	255
TN	5.75	NJ	171	NM	235
IN	-4.30	DE	164	DE	194

Table 3.14

Changing Interstate Bell System ALOH, 1968-1978

Source[S20]

The other element in the SPF formula, namely the SLU factor, is kept current. The data in Figure 3.8 and Table 3.15 isolate the effects of CSR ratio freezing from those attributable to changing SLU. The baseline for comparison implicit in those data is actual Bell System state-by-state interstate revenue requirements for 1977, based on 1977 SLU values and on CSR ratio values as frozen for the Bell System since 1968, i.e., as derived from frozen CSR curves with frozen ALOH values. Figure 3.8(a) and the "frozen curve" columns of Table 3.15 show what percent changes in interstate revenue requirement allocations--relative to the baseline--would result from using 1977 ALOH values to enter the frozen 1968 CSR curves of Figure 3.4 to get both numerator and denominator CSR values for determining CSR ratios.

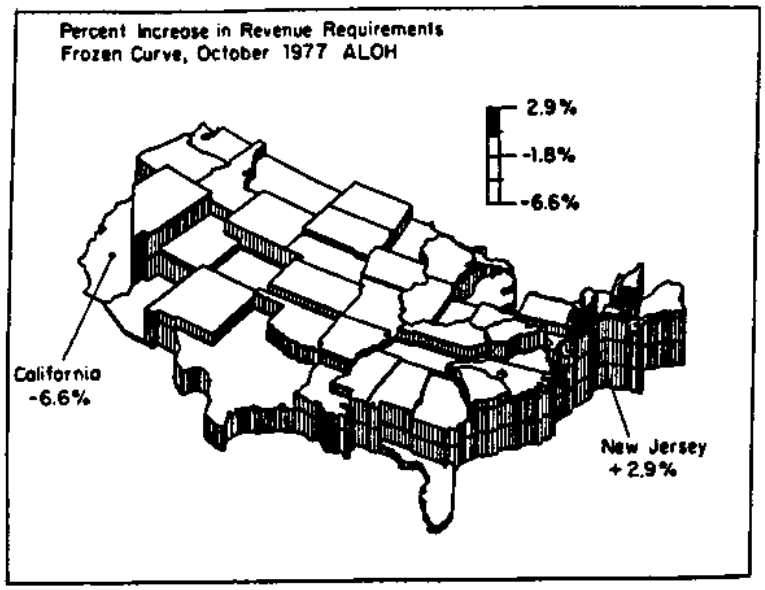
California, Arizona, Florida, Colorado and Texas would account for the largest percentage changes, all of them leading to reductions in the interstate allocation and to offsetting increases in state allocations. California, Florida, Texas, New York and New Jersey would exhibit the largest absolute changes, with the first four having the largest reductions in interstate allocation and New Jersey the largest increase. For California, for example, the 1977 SLU value of 4.78% is translated into a SPF value of 19.84% by the actual (frozen) CSR ratio value of 1.65. This compares to a SPF value of 18.42% translated from a 1976 SLU value of 4.45% by the same frozen 1.65 CSR ratio value (Table 3.13). That same 1977 SLU value of 4.78% yields a SPF value of only 16.49% when current ALOH values are used to enter the frozen CSR curve yielding a CSR ratio of 1.30.[71]

Figure 3.8(b) and the "October 1977 Curve" columns of Table 3.15 show what percent changes in interstate revenue requirement allocations--again relative to the baseline--would result from fitting a different formula to points calculated on the basis of prices in effect in October 1977 and the number of calls in that same month. This formula ($CSR = A + B[\ell n(ALOH)] + C[\ell n(ALOH)]^2$), under consideration, as of mid-1979, by the New York Public Service Commission and the FCC staff, is represented as giving a statistically better fit to points derived from October 1977 price and demand data. It is evident that, on the whole, more pronounced negative changes in interstate allocations would result from using it with October 1977 ALOH values.

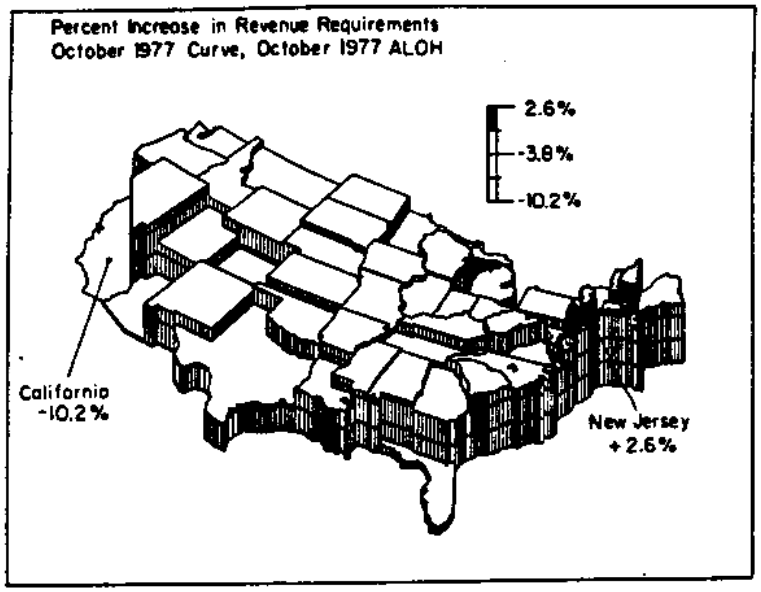
In November 1976 the FCC created a new Joint Board to reexamine jurisdictional separations to assess the impact of growing competition, specifically the "impact of customer provision of terminal equipment"[72] and also to ascertain "what safeguards should be incorporated to ensure that any revenues flowing from the interstate revenue pool are distributed among various basic local services according to public rather than private policies."[73]

E. Weighted Minutes of Use

Table 3.7 showed that about 45% ($239 million) of the LDSE interstate revenue requirement was derived by applying a SPF averaging 20% to return and expenses of the non-traffic sensitive portion of LDSE. The other 55% (297 million) resulted from applying an average 9% WMOU factor to the traffic sensitive portion.



(a)



(b)

Figure 3.8

State-by-State Impact of Substituting Thawed for Frozen CSR Ratios on Bell System Interstate Revenue Requirements

Source[S21]

	Frozen Curve, October 1977 ALOH (%)	October 1977 Curve, October 1977 ALOH (%)
AL	-2.1	-3.2
AZ	-6.4	-9.9
AR	-1.4	-2.5
CA	-6.6	-10.2
CO	-4.5	-7.4
CT	+0.8	0.0
DE	+1.7	+1.7
FL	-6.0	-9.3
GA	-2.5	-3.8
ID	-2.5	-4.4
IL	-1.4	-3.1
IN	-2.1	-3.0
IA	-1.4	-2.5
KS	-1.8	-3.0
KY	-0.8	-1.7
LA	-2.8	-4.6
ME	-1.2	-2.2
MD	-0.8	-1.8
MA	-0.9	-2.1
MI	-2.1	-3.7
MN	-3.2	-4.9
MS	-1.9	-2.9
MO	-1.6	-2.6
MT	-3.5	-5.2
NE	-2.4	-3.8
NV	-1.7	-2.7
NH	+2.2	+2.0
NJ	+2.9	+2.6
NM	-3.1	-5.0
NY	-1.0	-2.4
NC	-1.3	-2.4
ND	-1.9	-3.0
OH	-1.6	-2.9
OK	-2.7	-4.3
OR	-2.9	-4.7
PA	+0.3	-0.5
RI	+1.1	+0.5
SC	-1.0	-2.0
SD	-1.9	-3.0
TN	-2.1	-3.2
TX	-4.3	-6.7
UT	-3.8	-5.7
VT	+1.0	+0.5
VA	-2.0	-3.4
WA	-3.4	-5.9
WV	-0.2	-0.7
WI	-1.4	-2.8
WY	-2.4	-4.2

Ranked

Frozen Curve, October 1977 ALOH (%)	October 1977 Curve, October 1977 ALOH (%)
NJ +2.9	NJ +2.6
NH +2.2	NH +2.0
DE +1.7	DE +1.7
RI +1.1	RI +0.5
VT +1.0	VT +0.5
CT +0.8	CT 0.0
PA +0.3	PA -0.5
WV -0.2	WV -0.7
KY -0.8	KY -1.7
MD -0.8	MD -1.8
MA -0.9	SC -2.0
NY -1.0	MA -2.1
SC -1.0	ME -2.2
ME -1.2	NY -2.4
NC -1.3	NC -2.4
WI -1.4	AR -2.5
AR -1.4	IA -2.5
IL -1.4	MO -2.6
IA -1.4	NV -2.7
OH -1.6	WI -2.8
MO -1.6	OH -2.9
NV -1.7	MS -2.9
KS -1.8	KS -3.0
ND -1.9	SD -3.0
SD -1.9	IN -3.0
MS -1.9	ND -3.0
VA -2.0	IL -3.1
AL -2.1	AL -3.2
IN -2.1	TN -3.2
TN -2.1	VA -3.4
MI -2.1	MI -3.7
WY -2.4	NE -3.8
NE -2.4	GA -3.8
GA -2.5	WY -4.2
ID -2.5	OK -4.3
OK -2.7	ID -4.4
LA -2.8	LA -4.6
OR -2.9	OR -4.7
NM -3.1	MN -4.9
MN -3.2	NM -5.0
WA -3.4	MT -5.2
MT -3.5	UT -5.7
UT -3.8	WA -5.9
TX -4.3	TX -6.7
CO -4.5	CO -7.4
FL -6.0	FL -9.3
AZ -6.4	AZ -9.9
CA -6.6	CA -10.2

Table 3.15

State-by-State Impact of Substituting Thawed for Frozen CSR Ratios on Bell System Interstate Revenue Requirements

Source[S22]

Table 3.16 shows the proportions of non-traffic sensitive book costs (hence associated return and expenses) assigned to various types of LDSE[74] as of January 1, 1975. With but minor changes, the proportions and factors are based on sampling studies conducted during 1970.[75] At that time, there were but few electronic switches (ESS) in service. ESS weighting factors were then, and were still as of early 1979, set equal to those for the older #5 crossbar electromechanical switches. Also, as of early 1979, a Joint USITA/Bell Electronic Office Study Group was studying ESS with the aim of recommending factors tailored to the new technology; another group was studying digital switches. As of mid-1979 both studies had been completed but their recommendations not implemented.

Tables 3.7 and 3.16 establish that, on the average, the 6% SLU value is weighted by a factor of 1.5, resulting in the 9% average WMOU value.

F. State-by-State Incidence of Interstate Allocations

Figure 3.9 and Table 3.17 show the composite effect of all the factors which enter into determining the proportions of cost (revenue requirement) allocated to interstate and state jurisdictions. For the Bell System, in the aggregate, 25% of costs are interstate, 75% state.

As the ranked lists of Table 3.17 indicate, there is wide state-by-state variability around the 25% average, with Nevada high at 62% of costs allocated to the interstate jurisdiction and Michigan low at 18%. Dollar amounts for 1976 are shown in Figure 3.10 and Table 3.18.

C.O.E. Type	Office Size (Working Lines)	% Non-Traffic Sensitive Book Cost	Toll Minutes of Use Weighting Factor % Intraoffice Traffic	
			0-50%	51-100%
Step-by-Step[a]	0-5000	35%	2.3	
	Over 5000	25%	1.5	1.7
Panel	All	20%	1.3	1.7
#1 Crossbar	All	30%	1.3	1.7
#5 Crossbar[b]	0-5000	25%	1.5	1.9
	Over 5000	25%	1.3	1.7
ESS[c]	0-5000	25%	1.5	1.9
	Over 5000	25%	1.3	1.7

Table 3.16

Factors for Use in the Allocation of Local Dial Switching Equipment

Source[S23]

[a] In addition to Western Electric #1, 350, 355 and 35E97 SxS offices includes Independent Company local dial offices as listed below. The addition of common control features to these SxS offices will not change the SxS classification.

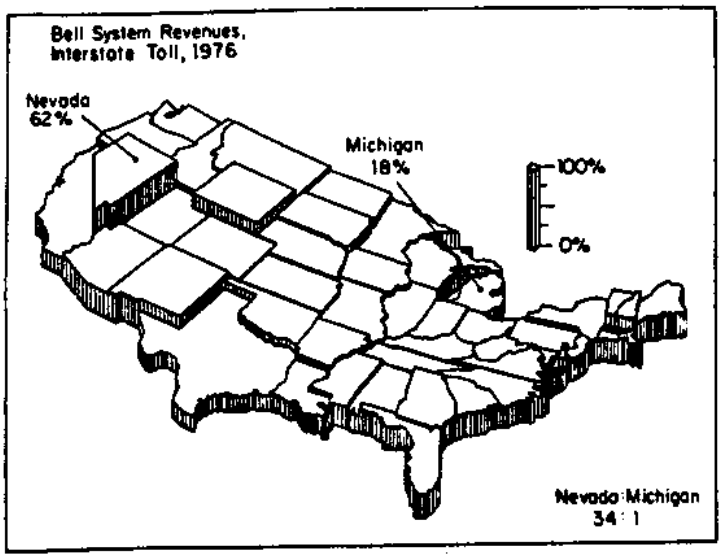
Automatic Electric #11, 20 (MAX) SxS
ITT (Federal) CSX, MSX, SxS
North Electric Link Type (CX)
Automatic Electric Link Type (Leich TPL Broad Span & TPL Selector Boards, LXP-1, LXP-2 and LXP-4)
ITT Kellogg Relaymatic K6-1, K6-2
Stromberg-Carlson X-Y
Kellogg K7-1, K7-2, K7-3

[b] In addition to Western Electric #5 Crossbar office, includes Western Electric #3 Crossbar office and Independent Company local dial offices with crossbar or crosspoint switches and electro-mechanical common control, e.g.,

North Electric NX-2A
North Electric NS-1D
ITT Pentaconta A-1, 32B
Automatic Electric CXP-5
Kellogg K-60
Northern Electric #5 Crossbar

[c] In addition to Western Electric #1 ESS and #2 ESS offices, includes Independent Company local dial offices with crossbar or correed switches and electronic common control, e.g.:

Automatic Electric EAX, No. 1 and C-1 EAX
North Electric NX-1E
Stromberg-Carlson ESS-C1
Northern Electric SP-1



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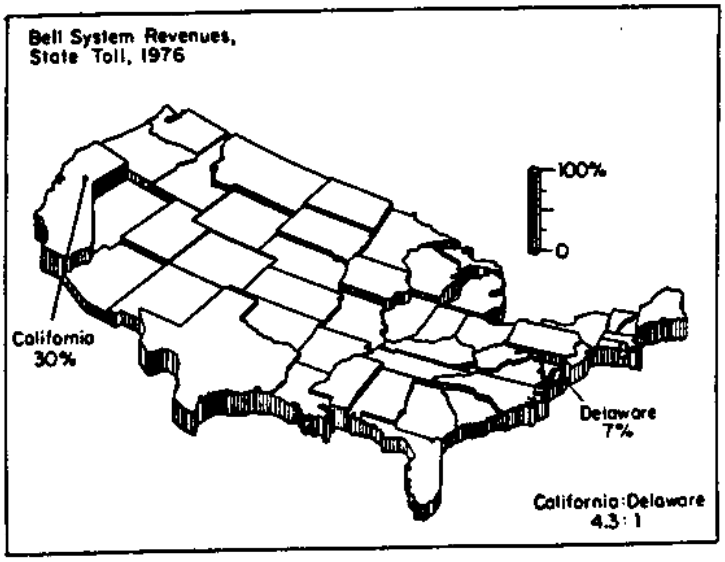

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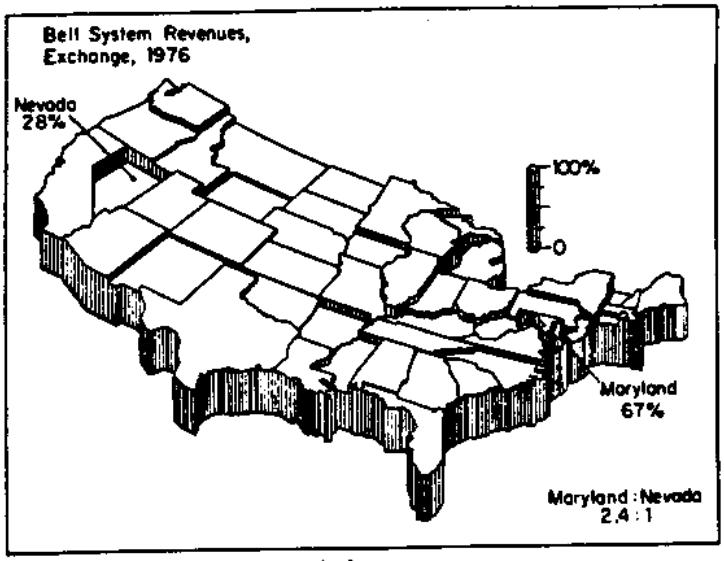


(c)

Figure 3.9

Bell System State-by-State Percent Revenue
from Interstate Toll, State Toll and Exchange Services, 1976

Source S24

	Interstate Toll	State Toll	Exchange & Other
AL	22.35	20.92	56.73
AZ	32.56	12.12	55.32
AR	29.17	23.59	47.24
CA	22.03	29.64	48.33
CO	31.48	16.41	52.11
CT	28.05	21.47	50.48
DE	34.23	6.90	58.87
FL	28.25	17.11	54.64
CA	30.01	15.56	54.33
ID	36.05	19.65	44.30
IL	22.72	10.77	66.51
IN	22.41	19.10	58.49
IA	27.71	24.16	48.13
KS	30.06	20.34	49.60
KY	23.72	23.49	52.80
LA	22.14	23.87	53.99
ME	30.33	26.19	43.48
MD	22.39	10.18	67.43
MA	23.66	21.53	54.81
MI	17.75	22.27	59.98
MN	25.19	18.75	56.06
MS	26.28	27.49	46.23
MO	26.44	15.49	58.07
MT	37.27	24.95	37.78
NE	32.81	18.32	48.87
NV	62.34	9.33	28.33
NH	39.83	15.76	44.41
NJ	27.33	21.55	51.12
NM	35.24	16.46	48.30
NY	25.81	11.98	62.21
NC	26.22	23.43	50.35
ND	32.68	27.22	40.10
OH	20.07	18.61	61.31
OK	28.77	22.78	48.45
OR	31.08	21.13	47.79
PA	20.49	23.07	56.44
RI	30.26	11.01	58.73
SC	28.55	17.43	54.02
SD	36.16	23.44	40.40
TN	22.74	21.27	55.99
TX	19.21	27.46	53.32
UT	29.44	18.96	51.60
VT	39.84	19.79	40.37
VA	26.60	16.59	56.81
WA	25.21	21.52	53.27
WV	26.40	20.25	53.35
WI	22.84	18.32	58.84
WY	47.72	17.97	34.31
BELL SYS	24.98	19.67	55.35

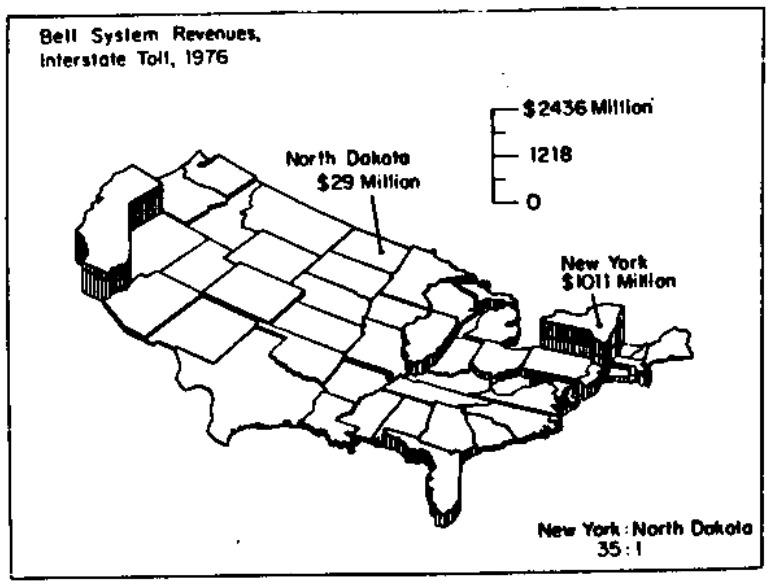
Ranked

Interstate Toll		State Toll		Exchange & Other	
NV	62.34	CA	29.64	MD	67.43
WY	47.72	MS	27.49	IL	66.51
VT	39.84	TX	27.46	NY	62.21
NH	39.83	ND	27.22	OH	61.31
MT	37.27	ME	26.19	MI	59.98
SD	36.16	MT	24.95	DE	58.87
ID	36.05	IA	24.16	WI	58.84
NM	35.24	LA	23.87	RI	58.73
DE	34.23	AR	23.59	IN	58.49
NE	32.81	KY	23.49	MO	58.07
ND	32.68	SD	23.44	VA	56.81
AZ	32.56	NC	23.43	AL	56.73
CO	31.48	PA	23.07	PA	56.44
OR	31.08	OK	22.78	MN	56.06
ME	30.33	MI	22.27	TN	55.99
RI	30.26	NJ	21.55	BELL SYS	55.35
KS	30.06	MA	21.53	AZ	55.32
CA	30.01	WA	21.52	MA	54.81
UT	29.44	CT	21.47	FL	54.64
AR	29.17	TN	21.27	GA	54.33
OK	28.77	OR	21.13	SC	54.02
SC	28.55	AL	20.92	LA	53.99
FL	28.25	KS	20.34	WV	53.35
CT	28.05	WV	20.25	TX	53.32
IA	27.71	VT	19.79	WA	53.27
NJ	27.33	BELL SYS	19.67	KY	52.80
VA	26.60	ID	19.65	CO	52.11
MO	26.44	IN	19.10	UT	51.60
WV	26.40	UT	18.96	NJ	51.12
MS	26.28	MN	18.75	CT	50.48
NC	26.22	OH	18.61	NC	50.35
NY	25.81	NE	18.32	KS	49.60
WA	25.21	WI	18.32	NE	48.87
MN	25.19	WY	17.97	OK	48.45
BELL SYS	24.98	SC	17.43	CA	48.33
KY	23.72	FL	17.11	NM	48.30
MA	23.66	VA	16.59	IA	48.13
WI	22.84	NM	16.46	OR	47.79
TN	22.74	CO	16.41	AR	47.24
IL	22.72	NH	15.76	MS	46.23
IN	22.41	GA	15.66	NH	44.41
MD	22.39	MO	15.49	ID	44.30
AL	22.35	AZ	12.12	ME	43.46
LA	22.14	NY	11.98	SD	40.40
CA	22.03	RI	11.01	VT	40.37
PA	20.49	IL	10.77	ND	40.10
OH	20.07	MD	10.18	MT	37.78
TX	19.21	NV	9.33	WY	34.31
MI	17.75	DE	6.90	NV	28.33

Table 3.17

Bell System State-by-State Percent Revenue from Interstate Toll, State Toll and Exchange Services, 1976

Source[S25]



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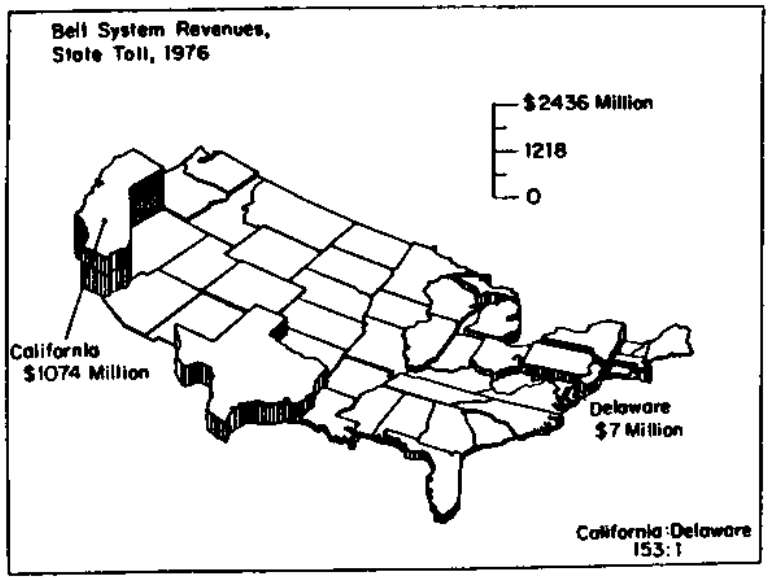

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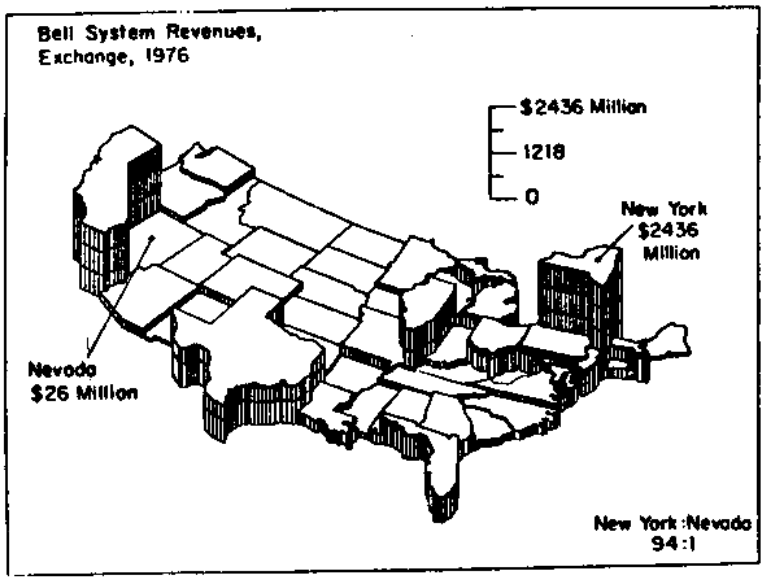

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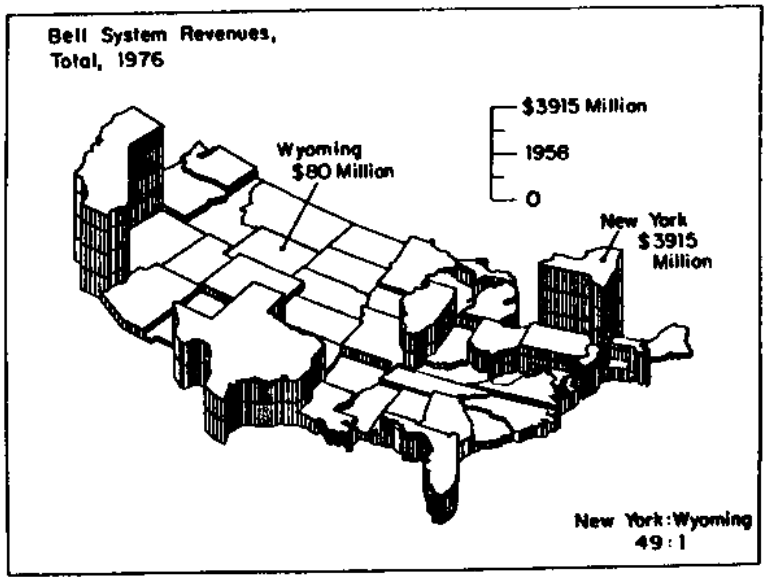


(d)

Figure 3.10

Bell System State-by-State Revenue from Interstate Toll, State Toll and Exchange, 1976 ($ million)

Source[S26]

	Interstate Toll	State Toll	Exchange	Total
AL	101.78	95.25	258.38	455.41
AZ	128.66	47.92	218.63	395.21
AR	63.67	51.50	103.13	218.30
CA	798.82	1074.29	1751.78	3624.89
CO	159.31	83.04	263.67	506.02
CT	149.64	114.52	269.32	533.48
DE	34.47	6.95	59.29	100.71
FL	336.79	204.03	651.44	1192.26
GA	216.30	112.82	391.53	720.65
ID	37.21	20.28	45.73	103.22
IL	397.80	188.47	1164.45	1750.72
IN	117.29	99.92	306.09	523.30
IA	91.82	80.07	159.51	331.40
KS	87.96	59.54	145.14	292.64
KY	76.62	75.88	170.56	323.06
LA	125.30	135.06	305.54	565.90
ME	45.60	39.39	65.37	150.36
MD	149.45	67.93	450.05	667.43
MA	282.53	256.98	654.42	1193.93
MI	208.63	261.74	705.14	1175.51
MN	126.06	93.84	280.49	500.39
MS	83.17	87.00	146.31	316.48
MO	168.55	98.73	370.18	637.46
MT	38.88	26.03	39.41	104.32
NE	52.64	29.38	78.40	160.42
NV	56.80	8.50	25.82	91.12
NH	57.53	22.77	64.16	144.46
NJ	359.49	283.53	672.46	1315.48
NM	55.37	25.84	75.88	157.09
NY	1010.53	469.22	2435.57	3915.32
NC	112.15	100.24	215.36	427.75
ND	28.53	23.77	35.01	87.31
OH	240.36	222.86	734.15	1197.37
OK	109.26	86.51	183.99	379.76
OR	107.96	73.38	165.98	347.32
PA	278.13	313.23	766.10	1357.46
RI	43.32	15.76	84.09	143.17
SC	87.23	53.27	165.05	305.55
SD	32.26	20.91	36.04	89.21
TN	123.48	115.45	304.00	542.93
TX	37.21	512.34	994.76	1865.52
UT	49.96	32.18	87.56	169.70
VT	33.52	16.64	33.96	84.12
VA	170.22	106.18	363.51	639.91
WA	124.67	106.46	263.46	494.59
WV	53.86	41.32	108.84	204.02
WI	99.63	79.88	256.60	436.11
WY	37.94	14.29	27.27	79.50
Bell System*	7814.86	6155.09	17319.89	31289.84

*Includes Washington, D.C.

Ranked

Interstate Toll		State Toll		Exchange		Total	
Bell System*	7814.86	Bell System*	6155.09	Bell System*	17319.89	Bell System*	31289.84
NY	1010.53	CA	1074.29	NY	2435.57	NY	3915.32
CA	798.82	TX	512.34	CA	1751.78	CA	3624.89
IL	397.80	NY	469.22	IL	1164.45	TX	1865.52
NJ	359.49	PA	313.23	TX	994.76	IL	1750.72
FL	336.79	NJ	283.53	PA	766.10	PA	1357.46
MA	282.53	MI	261.74	OH	734.15	NJ	1315.48
PA	278.13	MA	256.98	MI	705.14	OH	1197.37
OH	240.36	OH	222.86	NJ	672.46	MA	1193.93
GA	216.30	FL	204.03	MA	654.42	FL	1192.26
MI	208.63	IL	188.47	FL	651.44	MI	1175.51
VA	170.22	LA	135.06	MD	450.05	GA	720.65
MO	168.55	TN	115.45	GA	391.53	MD	667.43
CO	159.31	CT	114.52	MO	370.18	VA	639.91
CT	149.64	GA	112.82	VA	363.51	MD	637.46
MD	149.45	WA	106.46	IN	306.09	LA	565.90
AZ	128.66	VA	106.18	LA	305.54	TN	542.93
MN	126.06	NC	100.24	TN	304.00	CT	533.48
LA	125.30	IN	99.92	MN	280.49	IN	523.30
WA	124.67	MO	98.73	CT	269.32	CO	506.02
TN	123.48	AL	95.25	CO	263.67	MN	500.39
IN	117.29	MN	93.84	WA	263.46	WA	494.59
NC	112.15	MS	87.00	AL	258.38	AL	455.41
OK	109.26	OK	86.51	MI	256.60	WI	436.11
OR	107.96	CO	83.04	AZ	218.63	NC	427.75
AL	101.78	IA	80.07	NC	215.36	AZ	395.21
WI	99.63	WI	79.88	OK	183.99	OK	379.76
IA	91.82	KY	75.88	KY	170.56	OR	347.32
KS	87.96	OR	73.38	OR	165.98	IA	331.40
SC	87.23	MD	67.93	SC	165.05	KY	323.06
MS	83.17	KS	59.54	IA	159.51	MS	316.48
KY	76.62	SC	53.27	MS	146.31	SC	305.55
AR	63.67	AR	51.50	KS	145.14	KS	292.64
NM	57.53	AZ	47.92	WV	108.84	AR	218.30
NV	56.80	WV	41.32	AR	103.13	WV	204.02
MN	55.37	ME	39.39	UT	87.56	UT	169.70
WV	53.86	UT	32.18	RI	84.09	ME	160.42
ME	52.64	ME	29.38	ME	78.40	NM	157.09
UT	49.96	NT	26.03	NM	75.88	ME	150.36
ME	45.60	NM	25.84	ME	65.37	NH	144.46
RI	43.32	ND	23.77	NH	64.16	RI	143.17
MT	38.88	NH	22.77	DE	59.29	MT	104.32
WY	37.94	SD	20.91	ID	45.73	ID	103.22
ID	37.21	ID	20.28	MT	39.41	DE	100.71
TX	37.21	VT	16.64	SD	36.04	NV	91.12
DE	34.47	RI	15.76	ND	35.01	SD	89.21
VT	33.52	WY	14.29	VT	33.96	ND	87.31
SD	32.26	NV	8.50	WY	27.27	VT	84.12
ND	28.53	DE	6.95	NV	25.82	WY	79.50

Table 3.18

Bell System State-by-State Revenue from Interstate Toll, State Toll and Exchange, 1976 ($ million)

Source[S27]

Various influences combine to produce this variability. Figure 3.11 and Table 3.19 illustrate one source of variability--calling habits--whose influence is felt through variability in the SLU factor (Table 3.13). Delaware originates four times as many interstate toll calls as state toll calls, while in California the proportions are reversed, with five in-state toll calls for every interstate toll call.

Such variability might be accounted for in part by genuine demographic variability. A state with few major urban or industrial centers might produce fewer intrastate toll calls and more interstate toll calls to out-of-state centers than a state with many major centers that is surrounded by states with few centers. But some of the variability may be an artifact derived from varying state toll and exchange service definitions. A state with large local exchange areas would have fewer state toll calls than if it had small local exchange areas. Such a tradeoff could materially alter the interstate/state toll ratios of Figure 3.11 and Table 3.19 with little or no underlying demographic difference. There is in fact, as will be made evident in Part 4, wide state-by-state variability in exchange area definitions.

Variability in the "deterrent effect" reflected in the CSR Ratio (Table 3.13) combines with that in the SLU factor to produce the observed SPF variability (Table 3.13). The SPF is then applied to non-traffic-sensitive costs which themselves vary state by state. The result is combined with other costs that also vary, as illustrated for interexchange circuit costs in Figures 3.12 and 3.13 and Tables 3.20 and 3.21.

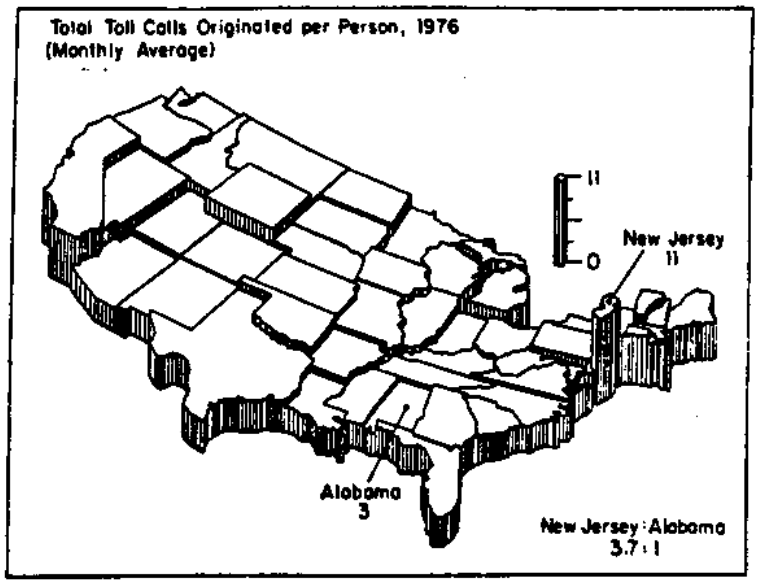
Although by no means the only cost element subject to dispute for jurisdictional separations purposes, the cost of non-traffic-sensitive

subscriber plant is a major cost element and a major object of contention. Figure 3.14 and Table 3.22 show the state-by-state incidence of non-traffic sensitive subscriber plant costs assigned to interstate message revenue requirements in 1976. Table 3.23 places the total industry-wide 1976 assignment of $3.633 billion in the context of relevant data of Figure 3.1. Table 3.24, which extends the picture of Figure 3.2, estimates the evolution of this assignment.

Variability in costs allocated to the jurisdictions induces variability in prices, but only indirectly. Within the allocated pools of cost-revenue requirements, there remains much latitude in setting prices for various services so as to meet the total revenue requirements in each pool. How these prices are set in turn influences usage patterns, hence the values of all the allocation factors, hence the allocation of costs. Describing the entire circular process requires describing also the details of cost allocation and of pricing within the state pools, a task to which we turn in Part 4.

However, the picture so far supports either of the two common polar positions. On the one hand, proponents of nationwide averaging can point to the evidence that there is great residual variability, with resulting comparative regional advantages and disadvantages. On the other hand, the argument can easily be made that there is already too much averaging, with inefficiencies resulting from failure to let costs bear on the regions--and indeed the households or the businesses--where they are incurred.

What level and incidence of costs and prices is desirable, and with what consequences for whom, is clearly a central policy issue. Whether it is an issue for low or for high politics remains to be assessed.



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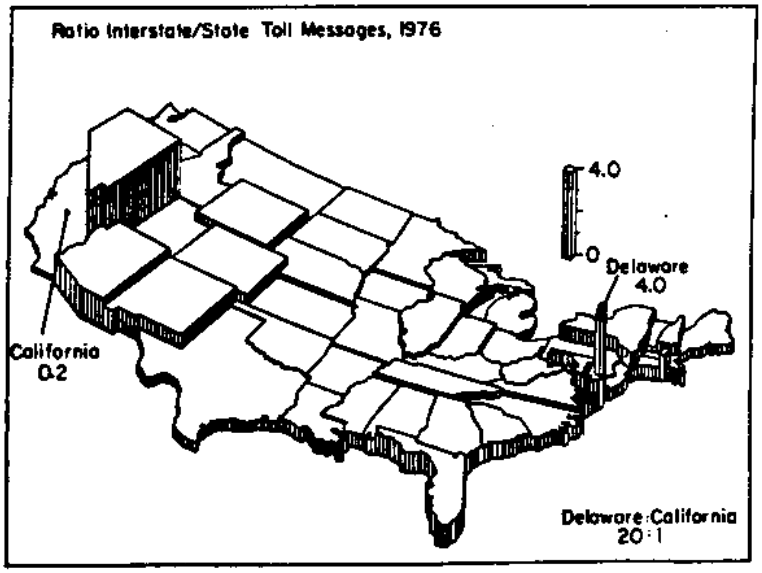
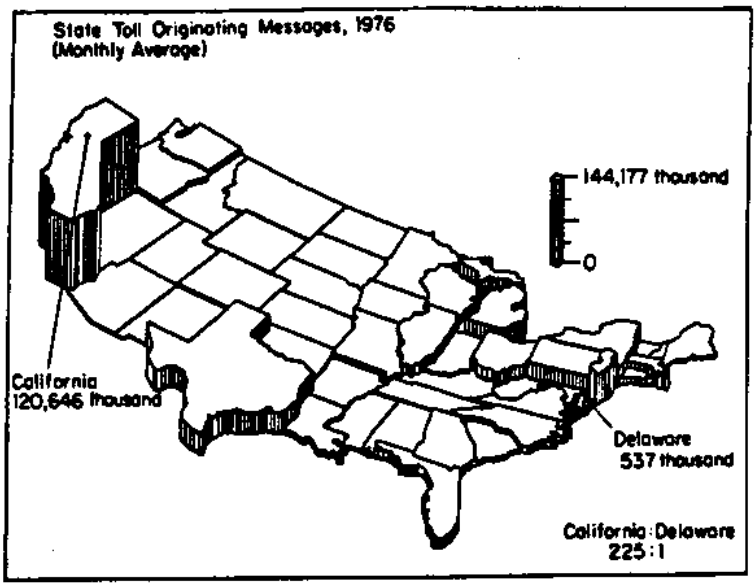


(b)

Figure 3.11

State-by-State Variability in Toll Calling Habits, 1976

Source[S28]



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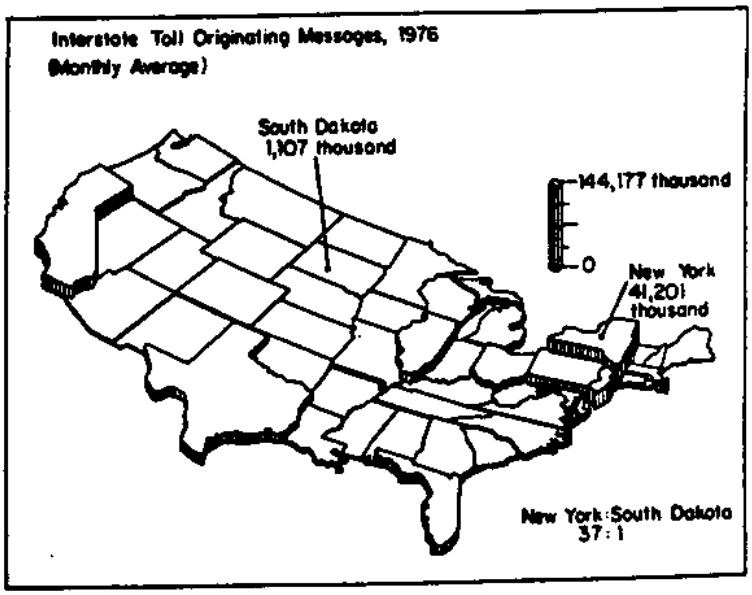

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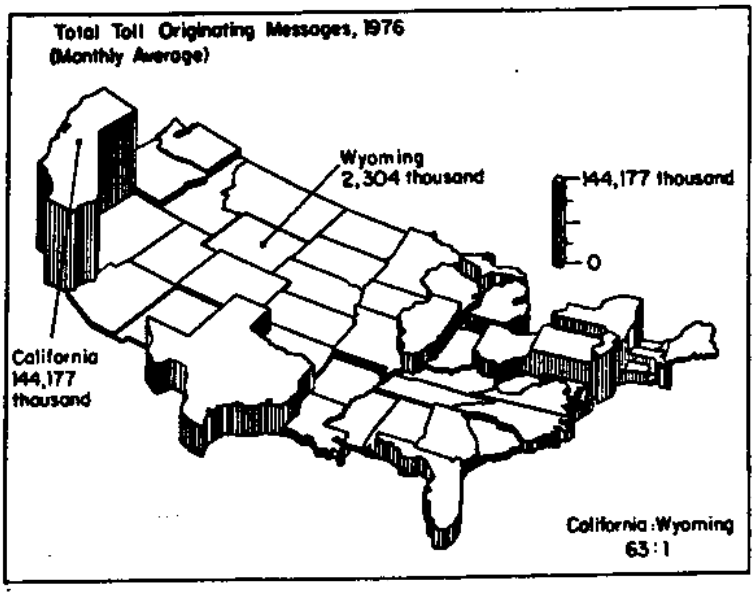


(e)

Figure 3.11 (continued)

	Ratio Interstate/State	Number of Average Monthly Originating Messages			
		Total Toll per Person	State Toll (thousand)	Interstate Toll (thousand)	Total Toll (thousand)
AL	.71	2.885	6175.338	4399.081	10574.419
AZ	1.41	3.117	2938.796	4137.899	7076.695
AR	.53	4.094	5864.414	3101.686	8966.100
CA	.19	6.700	120646.064	23471.263	144177.327
CO	.94	3.734	5492.120	5161.678	10653.797
CT	.65	6.412	12091.468	7895.059	19986.526
DE	3.99	4.607	536.798	2144.476	2681.274
FL	.94	3.601	15621.499	14705.746	30327.245
GA	.78	3.729	10402.268	8129.895	18532.163
ID	.75	5.082	2412.774	1810.622	4223.396
IL	.91	3.893	22891.956	20820.785	43712.741
IN	.74	3.078	9404.182	6913.093	16317.275
IA	.39	4.788	9886.452	3854.945	13741.397
KS	.47	5.081	7980.473	3755.857	11736.330
KY	.76	3.120	6060.055	4634.170	10694.225
LA	.58	3.337	8117.165	4701.783	12818.949
ME	.42	4.804	3618.531	1521.685	5140.216
MD	1.39	3.215	5584.865	7738.219	13323.084
MA	.53	5.893	22410.692	11819.002	34229.694
MI	.29	4.854	34311.747	9879.150	44190.897
MN	.52	3.279	8546.189	4453.723	12999.912
MS	.67	3.339	4712.349	3148.524	7860.873
MO	.62	4.613	13644.433	8396.748	22041.181
MT	.47	4.984	2555.331	1197.501	3752.832
NE	.67	4.342	4039.760	2703.305	6743.065
NV	3.31	5.374	760.963	2517.241	3278.204
NH	1.05	5.942	2385.686	2498.453	4884.139
NJ	.53	10.938	52505.519	27737.527	80243.045
NM	1.05	3.547	2025.718	2117.447	4143.165
NY	1.28	4.057	32172.316	41201.809	73374.124
NC	.59	3.380	11608.704	6874.174	18482.878
ND	.57	4.854	1991.809	1129.506	3121.315
OH	.53	3.609	25185.524	13393.489	38579.013
OK	.45	5.082	9676.126	4380.461	14056.577
OR	.56	5.805	8671.158	4848.882	13520.039
PA	.64	4.369	31668.043	20158.226	51826.269
RI	1.23	5.512	2293.910	2815.563	5109.473
SC	.75	3.358	5449.705	4112.579	9562.284
SD	.57	4.444	1941.478	1106.764	3048.242
TN	.87	3.313	7465.455	6496.591	13962.047
TX	.40	4.032	36011.998	14337.232	50349.230
UT	.67	3.848	2831.546	1894.035	4725.581
VT	.78	6.930	1855.518	1443.050	3298.569
VA	.78	3.752	10634.948	8242.838	18877.786
WA	.45	4.547	11308.244	5116.099	16424.342
WV	.82	3.715	3724.352	3039.816	6764.168
WI	.50	3.665	11251.443	5639.394	16890.837
WY	1.05	5.908	1126.093	1177.904	2303.997

Table 3.19

State-by-State Variability in Toll Calling Habits, 1976

Source[S29]

Ranked

Ratio Interstate/State		Number of Average Monthly Originating Messages							
		Total Toll per Person		State Toll (thousand)		Interstate Toll (thousand)		Total Toll (thousand)	
DE	3.99	NJ	10.938	CA	120646.064	NY	41201.809	CA	144177.327
NV	3.31	VT	6.930	NJ	52505.519	NJ	27737.527	NJ	80243.045
AZ	1.41	CA	6.700	TX	36011.998	CA	23471.263	NY	73374.124
MD	1.39	CT	6.412	MI	34311.747	IL	20820.785	PA	51826.269
NY	1.28	NH	5.942	NY	32172.316	PA	20158.226	TX	50349.230
RI	1.23	WY	5.908	PA	31668.043	FL	14705.746	MI	44190.897
WY	1.05	MA	5.893	OH	25185.824	TX	14337.232	IL	43712.741
NH	1.05	OR	5.805	IL	22891.956	OH	13393.489	OH	38579.013
NM	1.05	RI	5.512	MA	22410.692	MA	11819.002	MA	34229.694
CO	0.94	NV	5.374	FL	15621.499	MI	9879.150	FL	30327.245
FL	0.94	ID	5.082	MO	13644.433	MD	8396.748	MD	22041.181
IL	0.91	OK	5.082	CT	12091.468	VA	8242.838	CT	19986.526
TN	0.87	KS	5.081	NC	11608.704	GA	8129.895	VA	18877.786
WV	0.82	MT	4.984	MA	11308.244	CT	7895.059	GA	18532.163
GA	0.76	MI	4.854	MI	11251.443	MD	7738.219	NC	18482.878
VA	0.78	ND	4.854	VA	10634.948	IN	6913.093	MI	16890.837
VT	0.78	ME	4.804	GA	10402.268	NC	6874.174	MA	16424.342
KY	0.76	IA	4.788	IA	9886.452	TN	6496.591	IN	16317.275
ID	0.75	MO	4.613	OK	9676.126	MI	5639.394	OK	14056.577
SC	0.75	DE	4.607	IN	9404.182	CO	5161.678	TN	13962.047
IN	0.74	WA	4.547	OR	8671.158	WA	5116.099	IA	13741.397
AL	0.71	SD	4.444	MN	8546.189	OR	4848.882	OR	13520.039
UT	0.67	PA	4.369	LA	8117.165	LA	4701.783	MD	13323.064
MS	0.67	NE	4.342	KS	7980.473	KY	4634.170	MN	12999.912
NE	0.67	AR	4.094	TN	7465.455	MN	4453.723	LA	12818.949
CT	0.65	NY	4.057	AL	6175.338	AL	4399.081	KS	11736.330
PA	0.64	TX	4.032	KY	6060.055	OK	4380.451	KY	10694.225
MD	0.62	IL	3.893	AR	5864.414	AZ	4137.899	CO	10653.797
NC	0.59	UT	3.848	MD	5584.865	SC	4112.579	AL	10574.419
LA	0.58	VA	3.752	CO	5492.120	IA	3854.945	SC	9562.284
ND	0.57	CO	3.734	SC	5449.705	KS	3755.857	AR	8966.100
SD	0.57	GA	3.729	MS	4712.349	MS	3148.524	MS	7860.873
OR	0.56	WV	3.715	NE	4039.760	AR	3101.686	AZ	7076.695
AR	0.53	MI	3.665	WV	3724.352	WV	3039.816	NV	6764.168
MA	0.53	OH	3.609	ME	3618.531	RI	2815.563	ME	6743.065
NJ	0.53	FL	3.601	AZ	2938.796	ME	2703.305	ME	5140.216
OH	0.53	NM	3.547	UT	2831.546	NV	2517.241	RI	5109.473
MN	0.52	NC	3.380	MT	2655.331	NH	2498.453	NH	4884.139
MI	0.50	SD	3.358	ID	2412.774	DE	2144.476	UT	4725.581
MT	0.47	MS	3.339	NH	2385.686	NM	2117.447	ID	4223.396
KS	0.47	LA	3.337	RI	2293.910	UT	1894.035	NM	4143.165
WA	0.45	TN	3.313	NM	2025.718	ID	1810.622	MT	3752.832
OK	0.45	NM	3.279	ND	1991.809	ME	1521.685	VT	3298.569
ME	0.42	MD	3.215	SD	1941.478	VT	1443.050	NV	3278.204
TX	0.40	KY	3.126	VT	1855.518	MT	1197.501	ND	3121.315
IA	0.39	AZ	3.117	WY	1126.093	WY	1177.904	SD	3048.242
MI	0.29	IN	3.078	NV	760.963	ND	1129.506	DE	2681.274
CA	0.19	AL	2.885	DE	536.798	SD	1106.764	WY	2303.997

Table 3.19 (continued)

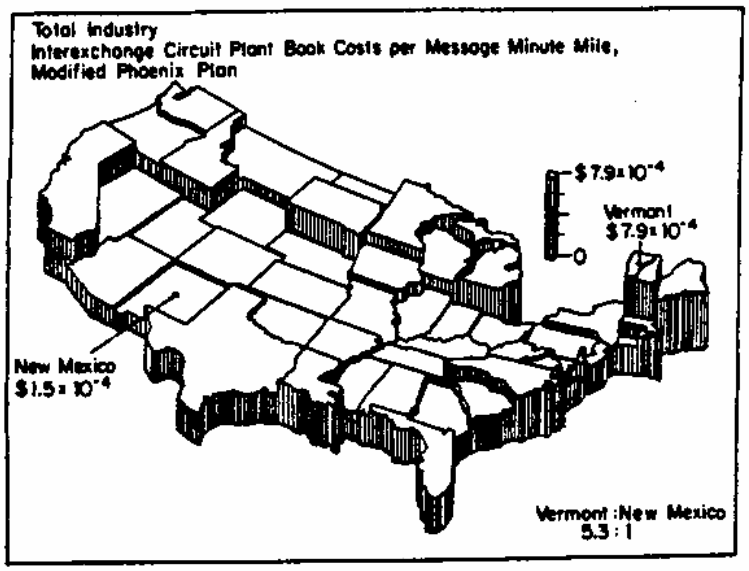


Figure 3.12

Modified Phoenix Plan: 1976 Nationwide Industry Wide Interexchange Circuit Plant Book Costs* per Message Minute Mile**
($1 x 10^{-4})

Source[S30]

*These book costs, requested by the Federal-State Joint Board on Telephone Separations (FCC Docket 20981) are hypothetical in that they are computed as for the Modified Phoenix Plan (1956-1969) described in Section 3-83. Figures actually used as of early 1979 were not available at the time of writing.

**Assumes AT&T Long Lines Interexchange Circuit Plant Book Costs per Message Minute Mile are the same in each state. Such data for Long Lines not available by state.

		Ranked	
AL	2.939	VT	7.906
AZ	1.995	NH	7.710
AR	3.276	ME	5.583
CA	4.382	MI	4.961
CO	2.021	SD	4.889
CT	2.788	MN	4.617
DE	3.449	NC	4.395
FL	3.299	CA	4.382
GA	2.209	MA	4.079
ID	4.024	WA	4.059
IL	2.300	ID	4.024
IN	2.487	LA	4.009
IA	3.424	RI	3.691
KS	2.605	OR	3.608
KY	2.816	WI	3.565
LA	4.009	DE	3.449
ME	5.583	IA	3.424
MD	2.029	FL	3.299
MA	4.079	AR	3.276
MI	4.961	SC	3.145
MN	4.617	MO	2.944
MS	2.799	AL	2.939
MO	2.944	ND	2.919
MT	2.873	TX	2.902
NE	2.190	TN	2.855
NV	2.063	MT	2.873
NH	7.710	KY	2.816
NJ	2.662	MS	2.799
NM	1.664	CT	2.788
NY	2.739	WV	2.752
NC	4.395	NY	2.739
ND	2.919	NJ	2.662
OH	2.234	KS	2.605
OK	2.541	OK	2.541
OR	3.608	IN	2.487
PA	2.127	VA	2.466
RI	3.691	IL	2.300
SC	3.145	OH	2.234
SD	4.889	GA	2.209
TN	2.855	NE	2.190
TX	2.902	PA	2.127
UT	1.804	NV	2.063
VT	7.906	MD	2.029
VA	2.466	CO	2.021
WA	4.059	AZ	1.995
WV	2.752	UT	1.804
WI	3.565	WY	1.777
WY	1.777	NM	1.664

Table 3.20

Modified Phoenix Plan: 1976 Nationwide Industry Wide Interexchange Circuit Plant Book Costs per Message Minute Mile

($1 x 10^{-4})

Source[S31]

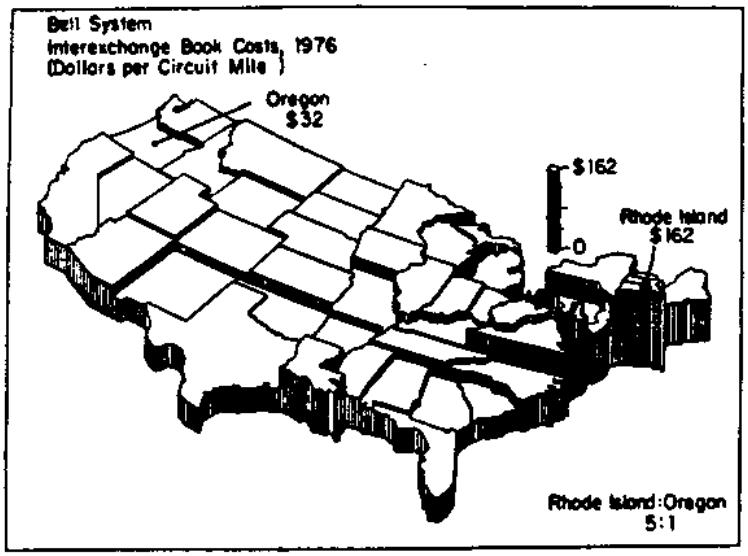


Figure 3.13

Bell System Interexchange Circuit
Book Costs, 1976 (dollars per circuit mile)

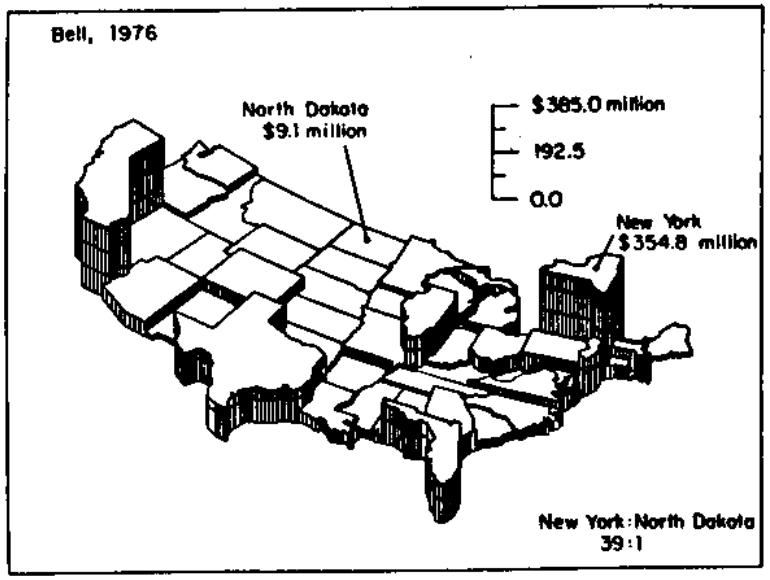
Source[S32]

Book Costs		Ranked Book Costs	
AL	52	RI	162
AZ	63	CT	151
AR	52	MA	149
CA	53	MD	148
CO	59	NY	139
CT	151	WV	121
DE	102	VT	108
FL	46	VA	108
GA	38	DE	102
ID	49	NJ	101
IL	90	PA	95
IN	88	NH	94
IA	86	IL	90
KS	66	IN	88
KY	73	IA	86
LA	86	LA	86
ME	83	ME	83
MD	148	OH	81
MA	149	MN	81
MI	79	MI	79
MN	81	WI	74
MS	63	KY	73
MO	65	TN	70
MT	59	UT	69
NE	67	NE	67
NV	46	KS	66
NH	94	MO	65
NJ	101	AZ	63
NM	43	MS	63
NY	139	NC	61
NC	61	CO	59
ND	53	MT	59
OH	81	SD	58
OK	43	CA	53
OR	32	ND	53
PA	95	AL	52
RI	162	AR	52
SC	40	ID	49
SD	58	WY	49
TN	70	FL	46
TX	46	TX	46
UT	69	NV	46
VT	108	WA	44
VA	108	NM	43
WA	44	OK	43
WV	121	SC	40
WI	74	GA	38
WY	49	OR	32

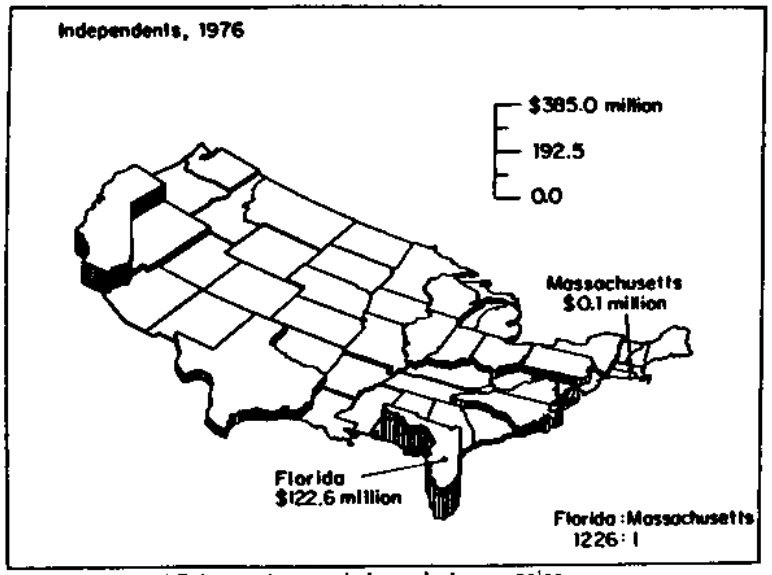
Table 3.21

Bell System Interexchange Circuit
Book Costs, 1976 (dollars per circuit mile)

Source[S33]

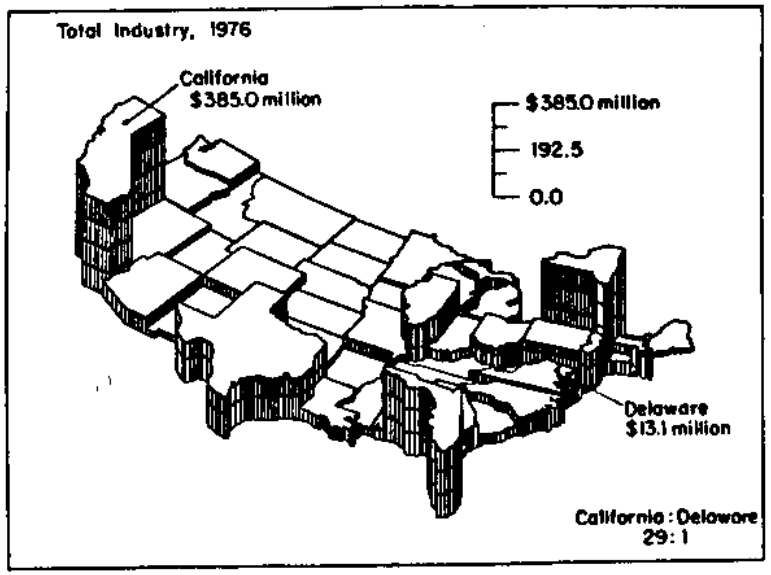


(a)



Rhode Island and Delaware have no independent companies

(b)



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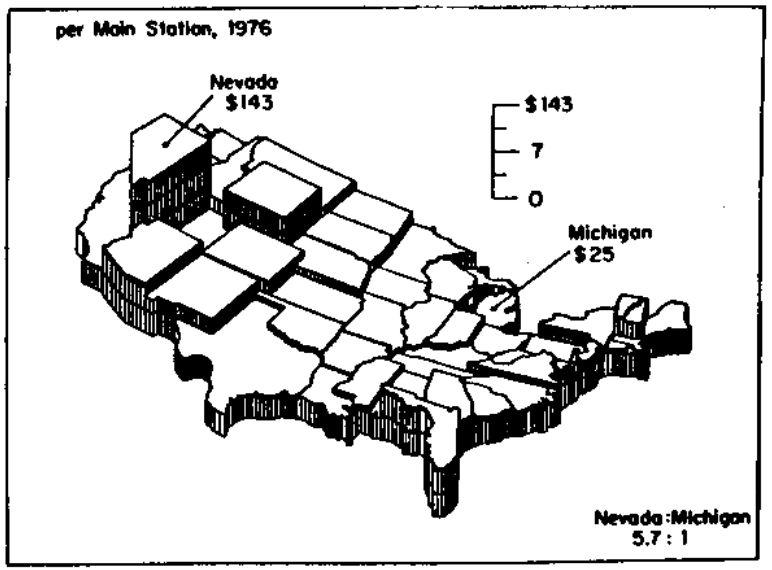
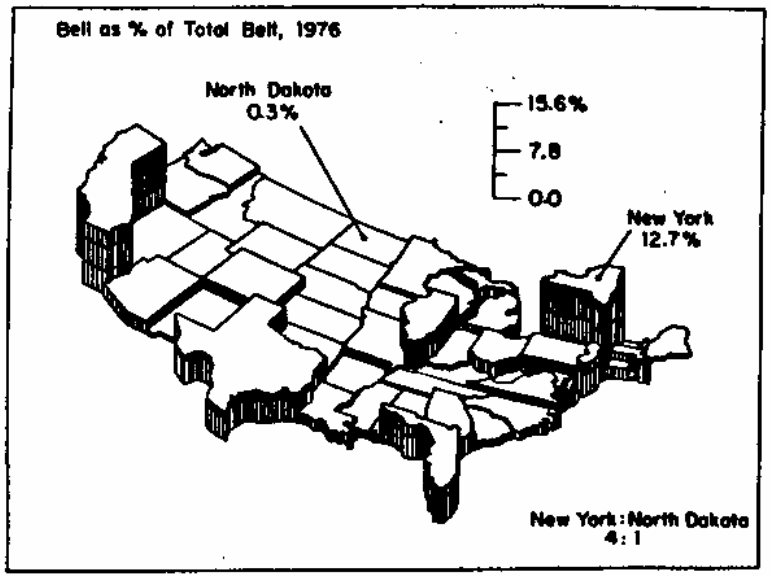


(d)

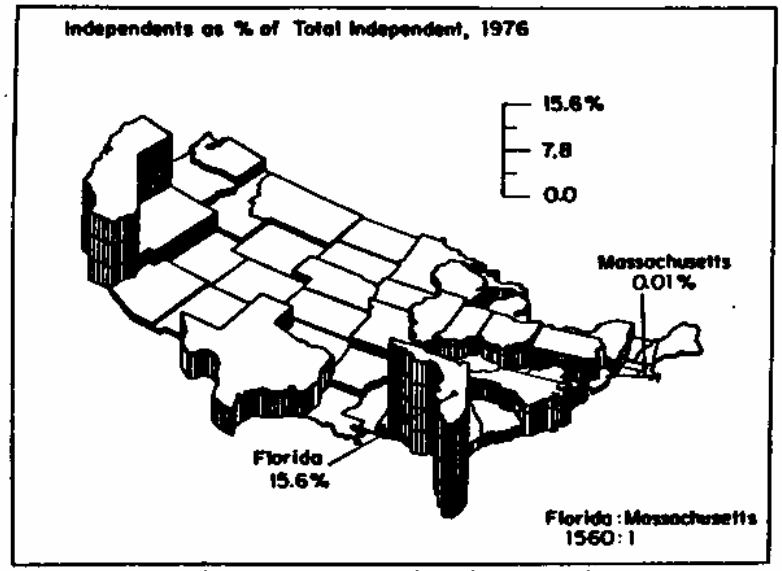
Figure 3.14

State-by-State Estimated Amounts of Non-Traffic-Sensitive Subscriber Plant Costs Assigned to Interstate MTS and WATS Revenue Requirements, 1976

Source[S34]

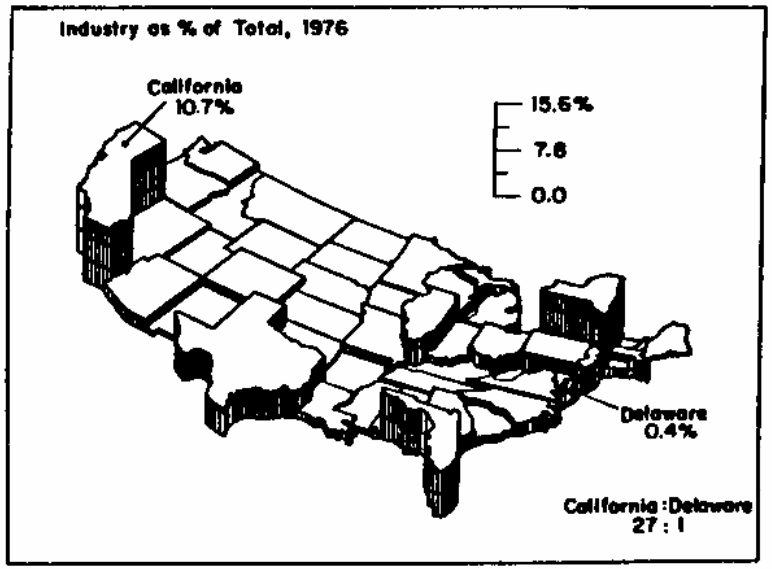


(e)



Rhode Island and Delaware have no independent companies

(f)



(g)

Figure 3.14 (continued)

	Bell ($ million)	Bell % of Total Bell	Independent ($ million)	Independent % of Total Independent	Total Industry ($ million)	Industry % of Total Industry	Per Main Station ($)
AL	32.17	1.15	10.81	1.38	42.98	1.20	34
AZ	60.40	2.15	7.80	0.99	68.20	1.90	76
AR	18.83	0.67	10.09	1.28	28.92	0.81	38
CA	292.71	10.44	92.25	11.74	384.96	10.72	37
CO	64.40	2.30	1.90	0.24	66.30	1.85	60
CT	55.91	1.99	0.70	0.09	56.61	1.58	42
DE	13.14	0.47	0.00	0.00	13.14	0.37	55
FL	156.52	5.58	122.61	15.60	279.13	7.77	75
GA	80.90	2.88	12.68	1.61	93.58	2.61	50
ID	13.63	0.49	6.05	0.77	19.68	0.55	60
IL	150.92	5.38	35.75	4.55	186.67	5.20	37
IN	40.93	1.46	39.08	4.97	80.01	2.23	40
IA	28.48	1.02	14.20	1.81	42.68	1.19	36
KS	25.46	0.91	10.49	1.34	35.95	1.00	38
KY	24.19	0.86	15.44	1.97	39.63	1.10	33
LA	47.30	1.69	2.01	0.26	49.31	1.37	35
ME	13.02	0.46	2.44	0.31	15.46	0.43	37
MD	55.72	1.99	0.12	0.02	55.84	1.56	32
MA	99.03	3.35	0.09	0.01	99.12	2.76	40
MI	78.18	2.79	15.59	1.98	93.77	2.61	25
MN	44.54	1.59	11.90	1.51	56.44	1.57	34
MS	30.57	1.09	1.65	0.21	32.22	0.90	43
MO	53.99	1.92	21.77	2.77	75.76	2.11	39
MT	12.16	0.43	6.98	0.89	19.14	0.53	64
NE	19.30	0.69	11.59	1.48	30.89	0.86	50
NV	15.26	0.54	25.83	3.29	41.09	1.14	143
NH	20.90	0.75	1.51	0.19	22.41	0.62	65
NJ	153.25	5.46	5.06	0.64	158.31	4.41	48
NM	18.97	0.68	4.82	0.61	23.79	0.66	57
NY	354.81	12.65	20.89	2.66	375.70	10.46	45
NC	36.74	1.31	40.21	5.12	76.95	2.14	39
ND	9.13	0.33	4.75	0.60	13.88	0.39	51
OH	80.35	2.86	38.49	4.90	118.84	3.31	28
OK	39.10	1.39	8.39	1.07	47.49	1.32	41
OR	32.97	1.18	14.13	1.80	47.10	1.31	46
PA	98.29	3.50	32.91	4.19	131.20	3.65	25
RI	14.12	0.50	0.00	0.00	14.12	0.39	36
SC	26.94	0.96	13.52	1.72	40.46	1.13	42
SD	10.34	0.37	3.49	0.44	13.83	0.39	52
TN	43.31	1.54	9.46	1.20	52.77	1.47	33
TX	133.31	4.75	33.73	4.29	167.04	4.65	34
UT	17.06	0.61	1.11	0.14	18.17	0.51	39
VT	11.08	0.40	2.76	0.35	13.84	0.39	70
VA	67.85	2.42	22.32	2.84	90.17	2.51	47
WA	41.21	1.47	19.75	2.51	60.96	1.70	38
WV	17.71	0.63	4.98	0.63	22.69	0.63	34
WI	35.39	1.26	22.36	2.85	57.75	1.61	31
WY	14.35	0.51	1.29	0.16	15.64	0.44	98
Total	2804.84		785.75		3590.59		

Table 3.22

State-by-State Estimated Amounts of Non-Traffic-Sensitive Subscriber Plant Costs Assigned to Interstate MTS and WATS Revenue Requirements, 1976

Source[S35]

Ranked

	Bell ($ million)		Bell % of Total Bell		Independent ($ million)		Independent % of Total Independent		Total Industry ($ million)		Industry % of Total Industry		Per Main Station ($)	
	NY	354.81	NY	12.65	FL	122.61	FL	15.60	CA	384.96	CA	10.72	NV	143
	CA	292.71	CA	10.44	CA	92.25	CA	11.74	NY	375.70	NY	10.46	WY	98
	FL	156.52	FL	5.58	NC	40.21	NC	5.12	FL	279.13	FL	7.77	AZ	76
	NJ	153.25	NJ	5.46	IN	39.08	IN	4.97	IL	186.67	IL	5.20	FL	75
	IL	150.92	IL	5.38	OH	38.49	OH	4.90	TX	167.04	TX	4.65	VT	70
	TX	133.31	TX	4.75	IL	35.75	IL	4.55	NJ	158.31	NJ	4.41	NH	65
	MA	99.03	PA	3.50	TX	33.73	TX	4.29	PA	131.20	PA	3.65	MT	64
	PA	98.29	MA	3.35	PA	32.91	PA	4.19	OH	118.84	OH	3.31	ID	60
	GA	80.90	GA	2.88	NY	25.83	NY	3.29	MA	99.12	MA	2.76	CO	60
	OH	80.35	OH	2.86	WI	22.36	WI	2.85	MI	93.77	MI	2.61	NM	57
	MI	78.18	MI	2.79	VA	22.32	VA	2.84	GA	93.58	GA	2.61	DE	55
	VA	67.85	VA	2.42	MO	21.77	MO	2.77	VA	90.17	VA	2.51	SD	52
	CO	64.40	CO	2.30	NY	20.89	KY	2.66	IN	80.01	IN	2.23	ND	51
	AZ	60.40	AZ	2.15	WA	19.75	WA	2.51	NC	76.95	NC	2.14	ME	50
	CT	55.91	CT	1.99	MI	15.59	MI	1.98	MO	75.76	MO	2.11	GA	50
	MD	55.72	MD	1.99	KY	15.44	KY	1.97	AZ	68.20	AZ	1.90	NJ	48
	MO	53.99	MO	1.92	IA	14.20	IA	1.81	CO	66.30	CO	1.85	VA	47
	LA	47.30	LA	1.69	OR	14.13	OR	1.80	WA	60.96	WA	1.70	OR	46
	MN	44.54	MN	1.59	SC	13.52	SC	1.72	WI	57.75	WI	1.61	NY	45
	TN	43.31	TN	1.54	GA	12.68	GA	1.61	CT	56.61	CT	1.58	MS	43
	WA	41.21	WA	1.47	MN	11.90	MN	1.51	MN	56.44	MN	1.57	SC	42
	IN	40.93	IN	1.46	NE	11.59	NE	1.48	MD	55.84	MD	1.56	CT	42
	OK	39.10	OK	1.39	AL	10.81	AL	1.38	TN	52.77	TN	1.47	OK	41
	NC	36.74	NC	1.31	KS	10.49	KS	1.34	LA	49.31	LA	1.37	MA	40
	WI	35.39	WI	1.26	AR	10.09	AR	1.28	OK	47.49	OK	1.32	IN	40
	OR	32.97	OR	1.18	TN	9.46	TN	1.20	OR	47.10	OR	1.31	NC	39
	AL	32.17	AL	1.15	OK	8.39	OK	1.07	AL	42.98	AL	1.20	MD	39
	MS	30.57	MS	1.09	AZ	7.80	AZ	0.99	IA	42.68	IA	1.19	UT	39
	IA	28.48	IA	1.02	MT	6.98	MT	0.89	NV	41.09	NV	1.14	KS	38
	SC	26.94	SC	0.96	ID	6.05	ID	0.77	SC	40.46	SC	1.13	AR	38
	KS	25.46	KS	0.91	NJ	5.06	NJ	0.64	KY	39.63	KY	1.10	WA	38
	KY	24.19	KY	0.86	WV	4.98	WV	0.63	KS	35.95	KS	1.00	CA	37
	NH	20.96	NH	0.75	NM	4.82	NM	0.61	MS	32.22	MS	0.90	IL	37
	NE	19.30	NE	0.69	ND	4.75	ND	0.60	NE	30.89	NE	0.86	ME	37
	NM	18.97	NM	0.68	SD	3.49	SD	0.44	AR	28.92	AR	0.81	RI	36
	AR	18.83	AR	0.67	VT	2.76	VT	0.35	MN	23.79	MN	0.66	IA	36
	WV	17.71	WV	0.63	ME	2.44	ME	0.31	WV	22.69	WV	0.63	LA	35
	UT	17.06	UT	0.61	LA	2.01	LA	0.26	NH	22.41	NH	0.62	TX	34
	NV	15.26	NV	0.54	CO	1.90	CO	0.24	ID	19.68	ID	0.55	WV	34
	WY	14.35	WY	0.51	MS	1.65	MS	0.21	MT	19.14	MT	0.53	NM	34
	RI	14.12	RI	0.50	NH	1.51	NH	0.19	UT	18.17	UT	0.51	AL	34
	ID	13.63	ID	0.49	WY	1.29	WY	0.16	WY	15.64	WY	0.44	TN	33
	DE	13.14	DE	0.47	UT	1.11	UT	0.14	ME	15.46	ME	0.43	KY	33
	ME	13.02	ME	0.46	CT	0.70	CT	0.09	RI	14.12	ND	0.39	ND	32
	MT	12.16	MT	0.43	MD	0.12	MD	0.02	ND	13.88	VT	0.39	WI	31
	VT	11.08	VT	0.40	MA	0.09	MA	0.01	VT	13.84	SD	0.39	OH	28
	SD	10.34	SD	0.37	RI	0.00	RI	0.00	SD	13.83	RI	0.39	PA	25
	ND	9.13	ND	0.33	DE	0.00	DE	0.00	DE	13.14	DE	0.37	MI	25
Total		2804.84				785.75				3590.59				

Table 3.22 (continued)

	Bell	Independents	Traditional Industry
Total[a] ($ billion)	2.847	0.786	3.633
Total as percent of:			
Industry Total Service Revenues[b]	7.44	2.05	9.49
Industry Interstate Revenue Requirements[c]	24.96	6.89	31.85
Industry State Revenue Requirements[d]	10.00	2.76	12.76

Table 3.23

Total Estimated Amounts of Non-Traffic-Sensitive Costs Assigned to Interstate MTS and WATS Revenue Requirements, 1976

Source[S36]

		Bell System			Industry		
	Year	① Interstate SLU Factor (%)	② Interstate SPF (%)	③ Annual Growth (%)	④ Interstate MTS & WATS Revenues Annual Growth (%)	⑤ Interstate Non-Traffic-Sensitive Costs Annual Growth (%)	⑥ % of Revenues to Cover Interstate MTS 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	18.6	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 3.24

Impact of Growing Interstate SLU Factor, 1972-1978

Source[S37]

To set the stage for that assessment, potential effects of the allocation processes described in this section are summarized in Tables 3.25 and 3.26, where details of intra-industry or inter-regional variability are subordinated to overall estimates.

Columns 1-5 of Table 3.25 summarize previously detailed cost allocations for message services. Arguments like those that led through the succession of separations plans to the Ozark Plan in the decades from 1940 to 1970 would tend to increase further the interstate allocation percentages detailed in Column 3 and aggregated in Column 5. These structural arguments and their effects have been addressed throughout this
fixed structure, changing price and usage patterns have tended to increase the interstate allocation of non-traffic-sensitive costs. Increasing minutes of MTS and WATS service usage are reflected in the growing interstate SLU factor in Table 3.24, Column 1. This translates into a corresponding growth in interstate SPF (Table 3.24, Column 2). Growing interstate MTS and WATS revenues (Column 4), and differentially growing interstate non-traffic-sensitive (NTS) cost allocations (Column 5) derived from the SPF combined to make NTS costs a growing proportion of MTS/WATS revenues (Column 6).

The countervailing competitive pressures would tend to decrease these allocations. We express these pressures in terms consonant with arguments presented by the telephone industry,[76] so as to lay the groundwork for examining the merits and likely consequences of those arguments. Column 6 of Table 3.25 displays allocation factors for costs that, in the short-run, are joint and common costs of the traditional telephone industry, adjusted in a rough-and-ready way: the factors of Column 5

are divided by 3 1/3, a reasonable average ratio of SPF to SLU values. The result roughly reflects interstate usage as it would be measured by the SLU factor alone, without "deterrent effects." Since it does violence to many details of the allocation process, this adjustment yields alternative results reliable only for gross estimates of tendencies. (See Table 3.25, note i for additional comments on reliability of estimate.) Columns 7 and 8 summarize the changes induced by the estimated alternative allocation.

Table 3.26 provides a basis for an eventual estimate of the consequences of arguments for changing interstate allocations of joint and common costs. That estimate itself is deferred since it requires coupling the analysis of intercompany settlements and state rate setting in Part 4 with the analysis of current incidence of revenues and costs developed in Part 2. Would the reductions in interstate revenue requirements as displayed in Columns 2-6 of Table 3.26 have to be balanced either by absolute cost reductions or by transfer of costs--and revenue requirements--to the state jurisdictions, hence to state toll or local exchange services? The analysis of such crucial details of magnitude and incidence must be deferred for now.

Message Services Costs	① % of Total[b]	② $ Billion[c]	③ % I.S. Allocation[d]	④ Ozark Plan I.S. Allocation $Billion[e]	⑤ Ozark Plan % I.S. Allocation[b] or Assignment	⑥ Estimated Alternative I.S. Allocation %	⑦ Estimated Alternative I.S. Allocation $Billion[j]	⑧ Alternative-Ozark Difference $Billion[k]
1. NON-TRAFFIC SENSITIVE PLANT RELATED COSTS	58.7	20,077		3,744	18.7	5.61[i]	1,126	(2,620)
2. Subscriber Line OSP	16.3	5,575	20.7	1,154				
3. Local Dial	19.1	5,168	12.4	640				
4. Subscriber Line Ckt. Equip.	3.4	1,163	20.7	241				
5. Station Apparatus	9.4	3,215	20.8	669				
6. Station Connections	11.5	3,933	21.0	826				
7. Large PBX	3.0	1,026	21.1	216				
8. OPERATING COSTS (NOT PLANT-RELATED)	25.3	8,653		2,430	28.1	8.43[i]	729	(1,701)
9. Traffic Expense	10.7	3,660	34.1	1,248				
10. Commercial Expense	12.0	4,104	22.9	940				
11. Revenue Acc'tg Expense	2.6	889	27.2	242				
12. SUBTOTAL	84.0	28,730		6,174	21.5	6.45[h]	1,855	(4,321)
13. OTHER COSTS	16.0	5,472		1,859[f]	34.0	34.0	1,859	0
14. TOTAL COSTS	100.0	34,202[b]		8,035[g]	23.5	10.9[h]	3,714	(4,321)

Table 3.25

Summary Ozark and Alternative Interstate Cost Allocations

Source[S38]

Interstate Revenue Requirement	① Ozark Plan $Billion	② Alternative Estimate $Billion	③ Alternative-Ozark Difference[f] $Billion	④ Alternative as % of Ozark[g]	⑤ Alternative - Ozark Difference as % of Ozark[h]	⑥ Alternative-Ozark Difference as % of Message Rev. Req's[i]
1. TOTAL	11.406[a]	7,085	(4,321)	62.1	(37.9)	(53.8)
2. "OBVIOUSLY" ASSIGNED	3,321	3,321	0	100.0	0	0
3. AT&T Long Lines	2,441[b]	2,441	0	100.0	0	0
4. I.S. Private Lines	930[d]	930	0	100.0	0	0
5. MESSAGE SERVICE COSTS	8,085[c]	3,764[e]	(4,321)	46.2	(53.8)	(53.8)
6. Non-Traffic-Sensitive	3,748[c]	1,125[e]	(2,620)	30.0	(70.0)	(32.6)
7. Non-Plant Related	2,430[c]	729[e]	(1,701)	30.0	(70.0)	(21.2)
8. Other	1,889[c]	1,889[e]	0	100.0	0	0

Table 3.26

Potential Impact of Competitive versus Averaging Pressures

Source[S39]

NOTES

1. Federal Communications Commission. Statistics of Communications Carriers, U.S. Government Printing Office, Washington, D.C., 1976, Table 16, p. 30.
   United States Independent Telephone Association (USITA), Independent Telephone Statistics, Vol. 1, 1978 Edition, Washington, D.C., pp. 5 and 19.

2. The independents not reporting to USITA are principally rural telephone borrowers. REA Bulletin 300-4 (1977 Annual Statistical Report - Rural Telephone Borrowers, U.S. Department of Agriculture, Rural Electrification Administration) cites revenues of $899 million for this group as a whole. Some, however, are among the companies reporting to USITA. We prefer, at this stage of analysis, to leave aside 0.6% of total cost, rather than disentangling REA borrowers reporting to USITA from those who do not. Of the 1568 Independent companies in 1976, 764 reported to USITA (Independent Telephone Statistics, Volume 1, 1978 Edition, p. 14).

3. FCC. Statistics, Table 16, pp. 30-31.

4. FCC. Statistics, Table 16, pp. 30-31 and USITA. Independent Telephone Statistics, p. 19.

5. FCC. Statistics, Table 16, pp. 28-29 and USITA, Independent Telephone Statistics, p. 22.

6. FCC. Statistics, Table 16, p. 30; USITA, Independent Telephone Statistics, p. 19; and personal communication with USITA, October 19, 1978.

7. Smith v. Illinois Bell Telephone Co., 282 US 148. For a history of separations to 1940, see Sichter, James W. Separations Procedures in the Telephone Industry: The Historical Origins of a Public Policy, Program on Information Resources Policy, Cambridge, Mass., January 1977, No. P-77-2. Richard Gabel's Development of Separations Principles in the Telephone Industry (Michigan State University, East Lansing, 1967) fills in the story up to the late sixties, the point of departure of this paper. A framework for analyzing what "recognition of the competent government authority" means in contemporary terms is given in Lavey, Warren G. A Framework for the Analysis of the Regulatory Problems of Telephone Separations/Settlements Procedures, Program on Information Resources Policy, Cambridge, Mass., November 1978, No. W-78-13.

8. Smith v. Illinois Bell, 282 US 150-151.

9. Ibid., 282 US 151.

There is considerable variance in current usages of "use", some of them contradictory.

A statement on Impact of Toll Settlements Changes on Local Rates issued in mid-1979 by the Organization for the Protection and Advancement of Small Telephone Companies (OPATSCO) offers the following gloss (p. 8):

> "Joint costs of providing local and long distance service are allocated according to use [Emphasis in original]. Use is defined in terms of minutes of use over a specified period of time. If jointly used facility costs are allocated according to "actual" use, then the unadjusted percent of local minutes of use to total minutes of use is applied to the total jointly used facility cost to determine the portion of exchange (local) costs which are paid by local service customers. Relative use concepts, which are in effect today, increase the long distance allocation ratio."

AT&T Comments on the FCC's CC Docket No. 20981 (Impact of Customer Provision of Terminal Equipment on Jurisdictional Separations) dated March 1, 1979, speak, at page 15, of "growth in SLU, relative interstate usage" and of "the SLU-relative use factor." But, as SLU was then defined (see Section 3-D), this seems to be OPATSCO's definition of "actual use."

In a personal conversation with one of the authors, an attorney for AT&T referred to SLU as a measure of "actual use" and SPF (Section 3-D) as a measure of "relative use."

In the opinion of a reviewer of an earlier draft, "actual use" is interchangeable with "direct assignment" as the latter term is used in Table 3.1.

The February 1971 Separations Manual (see Note 13, below) says that "Separations are made on the 'actual use' basis, which gives consideration to relative occupancy and relative time measurements." (§1.211, p. 12).

Our usage is based on the following observations. The Smith v. Illinois Bell Court drew on The Minnesota Rate Cases to justify separations (230 US 435, cited at 282 US 149). The Minnesota Court thought separations should not be based on revenue shares but on "the use that is made of the property. That is, there should be assigned to each business, that proportion of the total value of the property which will correspond to the extent of its employment in that business. It is said that this is extremely difficult." (230 US 461). The Court went on to consider the relative merits of various "use-units", but only held narrowly that the one presented in the case did not happen to justify a finding of confiscation.

The Smith v. Illinois Bell Court held that a specific contention made in that case "cannot be dismissed simply on the basis of the number [emphasis added] of interstate calls originated by subscribers of the Illinois Company in Chicago, without considering other factors of time and labor entering into the relative use" (282 US 148).

At most, therefore, what the Court meant by "actual uses"--as distinguished from ignoring uses altogether--was something more subtle than just counting calls. When the details came back up four years later in Lindheimer v. Illinois Bell Telephone Co., the Court was satisfied by the record of hearings held in the meantime that "no question is now raised as to the allocation of property to the intrastate and interstate services..the allocation being made on the basis of use" (292 US 155). "Relative use" seems to have its plain meaning, namely use by one "business" relative to use by another, however "use" might be reckoned. This seems consistent with the glosses in Sections 11.13 and 11.2 of the Separations Manual (Note 13, below).

10. Kahn, Alfred E. The Economics of Regulation: Principles and Institutions, Vol. 1, Economic Principles, John Wiley & Sons, Inc., New York, N.Y., 1970, p. 83.
11. Ibid., p. 86.
12. Jurisdictional Separations, 47 CFR §67.1.
13. 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.
14. Uniform System of Accounts for Class A and Class B Telephone Companies, 47 CFR §31.

15. FCC. Statistics, Table 12, p. 21; USITA, Independent Telephone Statistics, p. 22; and American Telephone & Telegraph Co.

16. FCC. Statistics, Table 16, p. 30 and USITA, Independent Telephone Statistics, p. 19.

17. FCC. Statistics, Table 16, p. 30; USITA, Indepedent Telephone Statistics, p. 19; and personal communication with USITA, October 19, 1978.

18. 9 FCC2d 95-96 (1967), Docket No. 16258, Interim Decision and Order.

The arithmetic basis for this scheme is as follows. Assume that "book costs of Long Lines plant which terminates in [a] State" are $\$b_1$, and "book costs of associated company terminating plant" are $\$b_2$, where $b_1, b_2 \geq 0$. Let m_1 be the fraction of interstate conversation-minute-miles routed via Long Lines plant; let m_2 and m_3 be the fractions of interstate and intrastate conversation-minute-miles, respectively, routed via associated company plant ($1 \geq m_1, m_2, m_3 \geq 0$; $m_1 + m_2 + m_3 = 1$). If Long Lines book costs are directly assigned to interstate costs, and associated company costs prorated according to "the relative number of state and interstate conversation-minute-miles," the total interstate assignment is:

$$(1) \quad I.S._r = b_1 + \frac{m_2 b_2}{m_2 + m_3} = b_1 + b_2 \left(\frac{m_2}{1-m_1}\right) .$$

Under the Phoenix plan, the interstate assignment is:

$$(2) \quad I.S._p = (b_1 + b_2) \frac{m_1 + m_2}{m_1 + m_2 + m_3} = (b_1 + b_2)(1 - m_3)$$

$$= b_1 - b_1 m_3 + b_2 - b_2 m_3 .$$

The difference in interstate assignments is therefore:

$$(3)\quad I.S._p - I.S._r = -b_1m_3 + b_2 - b_2m_3 - b_2\left(\frac{m_2}{1-m_1}\right)$$

$$= \left(\frac{b_2}{1-m_1}\right)(1 - m_1 - m_2 - m_3(1-m_1)) - b_1m_3$$

$$= \frac{b_2m_1m_3}{1-m_1} - b_1m_3$$

$$= \left(\frac{b_2m_1}{1-m_1} - b_1\right)m_3 \quad .$$

For this difference to be positive, i.e., for the interstate assignment to be greater under the Phoenix plan we must have:

$$(4)\quad \frac{b_2m_1}{1-m_1} - b_1 > 0$$

or, equivalently,

$$(4')\quad \frac{b_2}{1-m_1} - \frac{b_1}{m_1} > 0 \quad .$$

But $b_2/1-m_1 = b_2/m_2 + m_3$ is the "unit cost of associated company plant" and b_1/m_1 is the Long Lines unit cost. Hence, so long as the latter is smaller than the former, as stated in the cited decision, the Phoenix plan yields a greater interstate assignment.

19. Ibid., p. 97.
20. Ibid., p. 99.
21. Ibid.
22. Ibid.
23. Ibid., p. 101.

24. 16 FCC2d 320 (1969), Docket No. 17975, Report and Order.

25. Ibid., p. 321.

26. Ibid., p. 323.

27. FCC. Statistics, Table 16, p. 30; USITA. Independent Telephone Statistics, p. 19; and personal communication with USITA, October 19, 1978.

28. Richard Gabel. Development of Separations Principles in the Telephone Industry, Michigan State University, East Lansing, 1967, pp. 40-42. Federal Power Commission, Report on Review of Allocations of Costs of the Multiple-Purpose Water Control System in the Tennessee River Basin, as Determined by the Tennessee Valley Authority and Approved by the President under the Provisions of the TVA Act of 1933, as Amended. Washington, D.C., March 23, 1949; pp. 20-23.

29. Ibid., p. 42. The TVA's practices dated back to at least 1938 (F.P.C., Note 28, at p. 22). Their prepared cover for their political flanks was deployed in the 1949 review, which reported that TVA had had the matter "studied over a period of some three or four years" by the TVA Board's Committee on Financial Policy assisted by "three well-known consultants" (F.P.C., Note 28, at p. 20).

30. Federal Power Commission et al. v. Hope Natural Gas Co. 320 US 591.

31. Ibid., p. 602.

32. AT&T; USITA

33. Ibid.

34. NARUC-FCC Committee. Separations Manual, pp. 43-47.

35. Ibid., pp. 14-15.

36. United States Independent Telephone Association. "Report on Results of Telephone Separations and Settlements Analysis," USITA, Washington D.C., September 1976, and American Telephone & Telegraph Co., submission to the Federal-State Joint Board on Telephone Separations, Docket No. 20981, Request No. JB-40, August 4, 1978.

37. Adapted from AT&T. Federal-State Joint Board, Request No. JB-40, August 4, 1978.

38. United System Service, Inc. Response to FCC Docket No. 20003, April 1975, Exhibit 40.

39. AT&T.

40. NARUC-FCC Committee. Separations Manual, pp. 34-35, §24.82.

41. Ibid., p. 29, Sec. 23.444.

42. USITA.

43. 9FCC 2d 30.

44. 16 FCC 2d 317.

45. 9 FCC 2d 108.

46. Ibid., p. 109.

47. Ibid.

48. Ibid.

49. Smith v. Illinois Bell, 282 US 150-151.

50. 16 FCC 2d 324.

51. Ibid.

52. Ibid.

53. Ibid.

54. Ibid., p. 326, §28.

55. Ibid., p. 326, §29.

56. Ibid.

57. Ibid., p. 327.

58. AT&T. Letter from Richard B. Holt to the Chairman of the Pennsylvania Public Utility Commission, June 30, 1970, Attachment C. [Chrm. was Chrm. of Joint Board Staff Committee Docket 18866].

59. Ibid.

60. USITA.

61. AT&T; also, AT&T. "Notes Regarding the Bell System Interpretation of the FCC's January 29, 1969 Separations Order (Docket No. 17975) and Proposed Application for Internal Division of Interstate Revenues Purposes Effective with the January 1969 Study Month," FCC-NARUC meeting, Washington, D.C., February 17-18, 1969 (Part II, §1.1).

62. AT&T. "Notes Regarding the Bell System Interpretation," Part II, §2.1.

63. AT&T; GT&E.

64. AT&T. "Notes Regarding the Bell System Interpretation," Part III, §1.

65. 26 FCC 2d 252 (1970), Docket No. 18866, Report and Order.

66. Ibid.

67. Ibid., p. 253.

68. 25 FCC 2d 124 (1970), Docket No. 18866, Further Notice of Proposed Rulemaking.

69. 26 FCC 2d 254.

70. Ibid.

71. AT&T. Updating Federal-State Joint Board, Request No. JB-37, July 5, 1977, and Request No. JB-41, March 22, 1977.

72. 63 FCC 2d 202 (1976), Docket No. 20981, Proposed Rulemaking and Creation of Federal-State Joint Board.

73. Ibid., p. 205.

74. United States Independent Telephone Association. Memberletter, No. 1311, April 8, 1975; and AT&T. Submission to Federal-State Joint Board, Request No. JB-60, March 3, 1978.

75. AT&T. "Background Information on the Development of the Dial Equipment Minutes (DEM) of Use Weighting Factors," November 27, 1978.

76. AT&T. The Impact of Competition for Intercity Services and Terminal Equipment on Separations and Assignment Procedures, Bell Exhibit 45, FCC Docket 20003, April 21, 1975.

SOURCE NOTES

S1. Adapted from:

AT&T.

AT&T. Federal-State Joint Board, Request No. JB-40, August 4, 1978.

Federal Communications Commission. Statistics of Communications Common Carriers, U.S. Government Printing Office, Washington, D.C., 1976, Table 12, p. 21 and Table 16, p. 30-31.

United States Independent Telephone Association (USITA). Independent Telephone Statistics, Vol. 1, 1978 Edition, Washington, D.C., p. 5, 19, 20, 22.

S2. 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, Table 1, p. 14 and Table 2, p. 15.

S3. AT&T.

S4. AT&T. Federal-State Joint Board, Request No. JB-40, August 4, 1978.

NARUC-FCC Committee on Communications. Separations Manual, Table 1, p. 14 and Table 2, p. 15.

USITA. "Report on Results of Telephone Separations and Settlements Analysis," USITA, Washington, D.C., September 1976, p. 4-5, 8.

United Systems Service, Inc. Response to FCC Docket No. 20003, April 1975, Exhibit 4.

S5. AT&T.

Federal Communications Commission. Prescription 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.

S6. Adapted from AT&T. Federal-State Joint Board, Request No. JB-40, August 4, 1978.

S7. AT&T.

S8. United Systems Service Inc. Response to FCC Docket No. 20003.

S9. AT&T.

S10. United States Independent Telephone Association. Presentation on Telephone Separations, April 6, 1978.

S11. AT&T. Letter from Richard B. Holt to the Chairman of the Pennsylvania Public Utility Commission, June 30, 1970, Attachment C. [Chrm. was Chrm. of Joint Board Staff Committee Docket 18866.]

S12. Ibid.

S13. USITA.

S14. AT&T. Federal-State Joint Board, Request No. JB-41, March 22, 1977.

National Association of Regulatory Utility Commissioners. Proceedings, November 14-17, 1977, Washington, D.C., 1978, p. 586-595.

In 1976 residual local use for Continental's Western Region of Colorado would have been -105% as evident from Table (a). Other values adjusted for settlement purposes because "unadjusted combined SPF exceeded 75%" are shown in Table (b). Details are in the NARUC Proceedings, pp. 591-592.

	SLU(%)	SPF(%) (Unadjusted)
Interstate	37.32	134.73
State	29.34	70.71
Total	66.66	205.44

Table (a)

Continental	SPF% (Adjusted for Settlement Purposes)			% Residual Local use
	Interstate	State	Total	
Arizona	36.65	42.35	79.00	21.00
Colorado (Western Region)	85.00	00.00	85.00	15.00
Idaho	34.35	40.65	75.00	25.00
Montana	56.05	23.95	80.00	20.00
New Hampshire	53.12	22.88	76.00	24.00
New Jersey	28.55	50.45	79.00	21.00

Table (b)

S15. AT&T.

S16. AT&T. Federal-State Joint Board, Request No. JB-41, March 22, 1977.

S17. Ibid.

S18. Ibid.

S19. AT&T.

S20. Ibid.

S21. AT&T. Updating Federal-State Joint Board, Request No. JB-37, July 5, 1977, and Request No. JB-41, March 22, 1977.

S22. Ibid.

S23. USITA. Memberletter, No. 1311, April 8, 1975.

AT&T. Federal-State Joint Board, Request No. JB-60, March 3, 1978.

S24. AT&T. Federal-State Joint Board, Request No. JB-37, July 5, 1977.

S25. Ibid.

S26. Ibid.

S27. Ibid.

S28. AT&T. Federal-State Joint Board, Request No. JB-42, June 22, 1977.

U.S. Bureau of the Census. Statistical Abstract of the United States, 1977, 98th Edition, U.S. Government Printing Office, Washington, D.C., 1977, Table 10, p. 11.

S29. Ibid.

S30. AT&T. Federal-State Joint Board, Request No. JB-31, January 10, 1978.

S31. Ibid.

S32. AT&T. Updating Federal-State Joint Board, Request No. JB-64, June 9, 1977.

S33. Ibid.

S34. Telecommunications Policy Task Force. The Dilemma of Telecommunications Policy: A Supplement, Washington, D.C., October 31, 1978, Figure 1B, p. 76-77.

S35. Ibid.

S36. a. Figure 3.14
b. Figure 3.1, Box 16.
c. Figure 3.1, Box 15.
d. Figure 3.1, Box 15.

S37. 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.

S38. a. Table 3.4, Column 4 (Bell System figures, as approximation to industry figures).
b. Figure 3.1, Box 10 (Total Industry Figure).
c. Total (Line 14, Column 2) x Column 1 entry in same line.
d. Table 3.4, Column 5 (Bell System figures, as approximation to industry figures; see also Table 3.4, columns 6 and 7).
e. Column 2 x Column 3.
f. Line 14 - Line 12.
g. Table 3.1, Box 11.
h. Column 4/Column 2.
i. Column 5/3.333 (3.333=Average SPF/SLU Ratio)
This major assumption appears to reasonable for its stated purpose, to provide gross estimates of decreases in interstate allocations that would be consistent with the statutory and judicial framework as of mid-1979. The factor in line 1, column 6 incorporates the effect of all Local Dial Switching Equipment (line 3), although only a part of LDSE is Non-Traffic Sensitive and the separations process therefore more complex than assumed here (details are in Table 5). But this is recognized in part through the use of the 12.4% factor in line 3, column 3. In any case, the resulting "SLU-based" estimate of $1.126 billion (line 1, column 7) is consistent with $3.633 billion/3.3333 = $1.090 billion derived from the industry estimates displayed in Tables 3.22 and 3.23. Hence the estimated difference of $2.62 billion (line 1, column 8) is also consistent with an estimate derived from those industry estimates as $3.633 billion -$1.090 billion = $2.543 billion. The factor in line 9, column 6 does violence to the fact that only a small portion of non-plant-related operating expenses is separated according to the SPF. (See Section 3-C.) However, the traffic-sensitive/non-traffic sensitive distinction applies, even though different allocation devices are used (Table 3.1(b)). It therefore seems reasonable to assume that rationalizations for decreasing the interstate share of non-plant-related operating expenses by proportions similar to those for plant costs could readily be found. The resulting estimate of $1.701 billion (line 8, column 8) may be regarded as a rough and ready upper bound. Other justifications for a total difference on line 14, column 8 greater than the difference on line 1, column 8 have been offered, but not considered here (e.g. the argument that no terminal equipment costs at all might be allocated to interstate revenue requirements, as in Impact of Toll Settlements Charges on Local Rates, Organization for the Protection and Advancement of Small Telephone Companies, July 1979).

j. Column 2 x Column 6.
k. Column 7/Column 2.
l. Column 7 - Column 4.

S39. a. Figure 3.1, Box 15.
b. Figure 3.1, Box 8.
c. Table 3.25, Column 4.
d. Line 1 - Line 3 - Line 5.
e. Table 3.25, Column 7.
f. Column 2 - Column 1.
g. Column 2/Column 1.
h. Column 3/Column 1.
i. Column 3/Line 5, Column 1.

APPENDIX

Abbreviations of State Names used in Tables

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