

**Financial Structures  
In Competitive Telecommunications:  
An International Overview**

**Jaak Aulik**

***Program on Information Resources Policy***

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**Financial Structures in Competitive Telecommunications:  
An International Overview**

**Jaak Aulik**  
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*Project Director*  
**John C. LeGates**

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Jaak Aulik is International Market Planning Manager, AT&T Network Systems. He prepared this paper as a research fellow with the Program.

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## Executive Summary

- Competition in the United States has led to significant changes in domestic telephone rates and in the regulation of AT&T, the Bell operating companies (BOCs), and the other common carriers (OCCs). As competition moves into international telecommunications, profound changes may be expected.
- The divestiture of AT&T created two kinds of financial organizations, one characterized by its investments, the other by its expenses. The management of one is concerned with the growth of its rate base and a fair rate of return on the assets it deploys, the other by the volatility of its revenue stream and its need for cost controls. The organizations employ capital and expend their resources differently. But their financial structures are typically those of either a traditional industrial firm or an emerging service provider. As nations move toward service-based economies, their financial institutions increasingly take on a distinctive financial character common to service-based firms. Small amounts of capital leverage large customer bases of service revenues, the major portion of which are consumed by sales, labor, and other expenses rather than by the cost of capital.
- A framework for analysis of the financial forms being created in service-based economies suggests implications for telecommunications policy in the U.S. and other nations. Notably there is a growing gap between the intent of telecommunications policies and their effects on the financial structures of service-based carriers and nations. As economists, regulators, and judges struggle to understand today's financial complexities with models of competition and regulation drawn from yesterday's industrial structures, their conclusions are increasingly misapplied.
- The international competitive arena differs from the advanced economy of the United States and the universal telephone service enjoyed by its citizens. While the U.S. has virtually completed its transformation from an industrial to a service economy, parts of the world lag far behind. Thus, to the degree that rate-base regulation of service firms is misapplied in the United States, export of its telecommunications policies overseas presents a significant potential for serious miscalculation. Because competition on the world stage involves the economic welfare, sovereignty, and national pride of other countries, the controversies that arise may need to be resolved at diplomatic levels.
- Exploration of the financial structures of the international telecommunications carriers and of the financial arrangements between carriers in the U.S. and the Posts, Telegraph and Telephone administrations (PTTs) of other countries suggests that as competition intensifies, these structures and the nature of the firms competing in the joint provision of international services will undoubtedly change. Executives and regulators will face issues for which their domestic experience of competition provides no lessons, or may, indeed, mislead them.
- Can foreign telecommunications monopolies exploit the competitive policies of the telecommunications industry in the United States? Are governmental monopolies (the PTTs) bound by uniquely American antitrust laws? Conversely, would U.S. carriers be concerned by antitrust rulings of the European Economic Community? Would foreign price supports for its domestic or international telecommunications network be considered anti-competitive in the U.S.? Could removal of such supports be considered "predatory pricing"?
- Changing financial structures provoke such critical questions. Key variables include the probable effects of competitive rate structures on international accounting conventions affecting most other

countries of the world. Crucial also are the consequences of U.S. regulatory policies such as the balanced loading and uniform settlement rates policies of the Federal Communications Commission (FCC). The stakes are high and the time is short: As traffic volumes are diverted by new carriers between competing countries, the financial structures of their institutions will change. The sum of monies affected in the U.S. alone, nearly \$1 billion, is four times greater than all telecommunications aid from the U.S. government to all other countries in 1984.

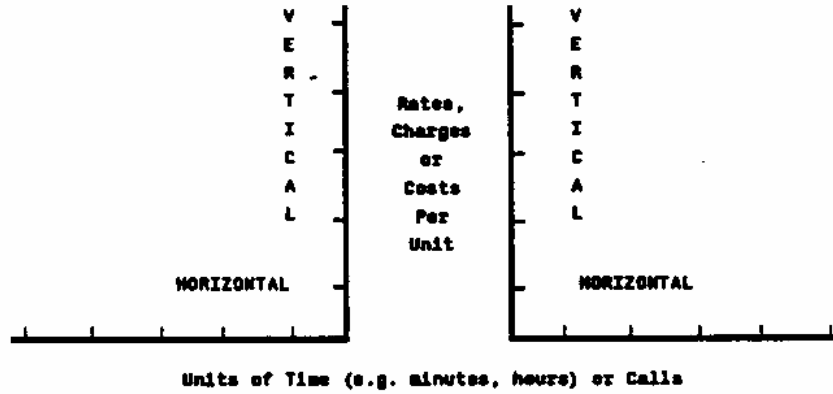
## AUTHOR'S NOTE

This paper is about financial structures and not about financial data. The data that are presented are not intended for rigorous financial analysis. They are inappropriate for casual comparisons or easy conclusions about very complex companies in a rapidly changing telecommunications industry. While drawn from authoritative sources such as annual reports or filings with the FCC, the data represent different periods of time or even fiscal years, and may be incomplete on the one hand or overly summarized on the other. They are briefly presented to illustrate essential financial structures in order to make visible the complex, hierarchical relationships that are often obscured by numerical details.

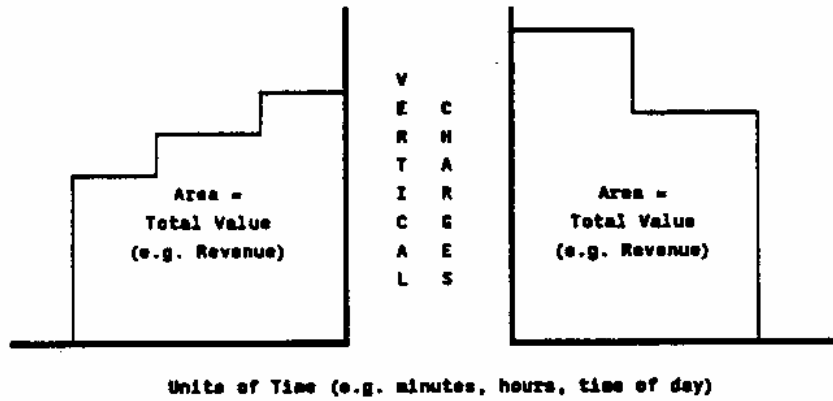
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TABLE OF CONVENTIONS  
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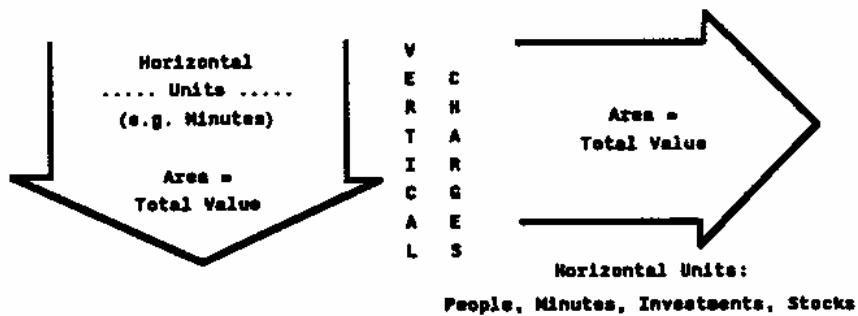
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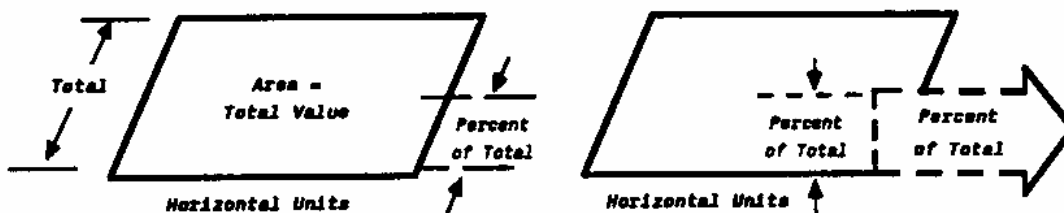
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3. ARROWS



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<p>Suggests that emerging worldwide trends toward services rather than industrial economies are fundamentally changing the nature of corporate financial structures. The nature of these structures is bringing into conflict longstanding U.S. telecommunications policies such as rate-base regulation, the balanced loading policy, and the uniform settlements policy.</p>	
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<p>Describes a conceptual framework of financial layers for understanding the financial structure of a telecommunications organization. Shows at a glance the distinctive structures of emerging service-based industries in contrast to the industrial financial structures prevalent in earlier eras of rate-base regulation. Visually depicts the financial structure that results from the interaction of a corporation's cost structure with its revenue structure.*</p>	
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<p>Describes the operating leverage wielded by service-based industries as compared to industrial financial structures. Poses the difficulties inherent in regulating service-based industries that leverage large revenue streams with small rate bases, in contrast to industrial firms that manage smaller revenue streams in proportion to their base of assets. Suggests that some forms of discrimination are unavoidable in rate structures, market structures, investment structures, or capital structures because of the differing distribution of resources in the layering of the financial hierarchy.</p>	

\*See Table of Conventions Used in This Text, p. iv.

Describes the volatility of financial streams in service-based firms, and begins to examine the extreme examples of service-based industries illustrated by international financial relationships. Since international rate levels balance the "public interests" of U.S. consumers against the "national interest" consideration of U.S. out-payments to foreign administrations, rate-base regulation of international services becomes extraordinarily complex.

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Poses the conceptual problem of understanding competitive information industries where "units of interaction" are abstractions of the different levels of the financial hierarchy, and the costs of providing services remain embedded in the structures of competing firms after service capacity has been leased to "consumers."

Takes issue with simplistic views of competition afforded by point-of-sale products whose costs in materials and labor are transferred cleanly to consumers without establishing a time relationship with the customer. Examines the layering of financial structures and their tendency to shear into other forms (either new companies or price structures) in firms that provide service by managing conceptual units of time.

Chapter 4. The Structure of the Divested AT&T and RHCs

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Analyzes the structure of the firms that have resulted from the divestiture of the Bell system under the Modification of Final Judgment: AT&T and the RHCs (the regional holding companies).

From data contained in their annual reports, illustrates the inherent difference in the financial nature of these firms. The way they utilize their assets, the percentage of their resources that they expend to reach their customers, and their sensitivity to variations in consumer demand are unique to their financial structures.

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Plots the return on average total assets for AT&T, IBM, and RHCs, and other significant competitors for interstate and international traffic. The topographical map that emerges reveals a clustering of the RHCs in their area of market emphasis, and different positions for AT&T, IBM, MCI, and the potential providers of transatlantic satellite and fiber optic capacity.

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## INTRODUCTION

The forces that have shaped the geopolitical landscape of telecommunications in the United States have now moved into the international arena. Or, as George P. Shultz, the U.S. Secretary of State, expressed it:

We vigorously pursue competitive, deregulatory policies domestically, and they will continue to serve as the foundation for our policy internationally.<sup>1</sup>

While these forces for competition and deregulation have met with considerable success domestically, they have encountered resistance from the established Posts, Telegraph and Telephone administrations (commonly known as PTTs) overseas. Usually government monopolies, the PTTs have viewed the export of U.S. domestic policies and telecommunications technology with some alarm, and occasionally as an effort to erode not only their financial and industrial strength, but also their national sovereignty.

Secretary Shultz recognized the skepticism of other nations when he addressed the concerns expressed by then Chairman of the Senate Committee on Foreign Relations:

However, it is essential in pursuing our international objectives to realize that the United States has adopted policies quite different than most other nations [and that] seeking acceptance of our policies [can] best be accomplished<sub>2</sub> by example and through consultation and negotiation.

When the Chairman of the Federal Communications Commission (FCC), Mark S. Fowler, spoke in December 1982 before members of the Organization of Economic Cooperation and Development (OECD) on the implications of U.S. telecommunications policy, he struck a similar theme:

Competition and the free flow of knowledge and ideas, regardless of their popularity, are cornerstones of the industrialized nations of the free world. Our societies and cultures have thrived upon these principles.<sup>3</sup>

Thus, the foundation and the cornerstones of American policy seem firmly in place. But what lessons these policies may offer for other nations remain to be seen. It is clear that in the United States they have transformed the telecommunications industry and have become a logical extension of the realization of universal telephone service.

Such a transformation would have been unlikely, however, without the underlying mandate presented by significant shifts in the nature of the American economy and in the distribution of employment in the U.S., as Table A suggests.

Table A  
Shifts in U.S. Employment, 1950-1984

	1950	1960	1970	1980	1984
Agricultural Employment	12%	9%	5%	4%	3%
Industrial Employment	34%	33%	33%	29%	24%
Services Employment	54%	58%	62%	67%	73%
(Information-Related Jobs Implicit in Above Data)	(17%)			(60%)	

Sources: Annual Report of the President of the United States on the Trade Agreements Program, 27th Issue, 1983 (Submitted to Congress April 1984), Figures 3A and 3B, pp. 7, 8; "Service Industries," Security Pacific Bank, as cited by the Wall Street Journal, August 7, 1985, p. 19; and others.

The movement to a service-based economy is an emerging trend not only in America but around the world: Knowledge, skills, and information have become increasingly valuable and salable within the U.S. economy and those of developed nations. Of 19 million jobs created

in the United States in the last decade, over 90% were related to the creation, processing, or manipulation of information. Feketekuty and Aronson report that, worldwide, 60 million jobs were created in information-related occupations, up from 10 million for the previous decade.<sup>4</sup>

At the same time, only modest increases in employment were reported in goods-producing industries. Jobs that generate, process, or distribute information and knowledge are now the principal forms of occupation emerging among the developed nations of the world.

The international telecommunications network is the nervous system that interconnects the U.S. with other nations. Its electronic arterials transfer the information and render many of the services in the world economy. The growth of information-based jobs has increased the extraordinary reliance which business applications have placed on telecommunications networks carrying voice, data, and video signals. To some degree, Table B reveals the extent of this link by comparing the country ranking in number of installed telephones with the development of information- or service-based economies among the world's 25 largest providers of telephone service. The 25 countries with the greatest numbers of telephones are consistently those with employment in services near or above 50%. Moreover, their rank in telephone development closely parallels their rank in the export of both services and merchandise in world trade: The higher the ranking in telephones, the higher the standing in total exports on the world market. Telecommunications stands out as a strategic sector for world development: In the view of the European Economic Community, where services comprise 56% of all employment, it "constitutes the essential vector for information flows and new services which help to create industrial and commercial activities."<sup>5</sup>

Country and Rank by Number of Telephones	Gross Domestic Product (US \$ Billions)	Civilian Employment		Employment		Export Trade		
		(Millions)	Unemployment: Percent of Labor Force	Percent in Industry	Percent in Services	Services (US \$ Billions)	Merchandise (US \$ Billions)	Percent Service Merchandise
1. United States	3,042	99,526	9.5%	28%	68%	38.1	236.2	16.1%
2. Japan	1,062	56,380	2.4%	35%	55%	20.4	137.6	14.8
3. West Germany	659	25,090	6.1%	43%	52%	29.4	172.1	17.1
4. France	540	20,982	8.0%	35%	57%	32 E	100 E	32 E
5. United Kingdom	477	23,462	12.4%	34%	63%	29.4	97.0	29.2
6. U.S.S.R.	1,715	115,200 E	na					
7. Italy	347	20,542	6.9%	37%	51%	20 E	72 E	28 E
8. Canada	298	10,574	10.9%	27%	68%	7.4	70.4	10.5
9. Spain	181	10,876	15.9%	34%	48%	11.9	21.0	56.7
10. Brazil	297					2.6 E	26 E	10 E
11. Australia	157	6,376	7.1%	30%	64%	3.7	20.9	17.7
12. Netherlands	138	4,984	11.4%	29%	66%	16 E	60 E	27 E
13. Sweden	99	4,219	3.1%	30%	69%	7 E	30 E	23 E
14. Mexico	254					9 E	22 E	41 E
15. Korea	65					6.3	21.0	30.0
16. Switzerland	97	3,033	0.4%	38%	55%	8 E	26 E	31 E
17. China (Taiwan)	46 E					23 E		
18. Belgium	84	3,620	13.1%	32%	65%	13 E	45 E	29 E
19. Poland	na					15 E		
20. Denmark	56	2,364	11.0%	29%	64%	5.2	15.5	33.5
21. South Africa	73					3 E	25 E	12 E
22. Germany, D.R.	na							
23. Austria	67							
24. Czechoslovakia	na					8.5	15.5	54.8
25. India	177 E					2.5 E	10 E	25 E

Note: Total labor force is 10% greater than civilian employment.

na = not available  
E = estimated

Sources: OECD Statistics, 1984; U.S. National Study on Trade in Services, 1984; and others.

Table B  
World Services Development  
(as of 1982)

Relatively few countries enjoy even basic communications services, however, much less entertain thoughts of universal telephone service or service-based economies. The Maitland Commission has documented that three quarters of the world's 600 million telephones, for example, are concentrated in just nine countries<sup>6</sup> (one third of them in the United States). A similar world concentration is evident, though not as pronounced, for 2 million telex terminals<sup>7</sup> (approximately one tenth of them in the United States). The scene is depicted more clearly by Table C.

Table C  
World Telephone Development

Rank by Number of Telephones	End of 1982 Telephones (000,000s)	1982 Population (000,000s)	Telephones per 1000 Population	Percent of World Telephones	Area in Km <sup>2</sup> (000s)	People & Telephones per Km <sup>2</sup>		Telephones per Mil of GNP
1. United States	183.1	236.06	789	33.4%	9,363	25	20	59
2. Japan	61.2	118.36	517	11.1%	372	318	164	55
3. West Germany	31.4	61.64	509	5.7%	249	248	126	48
4. France	29.4	54.22	542	5.4%	547	99	54	56
5. United Kingdom	29.1	55.78	522	5.3%	244	229	119	67
6. U.S.S.R.	26.7	269.84	99	4.9%	22,402	12	1	28
7. Italy	21.7	56.26	386	4.0%	301	187	72	59
8. Canada	17.1	24.63	694	3.1%	9,976	2	2	54
9. Spain	12.8	37.93	337	2.3%	504	75	25	80
10. Brazil	9.5	126.81	75	1.7%	8,512	15	1	32
11. Australia	8.3	15.04	552	1.5%	7,687	2	1	55
12. Netherlands	8.0	14.31	559	1.5%	41	350	195	61
13. Sweden	7.1	8.33	852	1.3%	450	19	16	80
14. Mexico	6.0	73.01	82	1.1%	1,973	37	3	40
15. Korea	5.2	39.34	132	.9%	98	399	53	75
16. Switzerland	5.0	6.48	772	.9%	41	157	122	51
17. China, R.(Taiwan)	4.4	18.25	239	.8%	36	507	122	79
18. Belgium	4.0	9.85	402	.7%	31	323	129	50
19. Poland	3.6	36.23	99	.7%	313	116	12	36
20. Denmark	3.6	5.12	703	.7%	43	119	84	62
21. South Africa	3.5	1.01	113	.6%	1,221	25	3	46
22. Germany, D.R.	3.3	16.74	197	.6%	108	155	31	50
23. Austria	3.3	7.51	439	.6%	84	90	39	50
24. Czechoslovakia	3.3	15.37	215	.6%	127	120	26	56
25. India	3.2	699.00	5	.6%	3,268	213	1	18

Sources: OECD Statistics; "The World's Telephones," 1983; ITU Statistics; UN Statistical Yearbook; and others.

Manifest in these data are the signs of a U.S. and world economy increasingly reliant on telecommunications as a basic component of its commercial infrastructure. "For in the kind of world we live in today, and even more so in the future," says Charles L. Brown, Chairman of the

Board of AT&T, "communications and information handling are a component of virtually every other form of human activity."<sup>8</sup>

For developing countries the situation is particularly acute. Competitive scenarios in information services are played out on a far different stage. Unless they are willing to accept subordinate roles as providers of cheap labor in the manufacture of goods destined for the industrialized nations, developing countries have little to offer to the world economy. Their domestic networks are woefully inadequate either in numbers of telephones or in the quality of the services they provide to support the requirements of information-based societies. As information ages, its value for service sectors decays. Consequently, countries with inadequate networks fall increasingly behind in their race with developed economies. As the developed nations contemplate the applications of their newest technologies, such as fiber optic cables and "specialized" satellites between themselves, they also threaten to deemphasize their reliance on INTELSAT, a cooperative consortium of 109 member nations that, more than any other development in telecommunications in this century, has joined together in a common bond the world's developed and underdeveloped nations. If a significant rise in the costs of service connections to underdeveloped nations were to accompany these ventures, the competitive advantage and the climate for business development would further shift to nations with more sophisticated networks, or to multinational corporations that have control of private systems of communications.

Today, on a global stage, advances in multi-beam satellite technology, small dish earth stations, and fiber optic submarine cables are encouraging the entrance of private international competitors. Five proposals involving satellites in the Atlantic and Caribbean regions and two for fiber optic cables have been put before the Federal Communications Commission; several have been approved. Almost universally opposed by governmental PTTs whose pricing structures and authority these systems challenge, the new entrants have nevertheless made powerful allies among large multinational businesses. Like domestic corporations in the U.S. before the introduction of competition, the

multinationals' international telecommunications costs are high. But the products and services they offer fuel the domestic economies of developed nations and swing influence in the corridors of power. Their transnational corporate subsidiaries have close ties with ministries of industry abroad. Thus new lines of conflict are being drawn in the international forum, between systems of authority, between regulators in the United States and government officials abroad, between competitors here and overseas, and between high-volume users of telecommunications and many smaller, low-volume subscribers to the international network.

No great sympathy attaches to a competitor's loss of market share. Should the other reside across an international border, however, an immediate outcry over the loss of employment, erosion of the industrial base, and a negative tilt of the balance of international payments ensues. Clearly, international competition evokes concerns which domestic competition does not. Moreover, international competition in telecommunications raises issues of national security, freedom of information and data flows, and even national sovereignty. These have been adequately addressed in many policy publications.

But the structure of international telecommunications services and the financial forces that drive it have not been adequately discussed. The international network that has evolved from the interconnection of the world's cables and satellites represents a unique resource: a consensual framework for the conduct of world communications and trade in services. Its agreements and arrangements are the result of bilateral, trilateral, and multilateral negotiations among independent and sovereign authorities. A web of relationships, physical, financial, and conceptual, binds them and their constituent organizations, whether political or technical, into a system: a dynamic grouping of inter-related parts, each one of which influences and is influenced by at least one other, but is not controlled by any. In ways that are only now emerging and becoming clear in the post-divestiture environment, regulatory and competitive changes made in disregard of political jurisdictions may bring with them undesirable consequences.

Different systems of authority, technology, working practices, and currencies present an extraordinary level of complexity in international policy analysis. Moreover, the U.S. practice of participation in international telecommunications through private corporations who provide service in partnership with foreign governmental administrations presents problems with trade and treaty obligations which may have to be resolved at diplomatic levels. Like wheels on a carriage, each nation's policies have evolved to support a common structure in international telecommunications. Each turns freely on its own course, but cooperates and is constrained by the individual actions of others. Similarly, international common carriers support one another's efforts while allowing the pursuit of individual courses of action. They are joined, big countries as well as small ones, by policies (such as the Balanced Loading Policy and Uniform Settlements Policy of the U.S.) and financial agreements which turn on the cooperative relationships of carriers to distribute their burdens among the many supporting nations. Consequently, to succeed, competition in international telecommunications must address these concerns and proceed with a measure of joint consultation, cooperation, and "international comity." We must reexamine the regulatory and legal principles that have emerged in earlier industrial eras of domestic telecommunications monopoly as well as competition, and question their validity in the international marketplace of sovereign states and transnational competitors. The stakes are high and miscalculations can cause severe hardships, not only to smaller nations around the world, but also to U.S. interests.

A measure of the U.S. stake is the marked growth in payments from U.S. carriers to foreign administrations: More than \$264 million in 1980, in two years it grew to \$502 million. Today, it is estimated to be over \$1 billion. This dramatic rise in U.S. outpayments can be shown to be a direct consequence of U.S. rate-base regulation and rate competition. This paper will show that the movement to services rather than industrial organizations has significantly altered the financial relationships on which rate-base regulation is based. The financial supports and rate distortions which have become evident in the post-divestiture United States are aggravated in international telecommuni-



cations by policies that have altered the traditional financial ratios on which competitors base their investment decisions. This has not only eroded the mandate for rate-base regulation in domestic telecommunications, but threatens a series of international conflicts and litigation as American policies come into conflict with those of other nations and the financial realities of the international marketplace.

The purpose of this paper is to present a framework for financial analysis with which to reexamine the role of regulation and competition in international telecommunications. As new financial structures have emerged among service-based firms and information-based economies, they have eroded the mandate for rate-base regulation. These financial structures are critical to the cooperative relationship between countries. This paper will identify the common financial structures between firms to examine the different levels and effects of competition in international telecommunications. It will touch on the role of policies that constrain the development of these structures, as well as the organizations, domestic and international, that influence their development. Financial structures, such as international settlements, which have strategic importance in the development of competitive telecommunications policies for international services will be discussed in depth.

Notes for Introduction

- 1 Shultz, George P., Letter to the Honorable Charles H. Percy, former chairman of the Committee on Foreign Relations, September 21, 1983.
- 2 See above.
- 3 Keynote speech of Mark S. Fowler, as reported in Changing Market Structures in Telecommunications, Ergas and Okayama, editors, North-Holland, OECD, 1984.
- 4 Feketekuty, Geza and Aronson, Jonathan David, "The World Information Economy," The George Washington University and McGill University, Montreal, Canada, November 17-18, 1983, page 6.
- 5 Maitland, Sir Donald, The Missing Link, Report of the Independent Commission for World-Wide Telecommunications Development, December 1984, page 3.
- 6 Williamson, John, "Teletex faces a future without surety," Telephony, Vol. 208, No. 5, February 4, 1985, page 72.
- 7 Communication from the Commission to the Council on Telecommunications, "Progress Report on the Thinking and Work done in the field and initial Proposals for an Action Programme," COM(84) 277 final, Brussels, May 18, 1984, page 3.
- 8 Shooshan, Harry M. III, editor, Disconnecting Bell: The Impact of the AT&T Divestiture, Pergamon Press, New York, 1984, page 6.

**SECTION I: FINANCIAL STRUCTURES**

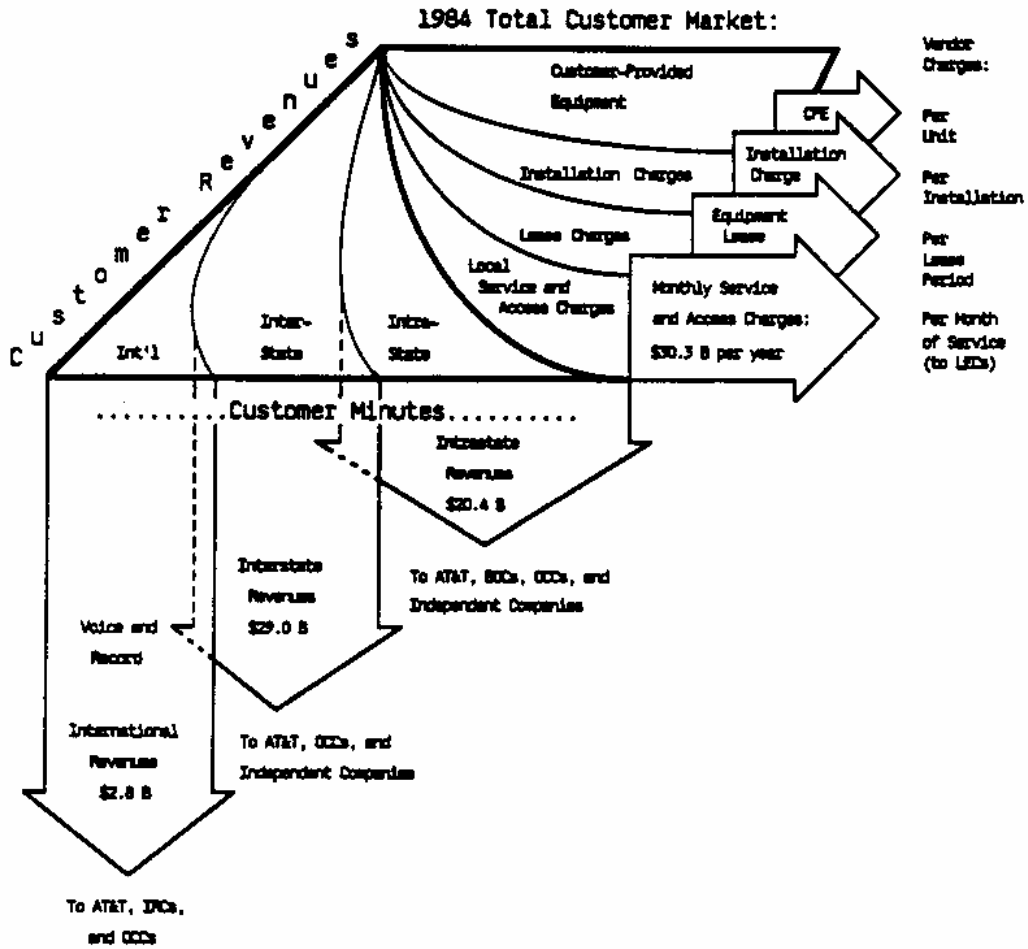


## A FRAMEWORK FOR FINANCIAL ANALYSIS

Financial structures in international telecommunications can be displayed as a series of broad financial layers which illustrate at least three perspectives: the view from the customer base of the country involved, the view from different levels of concern of a nation's financial organizations, and the political and financial forces that act on them. To provide the first layer and initial perspective, Figure I-1.1 portrays the customer base as a rectangular plane whose area represents the annualized value of the embedded base of customer equipment, both owned and leased, as well as the value of the goods and services provided to customers. The revenues that flow from these customers to their diverse suppliers are represented as broad arrows emanating from the edges of the financial plane. If drawn in proportion, a broader arrow would represent higher expenses and a narrower one lesser expenses; taken together the arrows would gauge the drain of revenues from the area of the customer base. Said another way, the expenses represented by the arrow are what the customer pays its suppliers.

For example, if Figure I-1.1 were to represent the value of the telecommunications marketplace in the United States, the first arrow on the upper right would represent the annualized value of purchases in customer-provided terminal equipment. The next arrow would represent the value of the installation charges paid to bring this equipment into service; the next, the annual value of the charges for equipment leased by customers; the next, the annual value of the service charges paid monthly to the Bell operating and independent companies who render local monthly services. The south-pointing arrows would represent the annual flow of revenues from minute-based charges for international, interstate, and intrastate services. In Figure I-1.2, access charges could be represented either as downward flows of minute-based charges included in customer rates for international, interstate, and intrastate services, or as part of the monthly service charges collected by the local exchange companies to compensate them for their fixed costs of investments. As access charges for fixed costs are transferred from minute-based charges

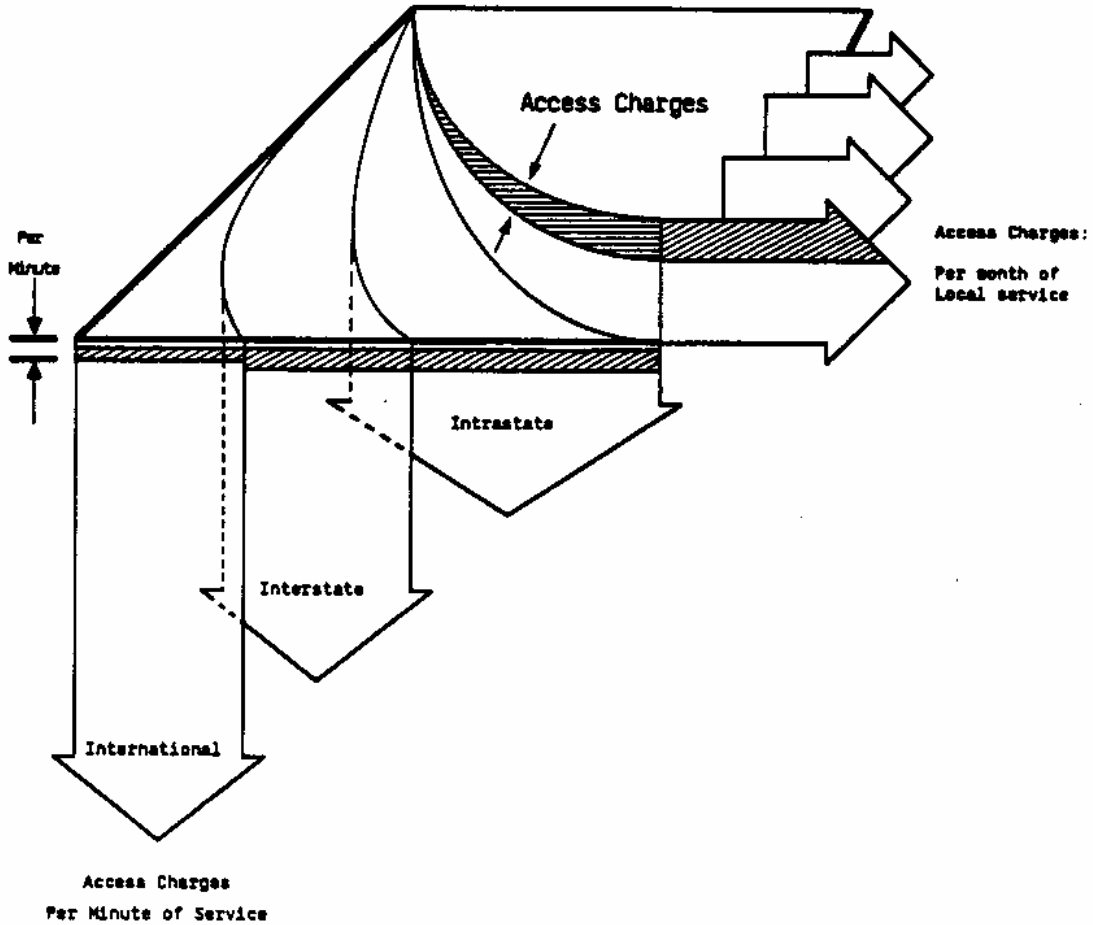
to monthly flat rates, the shaded portion of the south-pointing arrows would decline. The shaded portion of the monthly service charges would increase.



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Figure I-1.1

Marketplace Revenues and their Distribution at the Customer Level



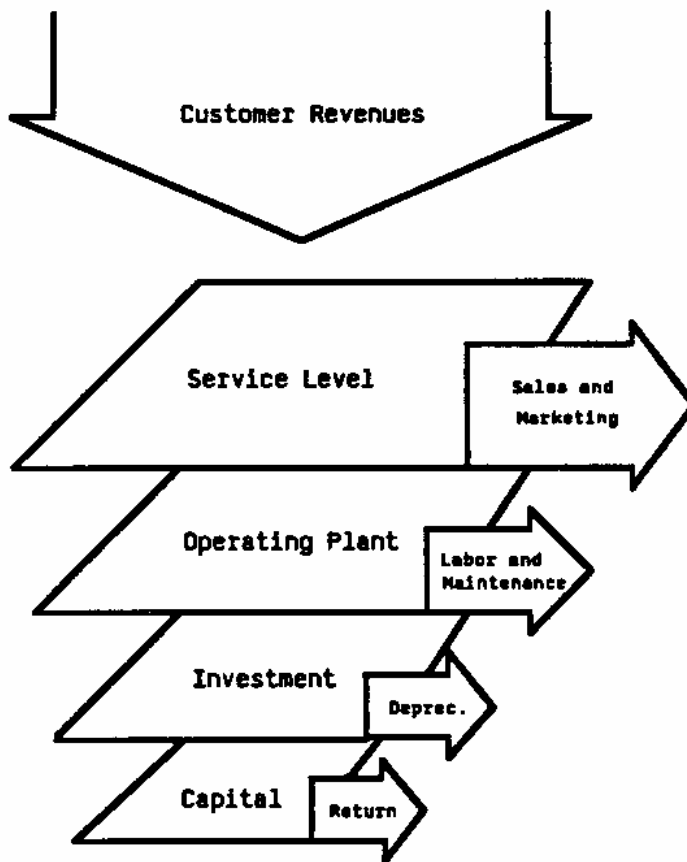
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Figure I-1.2

Access Charges per Minute or per Month

The levels of involvement of financial organizations are more difficult to portray. The total organization is a complex overlay of diverse structures, difficult to visualize, and consequently more difficult to analyze. For this reason, in order to make invisible ratios and other financial effects visible, they appear here as a series of layers or planes which can be discussed individually, or in relation to one another, to provide a framework for policy analysis. The four rectangular areas of Figure I-1.3 represent, successively, the annual value of a firm's goods and services, the book value of its operating plant, the current value of its investments, and the value of its capital. Seen overall, they form a kind of conduit, a funnel, for the revenue stream that comes from customers at the customer level and flows

vertically down to the owners of the business. Each layer, however, presents a scene for independent activity and a lateral flow of money (expenses and costs of investments) between the business and its suppliers. Distinct from the vertical flow of customer revenue, the management of these lesser streams of expense affects the area of the financial layers, as well as the revenue available to flow to the bottom line of the firm. Key management ratios become evident in this display: sales expense versus sales revenues, maintenance expense versus value of the plant maintained, depreciation expense versus total investments, and capital expense versus total capital. These ratios change with management decisions.



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Figure I-1.3

A Framework for Financial Analysis



For example, customers may open or close their accounts for service. If sales salaries, marketing, or advertising expenses are trimmed, fewer customers are reached. Not only the area of the service level but also the value it represents decreases. Equipment may be added, removed for maintenance, or retired from the level of the operating plant. If operating budgets are reduced, maintenance-related expenses decline. But over a period of time less and less equipment remains in service to provide customer services or earn customer revenues. The value of the operating plant in service declines. Investments may be made in new ventures, and old ventures may be fully depreciated or discontinued. But shortsighted attempts to reduce depreciation expense cripple the firm's ability to invest in new equipment or fund new ventures which may bring additional customer revenues. The value and area of the investment base decline. Shareowners and bondholders buy and sell stocks and bonds. But attempts to reduce dividends and yields will shrink the value of their holdings and hazard the ability of the corporation to attract new capital. The capital base declines.

These financial levels interact. They represent different constituencies and interests: At the service level of the organization, the marketing and sales staff provide the perspective of customers and the marketplace which guides a competitive corporation. At the level of the operating plant, the maintenance and installation forces provide the technical ability to service customers while assessing the operating capability of the plant. At the investment level, executive officers determine the choice of equipment, technologies, and research and development necessary for the markets of the future. At the capital level, the owners and credit holders evaluate the risk and potential of their holdings in the corporation against other opportunities to invest.

In aggregate the customer level and these four levels of the organization comprise the delivery system whereby a corporation serves its customers. Between levels, they describe the critical interfaces that are shaped by management and regulatory decisions. The first two levels are especially important since they represent the principal

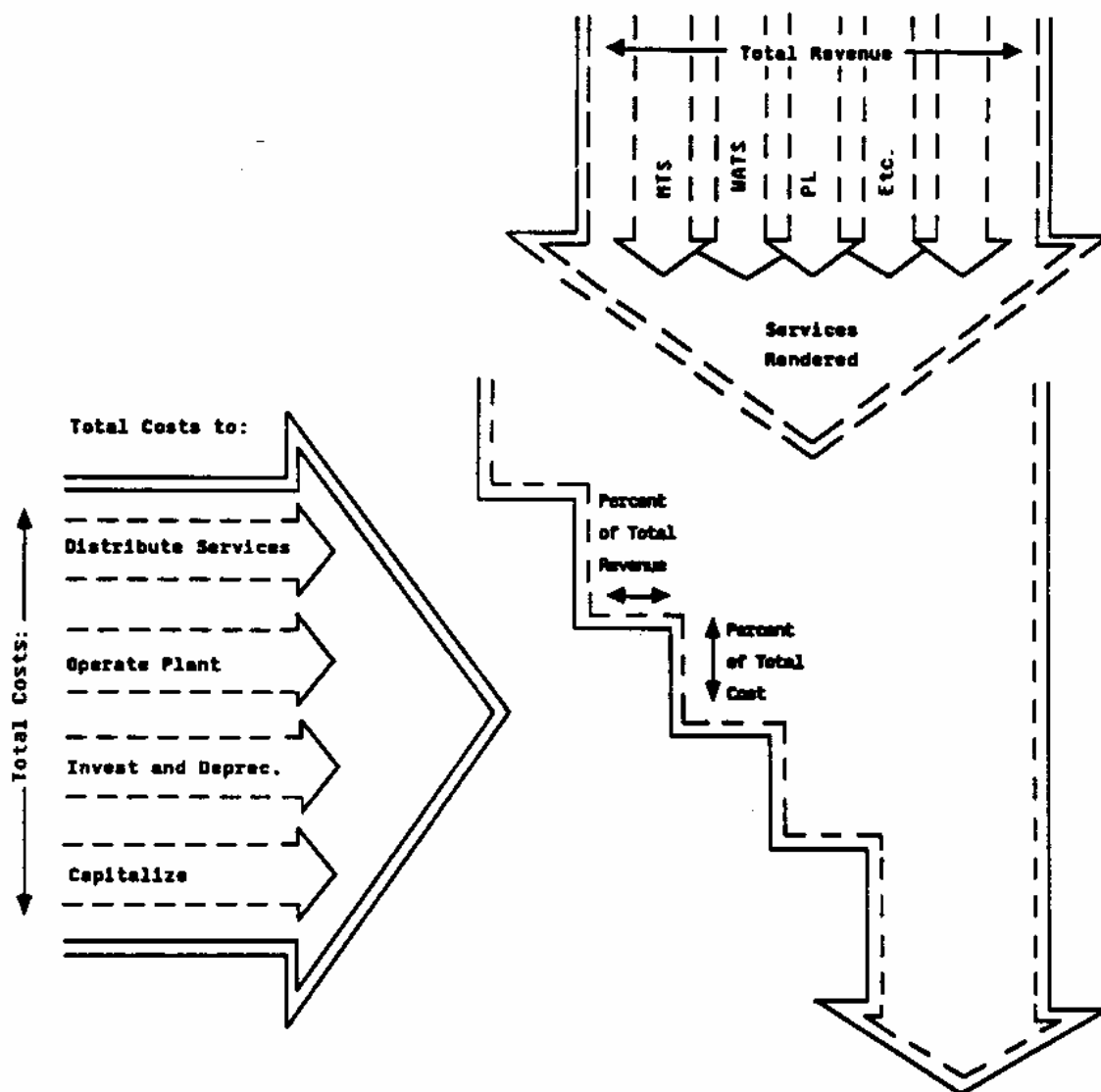
interface, that between the firm and its customers, as well as the rate structure of the organization (how the goods and services are priced and sold to customers). The next two levels describe the marketing structure of the firm (how effectively the operating plant is configured to distribute the corporation's goods and services). The next two describe the investment structure of the firm (the financial choices made as investments in service capabilities and varieties of depreciable equipment, as well as the life cycles or labor-saving technologies employed in operating the plant). The final two layers describe the capital structure of the firm (the sources of funds, interest rates, and financial ratios applied to its capital: debt and equity supplied by others for investment).

At each level, the unique expenses of operating that part of the business are drawn off, leaving less to flow to successive levels below. It is the task and, some would say, art of management to coordinate optimally the activities occurring on every level while holding their synergistic alignment against the shearing forces of competition and regulation, of national fiscal policies and international trade practices. Because each firm has an individual character, with differentiated markets and uniquely configured services, plant, investment and capital, national policies and regulation may apply differently to each firm and to the financial layers, even within the same industry. Complete knowledge of the structure and interfaces between financial layers of an international firm is rare, even among corporate executives; thus it is not surprising that regulatory policies that may produce apparently desirable results at one level of the hierarchy of Figure I-1.3, may make the management of another level or of the total firm difficult. In the worst case internationally, they may undermine the correspondent relationship and invite governmental reprisal.

In Figure I-1.4, the flow of customer revenues is offset and superimposed against the expenses that cancel some portion of them at every level of the business. From the sawtooth, pinking-shear pattern that emerges as the cost structure of the firm interacts with the

customer revenue stream, the overall financial structure of the firm is immediately evident. The length of the horizontal bite in the figure represents the percentage share of total revenue consumed by that level of expense. The length of the vertical descender represents the percentage share which that expense takes of the total expense. If the costs of determining customers' needs, or of reaching and selling them, are high, a bigger portion of the revenues is drawn off in marketing and sales expenses, distribution, or advertising. If the costs of production are high, a bigger portion of the revenues goes toward maintenance or labor expenses in operating the plant. If the costs of materials or of warehousing the raw materials are high, or if production requires a high investment in depreciable assets, then this level of the business takes the bigger proportion of total revenues. Finally, if the costs of capital are high, either from inherent risks in the marketplace or from regulatory uncertainties, then this level of the business consumes the predominant share of revenues.

The proportion of costs drawn off at every level of the financial hierarchy is of more than passing interest at the national level, particularly for a multinational firm. The same costs that drain the corporation's revenue stream are themselves revenue streams for other suppliers of services and equipment. The suppliers of these services may be located in different countries, thus contributing to the welfare of economies other than that of one's own nation. The revenues that derive from one nation's consumers, for example, may contribute to the working wages of suppliers of services and equipment in other countries, to the detriment of working conditions in the domestic economy and the balance of payments abroad.



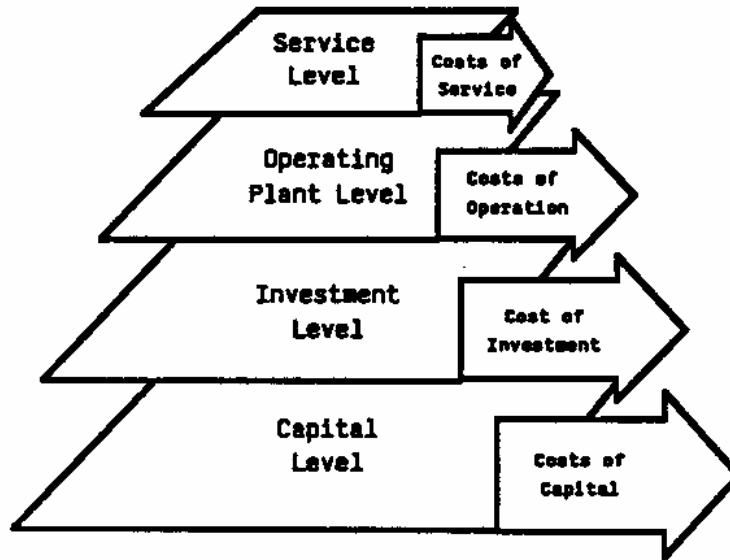
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Figure I-1.4

Revenues vs. Costs

Certain industries, such as traditional utilities, steel manufacturing, or the production of electricity, are known to be capital intensive. Their financial structures can be represented by Figure I-1.5, their cost structure by Figure I-1.6. The capital base is broad, and as money is drawn off in costs of construction or in inventories, less money is left to comprise the levels of investment or operating plant. Other industries, such as service-based firms, have character-

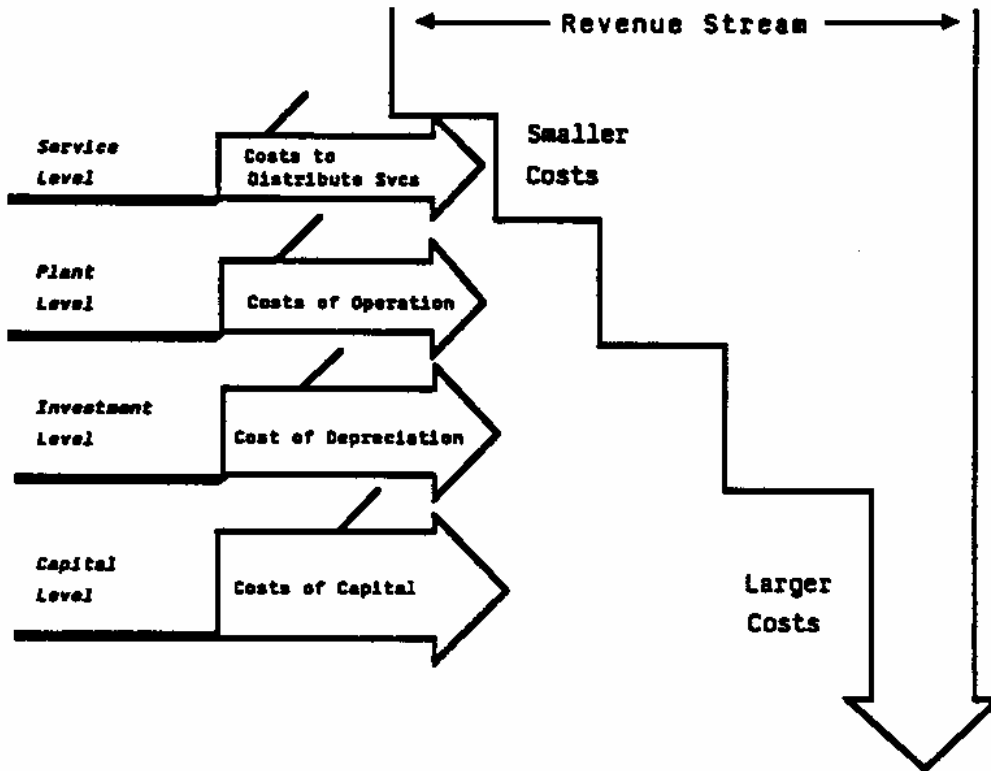
istically funnel-shaped financial structures represented by Figure I-1.7; their cost structures are represented by Figure I-1.8. Large numbers of service representatives or sales people attempting to reach and serve as many customers as possible increase the areas representing the service level and the operating plant. Consequently, their administrative, marketing, and labor expenses also tend to be larger, as indicated by the broader arrows representing expenses at those levels.



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Figure I-1.5

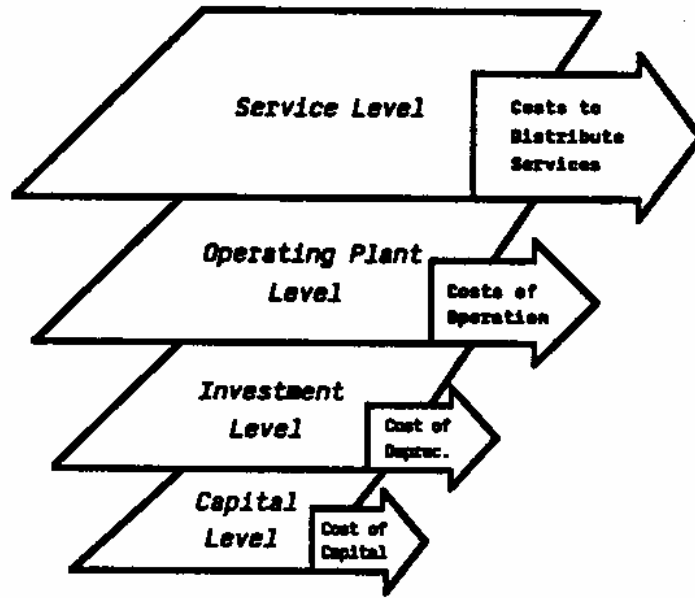
Financial Structure of the Industrial Firm



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Figure I-1.6

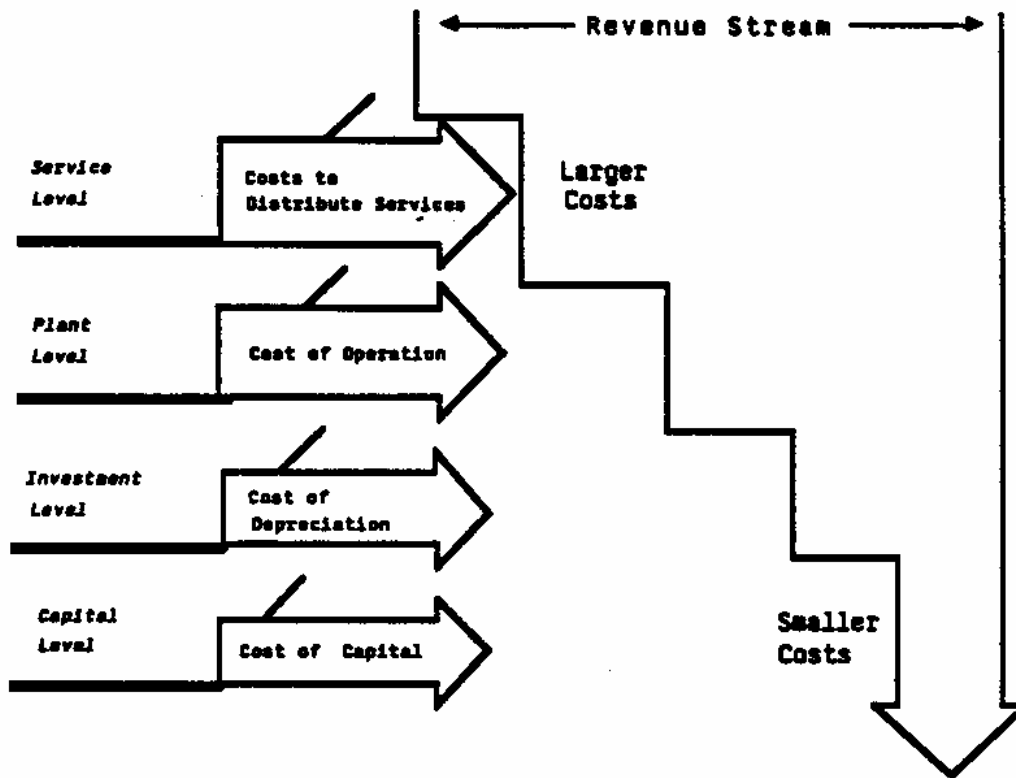
Cost Structure of the Industrial Firm



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Figure I-1.7

Financial Structure of the Service Firm



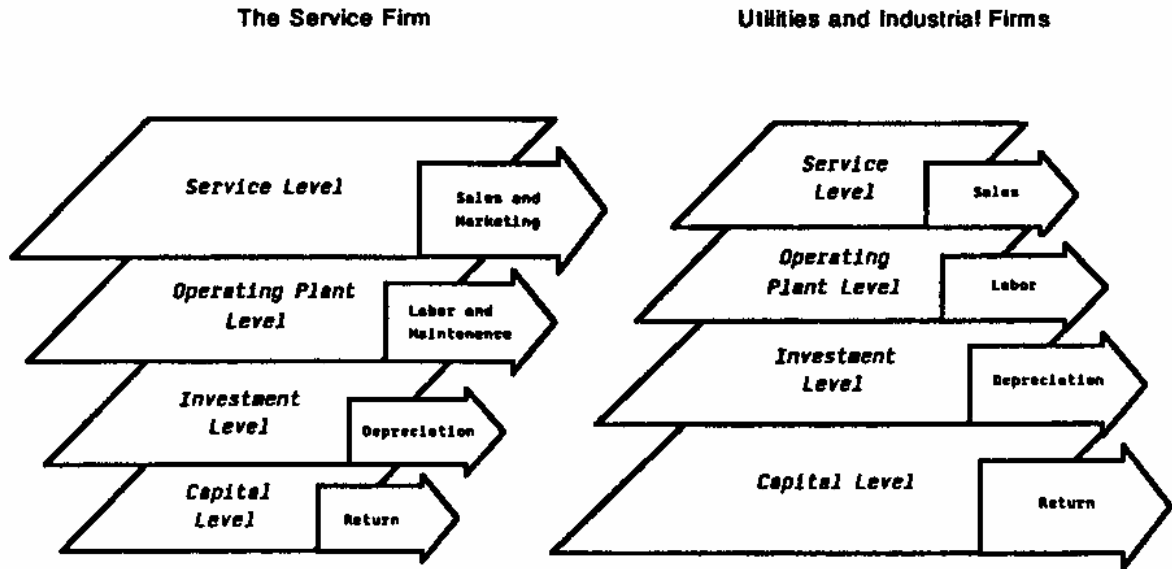
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Figure I-1.8

Cost Structure of the Service Firm

As economies have matured around the world, the structures of their financial institutions have changed. Heavily capitalized manufacturing firms have given way to services-based financial structures in advanced economies. When the two structures are compared side by side, as in Figure I-1.9, the effect is quite visible. More and more value is concentrated at higher levels of the financial hierarchy, close to customers and in the hands of salesmen, service people, laborers, and consumers. As these structures have changed, they have altered the flows of money in the world economies, forming new constituencies with new policies.





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Figure I-1.9

### Comparison of Service Firm and Industrial Firm

Policies constrain decisions. The effect of policies can be seen in decisions that further shape the different levels of regulated enterprises and that alter the expenses at each level. Competition as well as policies shape organizations, and often firms that are fierce competitors have similar financial structures or serve similar markets. Distributors who compete with other distributors within the same market, or manufacturers who compete with other manufacturers, may share financial structures. As companies specialize, however, they develop niches in the marketplace, and boundaries form between the marketplaces they serve. Their financial structures may be quite dissimilar. Manufacturers who supply hammers to home builders, for example, may compete against services rendered by carpenters. These businesses are competitors at the boundary of different markets. One is an industrial manufacturer. The other is a service provider. Their financial structures will be quite dissimilar, as already illustrated in Figure I-1.9. Depending on their structures, costs, licensing requirements, and regulation, the boundary between their markets at the customer level may shift as the "competitive advantage," regulatory policies, or

judicial climate favors one or the other. We will see that the new satellite and fiber optic applicants to the Atlantic telecommunications corridors illustrate such a change in financial structures. The new entrants have billed themselves as "specialized," and claim development of new and innovative services to gain authorization. As we will see, their financial structures support their claims for specialization, if not yet for innovative services.

Service industries make more efficient use of assets but tend to have higher expenses when compared to industrial production firms. While expenses may be higher in rendering services, the proportion of service revenues earned in relation to the assets employed is clearly higher. The same assets are employed again to earn additional revenues. A hammer, when used by a carpenter, is employed over and over again. A telephone, once installed, continues to provide service. An airliner, once purchased, serves thousands of travelers. Consequently, the focus of attention for service firms tends toward management of available service capacity, fill, and efficiency: How well utilized are their hammers, telephones, or airliners? For the rate-base regulated industry, the focus is the employment of assets: How much did the hammers, telephones, or airlines cost? In this regard, regulatory policies that attempt to manage the rate base of mature service industries are misapplied and merely distort the management of expenses while they increase the financial liability of the firm. In the international sphere, instead of protecting U.S. consumers, rate-of-return regulation would only encourage PTTs to negotiate for higher settlement rates, thereby shifting profits abroad.

It may be fairly said that the focus of regulatory activity in the United States over decades of regulation has been in approvals of facility loading, customer charges, and FCC applications for additional facilities -- in brief, the rate of return on assets employed and the growth of the rate base. But this form of regulation applies to out-moded industrial financial structures from which the United States and telecommunications services have evolved; it becomes anachronistic and burdensome as the U.S. moves increasingly to a service economy. If

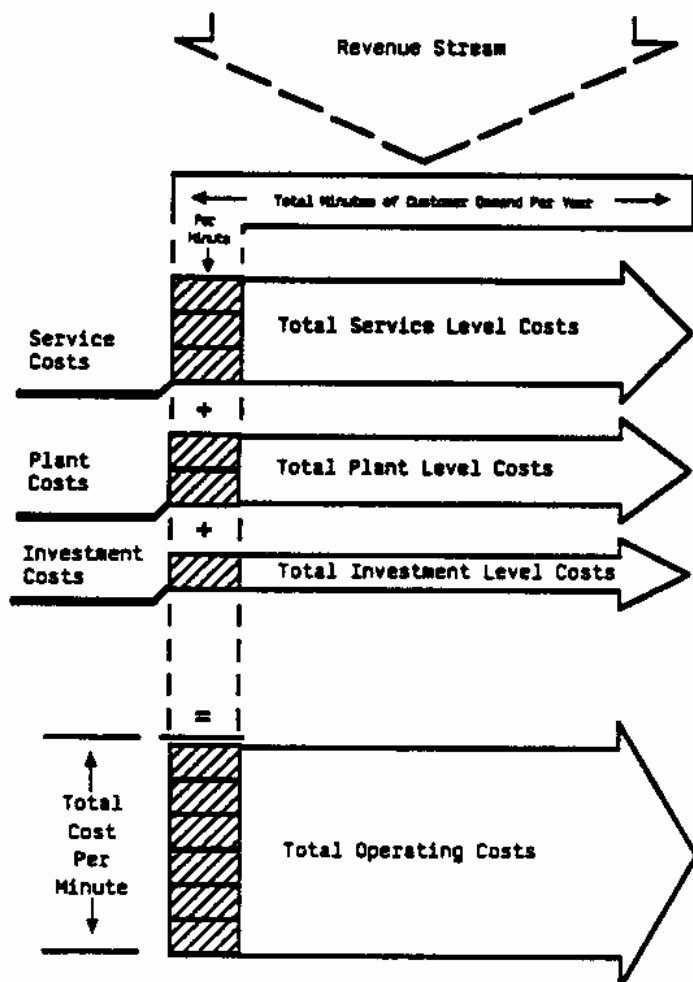
applied to international services, it will put the U.S. at a disadvantage in comparison to its international competitors and correspondent nations. Services economies are driven by their expenses rather than by the costs of their investments or capital. As a small asset base leverages an increasingly larger share of customer revenues, regulation of the rate base has severe effects on the management of the firm by requiring ever tighter controls over costs which may be determined by increasingly volatile corporate revenues<sup>1</sup> derived from customers. The result is economic inefficiency in the attempt to control customers rather than serve markets.

Notes for Section I, Chapter 1

- 1 For a discussion of revenue volatility, see Lindenberg, Eric B. and Rozycki, Christopher, "AT&T Communications: A New Financial Perspective," Telematics, Vol. 2, No. 5, May 1985, page 13.

OPERATING LEVERAGE IN THE FINANCIAL HIERARCHY

The framework for financial analysis presented in Chapter 1 can reveal the cost structure of companies per unit of service offered. Figure I-2.1, for example, displays the total minutes of traffic offered at the service level of a telecommunications firm to the marketplace, the customer plane above. It illustrates the impact of costs on a per-minute basis. For simplicity, only the costs incurred by three operating levels of the financial hierarchy are presented: relatively high costs of sales at the service level, medium costs at the level of the operating plant, and small costs of depreciation at the investment level. As the cost arrows emanating from these levels are portrayed proportionately to reach across the entire year of customer demand, their total contribution per minute can be seen in the width of the arrows: three units plus two units plus one unit of cost yields six units of cost per minute. More important than this elementary arithmetic, however, is that the carpenter's square structure portrayed represents an operating lever: As costs increase (the arrows pull to the right), they tend to raise the level of rates at the customer level above. Different costs may be leveraged from different planes as political forces place the fulcrum of the operating lever at one level or another. The effect on rates in the past, for example, has largely been determined by state and federal regulatory constraints during the era of monopoly telecommunications. They have set the fulcrum to increase or decrease the effect on rates by allocating the costs incurred at the investment and capital levels of the communications hierarchy.



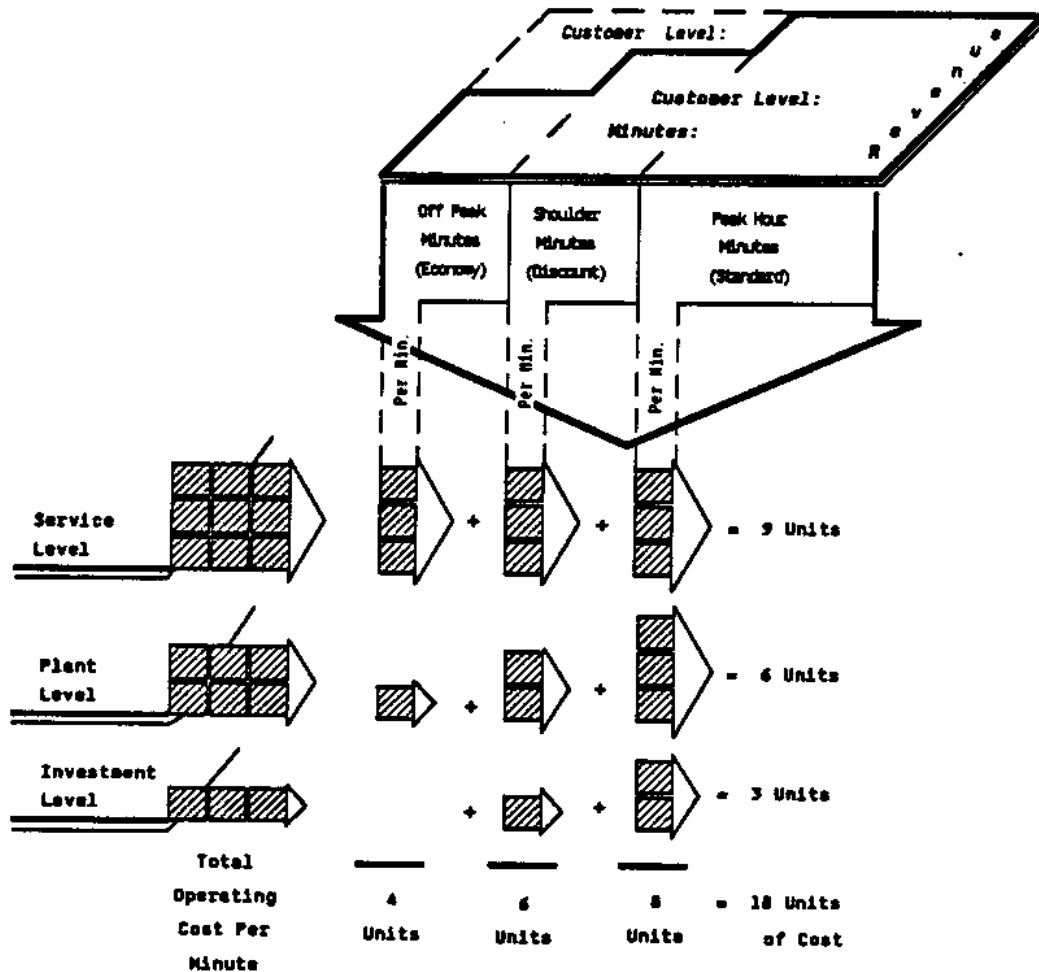
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Figure I-2.1

Average Cost Structure per Minute

Figure I-2.2, for example, displays the same number of annualized minutes of demand, but distributes them across the incoming revenue stream at the top by time of day. Low levels of demand occur in the off-peak hours (night), medium levels of demand occur in the shoulder (evenings), and high demand occurs during peak hours (daytime business hours). To minimize consumer demand for facilities during the peak hours, higher rates have been set by attributing larger portions of the costs of facilities and maintenance to the peak hours of usage, even though the same physical plant is used whether the call occurs in daytime or at night. The logic of the ratemaking principle is that

plant is largely constructed to meet the needs of the peak-hour users (the "cost causer"). The resulting policy increases the per-minute costs for calls occurring during peak periods of usage.



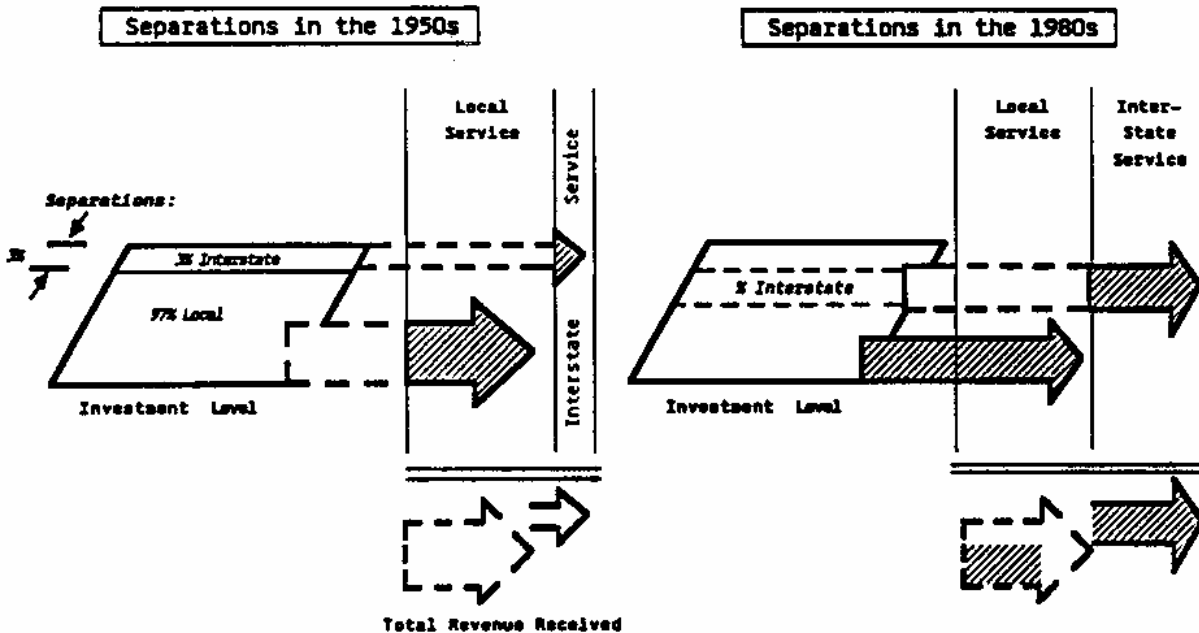
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Figure I-2.2

Contribution of Cost to Rate Structure

The same means of distributing costs has been seen in allocating costs between jurisdictions. Figure I-2.3, for example, displays two views of the investment level (only) of the financial hierarchy, but during different decades, separated by 30 years of regulation. The number of annualized minutes of demand has been distributed across the top by numerous decisions reached in compromise between the state public utility commissions (PUCs) with the interstate jurisdiction represented

by the FCC. In the 1950s the costs of local service attributed to local rates reflected nearly 97% of the rates. At the time, local calling also represented nearly 97% of the total of all calling, while interstate calls represented only 3% of total usage.<sup>1</sup> By the 1980s interstate usage had increased dramatically, but the attribution of investment to the interstate jurisdiction had increased even more substantially. Local rates had been held down as the costs of local service provision were increasingly attributed to interstate calls through a process known as separations. Simply put, as more subscribers joined the network, more and more of the costs of the investments required at the investment level of the financial hierarchy were attributed to long distance usage. More and more of the area of the investment level, therefore, is shown here to represent interstate rather than local costs. The shape of the investment plane has been determined by regulation, rather than by the economic reality of the marketplace. The nature of the two financial entities (though not yet separate companies) has been distorted, giving off misleading signals to the financial community of investors.



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Figure I-2.3

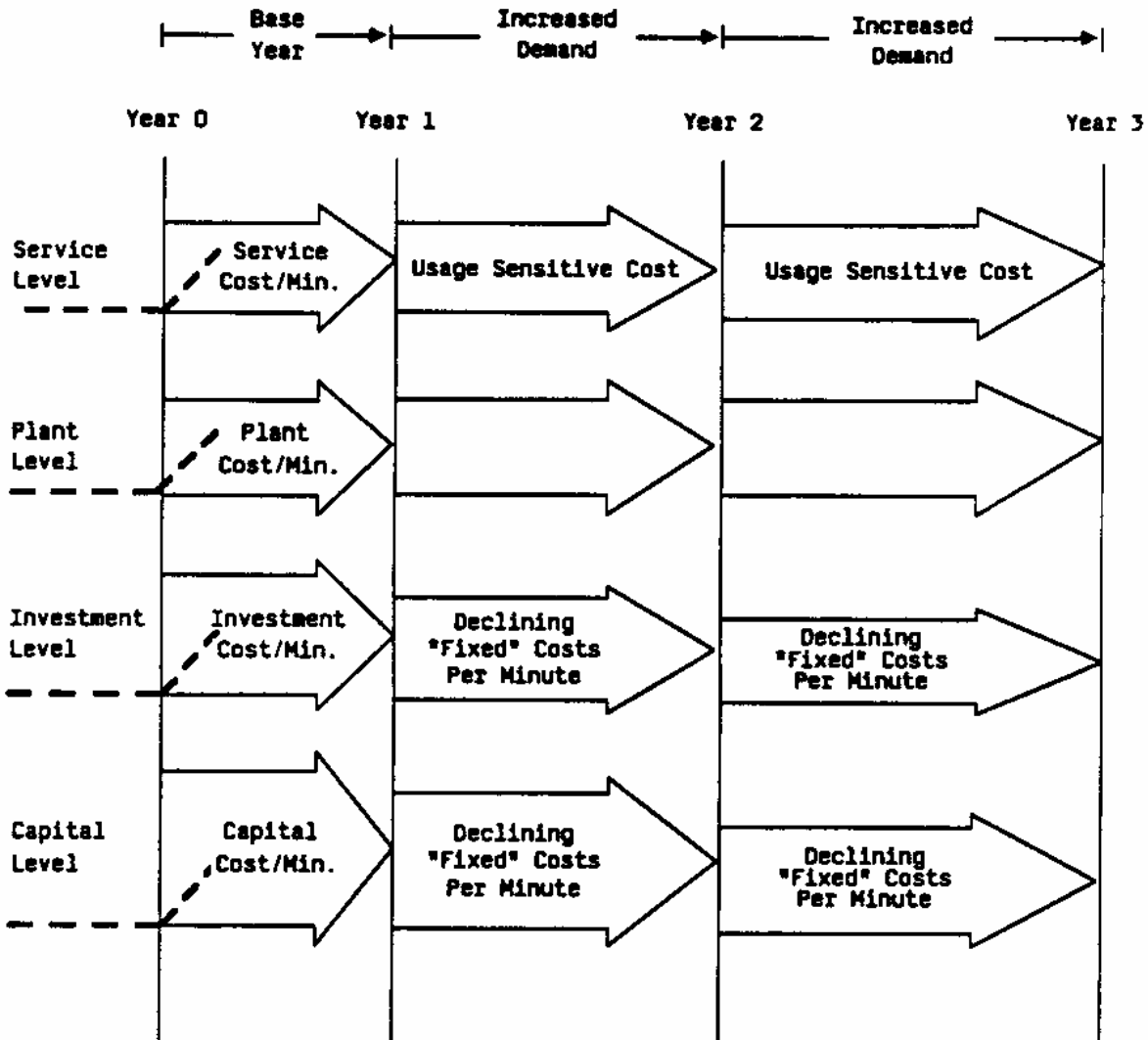
Comparison of Separations in the 1950s and 1980s



Local rates and installation costs were kept artificially low, while long distance rates were inflated by the amount of the subsidy, nearly \$15 per month per local subscriber, against nearly \$26 required to provide local service.<sup>2</sup> Such a high subsidy spurred research and development which accelerated technological advances in long distance transmission. As the capacity of long distance systems was increased, the reduced costs increased the profitability of AT&T and invited further allocations of state investments to the interstate jurisdiction; ultimately, the high rates of interstate calling attracted competitors to what was perceived as a high profit area of business.<sup>3</sup> Plotted on the framework for financial analysis, these allocations increased the apparent revenues of the customer and services levels, while artificially inflating the apparent investment required to support them.

From another perspective, this system of social pricing was quite beneficial. By keeping the costs of connection to the network low, more subscribers could afford to join, thereby increasing the opportunity for those who could afford long distance rates to call them. As a policy, it encouraged the proliferation of telephones, even to those individuals who could not otherwise afford their true economic costs. Universal telephone service became a reality in the United States through the cooperation of state and federal regulators, and the Bell system. In addition, and for another reason, the costs attributed per minute of usage to the investment level were not unduly burdensome. Their impact on an asset-intensive industry became less of a burden due to its financial structure as interstate call volumes increased. The effect can be seen in Figure I-2.4. Three years of increasing demand for interstate services are portrayed at four levels of the financial hierarchy. "Usage-sensitive costs," those components of cost that remain relatively constant with increasing usage, are shown as constant over the three years represented. But "fixed costs," components such as those embedded in development or capital for buildings and local loop plant, do not increase as rapidly with customer demand. As more and more minutes of calling are rendered, the cost per minute declines. The capital-intensive industry has a natural tendency toward increased profitability with increased volume; conversely, and of great

significance to the issue of bypass of the local companies, if volumes decline, per minute costs in an asset-intensive industry can rise quickly. On an international level, if significant amounts of traffic were to be diverted from nations with large embedded rate bases, competition can have dire consequences on existing rate structures.



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Figure I-2.4

### Effects of Increasing Demand on Interstate Services

We have seen in two instances above that the distribution of resources across the customer level may not be consistent with the distribution of resources at the service, operating plant, investment, or

capital levels below. For example, if minutes of customer traffic are represented on the horizontal axis, and customer revenues are portrayed on the vertical axis, the figure thus formed, when folded down, comprises the surface of the customer plane. But it is clear that certain customers make many more calls than others, or call at different hours. Yet those same customers, by virtue of their location or calling habits, may require fewer or shorter circuits than others who make less efficient use of their plant facilities. In the cases examined, either a desire to conserve facilities in periods of peak demand, or a regulatory or corporate value favoring local services, attributed the costs of serving some segments of the market on other market segments. Such a posture is discriminatory to one class of customers while it benefits others, even though it may serve a social purpose.

Henry M. Boettinger has described two forms of discrimination which illustrate this point:<sup>4</sup>

- Social discrimination exists whenever two persons pay two different prices for the same service.
- Economic discrimination exists whenever two buyers of the same service at the same price cause the seller to incur different costs.

It is useful to define two additional forms of discrimination:

- Financial discrimination exists whenever potential providers of operating plant capacity are constrained to incur different expenses or must make different investments.
- Entry discrimination exists whenever potential investors in the same service capability are denied the opportunity to invest.

Taken together, the four forms of discrimination can be described as dissimilar treatment of customers, service providers, capacity providers, investors, or owners. Their effects can be seen in interactions between levels of the financial hierarchy as their shapes are altered by business and regulatory decisions. From the aspect of the framework for financial analysis, discrimination is nothing more than variety in the population of financial forms (a bell distribution) at the levels of the financial hierarchy below. Decisions bear differently on some forms than others. Discrimination can be introduced by violating any condition of "sameness" between levels, as illustrated in Figure I-2.5:

	Example of Discrimination	Example of Policies
<p>Customer Prices (same prices)</p> <p>↑</p> <p>Social Discrimination</p> <p>↓</p>	<p>Higher Business vs Lower Residence Telephone Charges</p>	<p>Long Distance Subsidy of Local Service</p>
<p>Service Provision (same services)</p> <p>↑</p> <p>Economic Discrimination</p> <p>↓</p>	<p>Lower Urban vs Higher Rural Costs of Service</p>	<p>Urban Subsidy of Universal Service</p>
<p>Operating Plant (same costs)</p> <p>↑</p> <p>Financial Discrimination</p> <p>↓</p>	<p>Mandatory Lease vs Ownership of Plant</p>	<p>Balanced Satellite vs Cable Loading</p>
<p>Investment Opportunity (same capacity)</p> <p>↑</p> <p>Entry Discrimination</p> <p>↓</p>	<p>Denial of Entry vs License Approval or Operating Agreement</p>	<p>Private vs Government Monopoly</p>
<p>Venture Capital (same opportunity)</p>		

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Figure I-2.5

Discrimination: Conditions and Examples

Boettinger recognized that, for the first two levels, both forms of discrimination cannot be avoided at the same time, and that the avoidance of social discrimination in the United States (by attributing their costs elsewhere) gave some people more resources at the operating plant and investment levels than they paid for, and some less. The underpinnings of social discrimination were maintained by restricting competitive entry, so that inherent subsidies could be maintained between business and residence services. In brief, the capital and investment levels were not allowed to change. "But a natural alliance," as Boettinger put it, "was gradually forged between those customers who paid the subsidies and those eager to demolish the barriers to entry which prevented them from participation in what they saw as high-growth, high-profit parts of the business."<sup>5</sup>

When microwave technology generally reduced the costs of interstate services in the U.S. after World War II, it also made private providers of telecommunications services possible. Large corporations who had become increasingly dependent on telecommunications and critical of their rising costs for interstate services were authorized<sup>6</sup> to build their own systems of communications. Some joined with "specialized carriers" who promised "new and innovative" services from private systems of low-cost leased lines in selected corridors of high-volume traffic. At the time, they disavowed any interest in switched services, even though their interstate rates had been significantly inflated by the social pricing policies encouraged by the regulatory commissions. Although the new entrants were eventually authorized<sup>7</sup> to begin service between major U.S. cities, their effort to provide cost-effective private lines nevertheless faltered. But by turning to the antitrust laws, the new carriers successfully challenged the social pricing structure of switched message telephone services promoted over years of regulation in the United States. They obtained low-cost, subsidized connections to local switches in the public network, but created discounted tariff structures for high-volume interexchange customers who supported their costs.

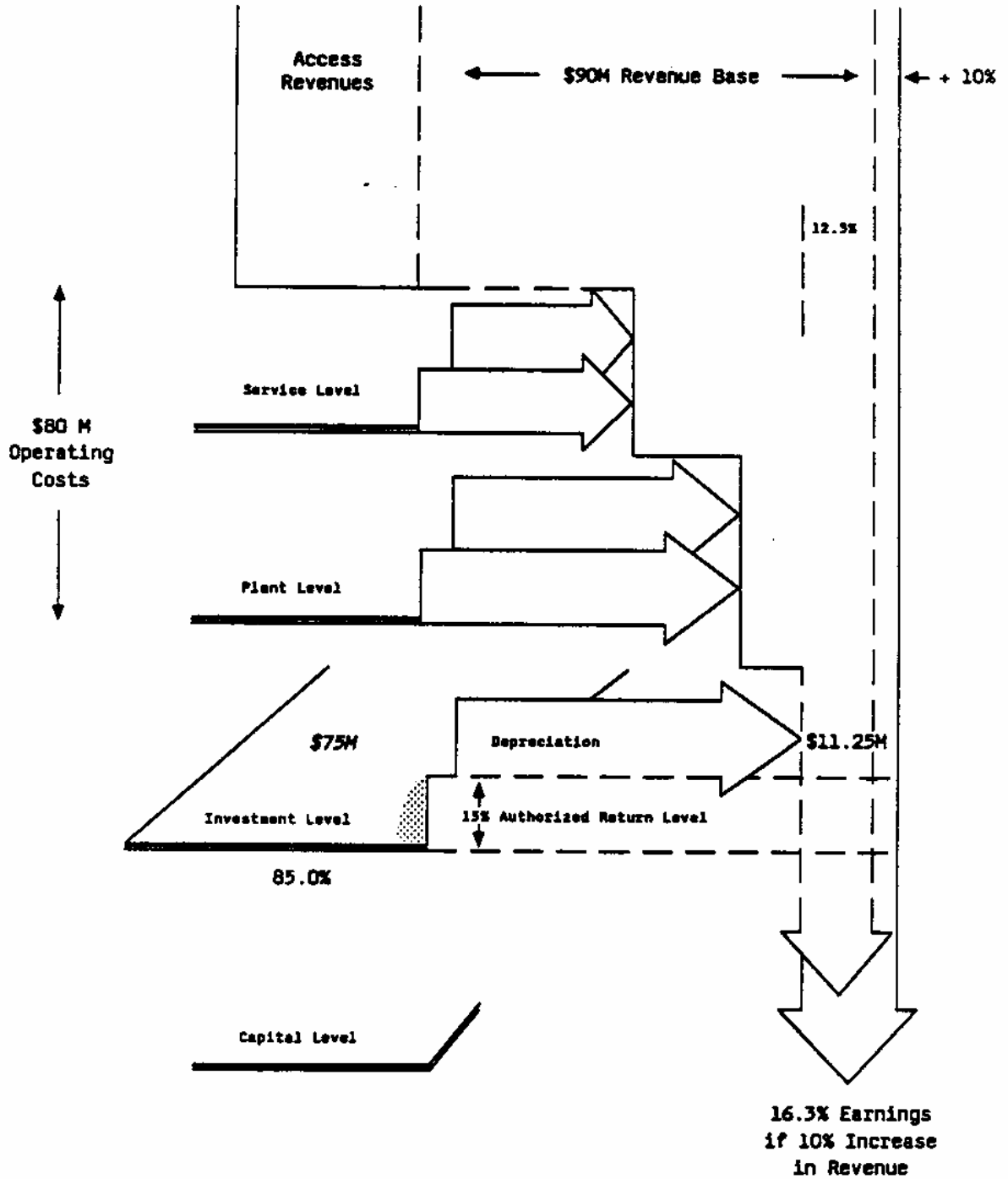
Caught in the bind, and beset by an increasingly hostile Department of Justice which characterized the regulated social pricing structure of AT&T as part of an anti-competitive effort to monopolize long distance communications, AT&T divested its Bell operating companies. In doing so, it divided the Bell system into many parts. Most of them (the BOCs), on the one hand, retained the character of the investment-intensive industry from which they emerged; AT&T, on the other, assumed the character and financial structure of a service provider. The two have distinctly different operating characteristics that are revealed by the framework for financial analysis.

Consider a hypothetical, but relevant, example of a large organization with \$150 million in revenues, and a rate base of \$100 million. At 15%, an allowable rate of return on \$100 million of rate base would be \$15 million. But it would represent only 10% return on customer revenues. If this organization were now divested into two organizations, one with \$75 million in rate base, and the other with \$25 million, the total authorized return for the two would remain the same. But if the expenses of reaching their customers or operating their plant were disproportionate between the two entities, \$25 million more for one than for the other, the revenues now required would also no longer be proportional since their cost structures have changed. Nearly \$90 million in revenues could be required to support the \$75 million rate base of the larger, while \$60 million could be required to support the \$25 million rate base of the smaller. The return on assets for each would remain 15%, but the burden of the rate of return on customer rates (per minute) would be greater for the larger organization than for the smaller. Conversely, the burden of expenses on customer rates would be greater for the smaller. One would reveal an industrial financial structure, the other a services financial structure.

The situation is portrayed more clearly by Figure I-2.6. The return on assets authorized for the industrial financial structure represents 15% of the investment floor, but is approximately 12.5% of its revenue, a nominal increase of 25% over the 10% return on revenue it was earning before it was separated from its larger parent. As traffic volumes

increase in successive years, additional payments of access charges swell its revenues but decrease the larger portion of its expenses -- the fixed costs portrayed at the capital level. For the service structure presented in Figure I-2.7, while still 15% of the investment floor, the return on assets represents only 6.5% of the revenue base, a 35% decrease from 10% before. Conversely, a 6.5% change in the revenue stream produces a 15% rate of return on assets. In other words, the financial structure of the service industry is more volatile: A 10% increase in sales volume would yield 17.0% rate of return for it, but a 16.3% rate of return for the other. The increase from 15 to 17% is nearly double the 1.3% increase for the firm dominated by its investment base. At the same time, the impact of the investment base per minute of traffic diminishes with increased volume. If capital is the largest portion of a firm's costs, it benefits more than the firm where usage costs are the largest portion of its costs. In an industry where fractional rates of return mean big gains or losses, the services firm is clearly more difficult to manage.

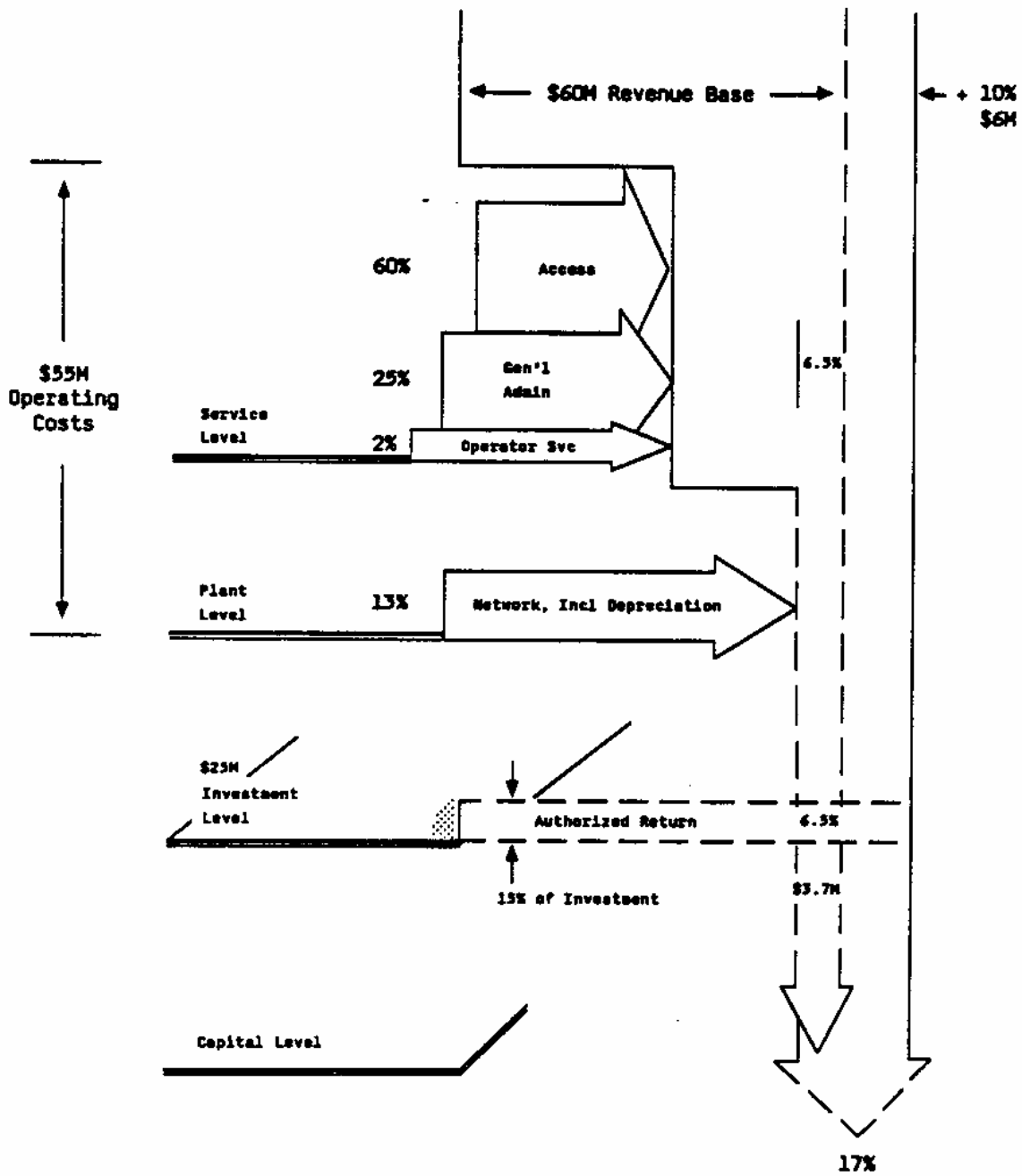




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Figure I-2.6

Authorized Return vs. Revenue and Expenses:  
Industrial Financial Structure



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Figure I-2.7

Authorized Return vs. Revenue and Expenses:  
Service Financial Structure

The operating cost structure presented in Figure I-2.7 is consistent with the figures presented by AT&T and cited by the National Telecommunications and Information Agency for long distance services.<sup>8</sup> As such, it portends great difficulties in ratemaking and regulation of long distance enterprises, not only for AT&T, but also for the competitive carriers. Management of a relatively small rate base in a services industry requires the delicate balance of a financial pyramid on its apex, rather than on its base. Not only are expense controls more difficult, but they would depend on accurate forecasting and management of traffic volumes in an intensely competitive business.

As competition moves into the international arena, even more volatile ratemaking is on the horizon. Since small increases in volume in international services result in larger changes in gross revenues, the fluctuating rate of return would be difficult to explain to regulators and to the financial community. Regulatory uncertainty and tortured rate hearings could increase the financial risk of the international as well as interstate carriers. Since the absolute value of the authorized rate of return on assets would remain relatively constant, it would present a smaller and smaller aperture on which to target earnings as minute volumes rose. When the financial base is small in relation to revenues, as in most service industries, and particularly in interstate and international telecommunications, even a 20% authorized rate of return may represent just pennies or fractions of pennies on consumer rates. Merely rounding of customer charges to a convenient number for advertising purposes may produce wild swings in the "authorized" rate of return.

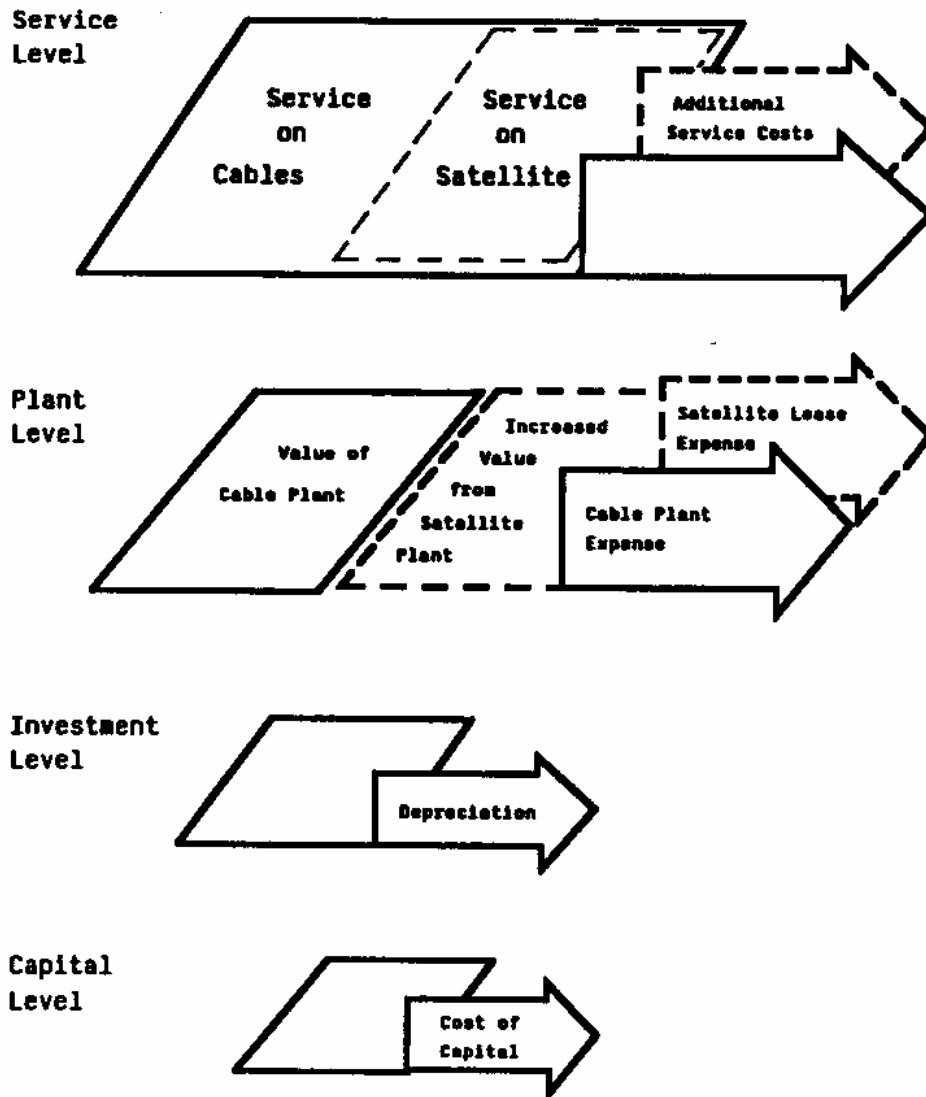
While AT&T rather than the competitive carriers has been the principal object of rate-base regulation, the competitive carriers are similarly affected by the typical financial character of service industries. Induced by higher profits in long distance services, many other competitive carriers have chosen to serve the high-volume corridors of traffic between major cities. Their ratios of revenues to assets employed are high. Consequently, they, as well as AT&T, are subject to volatility in earnings presented by fluctuations in traffic

volumes. What was once held out as an easy competitive opportunity for substantial profits has been revealed as a fast-turning, financial vortex that can pull down firms that have misread the financial signals hidden in regulated telephone pricing policies. Averaged rates, usage-based recovery of fixed costs, and the process by which investments and expenses of telephone companies are allocated between the interstate and intrastate jurisdictions give false signals to the investment community.<sup>9</sup>

Rate-base regulation has distorted financial signals for service-based industries in several significant ways: First, through a process known as separations, it has artificially loaded the economic costs of local services into long distance rates, giving a false picture of the investment floor and the natural levels of profitability of long distance services; second, by the balanced loading policy it has misshaped and inflated the service and operating plant levels of the financial hierarchy by mandating increased leased satellite expenses at the price of financial volatility; third, with the uniform settlements policy it has antagonistically linked levels of the financial hierarchy for the international record carriers between stateside carriers and their foreign correspondents.

Figure I-2.8 illustrates the effects of the balanced loading policy of the FCC. This policy has required equal loading of international satellite and cable circuits. Its purpose was to provide route diversity and to help the then infant satellite industry by assuring continued demand for satellite circuits on a par with cable usage. Its effect financially, however, was to increase the area at the level of the international operating plant, as well as substantially increase the minutes and revenues derived from the customer level. In practice, each level more than doubled since certain parts of the world could only be reached by satellite services. Nearly 67% of international services are provided by satellite. Neither the rate base nor the rate of return were increased, however, resulting in greater expenses to AT&T and greater financial volatility without a greater reward in earnings. The result was a set of financial signals to the investment community which

were attractive beyond the reality of the high return on international investment, reported at 36.5% in 1979,<sup>10</sup> and 18.93% in 1981,<sup>11</sup> after a 35% rate reduction.



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Figure I-2.8

### International Operating Leverage

Without divestiture, even these effects would have been absorbed within the large domestic message base. Since the authorized return is computed on message telephone service (MTS) as a total category, the higher return on international was merely turned back to domestic

consumers. Since divestiture, however, the interstate rate base was broken away from the large intrastate domestic base. Minute-based access charges have replaced the attribution of investment-level earnings from international services. The result is an exaggeration of revenues in relation to a very small international base for earnings, and ill-conceived rate hearings which attempt to ascertain a "proper" level of earnings for an extreme form of the services industry, based on industrial era regulation. As competitors turn toward the apparent investment opportunity, they are apt to misread the financial signals and attribute their miscalculation to others with rounds of interventions and recriminations, as general misunderstandings escalate. In the meanwhile, the PTTs may look on in quiet amusement and wait for a more ordered opportunity to join with American forces for competition. Thus policies that are intended to promote international competition may actually subvert it.

Price competition can similarly be shown to affect the rate of return on international services. As one nation's prices are reduced, more calls are originated or billed in that country while outpayments to the correspondent increase. But international agreements call for a 50%-50% sharing of circuit investments. As more and more traffic originates in one country, these calls use the 50% investment of the correspondent to complete. But foreign investment is not included in the U.S. rate base and consequently does not increase the authorization to earn, even though billed traffic may have increased dramatically.

If rate-base regulation in service industries produces such untoward financial effects, the question arises, "Why have they not been evident before?" Simply put, the answer is they have been averaged in the rate structures and unwittingly concealed within the lower, financial levels of the framework for financial analysis. Executives had not yet evolved a simple language with which to discuss these effects with regulators or congressmen. While predictable within the telecommunications industry, the financial turmoil that has grown from the breakup of the Bell system has surprised both regulators and congressmen. It may yet come to be seen that the greatest benefit of divestiture was the

restructuring of the Bell system's financial structure in such a way that embedded charges that support the fixed costs of local services at the level of investment were made visible and applied to the service level. Before divestiture they were of isolated concern to a small group of economists and accountants. After divestiture they are associated with more visible levels of the hierarchy where they are a concern to all customers and their congressmen.

Another question remains: If rate-base regulation of services in domestic telecommunications produced such dislocations, will their effects on international telecommunications where financial ratios are even more exaggerated be more severe? Before we can answer that, we must delve a little deeper into the meaning of the framework for financial analysis.

Notes for Section I, Chapter 2

- 1 MacAvoy, Paul W. and Robinson, Kenneth, "Losing By Judicial Policymaking: The First Year of the AT&T Divestiture," Yale Journal of Regulation, Vol. 2, No. 2, 1985, page 229.
- 2 MacAvoy and Robinson, above, page 228.
- 3 Wiley, Richard E., "The End of Monopoly: Regulatory Change and the Promotion of Competition," Disconnecting Bell, (Harry M. Shooshan III, editor). Pergamon Press, 1984, pages 23-46.
- 4 Boettinger, Henry M., "Comment: Doctrine, decision and development in international telecommunications, Telecommunications Policy, June 1984, page 90.
- 5 Boettinger, page 90.
- 6 "Issues in Domestic Telecommunications: Directions for National Policy," U.S. Department of Commerce: National Telecommunications and Information Agency, Special Publication 85-16, Table 4-4, page 91.
- 7 Allocation of Frequencies in the Bands Above 890 MC ("Above 890 Decision"), 27 FCC 359 (1959), modified, 29 FCC 825 (1960).
- 8 Microwave Communications, Inc., 18 FCC 2d 953 (1969), reconsidered, 21 FCC 2d 190 (1970).
- 9 Kahn, Alfred E., "The Road to More Intelligent Telephone Pricing," Yale Journal of Regulation, Vol. 1, No. 2, 1984, pages 141-143.  
  
See also, Alfred E. Kahn, "Straight talk about local rates: they have been and are today much too low," Telephony, April 15, 1985, pages 68, 70.
- 10 "FCC Needs to Monitor a Changing International Telecommunications Market," Report of the Comptroller General to the Chairman, Subcommittee on Government Information, Justice, and Agriculture Committee on Government Operations, U.S. General Accounting Office, Document Handling and Information Services Facility, Gaithersburg, Maryland, March 14, 1983, page 7.
- 11 "In the Matter of American Telephone and Telegraph Company," Revisions to Tariff FCC Nos. 258, 259, 260, 262, 263, 265, 266, 267, and 268 and The Associated Bell System Companies, FCC 81-286, Memorandum Opinion and Order, Released June 25, 1981, page 959.



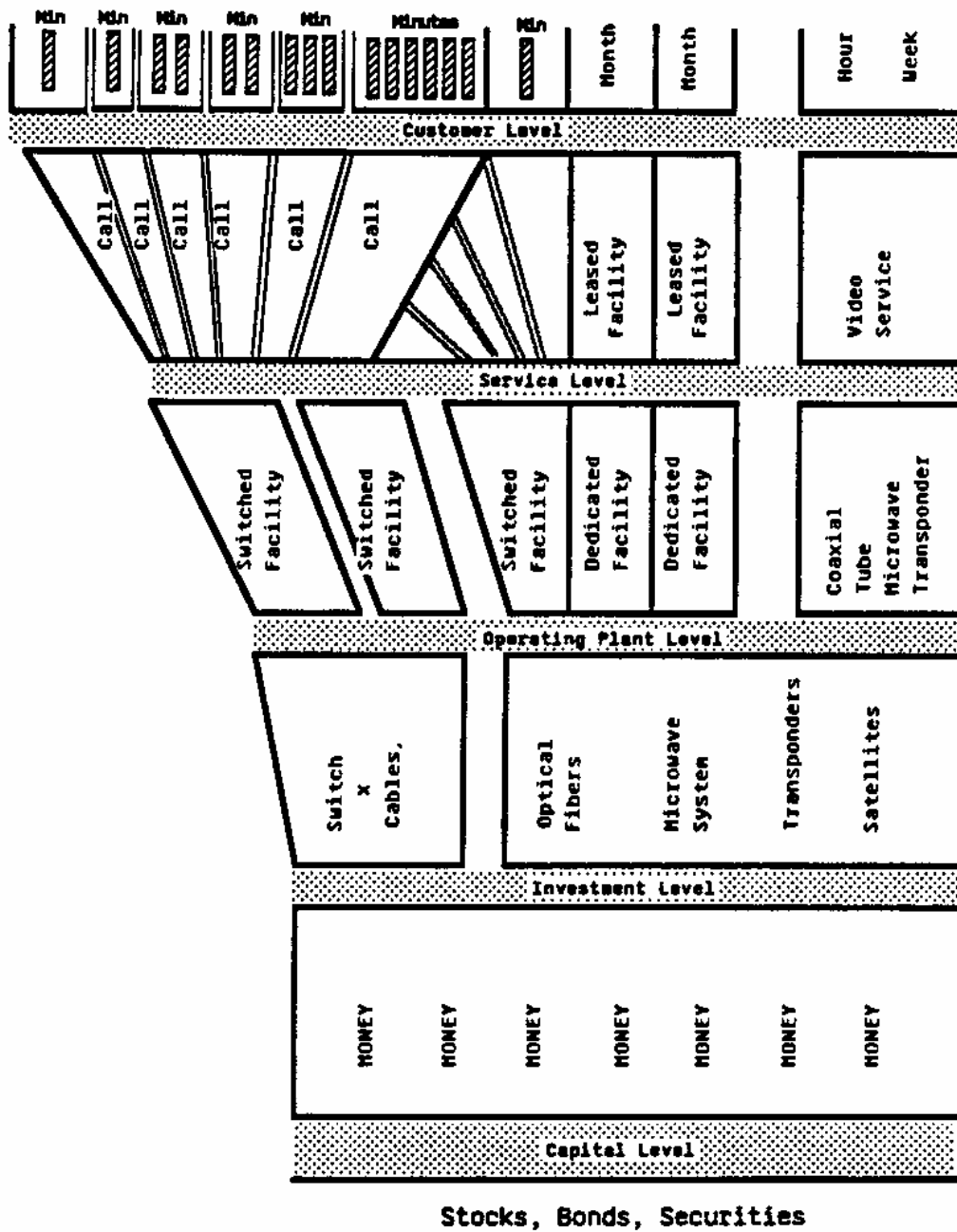
### FINANCIAL SHEAR IN A HIERARCHY OF FINANCIAL FORMS

The framework for financial analysis presented in Chapters 1 and 2 is not merely an abstraction. Conceptually, it has a deeper meaning that is revealed by Figure I-3.1. More than describing a physical network of circuits, cables, and switching equipment, it suggests conceptual forms or clustered symbols that are being processed by the layers of a telecommunications organization.

The layers of a telecommunications hierarchy (shaded for easy reference) transform unique units of interaction into other conceptual forms: At every level they act as transducers. For example, at the foundation of the business, the capital level transforms stocks, bonds, and securities into investment capital, money. The investment level of the hierarchy transforms capital into accounting entries -- units of investment -- such as accounts for cables, microwave systems, electronic switchers, optical fibers, transponders, satellites, and buildings. The level of the operating plant converts units of investment into "working" units of plant utilization. The service level transforms units of plant utilization into offered units of customer service. The customer level converts units of service rendered into units of customer charges.

When viewed from the top down, the complete hierarchy functions as an integrated processor. It combines certain forms of short duration into larger units of interaction. Each is a conceptual container that carries revenues down through the hierarchy from one level to the next. The gestalts that emerge at each level relate singular events of limited duration into processes extended over time.

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Figure I-3.1

Financial Forms in Telecommunications

The time relationships embodied in these financial layers are characteristic of organizations that render services, as opposed to selling products. Products are point-of-sale transactions; they do not involve the customer in a time relationship with the seller. Consequently they are easy to model and to understand. By way of contrast, service organizations assemble small units of time and distance into conceptual bundles of increased span and duration. An added benefit to the customer, an increase in value, derives from this relatedness in time. It is what the service organization offers; it is the firm's raison d'etre.

To the customer at the customer level, units of time provide the clustered structure for packaging information, data or video, whether they be minutes of voice conversation, months of (leased) private line charges, or hours, days, weeks, months, or years of leased video transmissions. To the organization at the customer level, the units of time represent increments of revenue.

At the service level of the framework, "calls," "leased facilities," or "video teleconferences" provide the basic units of service offered to the customer at the higher level. Many minutes of customer usage, i.e. time, may comprise one unit of customer service. Or, none may, if the time relationship is not established, as in a "busy" or a "don't answer." In these cases of a failed call, no charge is rendered because no timed service relationship was established. In most cases, even a "wrong number" is not charged to the customer because his purpose of establishing a timed relationship with another was not performed.

Units of plant utilized such as switched facilities (channels plus switching equipment), dedicated facilities (channels hard wired through testboards to customer locations), or broadband (video) facilities are the basic units of transaction at the level of the operating plant. Like the unit of service that comprises many units of customer charges, the basic facility utilized provides many units of service extended over time. In the case of the switched facility, it serves many customers.

The costs of the facility are averaged and distributed over many calls of different duration, distance, and time.

Units of fixed investment and finite lifetime are the basic units of transaction at the investment level. Ordinary usage expenses of the business, such as weekly sales salaries, maintenance labor, and minor point-of-time purchases of materials, are incurred at each of the three levels of the organization discussed above. But purchases of cable, microwave systems, switching equipment, optical fibers, transponders, and buildings are only incurred at the investment level. These costs are significantly granular. Half of an operating microwave system will not operate and half of a electronic switcher will not switch calls. The fixed costs of the business occur in sizeable accounting units at the investment level, even though they may be attributed for ratemaking purposes to the smaller units of plant utilization, services provided, or customer charges applied to the levels above. For a given unit of investment, the costs do not vary over the lifetime of the equipment: They merely reflect the purchase price. But depending on the depreciation life allowed by regulation or the number of units of plant utilized at the level above, or the services provided, the cost of the investment attributed per unit of customer charge can vary dramatically.

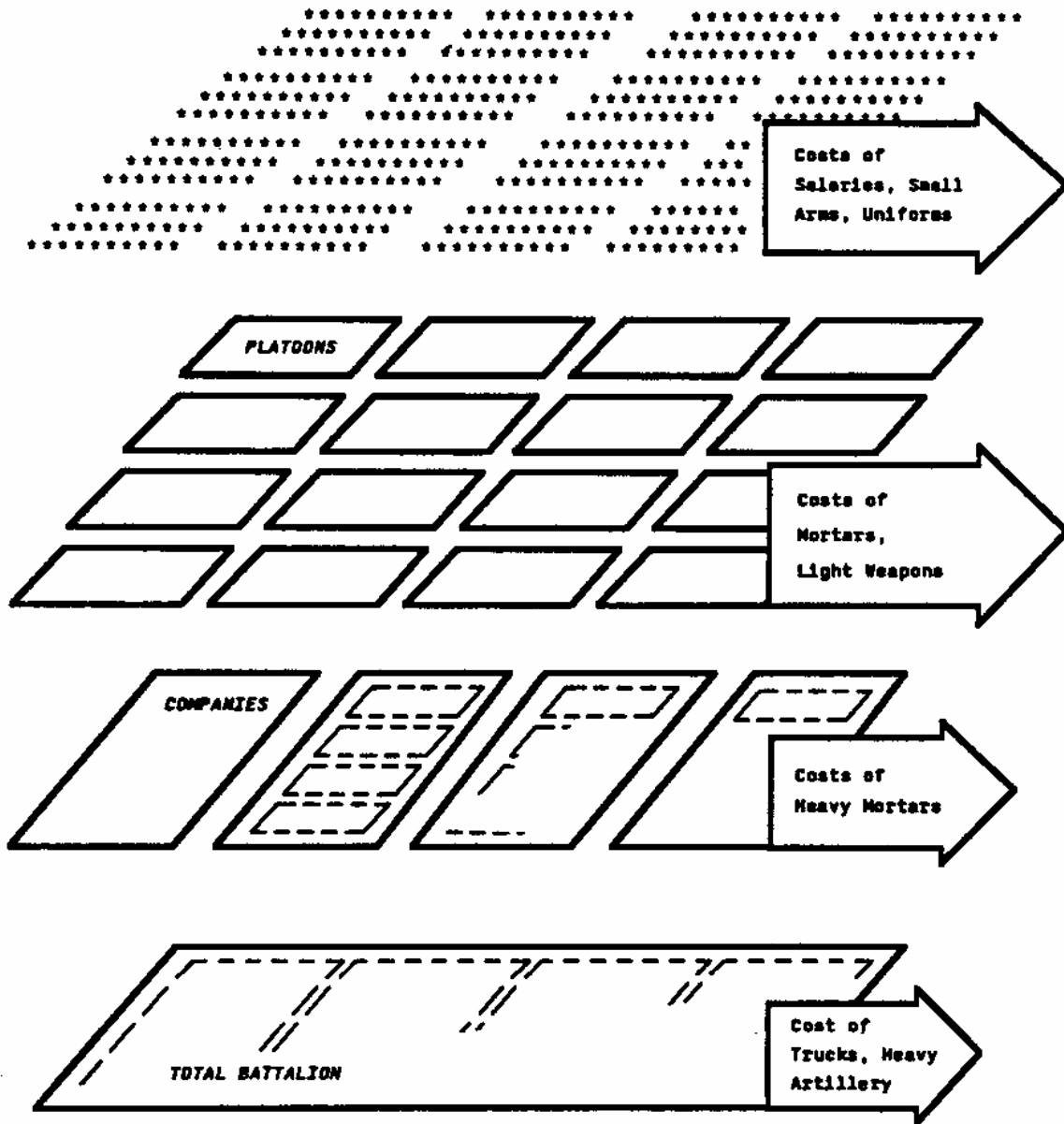
Stocks, bonds, and securities are the units of transaction at the capital level. As units of capital, their life must cover the life of the fixed investments purchased above. If these units are called before they have been fully amortized, the enterprise would go into receivership, threatening every level of the financial hierarchy above it.

Each financial unit of the hierarchy exists within the supporting forms of the framework for financial analysis at the level below. The financial symbols thus formed exhibit an electronic and financial Darwinism, perishing or surviving within the financial environment provided for them. At every level they are of a different logical type,<sup>1</sup> incorporating and exhibiting longer and longer intervals of time. In Mind and Nature, Gregory Bateson illustrated a relevant difference in logical types by describing an electrical switch placed in a conducting

wire. He pointed out that the concept "switch" does not exist, except as it relates two events in time. With the "switch on," the switch-as-conductor is merely an electrical wire which passes a current. With the "switch off," the switch-as-space merely describes two wires. Conceptually, the space between them (where the "switch" is located) is not different from the space between any other two parts of the wires. He concludes that the concept "switch" only has meaning when it incorporates both events into a common unit of time: "The concept 'switch' has thus a special relation to time. It is related to the notion 'change' rather than the notion 'object.'"<sup>2</sup> While Bateson did not discuss it explicitly, the concept "switch" also does not exist without the concept "current." In other words, symbols of a higher logical type must also be processors that move or process some fundamental units through them, whether they be electrons as in the case of a current or revenue minutes of calling as in the case of a financial organization. Consequently, as revenue minutes are reduced in the financial hierarchy, the financial forms that depend on them for meaning (as "switch" depends on "current") begin to lose their validity.

The financial hierarchy we have thus described is an abstraction of forms which relates logical units of time into larger and larger symbols, together comprising a hierarchy. As a further example, let us take a familiar hierarchical organization. If we were to describe a military battalion with such a hierarchy, as in Figure I-3.2, we could do so by distilling out the forms that comprise it: We would place the symbols for individual soldiers at the top of the hierarchy. We would place the symbols for "platoon" (made up of three columns, 13 soldiers deep) at the next lower level of the hierarchy; the symbols for "companies" (made up of four platoons) at the next; and the symbol for "battalion" made up of four companies at the very lowest level of the hierarchy. In this way we could discuss the structural forms which are so distinctly present in military formations, even though individual soldiers ("units") come and go, or "just fade away." The military forms -- platoons, companies, and battalions -- relate individual soldiers into single units of time and distance. These forms, like Bateson's switch, only have meaning when individual personnel existing

at different points in space and time move in unison and are considered parts of the integrated whole.



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Figure I-3.2

A Hierarchy of Symbols

We could also use arrows to represent the varied costs that apply to the different levels of the hierarchical structure. Certain "usage-sensitive costs," such as fatigues, could be attributed to the

individual user, but other "fixed costs" with long life cycles that require maintenance, such as "field artillery" or "trucks," do not apply to "units" of interaction, such as soldiers or platoons. Consequently, they are represented at different levels of the hierarchy. Unless someone arbitrarily computes the total costs of military procurement, divides by the total number of personnel, and attributes them -- somewhat capriciously -- as a "cost per soldier," they can only be attributed to the maintenance of the larger forms, such as "companies" or "battalions."

It is perhaps obvious that the forces and costs that apply to individual soldiers who have concerns for their personal welfare are not the same as the forces and costs that act on platoons or companies or battalions. These larger units are increasingly directed by political motives. As these forces act in opposition to one another on the symbolic forms of the different levels of the hierarchy, they tend to shear the units of structural authority that are incorporated in the different forms and formations. Individual soldiers may leave without authorization, or soldiers and platoons may be sacrificed in defense of deeper values or pursuit of larger objectives at the level of the company or battalion.

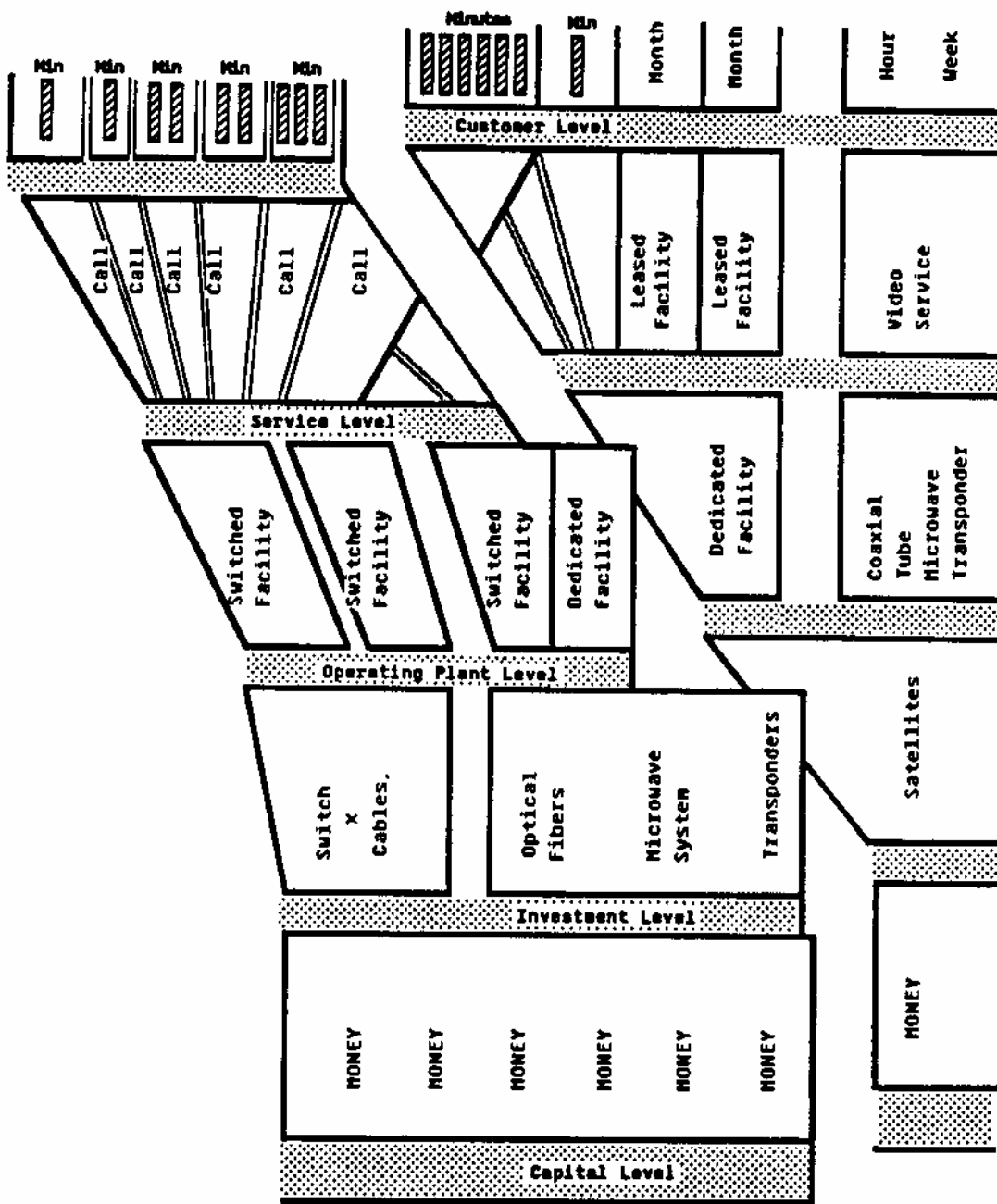
We do not have tidy symbols such as "platoons" or "companies" which can act as templates or labels for the structures that exist at the levels of communications hierarchies. These forms nevertheless exist and are known to the few financial experts who work at the investment levels of large corporations. To some degree they are also known by regulators, although less perfectly. Financial symbols are coded in tokens and patterns such as "revenue per customer," or "minutes per circuit," or "access lines per switch." The channels, switches, and cables are the icons and tokens of larger, conceptual gestalts that are difficult to visualize. They, too, are directed by political and jurisdictional forces, sometimes national, sometimes international. Particularly at the levels of research and development, investment and capital where national interests are involved, these forms are subject to competitive forces, antitrust laws, foreign trade restrictions, and

treaty obligations. Over time, they become embedded in these structures. Even if we do not have popular names for these symbols, as Oettinger has put it, "thinking in terms of these building blocks helps avoid entrapment in conventions appropriate at some moment in history but whose time has long since gone. Then, loosening up the basic building blocks releases once again the creative possibilities in their multiple potential combinations."<sup>3</sup> The knowledge that the building blocks exist is useful in understanding the processes that control them.

The integrating financial principle of the financial organization is to cluster as many units of interaction from the levels above into as few units of interaction as possible at the levels below. At the same time, the total hierarchy must continue to process units of revenue and units of traffic. The total enterprise must be viable as a going concern in the competitive marketplace. As competitive forces or regulation reshape the levels of the hierarchy, particularly at the investment and capital levels, new forms of utilization, service, or charge must emerge in the levels above to relieve the financial pressures created. Unless constrained by political or other forces, new technologies will emerge to balance the financial pressures. For example, as the costs of local service were increasingly attributed to long distance charges, new technology was developed to increase the utilization of toll facilities. Research and development efforts on the part of organizations are often directed at advanced technologies to help shape new forms at one level or to maintain other forms (such as customer charges per minute of long distance traffic) at others. If the new forms are not allowed to emerge, or are brought into conflict with other forces, either by application of law or regulation or even prejudice, the financial or legal pressures build until the total organization at all levels shears into two or more structures.<sup>4</sup> In the physical world, we call such a reshaping along lines of stress an earthquake. In the financial world, as illustrated by Figure I-3.3, we call it financial shear. In telecommunications, in 1984, we called it divestiture. Notice that the resources and forms embodied in the financial hierarchy did not break uniformly at all levels. Rather, they distributed in shapes determined by their financial volatility.



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Stocks, Bonds, Securities

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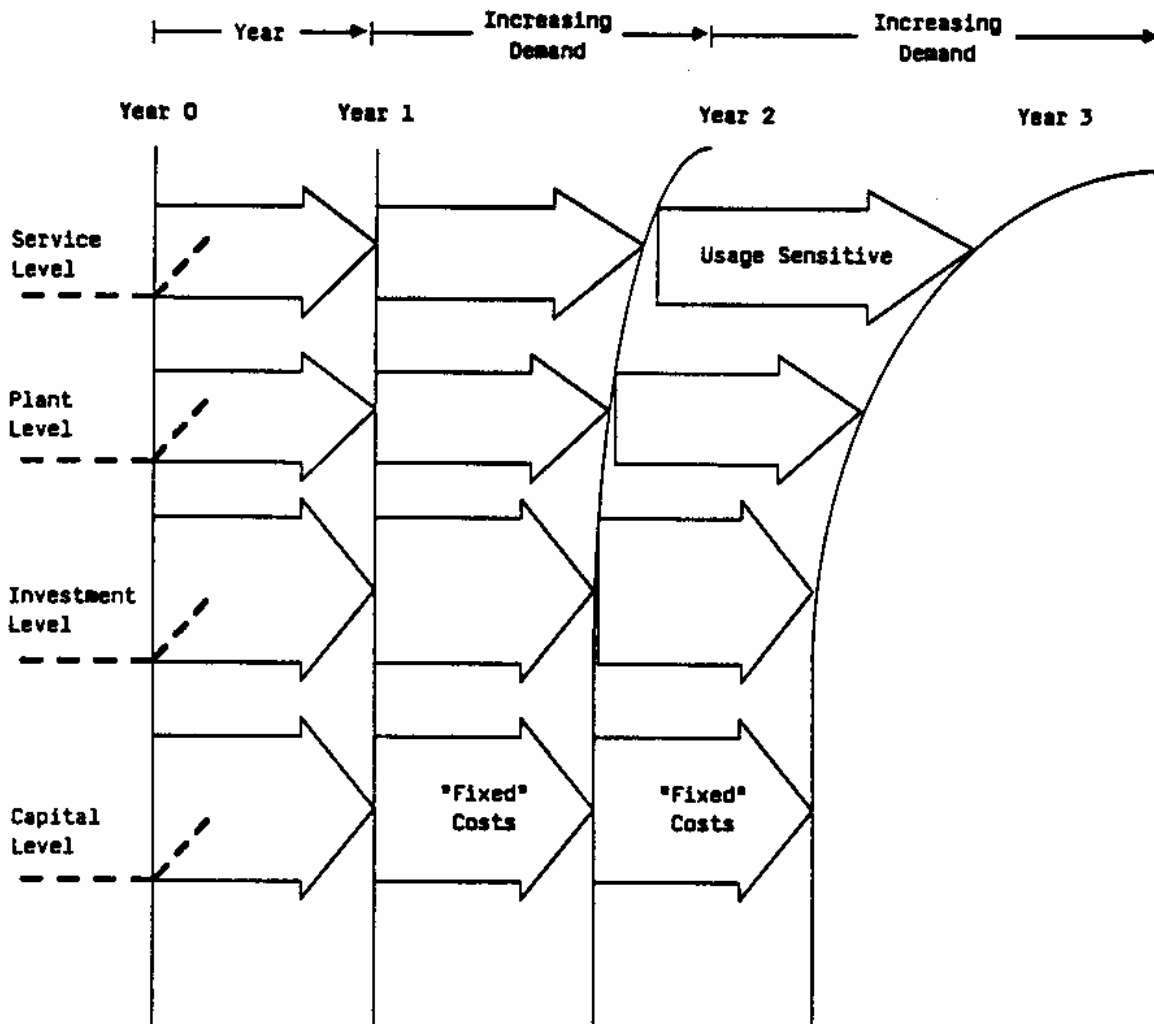
Figure I-3.3

Financial Shear

Unfortunately, new forms are not always welcomed by customers, regulators, competitors, or even managers themselves. Old forms have embedded constituencies; old jurisdictions within and without the organization will attempt to assert traditional policies on new structures. Politicians, judges, regulators, and managers are not predisposed to intellectual discussions or conceptual understanding of changing forms in competitive telecommunications. For them, political, judicial, and regulatory decisions are more manageable in a world of singular events, taken at isolated times, applied in a more or less zig-zag course of proceedings leading into a practical future. Legislators, attorneys, and economists who deal in points of order, points of law, or points of sale in the economic order find it difficult to see the results of processes that do not deal with isolated points of time. Nevertheless, processes characterize service industries, and literacy in financial forms would allow the conceptual underpinnings of emerging conflicts in telecommunications policy to be understood before legislation is undertaken. An understanding of financial forms could contribute to more coherent applications of law, regulation, and management.

In this context we can begin to examine the competitive, regulatory, and legal pressures that have been brought to bear on the financial structures of American telecommunications before divestiture, and which now pose a meaningful analogy through which we can examine current controversies in international telecommunications. Figure I-3.4 portrays conceptually the total costs incurred at different levels of the financial hierarchy over the course of three years. The arrows in the base year have been drawn in such a way that the lengths of the cost arrows represent the total costs over the "units of interaction" (e.g. minutes, calls, etc.) at each level for the entire year. At every level of the financial hierarchy, the scale of the "units of interaction" at that level remains constant across the lateral (horizontal) dimension. The vertical breadth of each arrow, in this way, represents the percentage share of the total costs at each level of the hierarchy per minute of traffic in the base year. As traffic increases with demand in successive years, usage-sensitive costs such as sales taxes or marketing

salaries at the upper levels of the hierarchy would add units of cost to the total costs incurred and lengthen the arrows; the fixed costs of investments such as buildings and capital would not increase with minutes of traffic and would remain about the same per year. As the first year scale is kept constant at all levels, an elongation of time lines results as minutes of traffic (and units of usage-sensitive costs) are added each year. Moreover, if one recalls that the total structure represented is a processor funnelling units called "revenue minutes" through the hierarchy, one must conclude that year after year the revenue per unit of investment and unit of capital must be increasing. If we may strain the analogy of the funnel a bit further, the volatility of the funds passing through the financial forms (units of investment) at the lower levels must be increasing, as in a vortex. As the funnel is further narrowed, the financial velocity increases, resulting in financial shear. This is enormously significant from the aspect of the suggested framework for financial analysis -- that shearing forces increase in the transition from an industrial to a services-based economy (those with the character of financial funnels). These financial forms suggest that new structures are inevitable, whether they emerge as specialized services, private networks that bypass the public switched network, or individual competitors with their own market shares. Political alliances would also change to reflect the new structures.



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Figure I-3.4

Effects of Time on Total Costs by Level in the Financial Hierarchy

The analogy of the vortex is not merely whimsical. The growth in revenue minutes of traffic is not homogeneous throughout the structure. Certain customers contribute more to the increase per year than others. It is as if the outside file of a marching platoon began to take increasingly larger steps: The total structure of the platoon, if it kept its integrity as an organized unit, would begin to curve inwardly to pivot on the slowest man. But the "platoon" would begin to give up its distinctive form. The shearing forces are greatest where the

velocity is greatest; in the comparison with telecommunications, business customers contribute more to financial velocity than other customers. International customers contribute more than domestic. As the funds spiral down through the financial forms of investment and capital, obviously, they will be the first ones to shear from the traditional structure to bypass the traditional network.

The mouth of the vortex, the top of the funnel, resides at the customer and service levels. Since divestiture, many of the costs previously recovered from customer revenues at the investment level have been transferred in the form of access charges to these usage-sensitive levels. They dramatically increase the aperture of the financial funnel. This contributes to the velocity of the vortex down below, increasing the likelihood of bypass by business customers. In turn, it drives the proliferation of points of presence in the network (new financial forms providing interconnectivity at the level of the operating plant) as AT&T attempts to retain these customers.

Since international rates are substantially higher than domestic rates, and traffic volumes are growing rapidly, the effect of an increase in volatility is more severe. For another reason that will become more evident in the discussion of "International Accounting Rates" in Section II, Chapter 3, a decrease in customer prices could trigger other concerns, such as an increase in U.S. outpayments to other countries, making their citizens rather than the U.S. domestic consumer the beneficiary of rate cuts in international services.

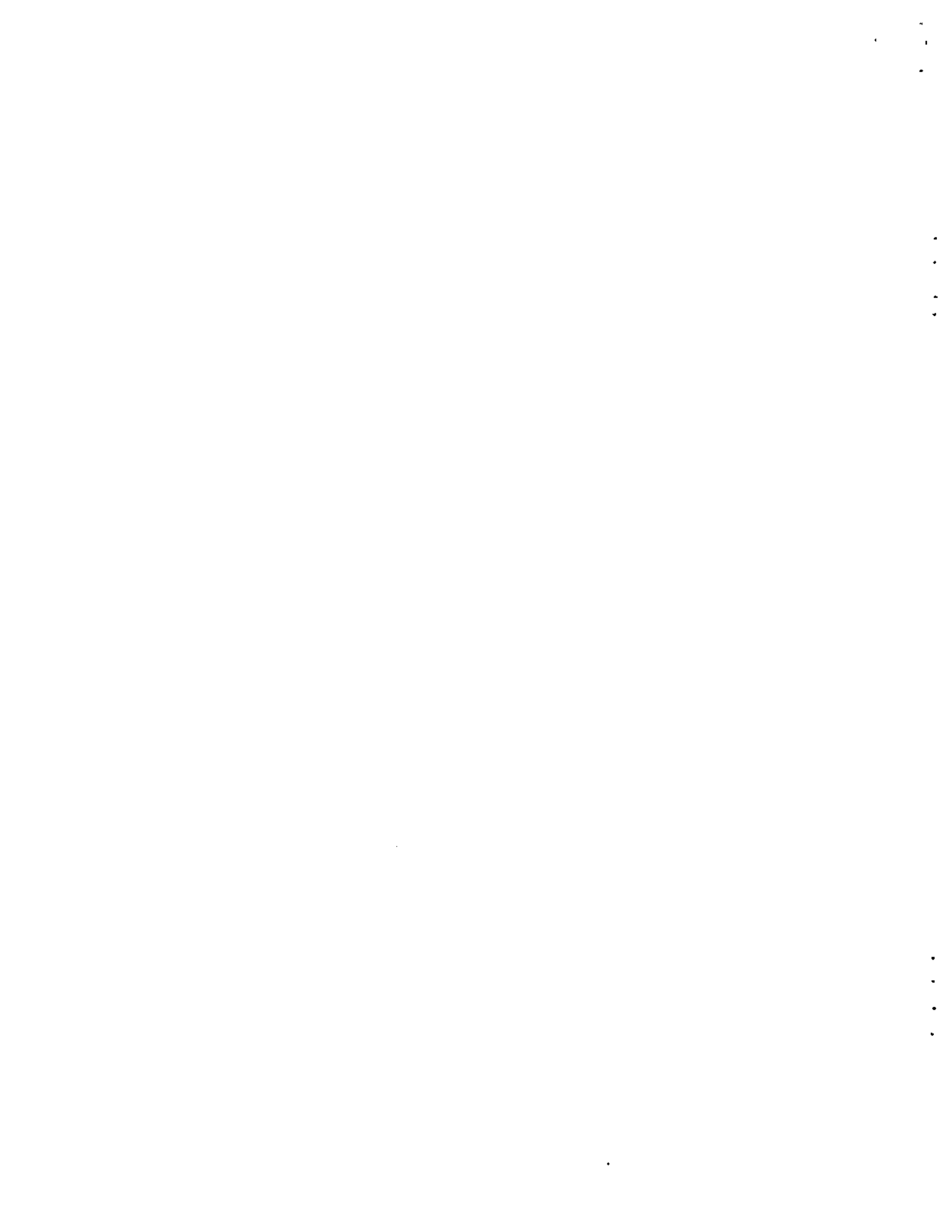
In contrast to most American systems, nearly all European telephone networks use a periodic pulse method of metering and charging for both local and long distance charges.<sup>5</sup> These may vary according to distance, duration, and time of day. Their "units of interaction" at the customer level are different. Consequently, the decrease in customer charges may not distribute evenly across the pulses of the European "units of interaction" at the service level, or in the same way that they do in the United States. Surely, international services present extraordinary complexities for regulators, legislators, and competitors.

Moreover, demand for telecommunications services is not spread evenly across the customer base of the world's consumers. Internationally, the levels of customer rates are set not only to earn a fair rate of return but to balance the outpayment obligations to foreign countries. Since U.S. dollars are a principal source of foreign exchange earnings, foreign governments have an intensely personal interest in U.S. regulatory policies that alter their financial levels, customer rates, or their balance of payments. Rate-base regulation and rates of return per country, therefore, become nonsensical in international services, unless coordinated with foreign correspondents, even though they may be of major concern to potential international competitors. But "coordination" of prices in competitive telecommunications can be construed as price fixing under American antitrust laws. It is at this point that the U.S. public interest conflicts with the national interest, since competition and lower U.S. rates are in the public interest, but if implemented, may result in a further tilt in the U.S. balance of payments by increasing the obligation of U.S. carriers to foreign PTTs.

As a feature of the service-based economies, international services such as the joint provision of telecommunications join financial structures in ways that changes in traffic volumes or rate increases or decreases for one alter the dimensions of the financial planes and expenses of the international partner. Even the proposals for private satellites or fiber optic cables will cause a restructuring of all the world's financial relationships, if they shift the balance of minutes of traffic between nations.

Notes for Section I, Chapter 3

- 1 For a discussion of logical types, see Gregory Bateson, Mind and Nature, A Neccessary Unity, Bantam Books, April 1980, pages 127-140.
- 2 Bateson, pages 120, 121.
- 3 Oettinger, Anthony G., The Information Evolution: Building Blocks and Bursting Bundles, Harvard University, Program on Information Resources Policy, (Draft, 1985) page 1.
- 4 Though it has not yet been explored in the field of anthropology, this same process explains the phenomenon of bursts of evolutionary activity and extinctions evident in the fossil record. Evolution takes place within gestalts, at first bounded by natural features of terrain such as mountain ranges or rivers, and later within "territories" that burst by overpopulation or are reshaped by geological forces, leading to sudden new groupings and bursts of speciation.
- 5 Mitchell, Bridger M., Pricing Policies in Selected European Telephone Systems, International Institute of Management and The Rand Corporation, July 1978, page 2. (Many regions of the United States use "Measured Service" for local service provision, essentially a pulse metering system.)





### THE STRUCTURE OF THE DIVESTED AT&T AND RHCs

To further illustrate the financial principles we have discussed in Chapters 1, 2, and 3, we can consider the repositioning of AT&T in the information industry as a consequence of divestiture of the Bell Operating Companies (BOCs). Under the provisions of the Modification of Final Judgment (the "MFJ," commonly also known as the "Consent Decree"), AT&T redefined the nature of its business under judicial and regulatory guidelines: It would no longer offer local exchange services (giving up this portion of its marketplace to the BOCs); it would concentrate instead on interexchange, interLATA long distance services. In exchange for this concession it would be allowed to enter new markets in the larger information industry by offering computer sales and services. The BOCs, by way of contrast, would continue to offer services, such as local exchange, which could be considered "natural monopoly" services and provide access not only to AT&T but also to other interexchange carriers. For this, they would receive payments called "access charges," through tariffs published jointly through the National Exchange Carrier Association (NECA) or separately by the regional holding companies (RHCs), groupings of BOCs into larger geographical entities. These payments would be revenues to the RHCs, but an expense of doing business to the new AT&T.

The judicially and politically engineered telecommunications network that emerged from divestiture is described in Figure I-4.1. The bottom level of the diagram shows individual customer telephones and Private Branch Exchanges (PBXs) of larger customers connected by overhead wires (Overhead Outside Plant) or conduits (Underground Outside Plant) to the local exchange switches of the BOCs or the independent operating companies (IOCs). Note that concentrations of telephones are evident under the PBXs of business customers, but their connections to the operating companies sometimes require no more lines than that of an individual residence telephone.

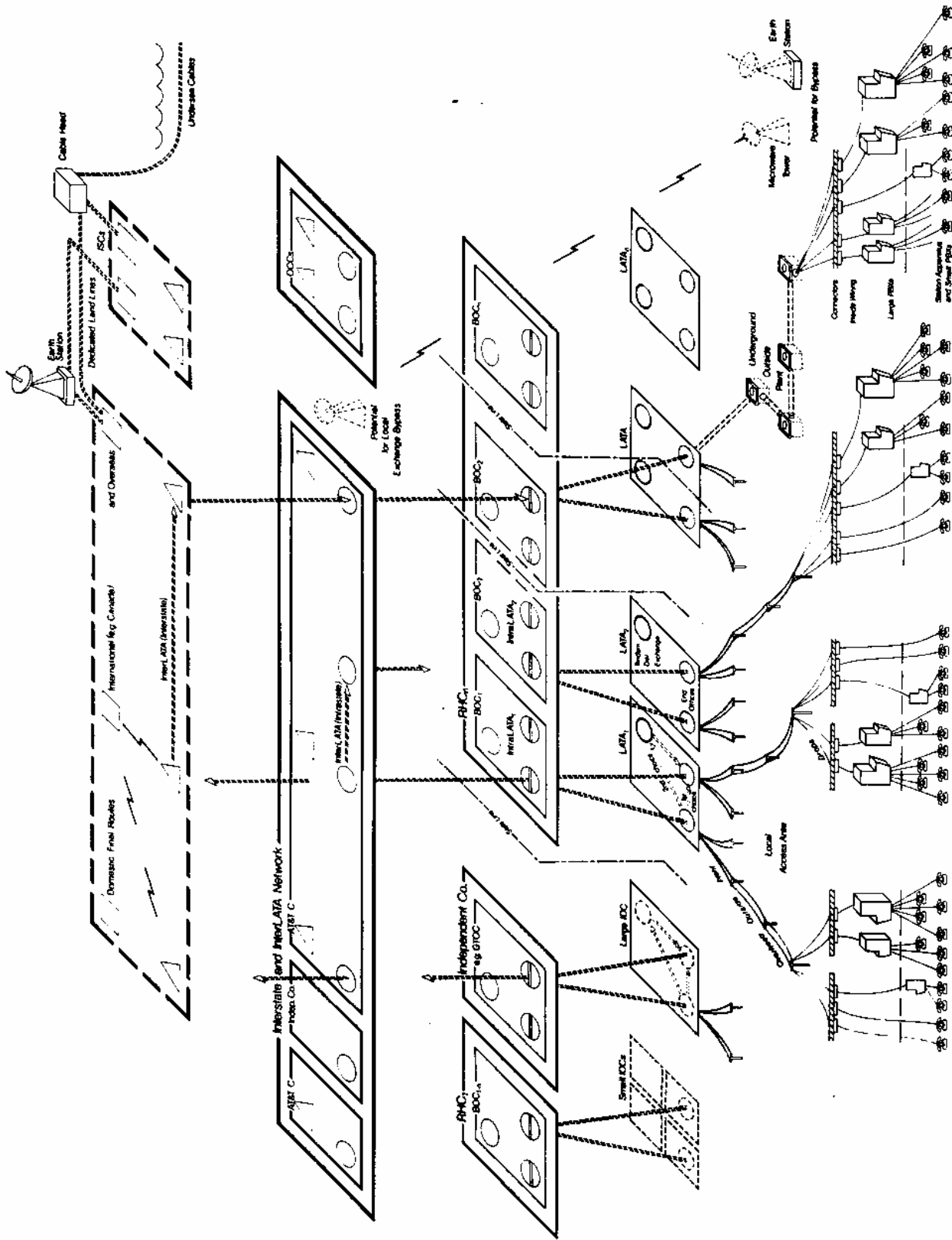


Figure I-4.1

Post-Divestiture Network

Several local exchanges comprise a LATA, a Local Access and Transport Area, which serves to distribute local calls between the exchanges and routes long distance calls to higher levels of the switching hierarchy. If the call remains within the LATA, whether local or long distance, it is an "intraLATA," "intrastate," call, and remains within the province of the Bell or independent operating company, as well as the jurisdiction of the public utility commission (PUC) that serves that state. If the call crosses a LATA boundary, it is an "interLATA," "intrastate" call and belongs to AT&T or one of the new competitive carriers, but remains under the jurisdiction of the state PUC. However, if the call crosses a state boundary, with few exceptions, it is an "interLATA," "interstate" call, under the jurisdiction of the Federal Communications Commission (FCC). Under the terms of the MFJ, 163 LATAs of various sizes were established, most of them residing wholly within state jurisdictions defined by the broken dashed lines in the diagram. Occasionally, however, a LATA straddled a state line, as in the high-density corridor between New York and New Jersey, and that traffic became the privileged business of two operating companies.

The Bell operating companies themselves were formed into larger groupings under seven regional holding companies (RHCs). Approximately equal in size at divestiture, these companies support their operating companies with administrative and technical advice, and research through Bell Communications Research (not pictured). They may participate in joint tariffs filed by the National Exchange Carrier Association (NECA).

Interstate and interLATA connections are provided by AT&T, the independent companies such as General Telephone, or by new carriers such as GTE Sprint or MCI, which acquired Satellite Business Systems (SBS -- another interexchange carrier) for an 18% sale of its stock to International Business Machines (IBM). InterLATA calls use the local facilities of the BOCs at each end of the communications path, and may be billed by either operating company. If international calls use the integrated network of AT&T, they are routed through "gateways" to satellite facilities or cable heads to be interconnected to the national networks of other countries. These calls contribute revenues in the

form of "access charges" to the operating companies in compensation for their minutes of use of the local network, but unlike the two-ended connections of interstate calls they connect only to one BOC and contribute only one half of the revenues provided by domestic calls. When access charges are higher than the costs of providing the connection, they support charges for local service or exchange calling, but invite uneconomic bypass of the local exchange network.

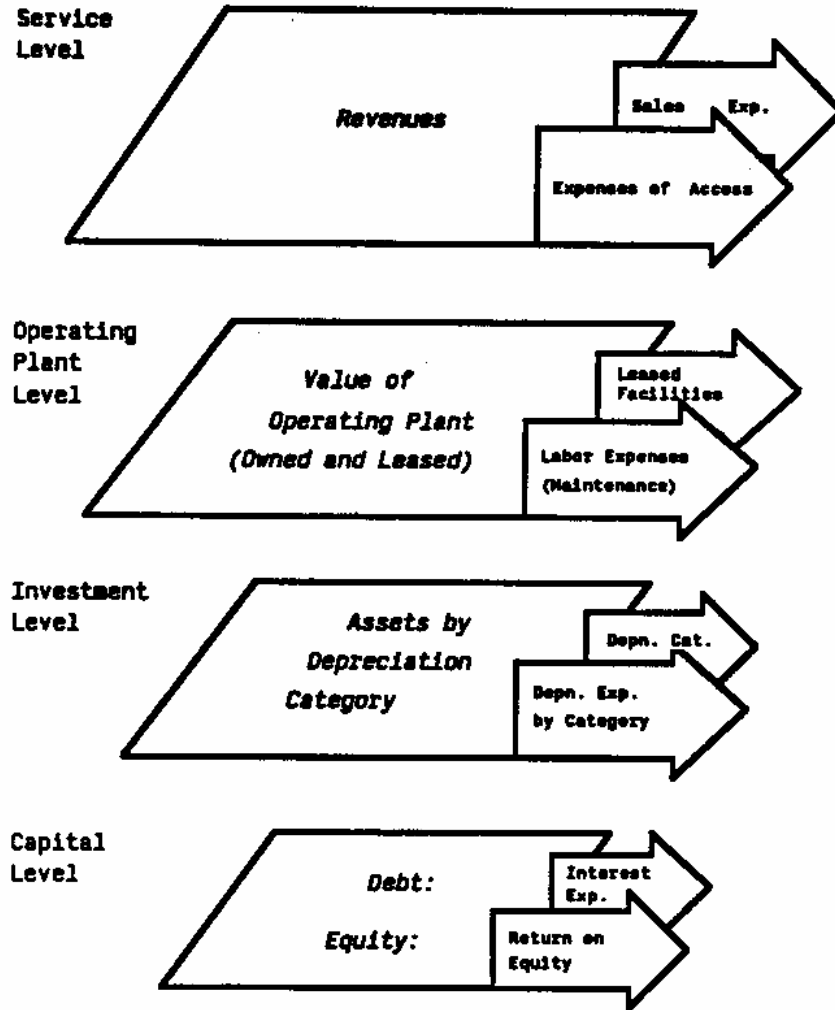
The potential for bypass of the local exchange network is illustrated by the microwave link between the interLATA network and the concentrations of telephones represented by PBXs on the right side of Figure I-4.1. Since business lines frequently pass as many as 6000 minutes of message traffic per month, but require no more connections to the central office of the BOC than the one line illustrated for a single residential connection, any usage charges applied to business calling generate revenues far in excess of the costs of the connection. As a comparison, if access charges of 8.5 cents were levied on 6000 minutes of use on the business line, and 600 minutes of use on the residential line (two calls of 10 minutes' duration per day), the business bill for access at the end of the month would be \$1020 dollars. The residential bill for access, if priced at the same level, would be \$102. In practice, of course, the portion of the costs attributed to local calling is less. This form of social discrimination, where the prices for the same service -- a telephone line -- are charged disproportionately through usage charges to two customers, one business and the other residential, led to a coalition of business users with those eager to challenge the social price structure that supported local service through business revenues. It is evident that bypass is extremely inviting for large business users: Nearly one third of business users already bypass the network with private facilities. Nearly one half will within the next year, further reducing the revenues available to support local services.

Bypass of the interstate or international network is also illustrated by the earth station in Figure I-4.1. Small, 3.3 meter terminals located at customer premises can now reach either domestic satellites or

the INTELSAT system, through Comsat. If additional private satellites are authorized and launched, undoubtedly international bypass of the network will accelerate.

The divestiture of AT&T had more profound effects than the realignment of the social pricing structure of the Bell system. The levels of the telephone hierarchy pictured as an integrated structure in Figure I-4.1 were separated into different companies. Physical connections between switches were "rehomed," and the investments ascribed to the new financial entities. The complex flows of monies between the Bell system companies were simplified, in concept, to access expenses and lease charges. What was at one time "return on assets" within one integrated system, was now a "usage charge" to AT&T and a different "return on assets" to the operating company. In brief, the financial framework of the organizations changed.

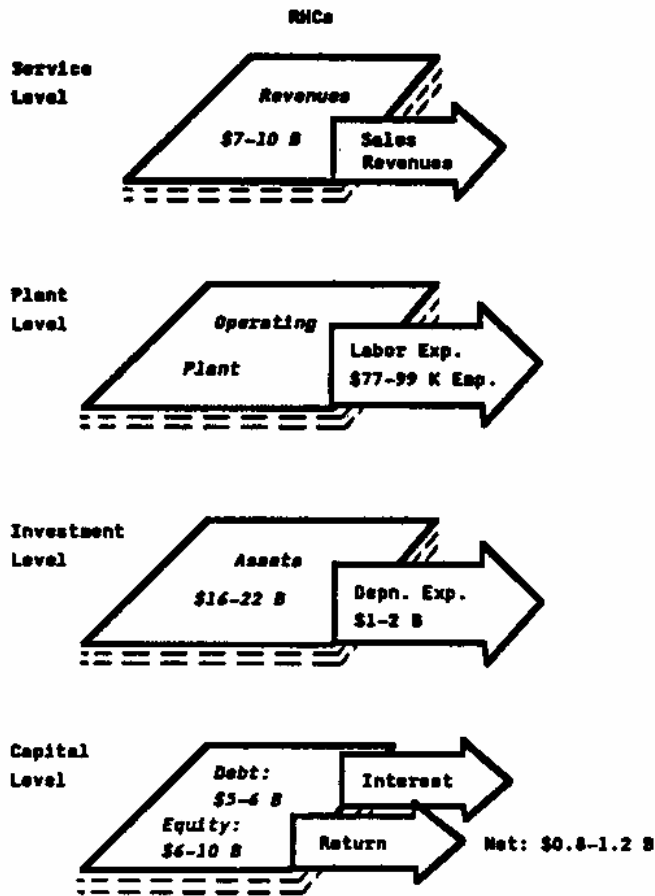
The effects of divestiture can be seen by visualizing the financial levels of the integrated Bell system, as in Figure I-4.2, and the levels of the financial framework for the separated companies, AT&T, and the "average" RHC pictured in Figure I-4.3. While the data are estimated from the annual reports of the companies, the overall structure of the firms is still evident. AT&T is clearly driven by the costs of providing services to the customer, while the RHCs are driven by the financial requirements of their proportionately larger capital base.



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Figure I-4.2

Financial Levels: Integrated Bell System



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Figure I-4.3

### Financial Framework for the Regional Holding Companies

The RHCs' access to the capital markets determines their security:

- 1) At the capital level, the capital base was disaggregated among the seven regional holding companies and AT&T. The individual expenses of both debt and equity were reduced in proportion to the remaining base.

On average, it is interesting to note, the capital of each of the RHCs is just under half that of AT&T. In aggregate, their capital is nearly four times as large.

2) At the investment level, the assets of the RHCs and AT&T were divided. Because the service lives of local exchange plant and long distance plant do not coincide, different depreciation schedules now apply to the divested RHCs and AT&T. Because competitive plant is more subject to obsolescence than monopoly plant, it warrants shorter depreciation schedules, causing greater expense to AT&T than to the RHCs. In the same way that patents allow an inventor a period of time to recoup the rewards of his intellectual investment, short depreciation schedules allow the investor in new ventures to recoup the fruits of his venture capital before newer technology can make it obsolete. The long depreciation schedules pictured, therefore, represent an agreement to invest in monopoly plant, and may now reflect regulatory depreciation policies for the RHCs and AT&T that are badly out of date in relation to the competitive environment. Depreciation reserves must be adjusted for AT&T as well as for the RHCs to reflect the capital investments forecast in the competitive future.

On average, the investments of the respective RHCs again represent approximately half that of AT&T.

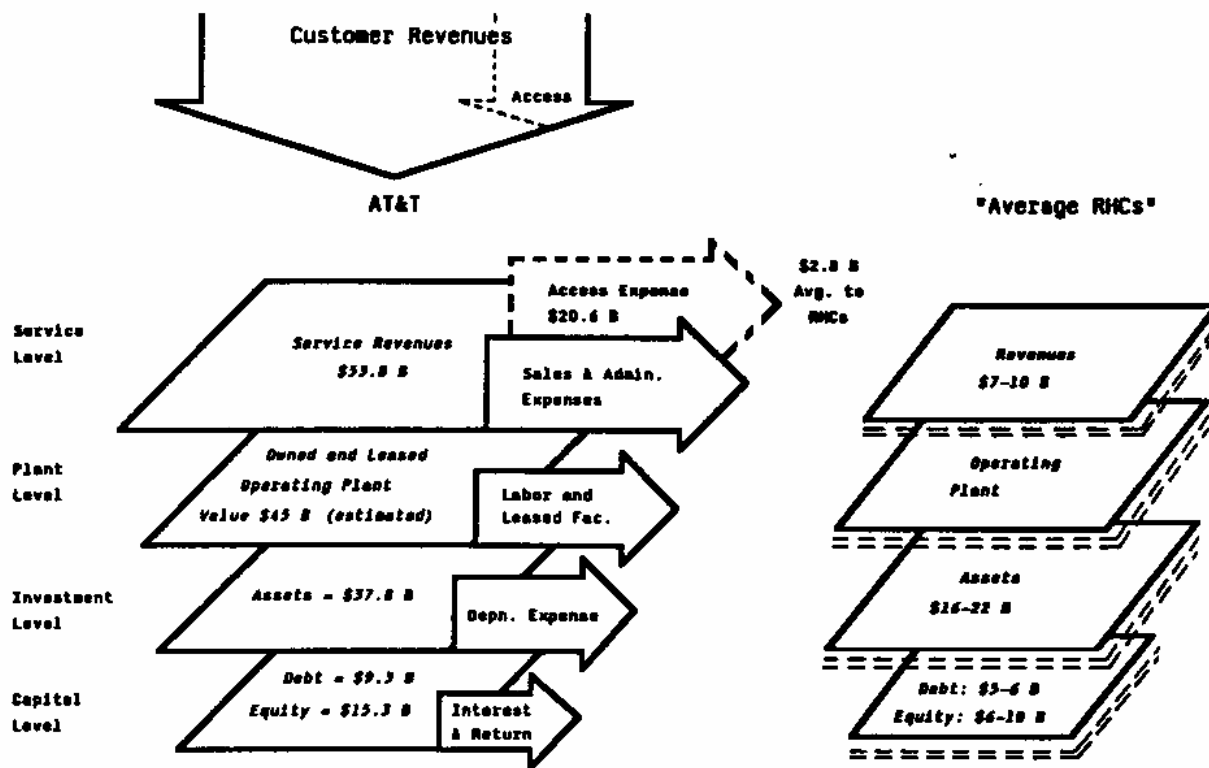
3) At the operating plant level, the nature of the equipment is now different for AT&T and the RHCs. Maintenance costs and labor expense were divided between the seven RHCs and AT&T. Because the nearly 40,000 employees involved in operator services and those in the manufacturing enterprise of Western Electric (renamed AT&T Technologies) fell to AT&T, its personnel expenses rose relative to its former operating companies. Similarly, since leased international facilities are the responsibility of AT&T, its leased facility expenses represent a greater portion of its expenses than those of a RHC.



4) It is at the service level, however, where the more dramatic changes took place. Since most calling is local exchange calling, there is a tremendous difference in the character of the customer base between the RHCs and AT&T. The RHCs have very large calling volumes at unit prices below those of AT&T. Even bolstered by revenues derived from access charges, the size of their asset bases in proportion to the revenues derived is nevertheless much different from that of their divested parent. The new AT&T, on the other hand, experiences lower calling volumes at higher unit charges. Consequently, its revenue level is significantly larger in proportion to its invested assets. Moreover, as local loops sit idle for long periods of the day, connected as they are to individual customer residences or places of business, their assets are not as productive. This change in the character of the companies is reflected in their financial ratios.

In addition, the entire effect of the separation of the capital, investment, and operating plant bases comes to bear on the service level of AT&T. Expenses previously charged at other levels of the business are now seen as access charges, an expense of connection through the BOCs to one's customers. Instead of various forms of labor expense, depreciation and payments of interest or dividends for divested capital, these expenses are now charged to the new AT&T as access. That these new expenses account for approximately 60% of the costs of the new AT&T-Communications shows the significance of the restructure, and perhaps, the levels of cross support that still exist between long distance and local services.

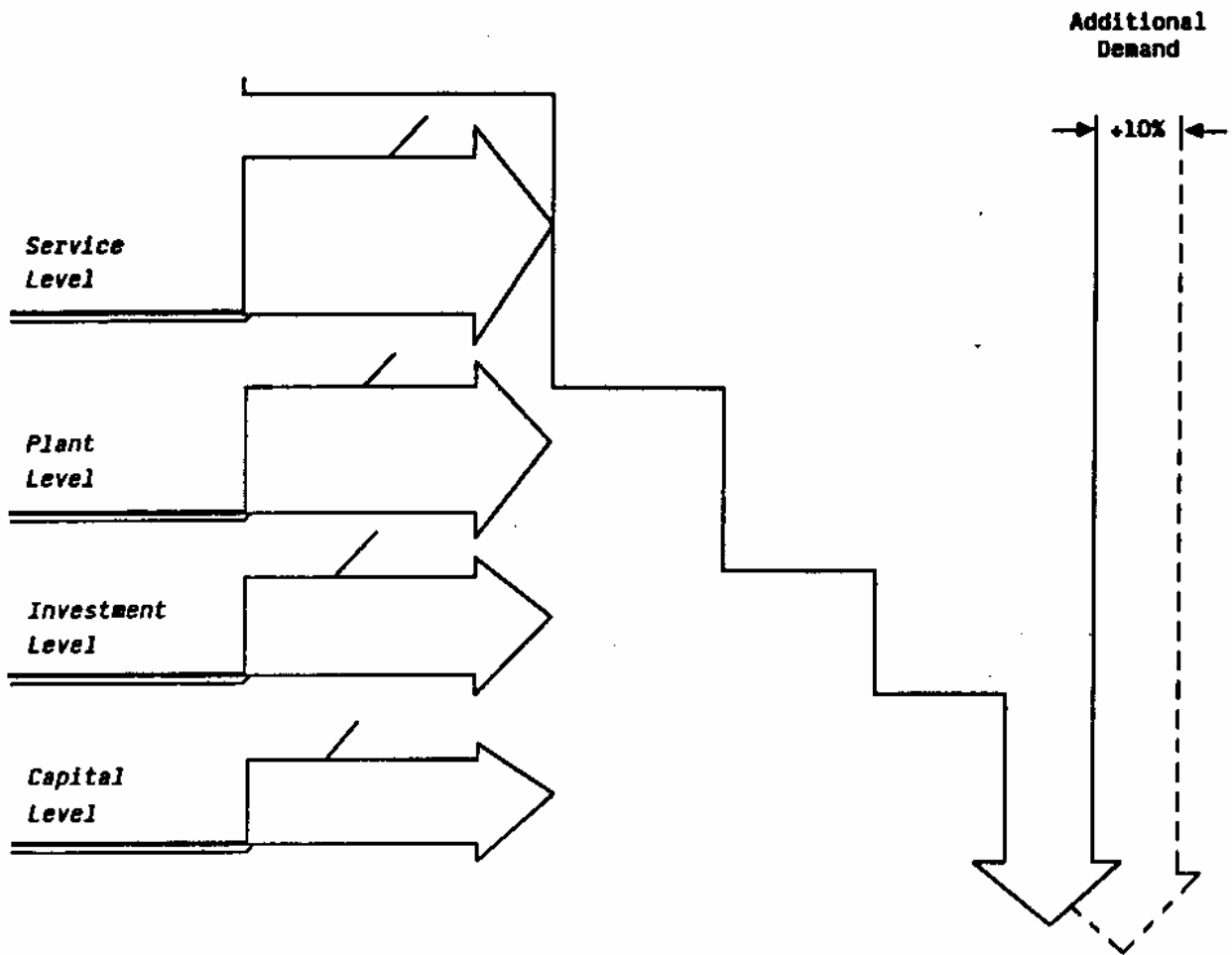
The firms that emerged from divestiture, as illustrated in Figure I-4.4, are clearly different financial entities in the information industry from the single firm that went in. While the RHCs retain similarities among themselves which characterize the local exchange business, AT&T is clearly in the service industry, the "knowledge business," a theme it once adopted in its advertising. Their cost structures are unique, as Figures I-4.5 and I-4.6 suggest.



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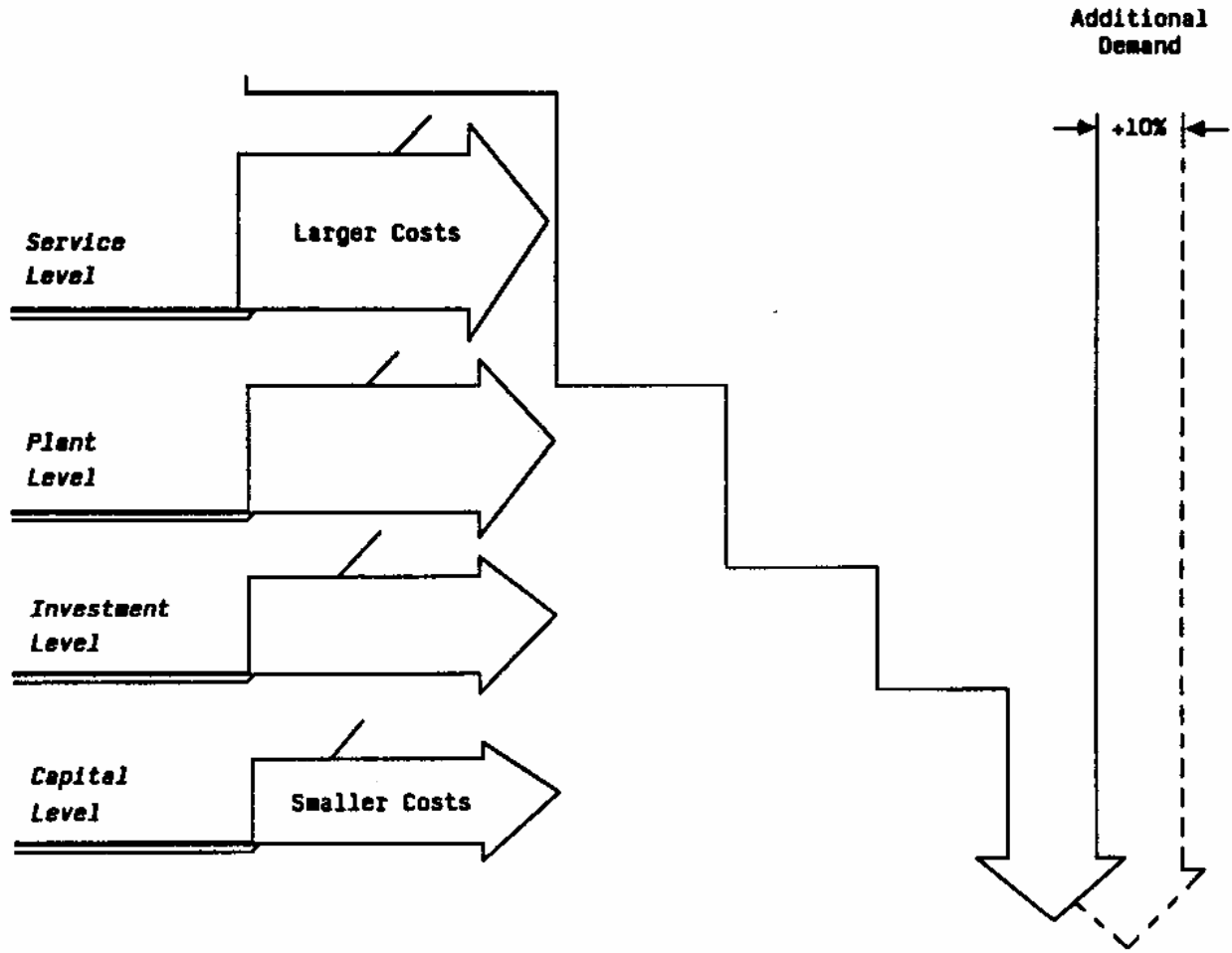
Figure I-4.4

Firms Emerging from Divestiture



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Figure I-4.5  
Cost Structure of AT&T



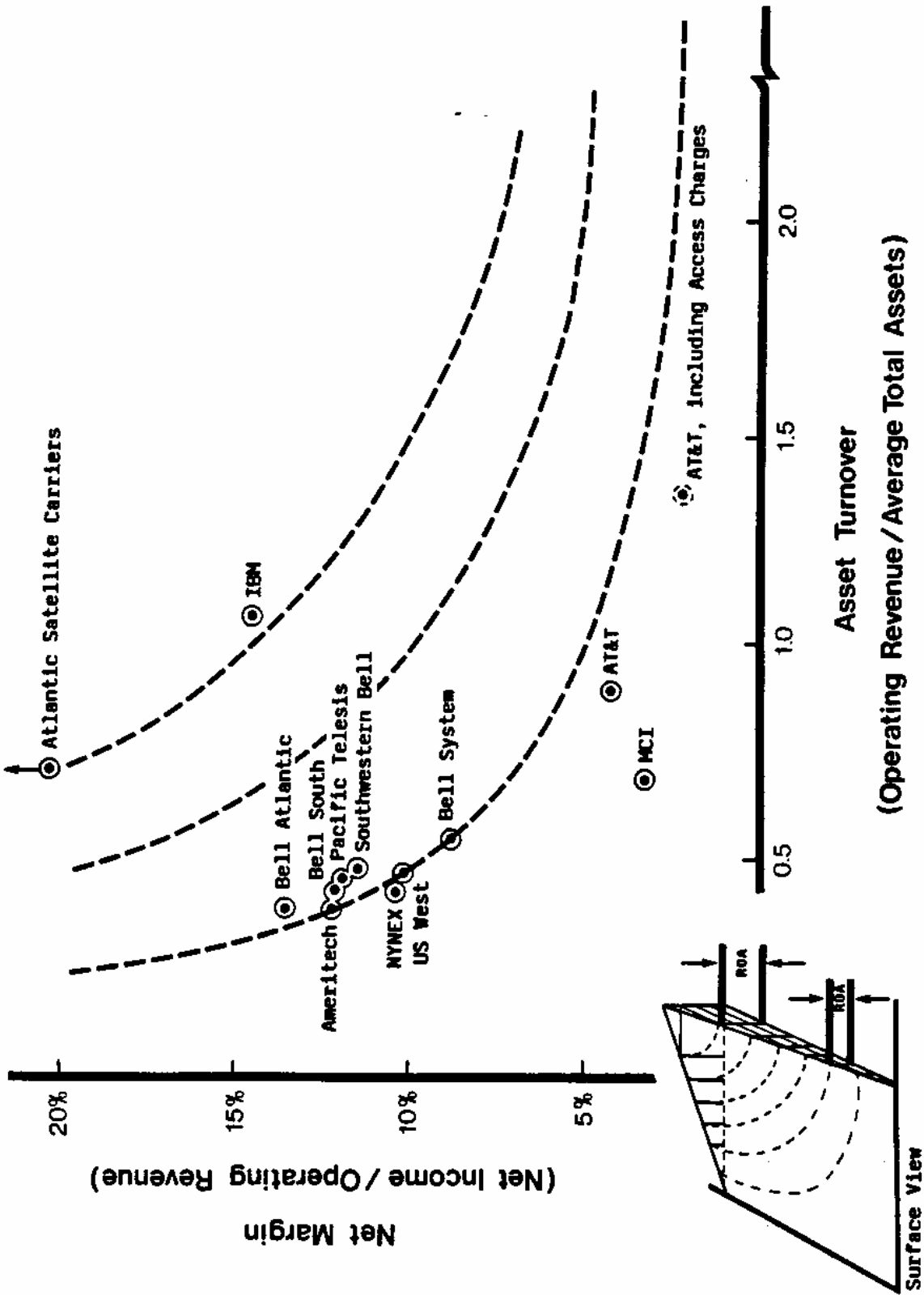
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Figure I-4.6

Cost Structure of RHCs

COMPETITORS AND THE FINANCIAL TOPOGRAPHY  
(RETURN ON ASSETS = NET MARGIN X ASSET TURNOVER)

In 1903, the Dupont Company introduced what was then a revolutionary accounting scheme. It has since become the standard for American industry.<sup>1</sup> Two concepts evolved from it: net margin, the ratio of net income to operating revenue (the value of all goods and services sold); and asset turnover, the ratio of operating revenues to the average total assets of the firm. "With these innovations," said Alfred Chandler, "modern managers had completed the essential tools by which the visible hand of management was able to replace the invisible hand of market forces in coordinating and monitoring economic activities."<sup>2</sup> The product of the two ratios defines return on assets, or the ratio of net income to average total assets. It is a measure of the intensity with which a firm uses its financial resources. When plotted graphically, as in Figure I-5.1, these factors form a raised topology which reveals the character of the firms situated on its surface. Firms with a high turnover of assets but low margins tend to be distributors, making their profits on high volumes (stock turnover) rather than individual sales. Firms with high margins but low turnover of assets tend to be specialized retailers with higher prices and longer shelf lives. In the telecommunications industry, they tend to be firms whose net margins are subsidized by access charges, or whose depreciable service lives are inordinately long. To this degree, the transatlantic satellite carriers, such as ISI, who have proposed new and innovative satellite services and have recently been approved for service by the FCC, can substantiate their claim to "specialized" status, since their financial profiles place them high in the upper left quadrant of Figure I-5.1.



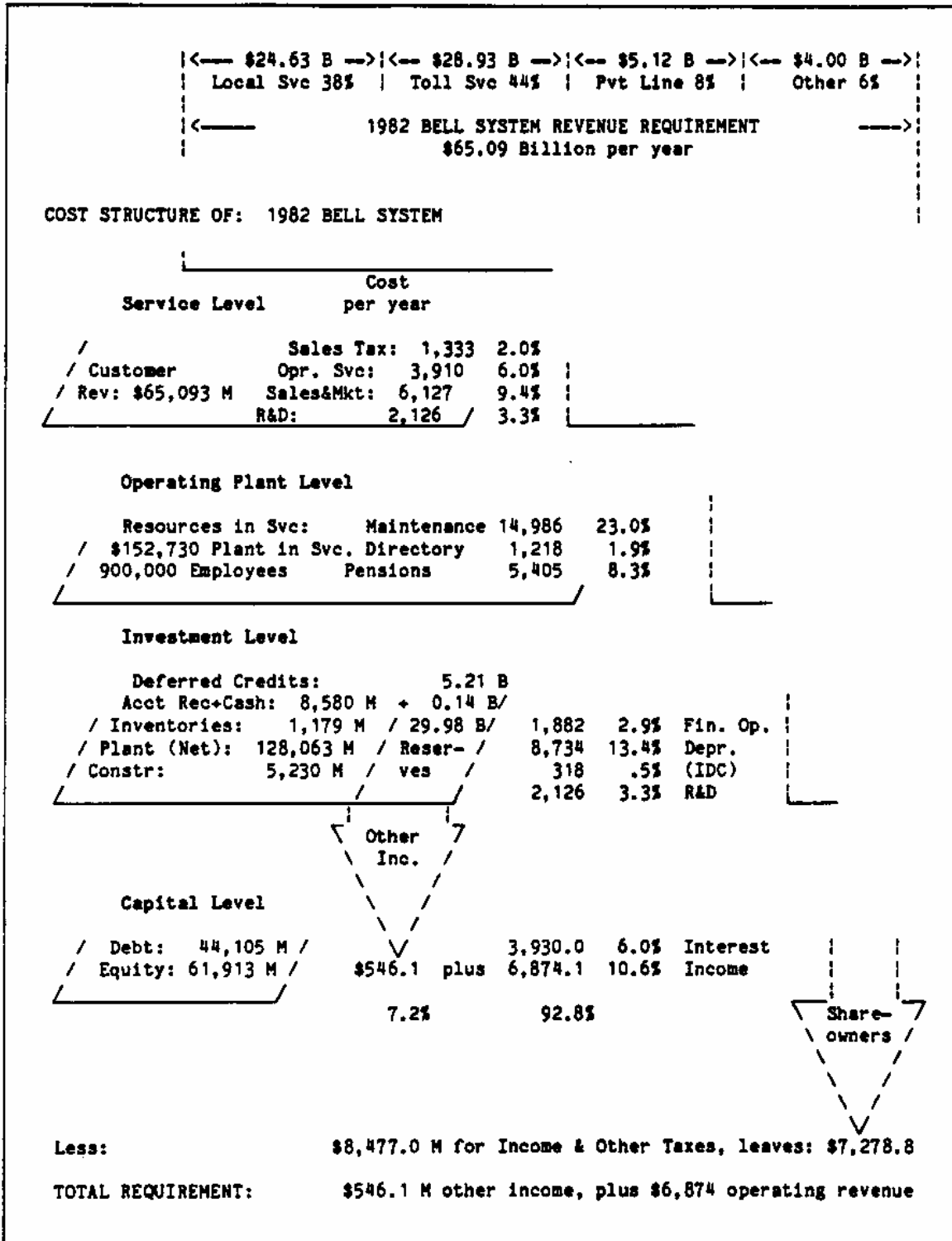
Source: Data adapted from Shearson Lehman Brothers, Telephone Numbers: A Weekly Update on the Telecommunications Industry. New York, 1985.

Figure I-5.1

The Financial Topography (Return on Assets)

As described by their locus on the topographical map, the nature of the RHCs and AT&T is clearly not the same after divestiture as that of the integrated Bell system. The differences between these firms are reflected in their financial ratios of return on assets, net margin, and asset turnover. While the RHCs cluster closely around a return on average total assets of 5.1 to 6.0%, the new AT&T has dramatically shifted to approximately 3.5% in 1984. If the revenues collected and paid by AT&T for access charges are calculated in the equation, the return on assets remains the same, but the locus of the firm shifts even more sharply to the right. Taken as a whole, the former Bell system would have earned approximately 5.0% return on assets, based on the 1984 annual reports of the companies.

Figures I-5.2 through Figure I-5.11 represent the financial profiles of the old Bell system, the new AT&T, the average regional holding company, and some significant competitors in international telecommunications, as distilled from publicly available financial reports, FCC filings, public statements of company officials, or annual reports. Various costs have been separated into financial levels according to the framework for financial analysis. Within the limits of the typed format, a stylized attempt has been made to represent relative proportions visually, but these do not accurately portray the true relationships of individual costs to either total revenues or total expenses. As a matter of convention, access charges for switched voice services (where they apply) have been deducted from the customer level of the financial hierarchy, and the remaining costs are shown as a percentage of the remaining non-access revenue requirement. Unless otherwise noted, revenue figures are represented in millions; units of operating plant such as transponders or access lines are occasionally included for the sake of information by individual count, as are numbers of employees, suggesting the forward liability of the firms in pensions, wages, and other personnel costs. Where these expenses are high, layoffs or wage concessions can be in the offing as competition among these carriers intensifies. In the case of the satellite and fiber optic providers, estimated customer charges are projected for circuits at the service level and transponders sales at the operating plant level for various levels of utilization at the costs and revenue requirements portrayed.

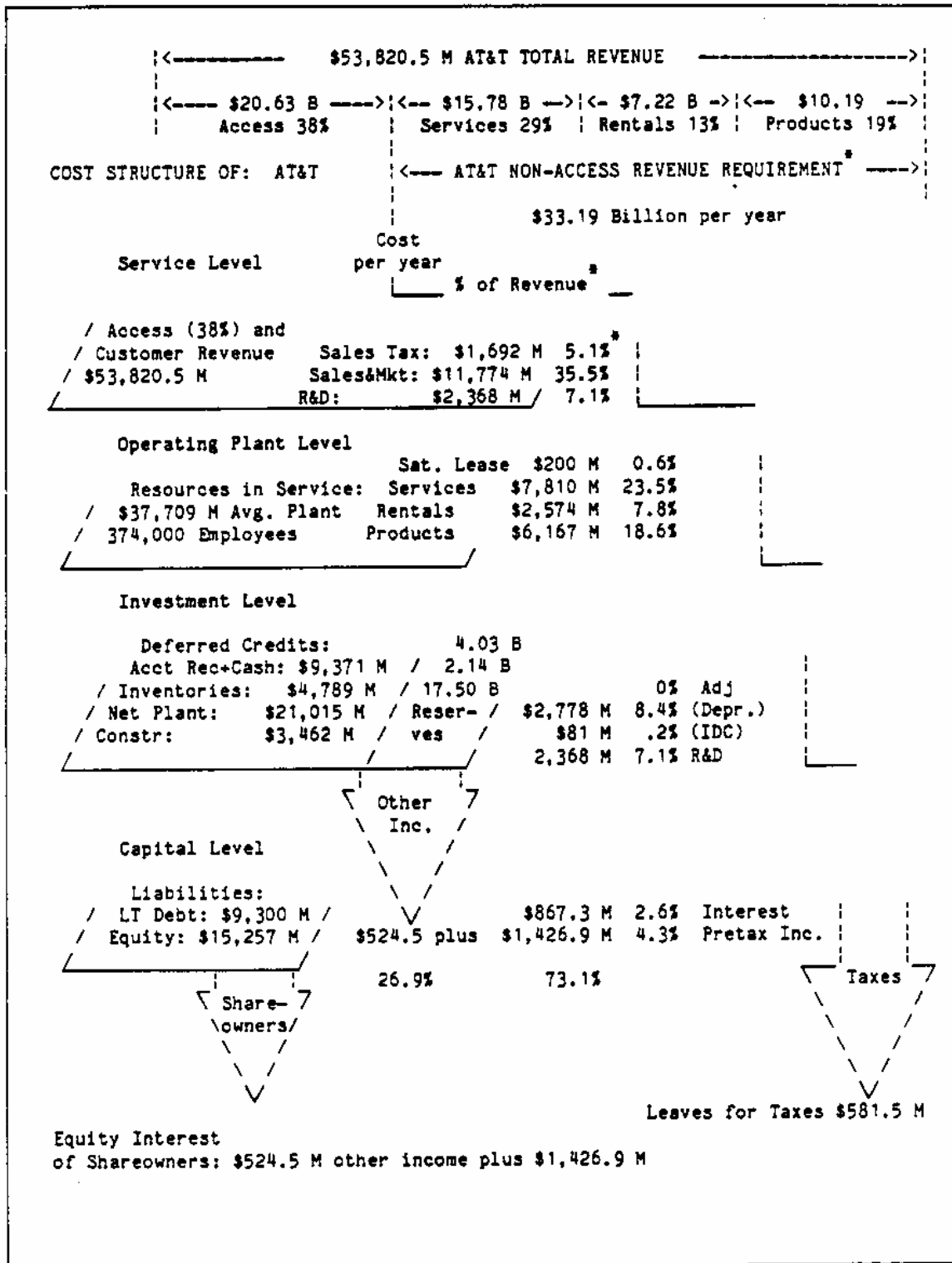


Source: Data adapted from AT&T. Information Statement and Prospectus. New York, November 1983.

Figure I-5.2

1982 Bell System Financial Structure

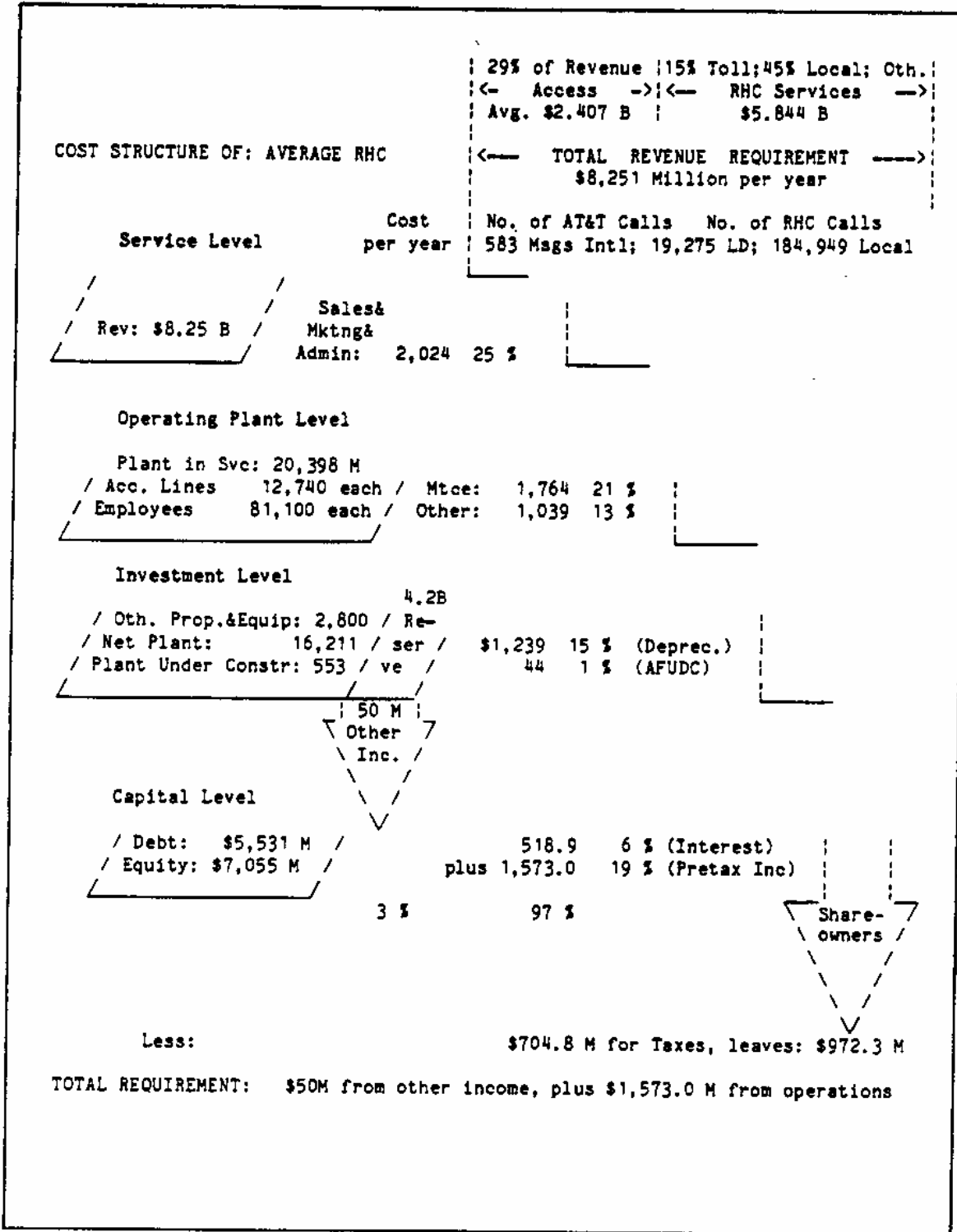




Source: Data adapted from AT&T Annual Report, 1984.

Figure I-5.3

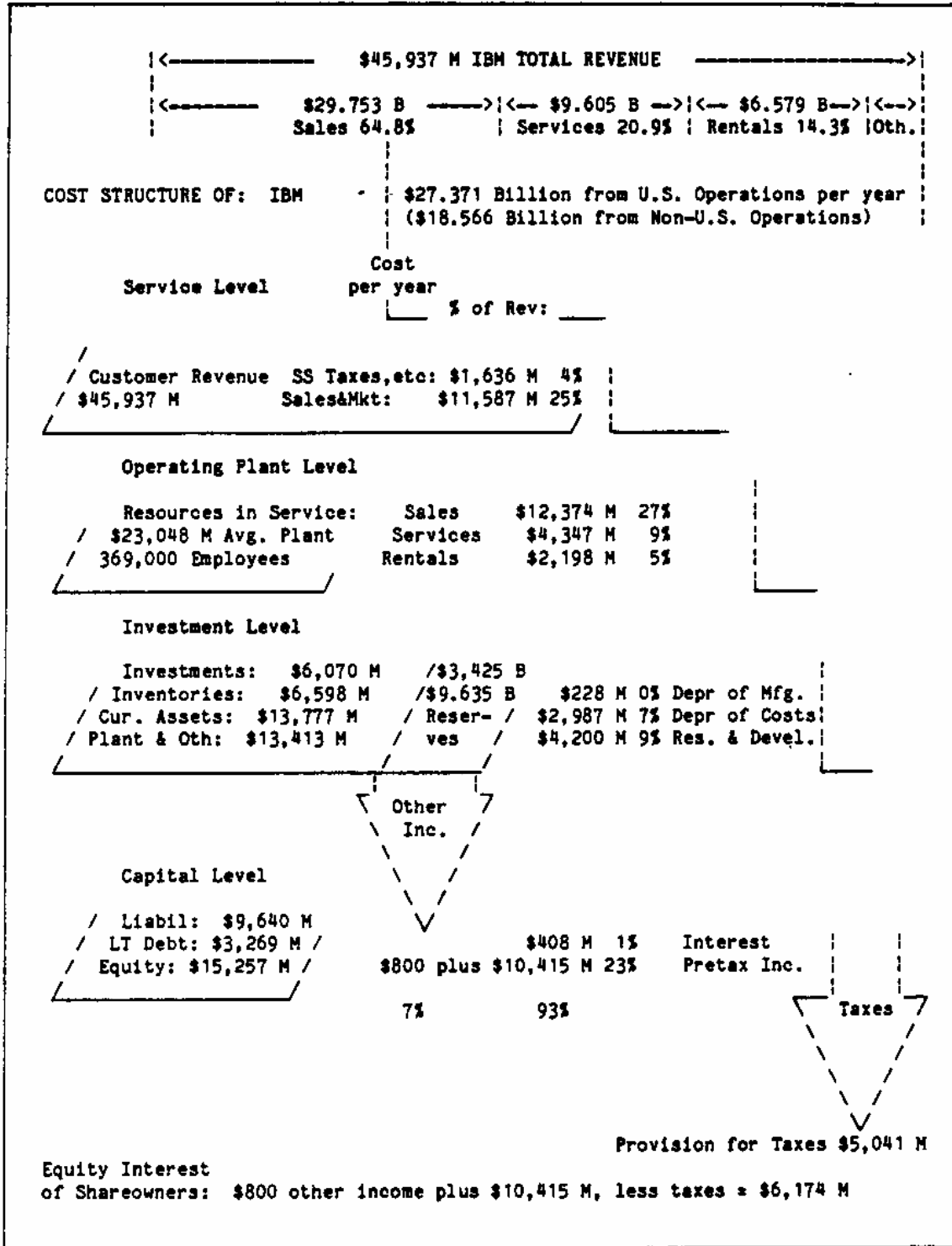
1984 AT&T Financial Structure



Source: Data adapted from RHC annual reports.

Figure I-5.4

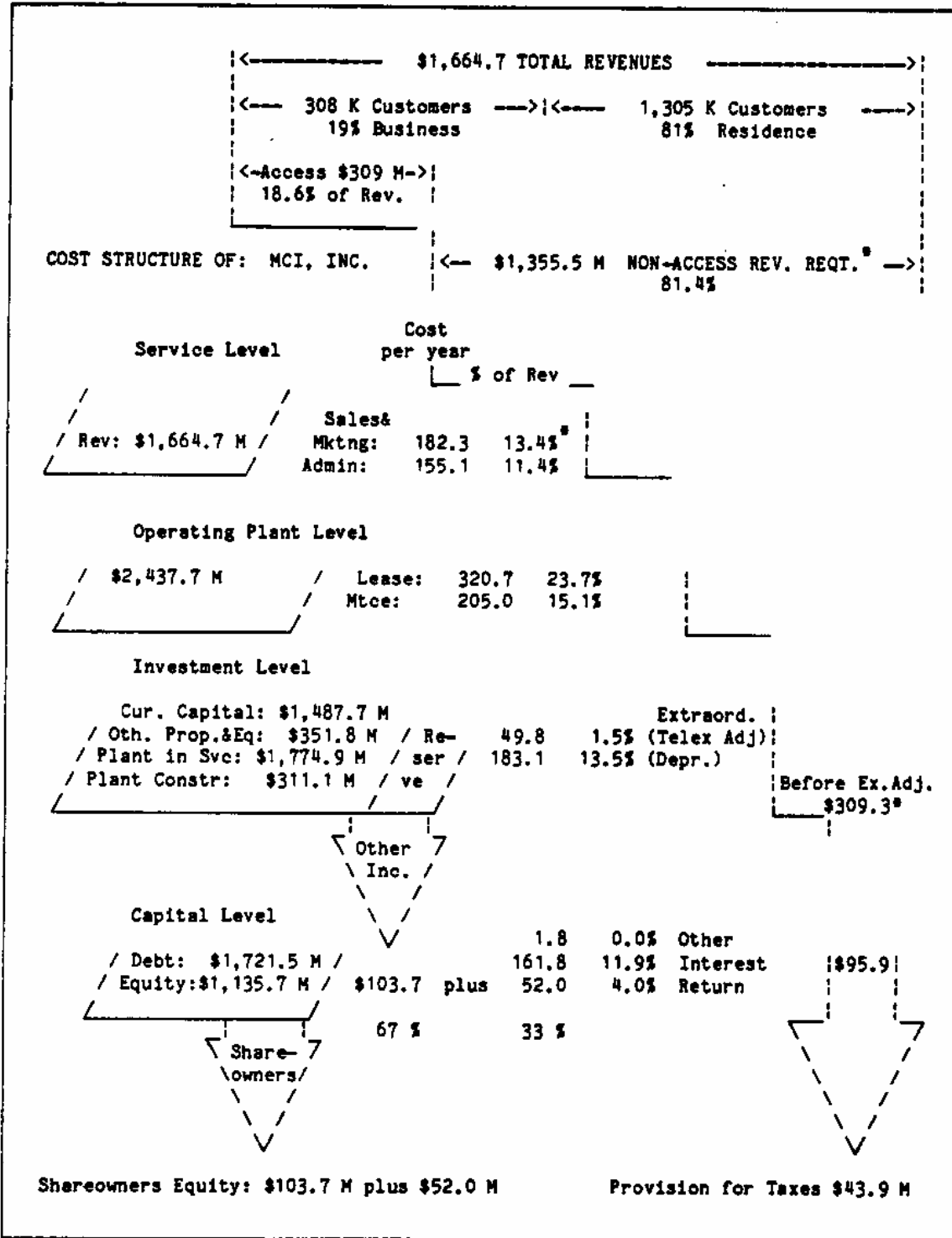
1984 Financial Structure of the RHCs



Source: Data adapted from IBM. Annual Report, 1984.

Figure I-5.5

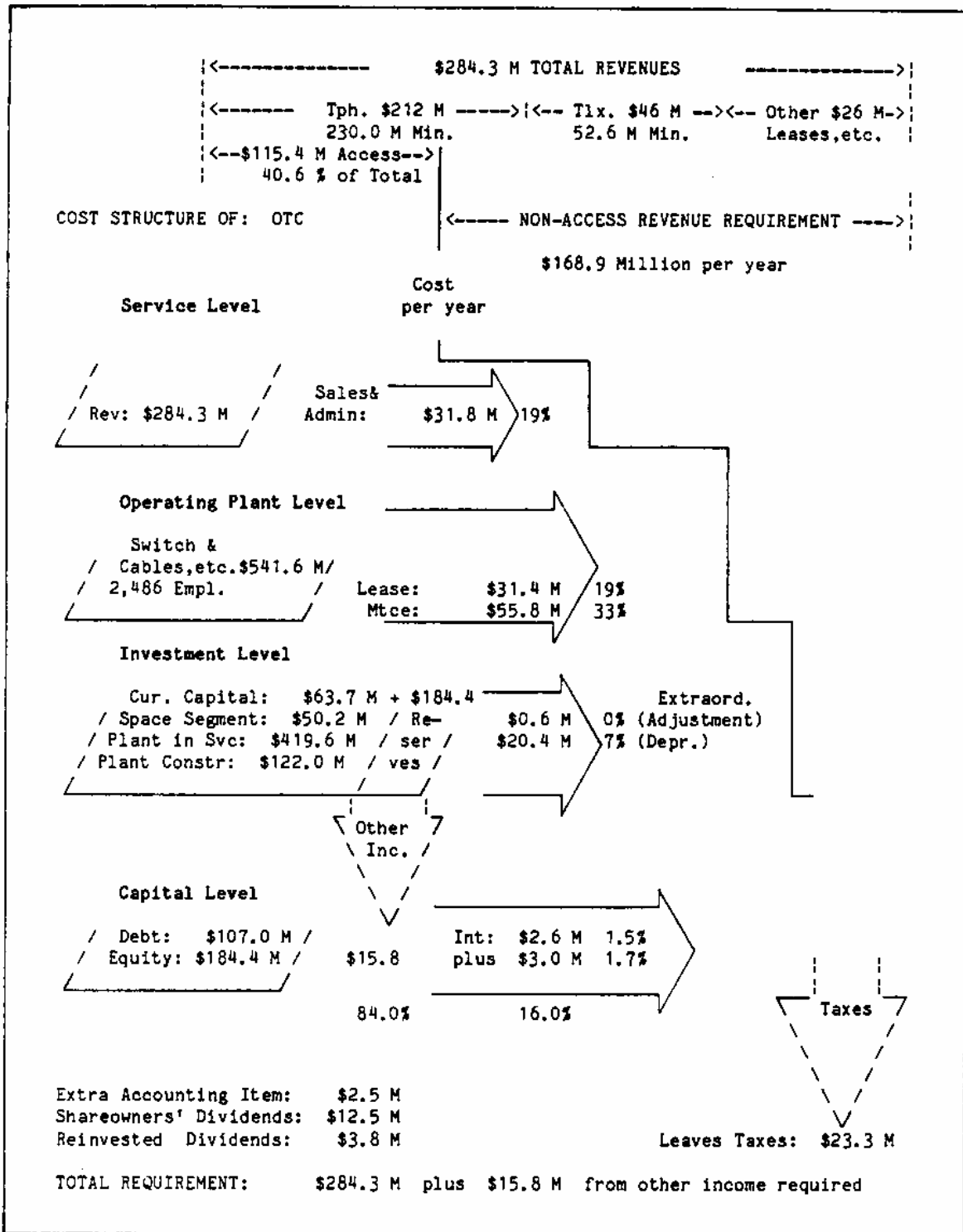
1984 IBM Financial Structure



Source: Data adapted from MCI Corp. Annual Report, 1984.

Figure I-5.6

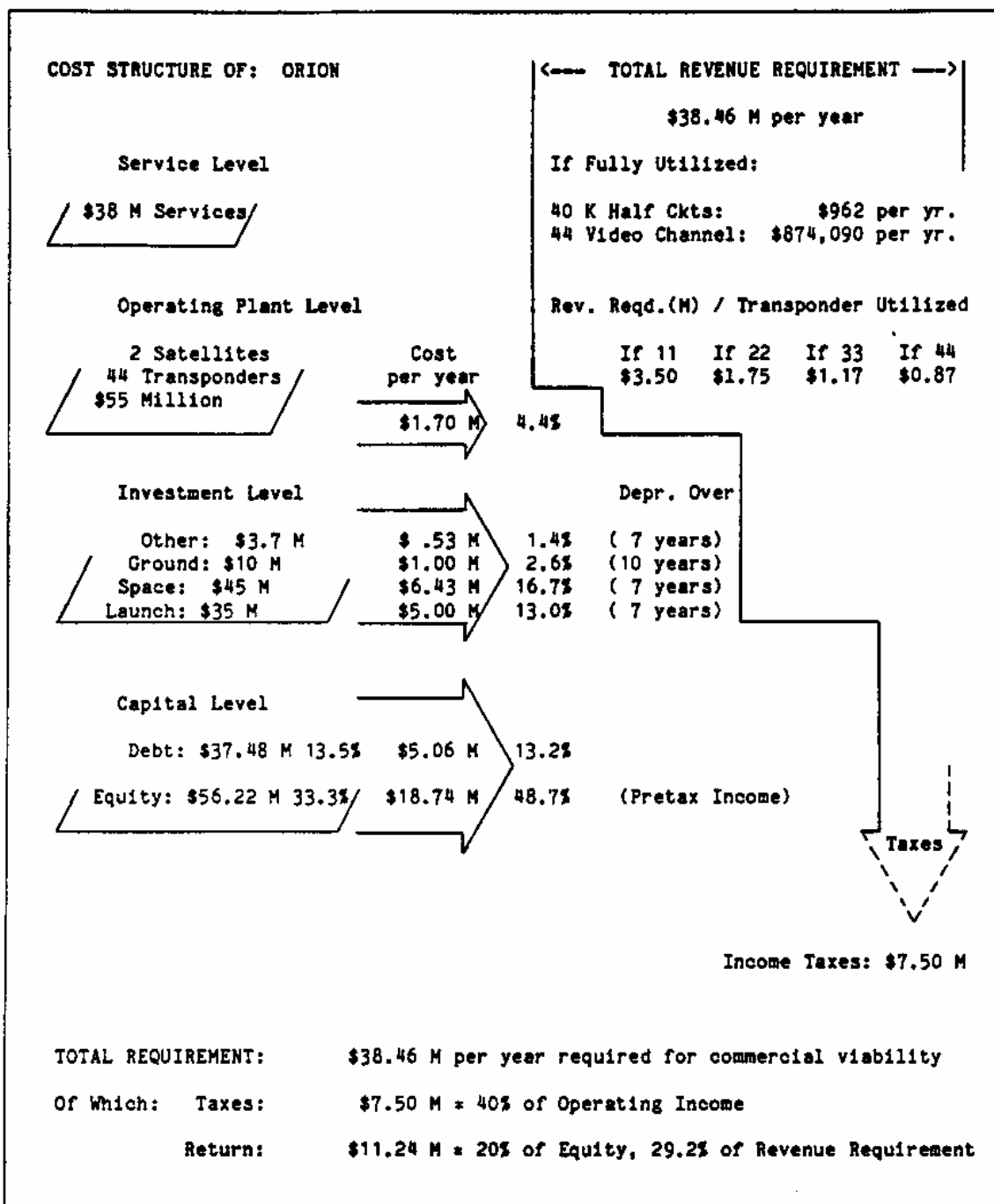
1984 MCI Financial Structure



Source: Data estimated from Australia Overseas Telecommunications Commission. Annual Report, 1983.

Figure I-5.7

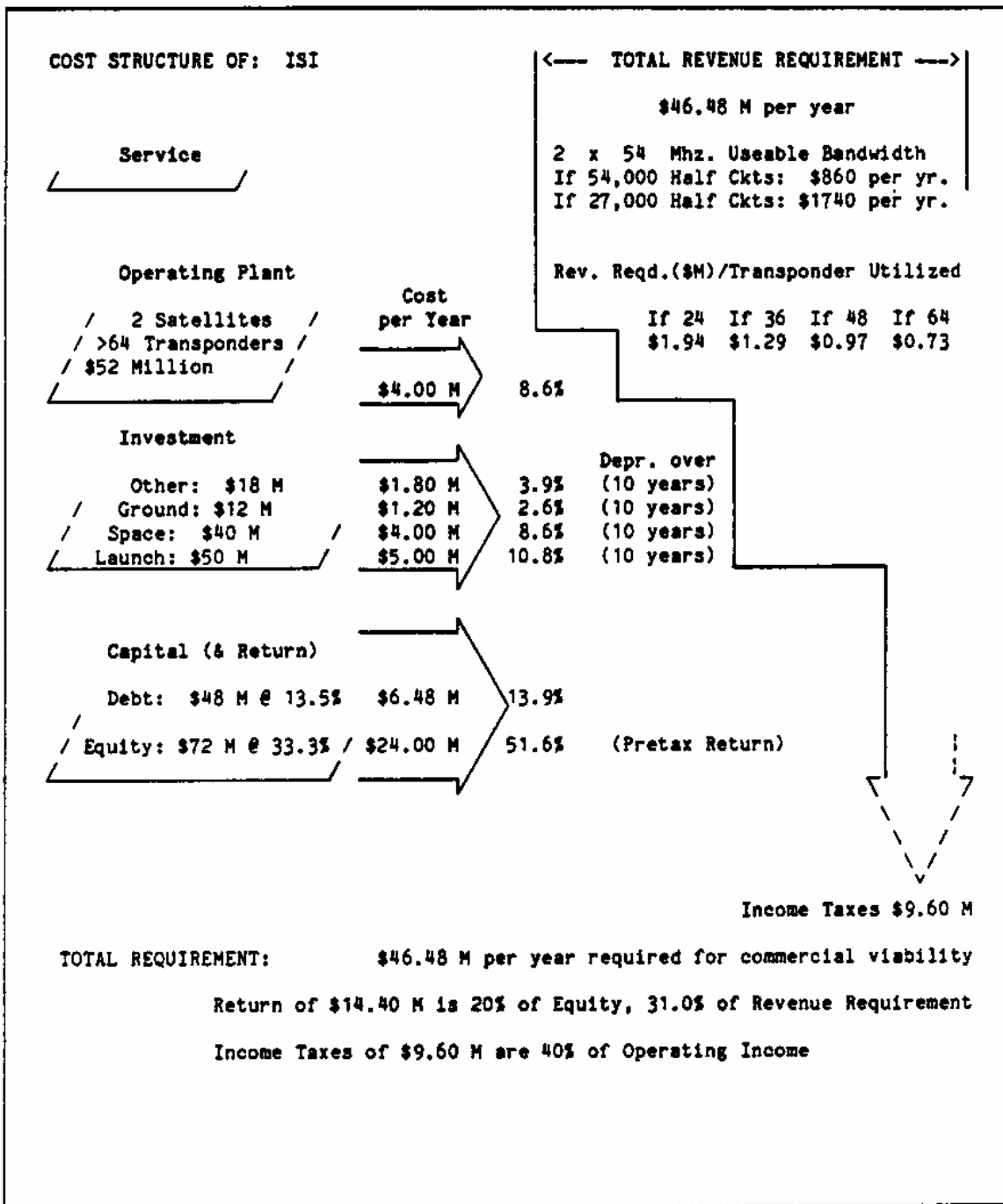
Australia: 1983 Overseas Telecommunications Commission Financial Structure



Source: Data assumed from Orion Application for Service.

Figure I-5.8

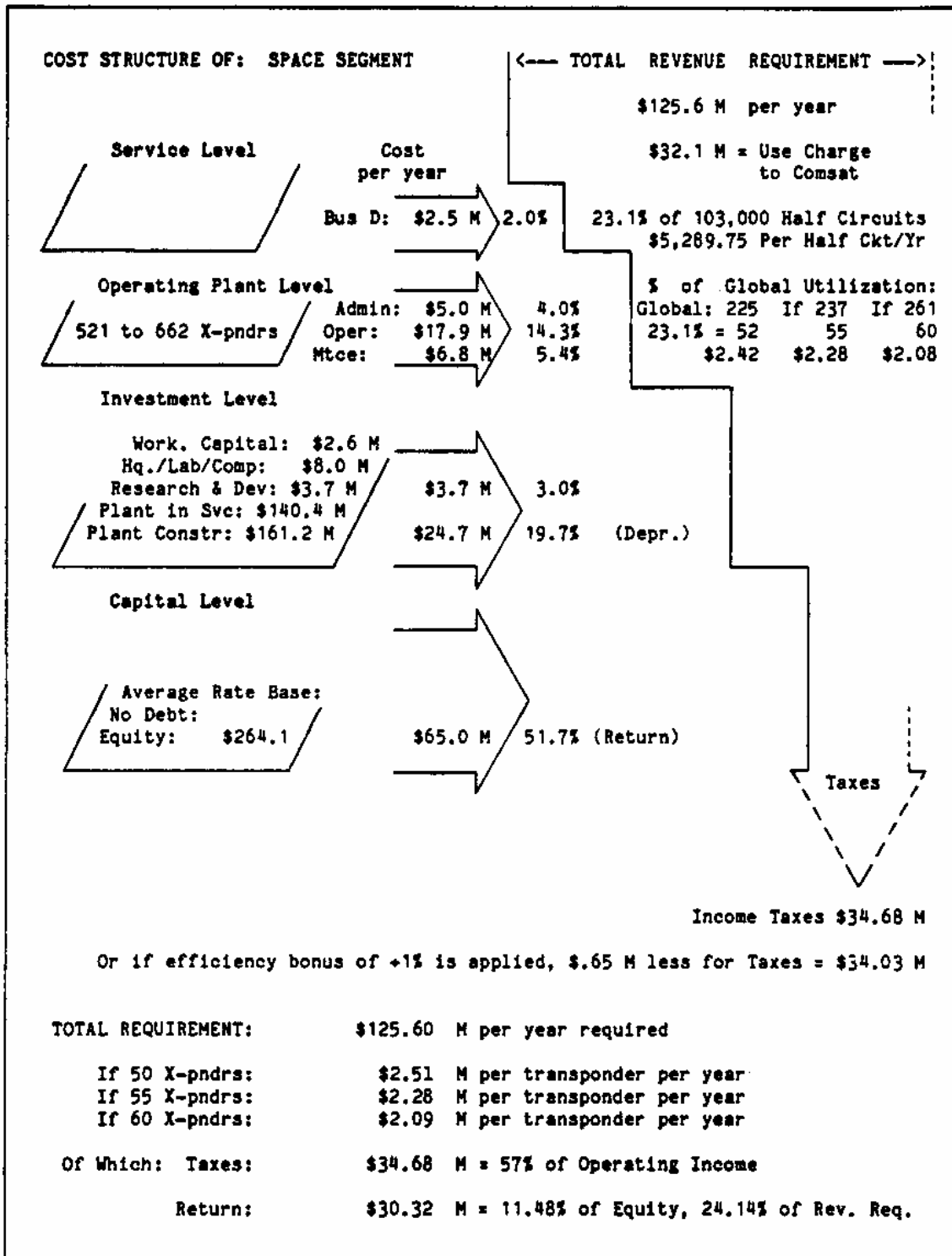
Competitive Satellites: Orion



Source: Data assumed from ISI Application for Service.

Figure I-5.9

Competitive Satellites: ISI

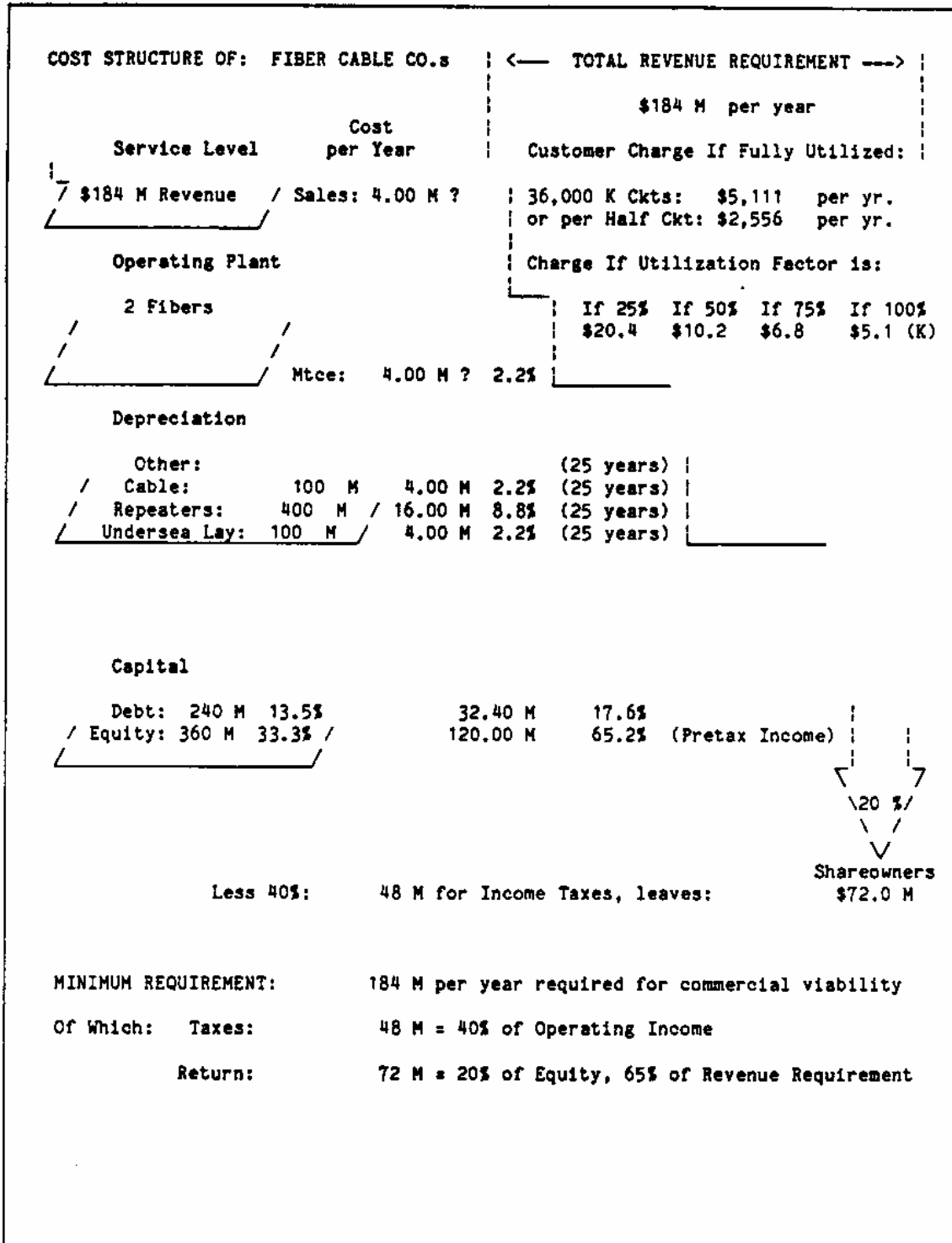


Source: Data as adjusted July 1984 for oversubscription, from Comsat Rate Structure Investigation, Exhibit B by W. Hinchman, July 23, 1984.

Figure I-5.10

Comsat Share of INTELSAT Space Segment  
 July 1, 1984 - June 30, 1985





Source: Data assumed for illustration.

Figure I-5.11

Hypothetical Fiber Optic Cable System

These figures also introduce a new concept. At the investment level, the proportion of the company's assets that are held in reserve are portrayed. These funds come from past depreciation that has been deducted from the customer revenue stream, but the funds have been invested in many ways until they are needed to replace plant capacity at the operating level above. The "other income" reported from this and other kinds of monies held in reserve constitutes a separate revenue stream, and an arrow is shown contributing to the equity interests of the financial organization. This income reduces the "revenue requirement" that falls on customers. The total of all income, that from "other income" and from the customer revenue stream, is thus shown on the "bottom line" of the firm's financial profile. It represents "pre-tax income." If income taxes are deducted from the revenue stream at this level, the remaining arrow would yield income left to shareowners or to be reinvested in the firm. If the notation shows dividends and reinvested earnings deducted at the equity line, the remainder portrayed by the arrow would represent a provision for income taxes.

Thus Figure I-5.2 represents the 1982 Bell system financial structure. Its principal expenses are for maintenance, depreciation, and return on equity. While not strictly comparable, Figures I-5.3 and I-5.4 show the 1984 financial structures of AT&T and the "average RHC." On the one hand, access charges, sales, and marketing expenses, particularly for AT&T-IS, its new equipment subsidiary, have begun to make significant impacts on the new AT&T. On the other hand, costs of maintenance of the operating plant have remained high for the RHCs, and their requirements for return on equity have increased.

Figure I-5.5 shows the 1984 financial structure of IBM. Its profile reveals its competitive advantage in its trim operating plant resources employed when compared to AT&T, though its costs at this level are higher. Its investments in companies such as Rolm have begun to be evident at the investment level, though its 1985 18% acquisition of MCI is not yet portrayed. Of interest, too, is its \$4200 million invested in research and development, 9% of its costs.

The financial structure of MCI, Inc. is revealed in Figure I-5.6. Its financial structure at the level of the operating plant helps to explain its mid-line position on the asymptotic curve between AT&T and the regional holding companies. While not yet burdened with the same level of access charges (only 18.6% of its revenues) as AT&T (38% of its revenues), it nevertheless incurs significant expenses (25.8% of its non-access revenues) for leased plant capacity; this cost, which is largely paid to AT&T and the BOCs for WATS service and other leased facilities, will decrease as MCI's capital construction program progresses. As it does, it will increase operating revenues to MCI and thereby increase its asset turnover. At that time, MCI will also assume the character of a "distributor" on the information topology, with high traffic volumes and high asset turnover. For the moment, helped by discounts in access charges, it is keeping its consumer rates low, buying market share with the help of other income from its reserves, to gain a beachhead in the competitive battles to come. Undoubtedly, it will also benefit from IBM's research and development in the future, having had no significant R&D budget of its own since its inception.

By way of contrast to stateside service providers in the northern hemisphere, Figure I-5.7 shows the financial structure of the Overseas Telecommunications Commission (OTC) of Australia, as reported in Australian dollars in its annual report for 1983. Its access costs are not strictly comparable either to AT&T's or to MCI's because these charges include interconnection to domestic long haul facilities as well as their "local exchange." As a "pure" overseas carrier, the characteristic costs of lease charges for overseas satellite services can be seen as 7% of total costs. Its costs of labor and network maintenance at the operating plant level consume a third of its non-access revenue requirement.

In sharp contrast to the service providers pictured, the financial structures of Orion, ISI (Figures I-5.8 and I-5.9), and the space segment business of Comsat (Figure I-5.10) present a far different character. Each is clearly a facility provider, a "specialized" carrier largely driven by its capital needs and which must earn its profits on

net margin rather than asset turnover. The proximity of these competitors on the topology gives an indication of the intensity of the competition that will emerge between them.

Yet there are also important differences between the space segment providers: Neither Orion nor ISI detailed any expenses for the sale of its facilities; neither described any significant expenses to operate its plant. Presumably, each has customers presubscribed to its services, based on potentially low quotes for long-term lease charges. In sharp contrast, a large portion of Comsat's expenses derive from the service and operating levels of its business. While it, too, is largely driven by its financial needs for capital, just over 25% of its total revenue is required for the development of its future services, rearrangements of assignments, and the operation of its plant.

This poses a significant question of the credibility of the filings of the specialized carriers recently approved for service by the FCC, or of Comsat's ability to compete with Orion, ISI, and others if their interests were to be redirected from new and innovative services toward the established switched services market. Since the preponderance of costs for each firm is in its investment base, any shortfall in either the specialized carriers' or in Comsat's traffic forecasts would translate immediately into higher charges for its services, as we have seen in Chapter 2, "Operating Leverage." For the specialized carriers it underscores the high risk, high reward nature of the services they intend to provide; for Comsat it intensifies the concern of the international community whose rates would be raised for space segment capacity if traffic from the high-density routes were siphoned from INTELSAT's Atlantic satellites. Yet competition for the space segment seems already to have produced tangible benefits, since steps have been taken to begin to reduce INTELSAT's traditional overcapacity that has resulted from years of generous and penalty-free overforecasting of the space segment needs of its signatories.

Figure I-5.11 profiles a hypothetical fiber optic carrier. If \$600 million were required to construct and lay the operating plant, and only

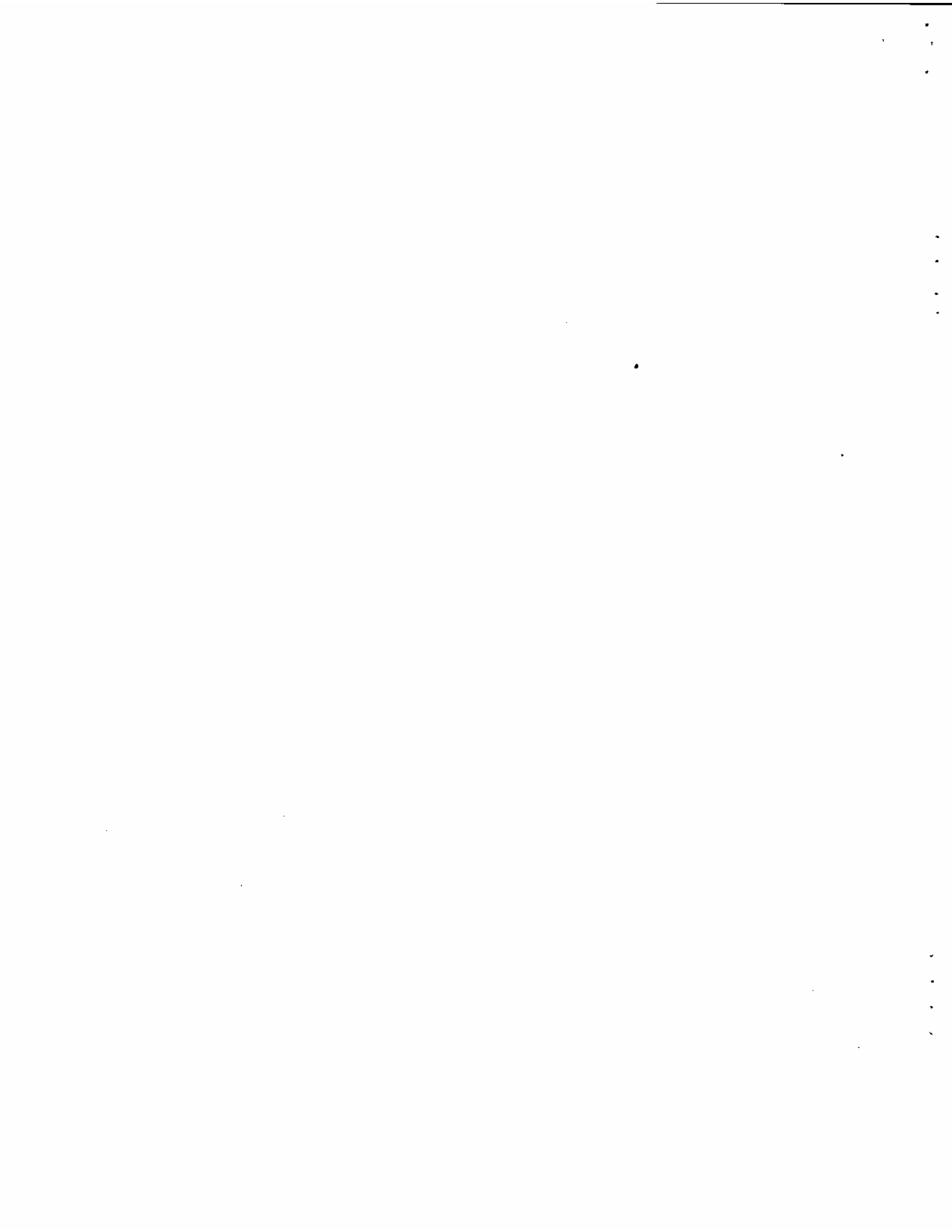
36,000 circuits were provided to customers, there would be serious doubt that such a cable would be economical. However, increases in fiber optic carrying capacity are being reported daily in the press, and increased capacity could make these systems serious competitors to INTELSAT and the specialized carriers in the late 1980s or early 1990s.

Notes for Section I, Chapter 5

1 Chandler, Alfred D., Jr., The Visible Hand, The Managerial Revolution in American Business, (Cambridge, Mass: Belknap Press, 1981), page 446.

2 As above, page 448.

SECTION II: INTERNATIONAL FINANCIAL STRUCTURES





## THE STRUCTURE OF INTERNATIONAL TELECOMMUNICATIONS

Telecommunications services are vital to national economies and to the security and sovereignty of nations. Overseas, they have traditionally been provided in conjunction with postal services by government monopolies called Posts, Telegraph and Telephone administrations. The PTTs are frequently the largest employers, and often the principal sources of foreign exchange for governments overseas.

Until recently, when the United Kingdom and Japan began to privatize their telecommunications networks, the United States had been unique in the world by entrusting its communications to private companies. In the U.S., AT&T and the International Record Carriers (IRCs) provide international services. At last report, AT&T provided direct dial voice services to 146 countries<sup>1</sup> and operator services to nearly 100 others. The IRCs provided telegraph message services and telex to over 200 countries and territories.<sup>2</sup> New American carriers such as MCI, Inc. and GTE Sprint have also successfully reached agreements with several foreign correspondents. The penetration of the international market has been quite dramatic: MCI now serves or has applied for service to more than 31 countries, true to its prediction that it would reach 80% of the world's telephones by the end of 1985.<sup>3</sup>

Historically, the international market<sup>4</sup> has shown dramatic growth, as Table D summarizes:

Table D  
U.S. International Telecommunications Market Growth  
(Millions)

	1950	1960	1970	1980
<u>Voice:</u>				
No. of Overseas Calls	.7	3.3	23.4	199.6
Overseas Telephone Revenues	\$9.0	\$42.0	\$252.0	\$1,535.0
<u>Record:</u>				
No. of Telegraph Messages	23.0	28.0	32.0	20.0
Overseas Telegraph & Telex Revenues	\$42.0	\$71.0	\$124.0	\$380.0

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Similarly world trade in goods and services has accelerated, to reflect an increasingly competitive global economy (Table E):<sup>6</sup>

Table E  
International Trade Growth  
(U.S. \$ Billions)

	1950	1960	1970	1980	1982
<u>Exports</u>					
Merchandise					
World				\$1,370.0	\$1,650.0
United States	\$10.2	\$19.7	\$42.5	\$220.6	
Services					
World				\$295.0	\$350.0
United States			\$34.9	\$126.5	
<u>Imports</u>					
Merchandise					
World					
United States	\$ 9.1	\$14.8	\$39.9	\$244.9	
Services					
World					
United States					\$91.0

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The growth in world trade is clearly linked to the provision of telecommunications services. As the world network began to emerge, the coordination of traditional modes of trade was made easier. In addition, goods that required ongoing service could now enter world markets. Purchasers of foreign computers and communications equipment could now have easy access to new software and services to stay current with new innovations. The merging of communication and computer technologies has opened up new possibilities for trading services that are based on knowledge, skill, or information. Many of the technological developments that have made international service-based industries possible can be traced to American initiatives.

The United States first shaped the policy that advances in space technology would be shared with other nations -- particularly developing countries. Kennedy initiatives in the early 1960s captured advances that had been made in microelectronics, including the early work of the Bell Telephone Laboratories in satellite technology. Passage of the Communications Satellite Act of 1962 established a U.S. private corporation, Comsat (founded on February 1, 1963), to lead the effort to commercialize space. Under provisions of the satellite act, INTELSAT, a consortium of 73 countries, was formed to establish a commercial global satellite communications system. It launched its first satellite within two years.

At the time, fewer than 500 cable circuits in four transatlantic cables connected the United States with the rest of the world. With its launch of "Earlybird" with 240 voice grade channels in 1965 and "Intelsat II" with 240 more in 1967, the International Telecommunications Satellite Organization, INTELSAT, doubled the voice capacity for international communications from the United States to the rest of the world. In addition, it revolutionized the telecommunications industry since satellite beams were not limited to two points as in cable terminals. Merely by building earth stations, and paying an equitable usage charge, the world's most remote nations could join the electronic community of developed nations. Encouraged by "the commercial provision of the space segment . . . on a global and non-discriminatory basis," as provided in the Intelsat Definitive Agreements (entered into force on February 12, 1973), the world's nations tuned in, not only to the individual voices on telephone channels, but to broadcasts of TV programming and American culture.

INTELSAT grew to 109 member nations, and today serves more than 170 countries. By U.S. law, supported by international treaties, Comsat, a private corporation, has remained the U.S. signatory to the INTELSAT accords, on a par with designated representatives of sovereign governments. Largely on the basis of U.S. usage, its ownership share in INTELSAT is approximately 23%, the largest of any signatory in the world.

The many generations of satellites that followed the launches of Earlybird and its sisters, Intelsats II, III, IV, IV-A, and V, have expanded INTELSAT's capacity to the equivalent of nearly 100,000 circuits today.<sup>6</sup> Intelsat VI will add nearly 40,000 circuits when launched in 1987. More recent generations of satellites add the capability of thin route telephony with developing countries, digital television and data links using terminals as small as 3.3 meters, as well as advanced services that use microterminals of only 75 centimeters diameter located on customer premises. Satellites in 1985 provided nearly two thirds of U.S. communications needs, 15,000 of the approximately 25,000 U.S. circuits required. They provided over 70% of the world's communications paths, despite the advances that have occurred in cable technology from TAT-1 with 52 circuits in 1956 to TAT-7 with 9000 in 1983 to the optical fiber TAT-8 in 1988 with a capacity of 40,000 simultaneous calls.

While fiber optic cables and "specialized" satellites promise intense competition for INTELSAT, particularly in the developed traffic corridors between the United States and Europe, Comsat can be justifiably proud of its contribution to the growth in world services and the formation of the world information economy.

The international network that has formed through the connection of the world's nations by cables and satellites comprises a unique resource: a consensual framework for the conduct of world communications and trade in services. Its agreements and arrangements are the result of bilateral or trilateral or even multilateral negotiations between independent and sovereign authorities. A web of relationships, physical, financial, and conceptual, binds the diverse nations of the world and their organizations, whether political or technical, into a system: a dynamic grouping of interrelated parts, each one of which influences and is influenced by at least one other, but is not controlled by any.

The "sovereign right of each country to regulate its telecommunications" has been consistently recognized by nations participating in

international forums, as well as the right to "cut off any other private telecommunications which may appear [to be] contrary to their laws."<sup>7</sup> Despite the opportunity for conflict, the cooperative nature of the joint provision of telecommunications services has sustained governments in conflict; the international network has preserved the authority and freedom of initiative of its members. While nations may compete with other nations, or users of telecommunications with other users, the integrity of the network has been maintained to the benefit of all who use it.

Much of the credit for this custodianship belongs to the International Telecommunication Union (ITU) and its Consultative Committees. Since its antecedents emerged from the union of the Austro-German Telegraph and Western European Telegraph Unions in 1865, and the International Telegraph Union was formed by the Paris Convention, the International Telecommunication Union has become the principal forum for debating and resolving telecommunications disputes among nations. Through their International Telegraph Consultative Committee, later to be paired with a similar Committee for Telephone, the forerunners of the CCITT promoted technical cooperation that saw the development of international telegraph networks, radio telegraphy, and ultimately telephone and satellite communications. The process was never free from international politics. Heated exchanges resulted over attempts in 1906 by the British Marconi Company to monopolize world trade in the transmitter market. Similar debate over British and French efforts to interfere with American telegrams occurred during World War I. Even the United States participated in such events with its own successful effort in excluding the Russians from the 1927 Washington ITU Conference (which established the International Radio Consultative Committee). The recent Nairobi Plenipotentiary Meeting was marked by increasing ideological debates.

The ITU's mandate, nevertheless, evinces a purpose "to foster the creation, development, and improvement of telecommunications equipment and networks in new and developing countries . . . ." <sup>8</sup> Moreover, when the conference of 1947 rewrote the ITU charter and established an

Administrative Council, its membership would be decided "with due regard to the need for equitable representation of all parts of the world."<sup>9</sup>

Countries sometimes band together, such as CEPT (the Conference of European Posts and Telecommunications, a consortium of 26 European nations) and COMTELCA (the Commission on Telecommunications for Central America, involving Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), to promote their regional telecommunications interests. Other organizations, such as the European Economic Community (EEC) or the Organization for Economic Cooperation and Development (OECD), may also conduct studies or formulate positions for their member nations.

For the most part, however, the rulemaking authority for international telecommunications operating practices and financial settlements resides within the ITU, with the CCITT (the Consultative Committee on International Telephone and Telegraph). As in the United Nations, of which it is a part, its recommendations do not have the force of law but are followed zealously by many countries of the world. Delegations from various nations meet regularly in "Working Groups" to formulate common working practices which are eventually adopted and published to the member nations.

Private corporations may also participate in the activities of the ITU through supporting contributions. In return, they may send direct delegations to the CCITT and the International Consultative Committees, but they are not recognized members of the ITU. For U.S. companies, their activities chiefly center on standards. Since more liberal standards for telecommunications products enhance their competitiveness in world markets, transnational corporations find it in their interest to influence the outcome of technical standards. In subtle ways, then, participation in these committees can mark early skirmishes that determine larger conflicts in commerce between nations and political groupings.

For example, CEPT generally favors more restrictive standards, since tight network controls sustain the European monopolies in telecommuni-

cations. Together with their industrial allies in favored national manufacturing firms, they form a coalition of interest groups centered around the telecommunications monopolies, what Eli Noam, an associate professor at Columbia University, has called the "Postal-Industrial Complex."<sup>10</sup>

One organ of the ITU, the International Frequency Registration Board (IFRB), is of particular importance to the United States. The IFRB maintains a record of frequency assignments and technical parameters of communications systems in order to prevent interference among users of the spectrum. The largest user of the radio spectrum, the United States often finds itself in controversies between developed and developing nations for scarce spectrum resources -- for positions in the orbital arc for space satellites, assignments of frequencies, and the area of coverage of the transponder signal's "footprint."

Most recently, the applications of several U.S. companies, Orion, ISI, Inc., Cygnus, RCA American Communications, and others, to launch private satellites into positions above the Atlantic to serve the dense traffic corridors of Europe and the United States have awakened a storm of protest from around the world. Congress has received letters from more than 70 nations, expressing concern and questioning the United States' commitment to the INTELSAT accords and to the preservation of the global network.<sup>11</sup> Despite the controversy this issue has aroused, the INTELSAT pricing issue would need to be addressed in any event, since fiber optic technology has produced a new generation of high-capacity undersea cables. The rivalry between these technologies, satellite and cable, has long been an issue in international telecommunications. The capacity and transmission quality of the proposed cables, TAT-8 and Trans-Pacific-3, promise to tilt the competitive advantage to fiber optic technology, and thereby threaten to strand the INTELSAT investment in several generations of satellites. Developing countries who are protected by INTELSAT's worldwide pricing umbrella and who must rely on their presence in the satellite's worldwide footprint would not have direct access to the fiber optic technologies between two developed nations or be able to share in their



transmission savings. They would, however, benefit from the reduction in prices in the fiber optic technology itself, as competition improves this medium for their future use.

Perhaps spurred by its long-standing policy of free market competition, the added security of fiber optic systems (the manufacture of which the U.S. is an acknowledged world leader,) and the finding of "in the national interest" by the Reagan administration for private systems of satellites above the Atlantic, the FCC has approved many of the applications, both fiber and satellite, while affirming its support of INTELSAT. Ironically, the original filing by Orion was turned back to the company to correct technical omissions in its application.

While we will show that developed countries have little to fear from increased costs of their satellite space segment from the new carriers, despite their demonstrable cost advantage, the ideological debate does have validity in the effect it will have on telephone pricing structures around the world. As the world moves further to services-based economies, the traditional methods of settlements between nations will be made obsolete. Since the PTTs and other institutions around the world are invested in the traditional structures, some even by law, their continued application in competitive situations threatens severe financial balance-of-payments problems for the U.S. as well as for other countries.

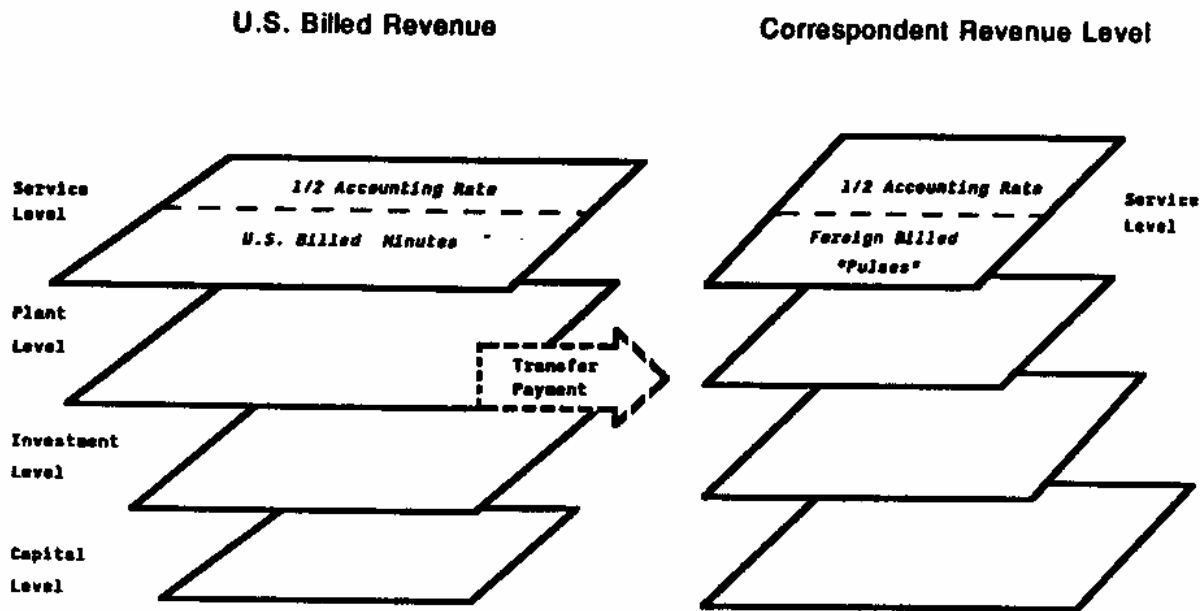
Notes for Section II, Chapter 1

- 1     Communications Week, January 1986.
- 2     FCC Statistics of Communications Common Carriers, U.S. Government  
      Printing Office, 1982.
- 3     "AT&T Improving Int'l Network As Its Competitors Push For Larger Share  
      of Voice Market," Communications Week, March 4, 1985.
- 4     Statistical Abstract of the United States, U.S. Department of  
      Commerce, 104th Edition, Table No. 944, page 558.
- 5     U.S. National Study on Trade in Services, Submission of U.S. Govt. to  
      GATT, USGPO, 1984, pages 60 and 61.
- 6     Colino, Richard R., "A Review of Space and Global Communications  
      Policies," March 5, 1985, page 2.
- 7     International Telecommunications Convention (Nairobi), 1982, Preamble.
- 8     Feldman, Mildred L. B., "The United States in the International  
      Telecommunications Union and in Pre ITU Conferences," as cited by  
      Allen Weinstein and Leslie B. Milk in "United States Participation in  
      the International Telecommunications Union: A Study of Policy  
      Alternatives," page 12.
- 9     Coddling, George A. Jr. and Rutkowski, Anthony M., The International  
      Telecommunications Union in a Changing World, (Dedham, Mass.: Artech  
      House, 1982), page 3.
- 10    Noam, Eli, "Telecommunications Policy on the Two Sides of the  
      Atlantic: Divergence and Outlook," Columbia University, August 15,  
      1984.

### THE CORRESPONDENT RELATIONSHIP

The correspondent relationship joins the cooperative efforts of two firms in a joint international venture. It binds telecommunications firms of different financial structures in different nations under two different forms of regulatory authority. Often with different languages, the two countries employ different manufacturers and vintages of telecommunications equipment, have two different billing systems, and account in two different kinds of currencies. But they invest in and maintain commonly owned plant between them. And, if they do it well, the correspondents mutually provide voice, record, and data services of the highest quality to their respective citizens.

The dissimilar financial structures of international correspondents are illustrated by Figure II-2.1. While they jointly provide international service, their growth characteristics are determined by the levels of their customer charges, the service capacity of their plant, the regulatory policies of their governments, and the availability of capital. Each factor is not taken in isolation, but is balanced against the need for domestic development in telecommunications or simply roads, electricity, or even water. Consequently, the service interest of one country must consider the needs of its partner. Unless carefully managed, the benefits of competition in telecommunications services among and between the industrialized nations may not reach a rural India, a developing China, or the desert countries of Africa. When basic human needs present more pressing concerns than consumer options in telephone equipment, competition in international telecommunications may impose an "electronic colonialism" of developed countries over those less well developed.



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Figure II-2.1

### The Correspondent Relationship

Indeed, with the world becoming increasingly dependent on telecommunications services for world trade, and telecommunications services becoming increasingly concentrated in fewer countries, it is possible that economically advantaged countries can impose a cultural imperialism on their neighbors, preempting or eroding the independent policies of sovereign neighbors. The private systems of specialized satellites and fiber optic cables between industrialized nations can potentially divert capital, traffic, and revenues from other world administrations, thus stagnating the economies or stranding the monopoly investments of other governments in existing generations of satellite systems and cables. Uncontrolled growth of one can put severe strain on the financial agreements between correspondents.

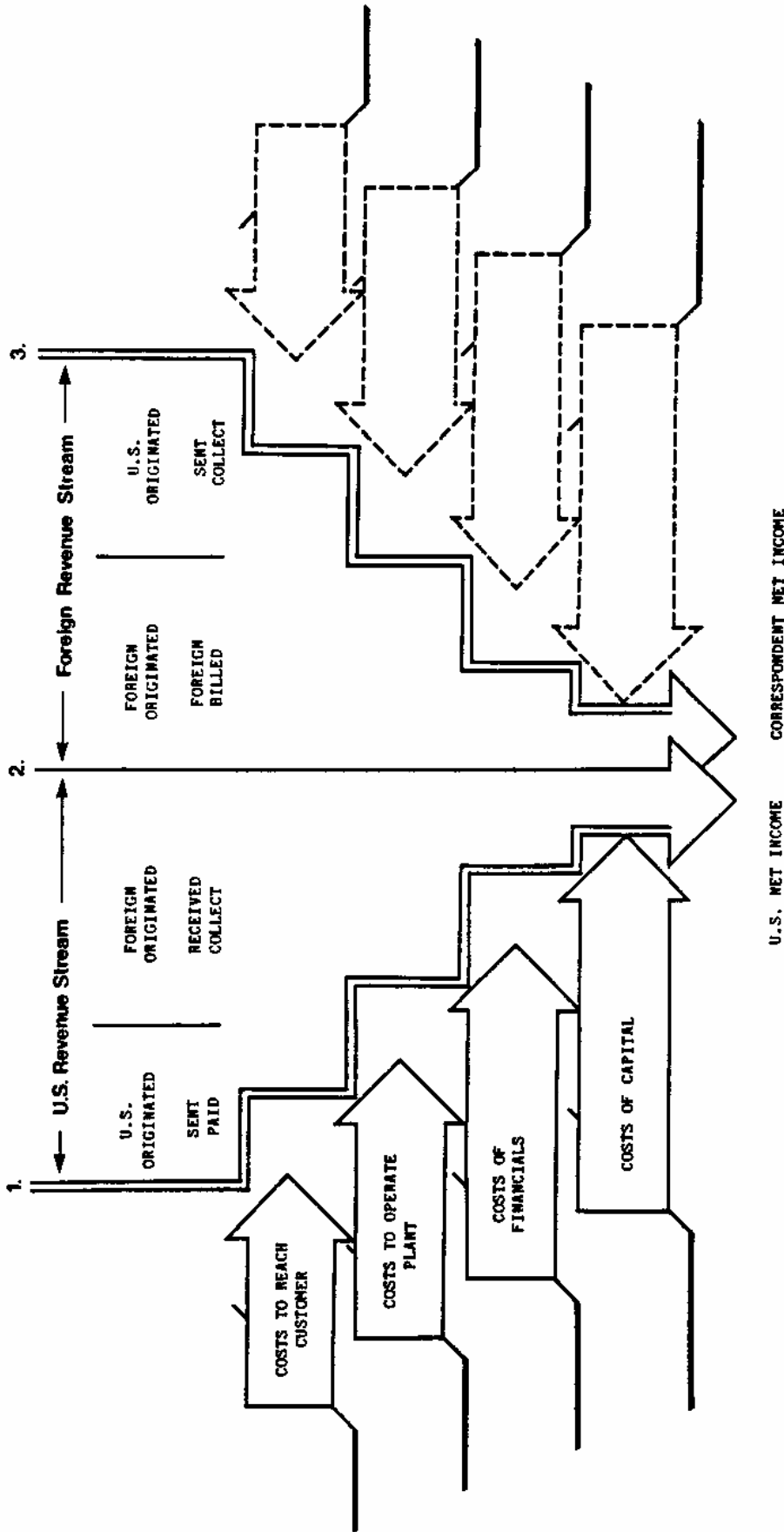
The financial relationship between international correspondents is depicted in Figure II-2.2. The adjoining revenue streams developed in the joint provision of telecommunications services are portrayed as mirror images of one another. One, however, is billed in the United

States while the other is billed in a foreign country. The correspondent relationship reaches across them both.

Notice that each country handles calls that are both originated domestically and received from the other country to be collected locally. As pictured in this illustration, each administration has equal billing volumes and revenues, and incurs similar costs which are subtracted from the individual revenue streams at appropriate levels of the financial structure. Neither administration causes any extraordinary investment or expense to the other in the joint provision of telecommunications services. Consequently, no monies need to be transferred between the two countries (in this example) to compensate for any financial advantage of one partner over another. Each administration pays its individual costs to third-party vendors and suppliers of their services. These costs are subtracted from the revenue streams of the correspondents, and form what is shown here as a stair structure characteristic of their financial structures.

A symmetrical structure would be extremely rare in the practical world, however. Each country could be expected to incur costs characteristic of its unique financial structures. The costs of reaching customers in different countries, or of maintaining operating plant that is dissimilar in vintage or technological development, would rarely be the same. Depreciation and capital recovery policies would normally not coincide between correspondents operating under their own unique systems of authority or individual governmental views of social justice, regulation, and competition.

U.S. Customer Revenues



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Figure II-2.2  
The Two-Way Revenue Stream

As a beginning point in understanding the financial relationship between correspondents, Figure II-2.2 also illustrates the linkage between customer collection rates in the two countries. Everyday dial and operator-handled calls are usually billed in the country of origination. Collect calls are billed at the prevailing tariff rates and time schedules in the country that receives the calls. Consequently, the point of sale of the service can shift between countries. If tariff rates are raised dramatically in one country, for example, the customer may choose to place his call collect, and transfer the billing to the distant party. While this may be inconvenient or socially awkward for residential calls between friends, it is not unusual for corporate subsidiaries to take advantage of the best rates available in either country in order to minimize the total communications expense of a multinational firm.

Consequently, the two-way market is inextricably linked, and as national or regulatory policies favor higher or lower customer rates for one country over another, they cause shifts in traffic volumes and revenues for the administrations involved. More importantly, they cause different levels of expense, shift the contribution of fixed costs to rates per minute or per pulse, and reshape the financial structures of the correspondents.

For example, a collect call placed from the United States would involve a U.S. operator and add to U.S. labor costs (the costs of "reaching the customer.") But the revenue for the call would be collected in the foreign country. Conversely, lower rates in the U.S. would stimulate calling volumes and U.S.-billed revenue, but add to the costs of constructing international facilities, transmitting, and terminating calls in foreign countries.

To compensate for these shifts in traffic volumes and costs between administrations, a system of "accounting rates" was established. (The next chapter, "International Accounting Rates," gives a deeper understanding of how they work.) In their simplest expression, accounting rates are negotiated values for units of telecommunications passed

between two correspondent countries. They form a conduit between the two revenue streams, and help to balance the financial levels implied in the correspondent relationship. Consequently, in their more subtle application, they are a means of shifting the revenue relationship between partners (i.e., countries) to compensate for variations of costs, traffic volumes, or rates of exchange. They do not, in themselves, form a cost of doing business for the partnership, since they do not remove revenues from the two-way relationship. Yet they may be burdensome on one party to the joint provision of telecommunications services when the costs of the different levels of the financial structure are no longer consistent with the accounting relationship. If these rates are not allowed to move between correspondents as traffic conditions or prices change, they interfere with the internal balance of compensation of the two partners, subverting the correspondent relationship. In this regard, the Uniform Settlements on Parallel Routes Policy of the FCC, while well intended, is an onerous government control of a partnership financial arrangement. While it has some negative consequences in the record business where rates are reasonably uniform, it portends significant problems to the international relationship in the voice environment where rates vary by class of service and time of day, sometimes minute by minute. No uniformity of accounting rates is possible, even in theory, since any variation in traffic pattern would establish a new set of financial costs to the two financial structures of the joint providers.

By mutual, bilateral agreement, each country owes its correspondent one half of the accounting rate for each minute of billed traffic. At the end of the billing period (typically, one month), the traffic volumes and amounts owed are compared and the debtor country compensates the creditor country for any imbalance. The amount remitted is called a "transfer payment," "settlement," "outpayment," or "inpayment," depending upon the perspective of the administration concerned.

Consider a shift in the traffic pattern between the two correspondents of Figure II-2.3. Let us assume that the U.S. reduced its dial rates significantly. As customers in the U.S. and the foreign country



learn of the reduced rates they would exercise their new options and cause shifts in the traffic pattern: Some U.S. customers who previously called collect would now consider the lower dial rates and possibly dial their calls directly. Other, foreign customers would eventually discover that the rate for additional minutes of calling after the initial three minutes (which compensates for operator handling) also applies to calls placed from the foreign country to be collected in the United States. The combined effect would alter the distribution of traffic between the two countries and the amounts of revenue billed within their national borders. Figure II-2.3 illustrates the effect on the transfer payment. If viewed from the perspective of the U.S. which bills more minutes of traffic than its correspondents, the outpayment increases. It would appear to be an increased "cost to reach its customer," similar to an access charge paid by a U.S. interLATA carrier to a regional holding company (RHC). Rather than being paid to a third party, however, and subtracted from the revenue stream as the other costs that are portrayed, the outpayment is paid to the correspondent in the joint provision of telecommunications. Consequently, it shifts the median line (from the point labeled, "2" to "21") which separates the revenue shares of the administrations. While it reflects costs that have been incurred, it is not itself a cost, but an offset to revenue. When received as an inpayment, it increases the revenue share of the one correspondent, but only to compensate for the additional costs it incurred on behalf of its correspondent in the joint provision of telecommunications services.

Thus, any payments made by the new entrants to compensate a correspondent for facility costs or other costs would be a form of settlement. If one paid for the costs of the foreign satellite downlink, for example, in addition to minute-based "uniform" charges according to the accounting relationship, the settlements would no longer be "uniform." If one counted its traffic volume in seconds rather than minutes, the accounting relationship would be changed, even though the charge per minute would remain "uniform."

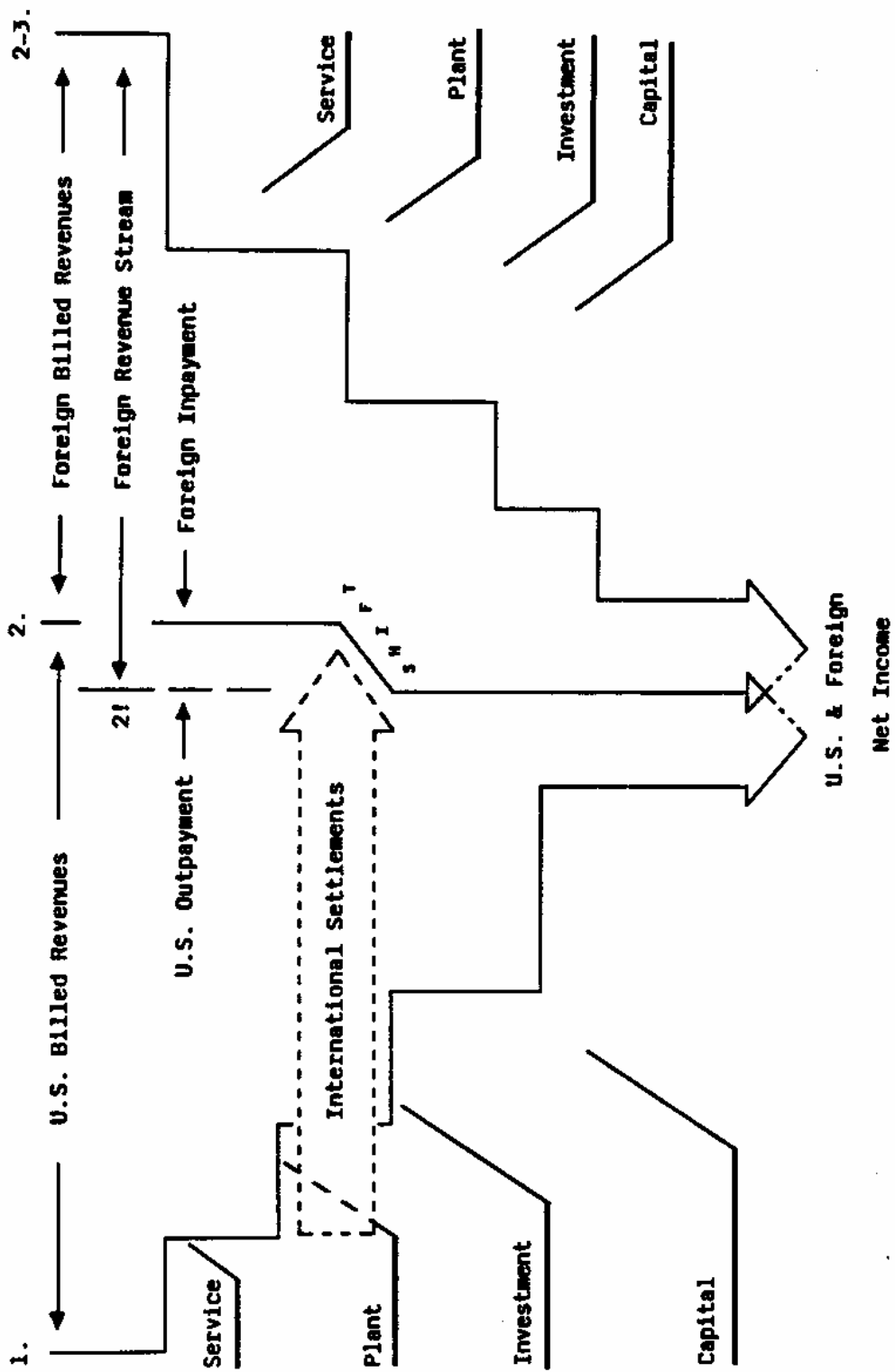


Figure II-2.3

Settlements in the Correspondent Relationship

In contrast to an access charge paid by a carrier to a U.S. regional holding company, the international settlement is reduced when increased traffic is returned from the correspondent. Access charges increase with increases in traffic volume, regardless of the direction of the call or point of billing. The RHC extracts its tariffed charge for the handling of the call, since its costs do not vary dynamically with the distribution of inbound or outbound traffic, but rather by the total traffic handled. In contrast, the proportion of the costs attributable to each billed minute of international traffic varies dynamically with the distribution of traffic between correspondents. (This is illustrated and discussed more specifically in Appendix A, "International Facilities.") Other costs, such as operator handling, as we have seen, also vary with traffic distributions and shifts in the point of billing. Moreover, as traffic volumes grow on the part of one administration, they occasion investment and increased financial costs on the part of its correspondent. If no provision were made for shifting a portion of the billed revenues received by one administration for these increased volumes, there would be no incentive on the part of its partner to build the plant to carry the calls of its correspondent, since existing facilities would already meet its own needs.

The significance of the accounting rate, therefore, does not lie in the number in isolation, but is inextricably linked to the rates, traffic volumes, facility growth, and financial costs at every level of the financial structure. It is a cost and revenue allocator, bilaterally negotiated, and subject to regulatory oversight. Unfortunately, it is also subject to political gerrymandering and uneasy antitrust oversight. It is poorly understood. Yet its significance to a firm cannot be overestimated because it cuts through every level of the financial structure, straight to the bottom line. While it merely restates gross income for each party, it affects the net income of each directly. Small shifts in its value can cause million dollar shifts in the net revenues of the firms involved.

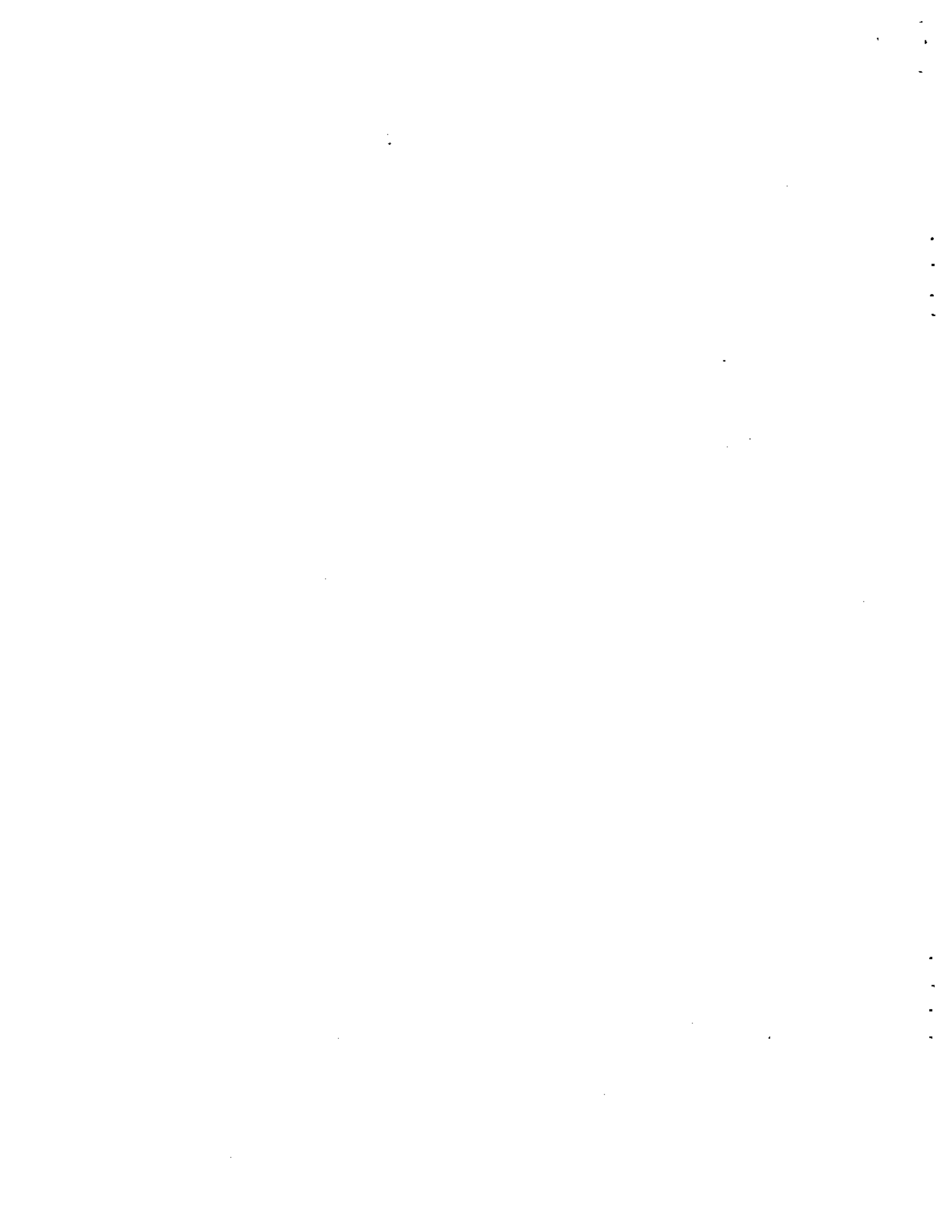
Between the years 1980 and 1982, two-way traffic between the United States and points overseas grew 60%, from 1.26 billion minutes to 2.02

billion minutes.<sup>1</sup> Such growth is startling, but a more important statistic, implicit in these data, is that the growth in U.S. billed traffic over those two years, 436.5 million minutes, is nearly equal to all U.S.-destined minutes billed by overseas points in 1980. In other words, construction of foreign telephone capacity to accommodate the growth in U.S. international traffic over two years nearly equaled the then-existing capacity provided by foreign international voice networks to complete their own billed minutes, developed over all previous years leading up to 1980.

The construction required to develop their domestic networks which provide the completing field for international calls, plus construction required to complete U.S.-destined calls, absorbed \$51.33 billion (U.S. dollars) in 1983 for points outside North America.<sup>2</sup> For the world, such construction totaled \$74.69 billion in 1983, \$75.22 in 1984, and was planned out to reach \$79.19 billion in 1985.<sup>3</sup> According to world bank figures, 60% or more of this construction expense must be met in hard currency by many countries.<sup>4</sup> Since foreign exchange is only earned by the international network, it is the prime source of revenue for telecommunications projects in the developing world. Outpayments from the United States for use of overseas networks rose from \$263.9 million in 1980, to \$373.5 million in 1981, and \$501.8 million in 1982.<sup>5</sup> Due to continuing high demand in telecommunications services, as well as regulatory policies of the FCC in pricing and competition, they have grown steadily. In 1984, they reached well over \$1 billion.<sup>6</sup>

Notes for Section II, Chapter 2

- 1 FCC Statistics of Communications Common Carriers, U.S. Government Printing Office, 1982, Table 15.
- 2 Telephony, February 25, 1985, Table 2, pages 40, 41.
- 3 Telephony, page 40.
- 4 Maitland, Sir Donald, The Missing Link, Report of the Independent Commission for World-Wide Development, December 1984, page 19.
- 5 FCC Statistics of Communications Common Carriers, as above.
- 6 Projected by the author from recent growth figures and constant accounting rates.



### INTERNATIONAL ACCOUNTING RATES

International calls use the equipment and facilities of at least two countries to complete the communications path. Consequently, some method of compensation must be negotiated to reimburse the correspondent terminal country for its costs when the revenues for the calls are collected in the country of origination. While these costs can be recovered in many ways, it is characteristic of accounting rate systems that they key on minutes or other units of usage, rather than on the revenues collected or the facilities used. Revenue-based accounting arrangements are presently in use between the United States and Canada by the new competitive carriers. They are discussed in Appendix C.

Since accounting rates are in use between approximately 20,000 country pairs around the world, policy pronouncements in this area have wide-ranging impact. One nation's policies can easily stir international controversies, particularly if more than one competitive carrier is involved. The United States, for example, is represented in direct accounting arrangements with 146 countries. Unlike the government monopolies that handle record, voice, and frequently postal traffic overseas, the U.S. telecommunications responsibility resides with private voice and record carriers. Each of these has its own arrangements for settling international traffic, although the FCC's Uniform Settlement Rates Policy on Parallel Routes constrains the freedom of the International Record Carriers (IRCs) to reach separate accounting rates with their correspondents without obtaining an explicit waiver from the Federal Communications Commission.<sup>1</sup> In general, the policy requires an "equal division" of the accounting rate between the U.S. carrier and the foreign PTT. It also specifies that the same accounting rates be used for like services on parallel routes between two or more carriers operating to the same country. Although competition has emerged for voice traffic from the U.S. to other international points, it has only recently been determined that the Uniform Settlements Rates Policy applies to the voice carriers. Surprisingly, the new entrants have

assumed that it does, even though concessions in accounting arrangements could be and possibly are being used as inducements to foreign administrations for the right of interconnection.

By international convention, as documented in the recommendations of the Consultative Committee on International Telephone and Telegraph (CCITT), the accounting rate is "shared 50/50" between the originating and terminating administrations. That this language of "sharing" persists is an anomaly of the historical way in which communications were established between two countries. In the case of the United States, it was applied to message telegraph tolls on cables between the U.S. and Europe, after deductions for expenses had been made by the carriers involved. Because the revenues available had to be shared by various governments and owners of the cables, the amounts actually retained were significantly unbalanced. Later, the language came to apply to radio telegraphy, telex, and ultimately telephone traffic. In 1936, the subject was addressed before the FCC in the "Oslo Case" when the FCC declined the application of Mackay Radio and Telegraph Company, Inc. (a subsidiary of ITT) for a license to operate a direct radio telegraph circuit between the U.S. and Norway in competition with the cable companies routed via London and Paris and with the direct radio circuit owned since 1920 by R.C.A. Communications, Inc. In that case, the FCC noted,

The Traffic which applicant would gain at the expense of the cable companies would produce less revenue to applicant than it now produces to the cable companies . . . This difference . . . would accrue to the Norwegian Administration.<sup>2</sup>

The FCC went on to say:

To expect the telegraph administration to play the competing companies against each other is simply to expect that the administration will be headed by good business men, loyal to their national interest. To rely upon companies which are bitter competitors not to make concessions to the administration which controls all outgoing radiotelegraph traffic is to provide an exceedingly tenuous basis upon which to rest public interest.<sup>3</sup>



The decision was later affirmed in 1938 by the U.S. Court of Appeals for the District of Columbia, which noted,

as the Norwegian administration receives 50 per cent of the tolls for radio communication, and a much smaller fraction of cable tolls, the Commission properly found that the total revenue to the American-owned companies, upon which this country must depend for its independent foreign communications system, would be reduced by<sup>4</sup> the diversion of Commercial Cable traffic to the appellant.

Gratuitously, the court went on to say,

Moreover, the record shows that foreign governments sometimes use the entry of a second radio company into the field as means of forcing both companies to accept more onerous terms, including a smaller division of tolls, than were previously imposed upon a single company.<sup>5</sup>

Thus, this passage became the first judicial recognition of "whip-sawing," a subject which was to figure importantly in competitive telecommunications entry and determinations of "national" versus "public" interest in the future. Since more record traffic originates from foreign terminals than is sent by the United States, several governments have used this bargaining power to negotiate more favorable divisions of revenue. Egypt, for example, obtained concessions which left the originator of traffic a two-thirds share in revenues, favoring Egypt.<sup>6</sup>

In the voice environment, the subject of "sharing 50/50" was addressed when calling was established between the United States and the United Kingdom in 1927. The collection rates for three minutes of calling in either direction were set at \$75.00. By agreement, an accounting rate denominated in U.S. dollars was established, even though the individual calls were collected in U.S. dollars in the States and in their equivalent English pounds in the United Kingdom. Theoretically each country owed half of \$75.00 for each three-minute call. It retained the other half of \$75.00, preserving the language of "sharing 50/50." As time progressed, however, the value of the pound changed in relation to the dollar. On the one hand, the U.S. administration continued to retain half of \$75.00 for each three-minute call, and to owe the other half to the United Kingdom. On the other hand, as the U.K. currency devalued, it collected less than \$75 in the value of U.S.

currency due to the exchange rate fluctuation (even though the U.K. collection rate, stated in pounds, did not change). Since they still owed half of \$75.00, as specified in the accounting rate agreement, their "share" was the lesser value of the remainder. To again "share 50/50" a change in collection rates was necessary, and insofar as "reasonable," was called for in the operating agreement between AT&T and the British Post Office.

If the minutes of traffic volume were balanced between countries, however (i.e. one country's outbound minutes were equal to inbound minutes from the other country), the amounts owed between countries were equal and no transfer payment was necessary. Each country, therefore, collected its revenues from its own ratepayers, whether changing rates of exchange between currencies altered their relative value (and "50/50 share") or not.

While the operating agreements between AT&T and the PTTs generally call for customer charges to be kept in some reasonable balance to the best of each administration's ability, in practice this has been very difficult to do. The world's currencies are in constant states of change in relation to one another's values. As each administration has faced unique circumstances, it has wanted to exercise its own policies over rate setting in relation to its nation's priorities and competitive pressures. Consequently, more and more frequent rate changes have affected the level of customer charges, as well as the levels of calling volumes from one country to another. For example, in the United States, the FCC has on several occasions required the reduction of collection charges to U.S. telex and telephone customers, as the rates charged by Comsat for use of the international space segment were reduced. As international calling volumes increased in the U.S. and new cable and satellite technologies continued to reduce the costs of international facilities, AT&T further reduced its international rates by 35% in 1981. Moreover, in 1982, in response to an FCC Notice of Inquiry, it restructured its collection rates into three tiers and nine world rate regions. In 1984, it decreased its rates again by 6.1% in response to an FCC "across the board" rate order when access charges were

implemented after divestiture of the Bell operating companies (BOCs) from AT&T. In 1985, additional decreases were made to selected countries that were earning above costs. In 1986, a further rate reduction totaling 9.1% was ordered by the FCC.

These rate changes, largely forced on foreign correspondents by U.S. policies, clearly spelled the end of any joint consideration of collection charges between administrations. They have dramatically altered traffic distributions between the U.S. and other countries, and thereby the distribution of facility costs between administrations. In consequence, they have also led to urgent renegotiations of the accounting rate arrangements between AT&T and many PTTs around the world as the proportion of outbound calling has given rise to increasingly larger outpayments from the United States. In the three years from 1980, 1981, and 1982, for example, the total level of U.S. telephone outpayments rose from \$263.9 million, to \$373.5 million, to \$501.9 million.<sup>7</sup> In the period from 1982 to the first half of 1985, 140 accounting rate changes were implemented for telephone traffic.<sup>8</sup> While the overwhelming majority of these changes improved the balance-of-payments position of the United States, as outward traffic volumes have continued to rise, so have the outward payments to foreign administrations. Now approaching \$1 billion per year, this amount overwhelms by four times the \$200 to \$250 million in aid rendered by all agencies of the United States government to foreign countries for telecommunications development.<sup>9</sup> These payments, while fair compensation to other administrations for the use of their facilities, are a direct consequence of American policies urging significant reductions in American collection rates.

While much has been made of the PTTs' monopoly positions and their early attempts to impose "more onerous" terms in accounting arrangements, such abuses of market power have not been evident in the voice environment. Quite the contrary, the PTTs have responded to American proposals to reduce telephone-related outpayments, even though the changes in accounting rates have dramatically reduced their shares of international telephone revenues to which they might otherwise have been

entitled. Moreover, the reduction in accounting rates has, to some degree, made competitive market entry easier for U.S. carriers, since it has reduced the revenue required to cover accounting charges for outbound traffic from U.S. markets.

For the same period of time, fewer changes have occurred in existing telex accounting arrangements, even though foreign administrations have been under severe financial pressures from the falling values of their currencies. Proposals to reduce accounting rates with the American IRCs have encountered delays, and more recently, have been blocked by the FCC.<sup>10</sup> Relatively fewer collection rate changes have had less impact on telex traffic distributions, possibly explaining this inaction. Undoubtedly, the negotiation process is more difficult in the multi-carrier environment since it involves FCC oversight and requires consensus of the IRCs. For antitrust reasons, collection rate levels cannot be discussed between the many record carriers, even though their individual traffic distributions and costs must necessarily vary, and are affected by collection rate levels. It is a source of considerable irritation overseas, however, and possible embarrassment to U.S. competitive policies that accounting rates in a competitive telex market are not being easily renegotiated in response to PTTs' proposals. It chills negotiations for entry to foreign PTTs. The rapidly emerging competitive environment for telephone traffic can be affected by reluctant actions within telex accounting relationships.

An incomplete understanding of the relationships between calling volumes, collection rates, and accounting rates may lead to protectionist sentiments. Because one country's rates affect another country's policies, a refusal to negotiate telex accounting rates can have significant consequences in the voice marketplace. Inflexibility in regard to one service affects the negotiations for the other since the PTTs handle both services under a common enterprise. Consequently, as parties forestall changes to accounting rates, they may also foreclose beneficial actions on the part of the monopoly PTTs. Cooperative action under regulatory oversight may be needed to gain entry by others, to renegotiate existing voice agreements, or to develop new services.

From the previous discussion, it is apparent that several factors can affect the negotiation of appropriate levels of accounting rates:

- 1) the level of the collection charges imposed by each administration, whether collected in U.S. dollars or in pounds, francs, marks, pesos, yen, or yuan;
- 2) the calling volumes from each country to the other, whether expressed in minutes of billing, or conversation time measured in seconds, or "pulses;"
- 3) the rates of exchange between the collection rate currencies in the United States and its correspondent countries;
- 4) the rates of exchange between the collection rate currency in the United States, and the medium of exchange that denominates the accounting rate;

(In frequent practice, this medium of exchange is expressed either in U.S. dollars, Special Drawing Rights (SDRs), or Gold Francs (GFs). The value of SDRs is derived from a weighted "basket" of many world currencies. Consequently, it varies in value over time in relation to the dollar. However, since rising values for one currency are often balanced by falling values in another, the value of the SDR tends to change more slowly than any single currency. The value of the Gold Franc, on the other hand, is pegged to each currency. In early 1985, 2.5374 Gold Francs equaled one U.S. dollar, although some agreements still exist using its former value of 2.8193.)

- 5) the costs incurred by each administration at every level of a firm's activity in the provision of international telecommunications services, as well as those that may be imposed as a matter of national policy or corporate judgment.

Frequently, telecommunications revenues overseas have subsidized the postal services of the PTTs. In the United States, international telephone revenues have not been distinguished from domestic telephone revenue pools, and have supported domestic message telephone service (MTS). Since less than 1% of all toll calls are international, however, and less than 12% of all calls are toll, the amount of any "subsidy" has been very small.<sup>11</sup>

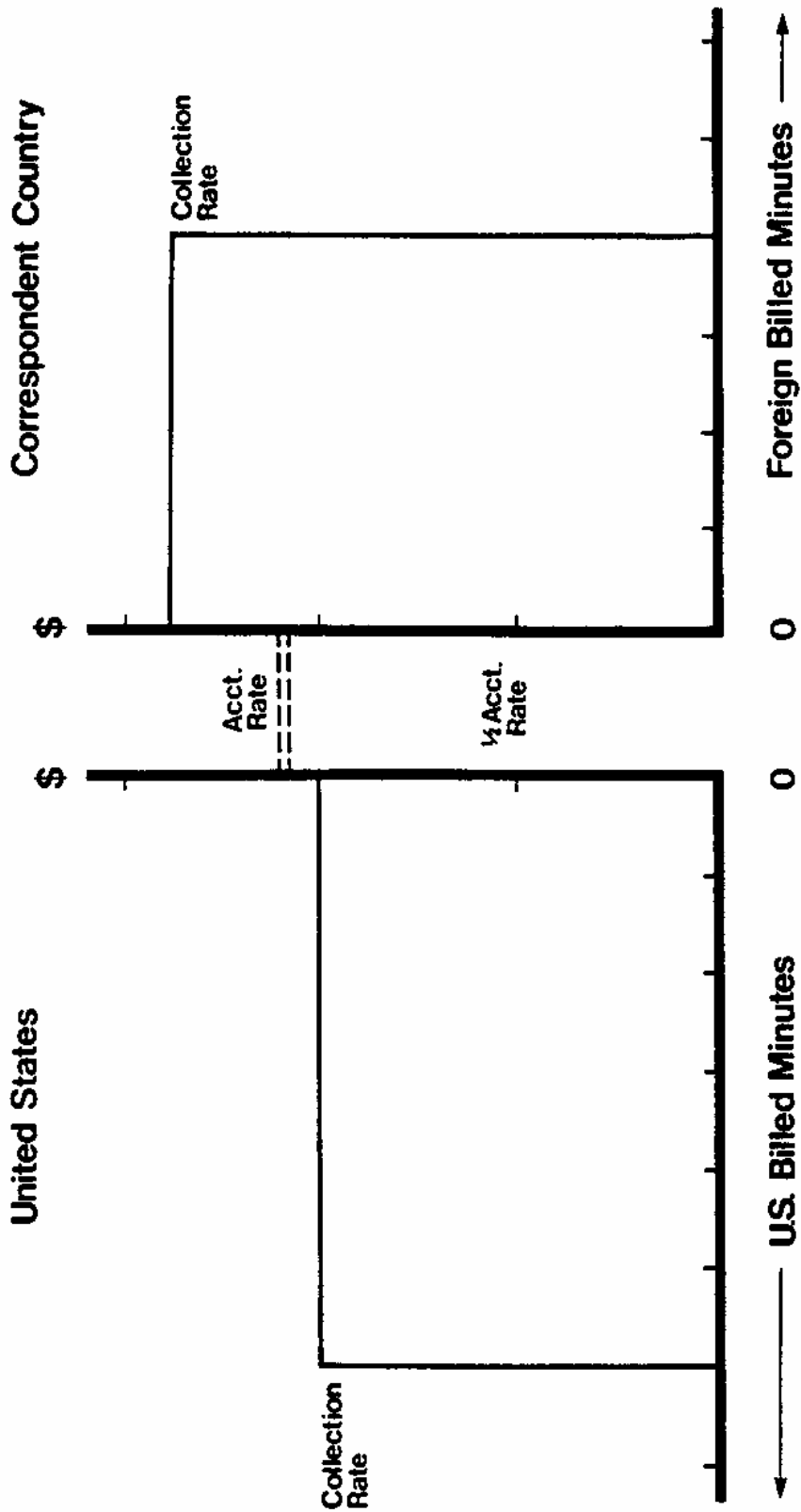
The relationship between these factors can be illustrated by the arrangement of two graphs as mirror images of one another (see Figure II-3.1). The left-hand graph represents minutes of calling billed in the United States. The right-hand graph, then, represents minutes of calling billed in a correspondent country. Whether for telex or voice, the vertical axis of each graph is normalized to represent the value of the collection charges in U.S. dollars for the minutes of calling billed in each country. While they are obviously collected in different currencies, they are here represented in their dollar equivalents at a given rate of exchange. (In practice, telecommunications usage is charged in many kinds of units, whether they be words or minutes or "pulses" -- arbitrary divisions of time used by many foreign administrations and some stateside carriers for voice traffic. These pulses can be of varying lengths, four, five or six seconds, for example, and are similar to units called "measured service" in the United States.) The horizontal axis of each graph represents the number of billed minutes for each country, whether it is comprised of originated calls sent paid to the foreign terminal or calls received collect from a foreign telephone operator. For convenience, we will adopt the convention that traffic "from" the United States will refer to billed minutes whether originated here or abroad.

In the figures illustrated for the voice environment, the U.S. collection rates for international calling are depicted as generally lower than those in other countries. As a consequence, calling volumes tend to be higher from the United States to other countries. (More correctly, billing volumes tend to be higher.) The two rectangles

formed by these graphs represent the "billed revenues" of each country: the number of billed minutes times the charge per minute.

In practice, of course, the tariff structure may not be this simple, but for the moment, it accurately represents the character of voice volumes and revenues between the United States and most other countries. It also suggests a different philosophy of pricing and possibly of telephone plant investment: higher volumes and investment in the United States, and lower volumes and investment overseas.

Figure II-3.1 does not tell the whole story, however, because each country owes the other for the use of its facilities in establishing a voice path. This is accomplished through the device of an "accounting rate," represented in Figure II-3.2 by the double dashed line set at a level between the collection rates of the two countries. While exceptions can be found, this level of accounting is quite common, not only because U.S. collection rates are lower and other countries' rates tend to be higher, but also because as a "negotiated value" for a unit of calling, it quite naturally falls between the two collection rate levels actually charged.



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Figure II-3.1

U.S.-Billed vs. Foreign-Billed Minutes



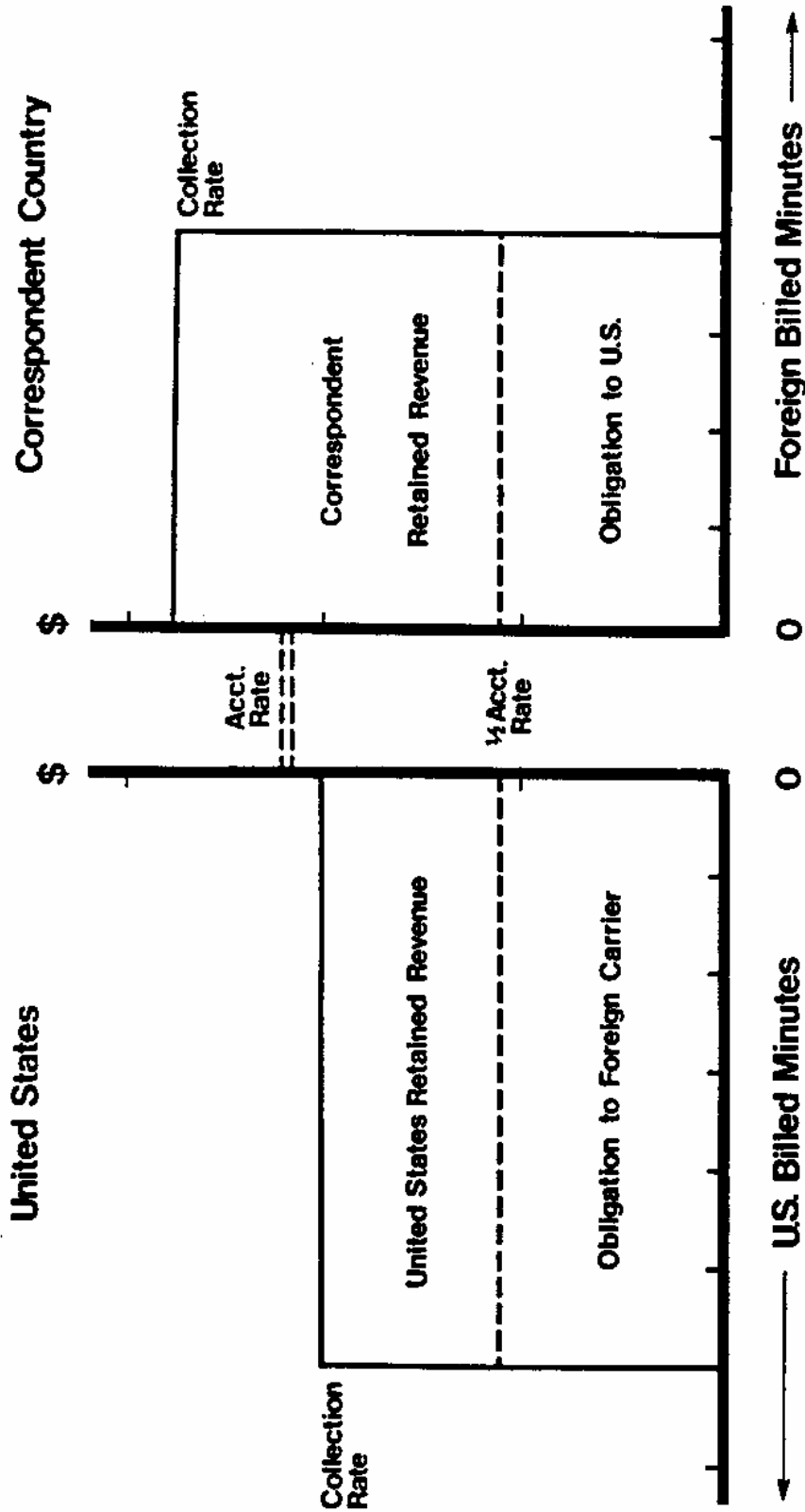


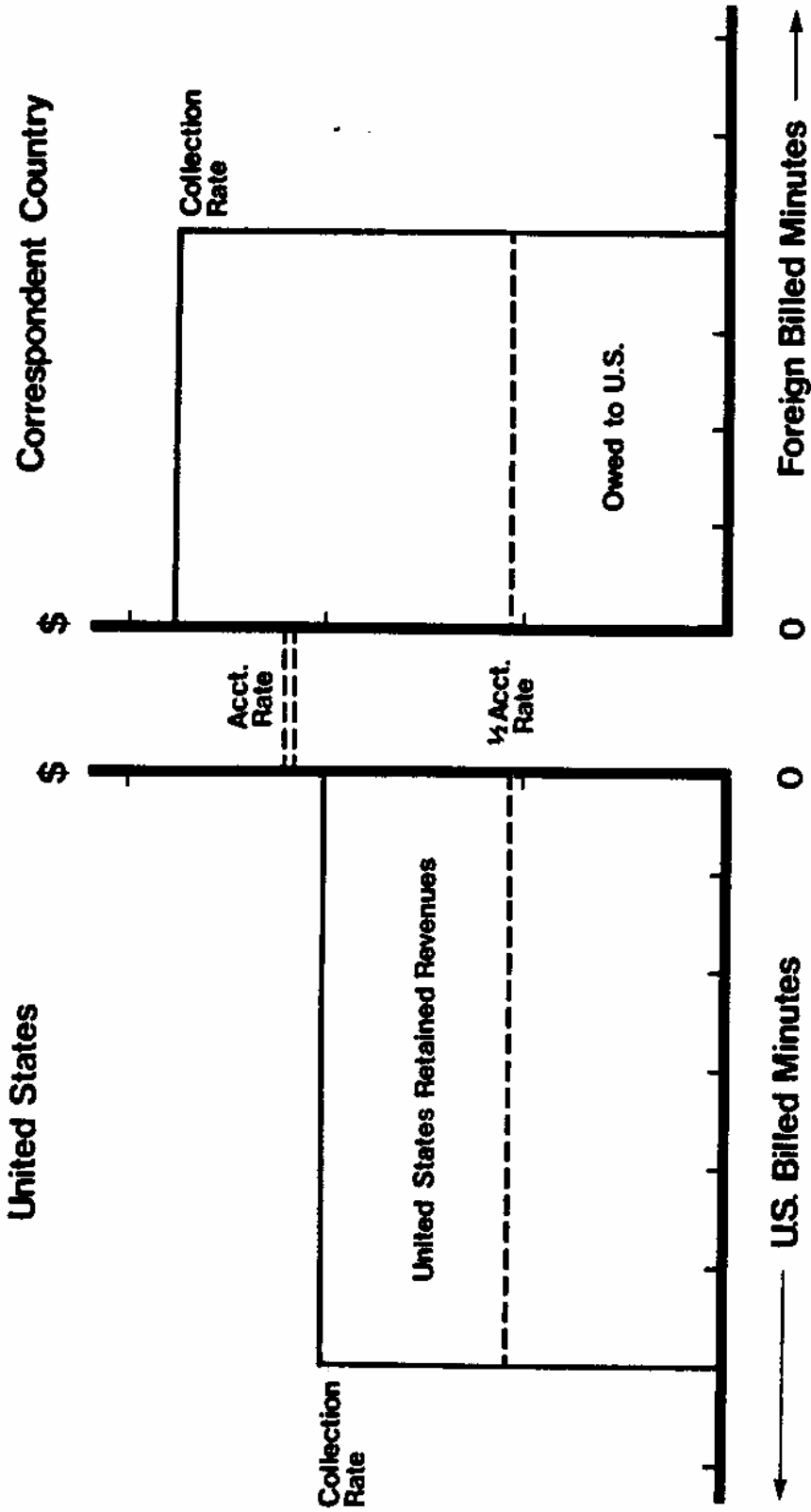
Figure II-3.2

Billed Revenues: Accounting Rates

The importance of the accounting rate lies more in the computation of its half-value than in its full measure: By international convention, one half of the accounting rate is owed to the foreign administration for each minute of calling. It is clear, then, that of all the monies collected in the United States, the portion below the single dashed line (the half-value of the accounting rate) represents an obligation to the foreign administration. The revenues above the single dashed line and below the collection level are retained in the U.S. (It should now be clear that the collected revenues are not at all "shared 50/50.") Similarly, in the correspondent country, the collected revenues below the single dashed line are owed to the carrier in the United States; they represent an accounting contribution to defray the costs of access and use of stateside facilities.

From the perspective of the United States, the sum of the revenues retained from its billing plus those owed by the foreign administration represents the U.S. revenue share (Figure II-3.3). Similarly, the sum of the revenues owed by the U.S. to its correspondent plus its retained revenues represents the correspondent's revenue share.

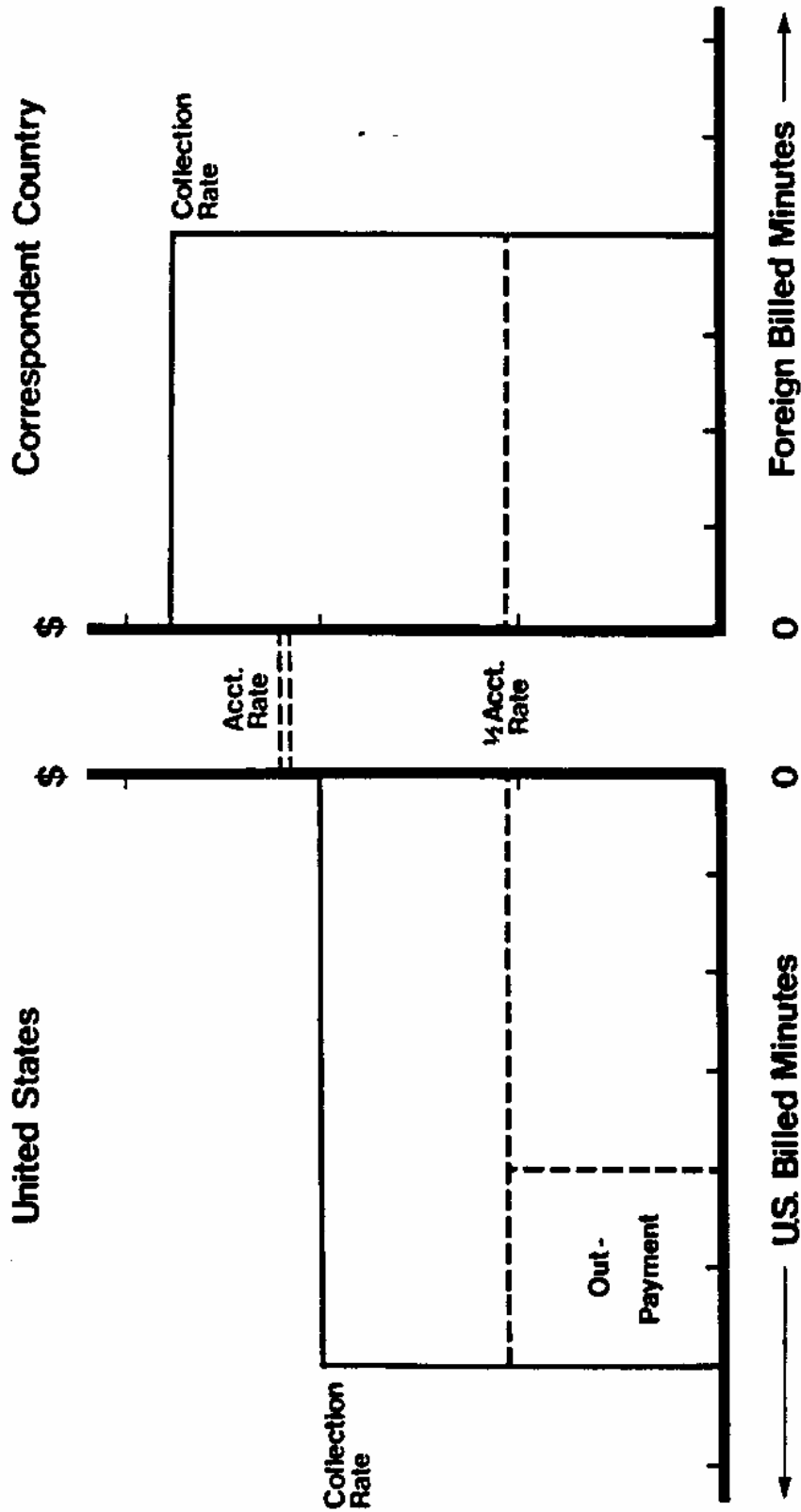
The crux of the problem, of course, is that the amounts owed, one to the other, reside in different countries and were collected in different currencies. It would be possible, of course, to have each administration pay its amounts owed and credit its "accounts receivable," but this would be an unnecessary administrative burden. In practice, the two administrations have resolved to "net" the two amounts owed, and only the debtor administration sends the appropriate amount to cover the "imbalance" (see Figure II-3.4).



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Figure II-3.3

U.S. Revenue Share



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Figure II-3.4

Outpayment

The creditor receives the "transfer payment," in a currency of its choice. Unless fluctuations in the rates of exchange have changed its value, the total payment has been determined by the record of accounts for the accounting period (typically one month). Commonly also called an "outpayment," or "settlement," it is frequently the subject of much controversy. As used here, it represents only the difference between the two obligations of the correspondents. In this sense, it is the difference between a perceived outbound cost and an inbound revenue contribution. This distinction is important, because when costs and revenues are equal, their respective impacts can be obscured to executives and regulators alike. They are frequently said to cancel one another, and drop from attention. The accounting arrangements, however, are intended to compensate for foreign costs or investments incurred by one administration on behalf of its correspondent. Additional investments continue to be required by additional traffic volume. In this way, the accounting arrangement should be seen as an allocator, a surrogate, for redistributing "actual" costs back to the administration that causes the additional investment. But, if the base of costs (the additional investment) is growing faster than the base for revenues (i.e., if outbound traffic is growing faster than inbound traffic), a momentary period of traffic balance merely masks the impending revenue shortfall to an administration.

For example, the international telecommunications market is comprised of two segments: U.S. outbound (or billed) traffic, and U.S. inbound (foreign-billed) traffic. The outbound segment represents a base for outbound settlements. The inbound segment represents a base for inbound settlements. Together, they comprise a single transfer payment. Yet each traffic segment may experience its own rate of growth, particularly since the U.S. has successively lowered its international collection charges by nearly 50% in the last five years. Not only have U.S. outbound calling volumes been stimulated by these price reductions, but collect calling from foreign countries has also increased. As U.S. tourists and employees of multinational corporations discovered they could avoid the higher tariffs of their host countries by placing their calls "collect" to the U.S. at U.S. rates, this traffic

has been diverted from that which the PTTs would normally bill. Consequently, the gap between U.S.-billed traffic volume and foreign-billed volume has been growing at a high rate. The U.S. base that generates the transfer payment, therefore, has also been growing at a much higher rate than the U.S. base of inbound settlement revenues owed.

While the two segments of traffic, outbound and inbound, may have been equal over one propitious period of time, the rate of growth in U.S. settlement costs has overtaken the growth in revenues. It has become a drain on U.S.-billed revenues. Ultimately this would lead to a reintroduction of higher stateside rates, with all its attendant regulatory and public relations problems, or renegotiations in the cost and revenue structures between correspondents. It is these dynamics which led to the spate of accounting rate renegotiations in the voice telephone environment. Despite the diversion of "their" billed traffic, and contrary to the image of "government monopolies" held in the United States, the PTTs responded to proposals for accounting rate changes by agreeing to reduce settlement payments as well as to restructure the accounting relationship to reflect the new distributions of voice traffic.

Figure II-3.5 illustrates the effects of the outpayment per minute of billed traffic for telephone traffic. On average, it represents a small "cost burden" on the rates charged to U.S. consumers, and is paid in compensation for the use of the foreign network. To the correspondent, it represents an inbound contribution per its billed minutes, providing funds to build its network in response to increased "foreign" (U.S.) use, while relieving its customers of rate pressures for this construction. Notice that the contribution per foreign-billed minute is greater than the cost burden per U.S.-billed minute, because a greater number of minutes is billed by the U.S. When the outpayment is averaged over the larger number of minutes, its impact per minute is less. It should be clear, however, that U.S. rate-setting policies change traffic volumes and affect rate-setting practices abroad. In this way, American actions in such mundane affairs as telephone rate

setting have political consequences abroad. Moreover, a policy of "free entry" of competitive carriers into the international environment holds a subtle, and to the PTTs, alarming, prospect of recurring rate shocks as U.S. competitors vie for U.S. customers by changes in collection rates. U.S. competitors would pose difficulties for the PTTs in the ordered development of their networks based on sound forecasts of traffic volumes. For some ministers, whose governments desperately need money for essential goods and services, an inability to control budgets may have consequences beyond what American citizens and regulators can easily appreciate.

The growing strength of the U.S. dollar in the early 1980s (and more recently its decline) have had profound effects on the correspondent relationship. Consider the familiar relationship in Figure II-3.6, and picture the change each month in values of the collection rate, as traffic is pictured from January to December. From the perspective of the foreign administration, its collection rate remains the same while the U.S. rate appears to increase, month over month. If the accounting rate is denominated in dollars, the share of its collection rate that is owed to the United States is also growing. It is altering the proportion of the revenues that derive from inbound versus outbound traffic for both correspondents. As pictured, the result benefits the correspondent, because it is receiving the payment. Each month, although the same number of dollars is sent, the value of those dollars is greater when converted to the foreign currency. Of course, if the direction of movement for foreign exchange reverses, the value to the correspondent diminishes and produces pressure to renegotiate accounting rates.

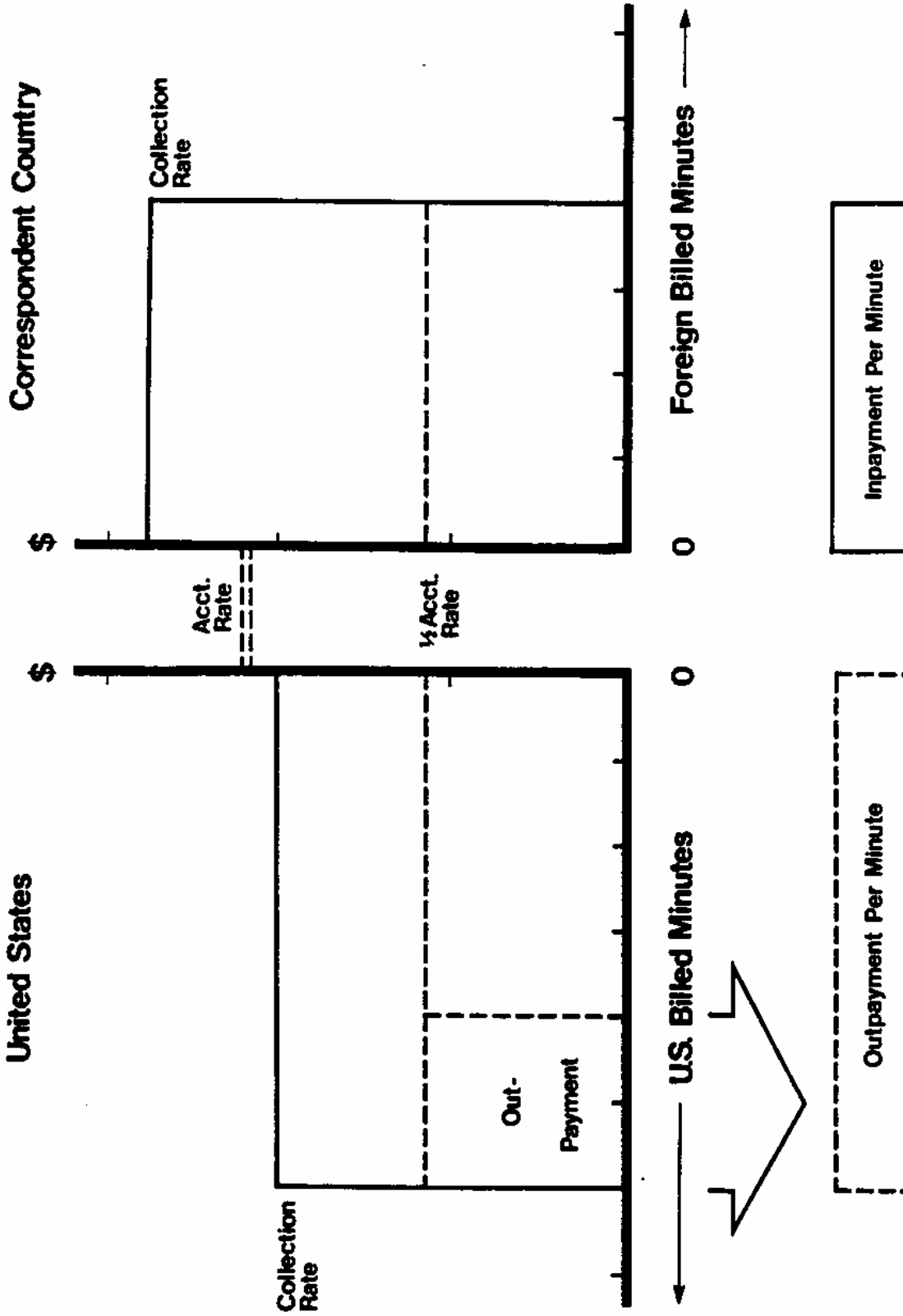


Figure II-3.5

Effects of Outpayment



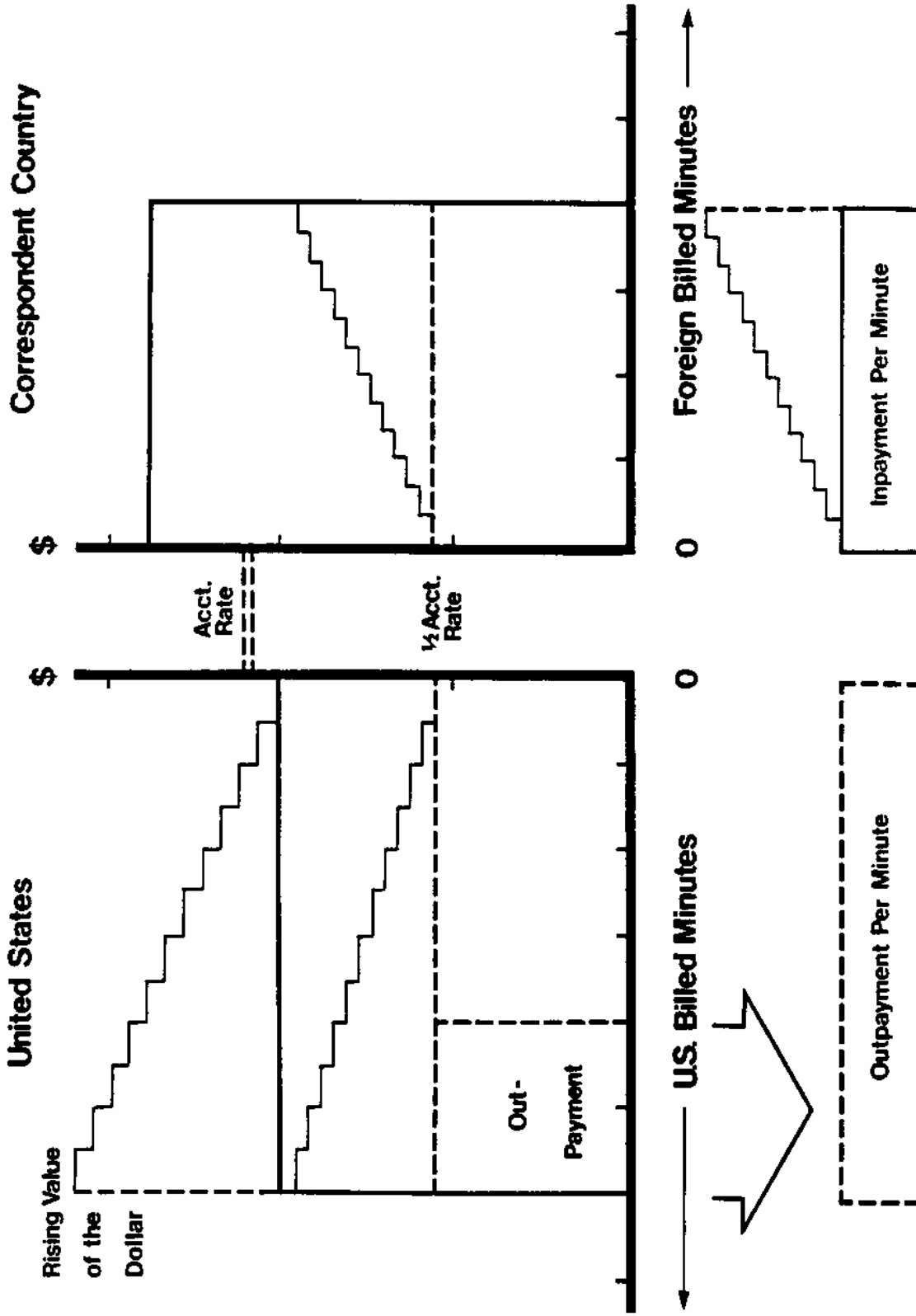
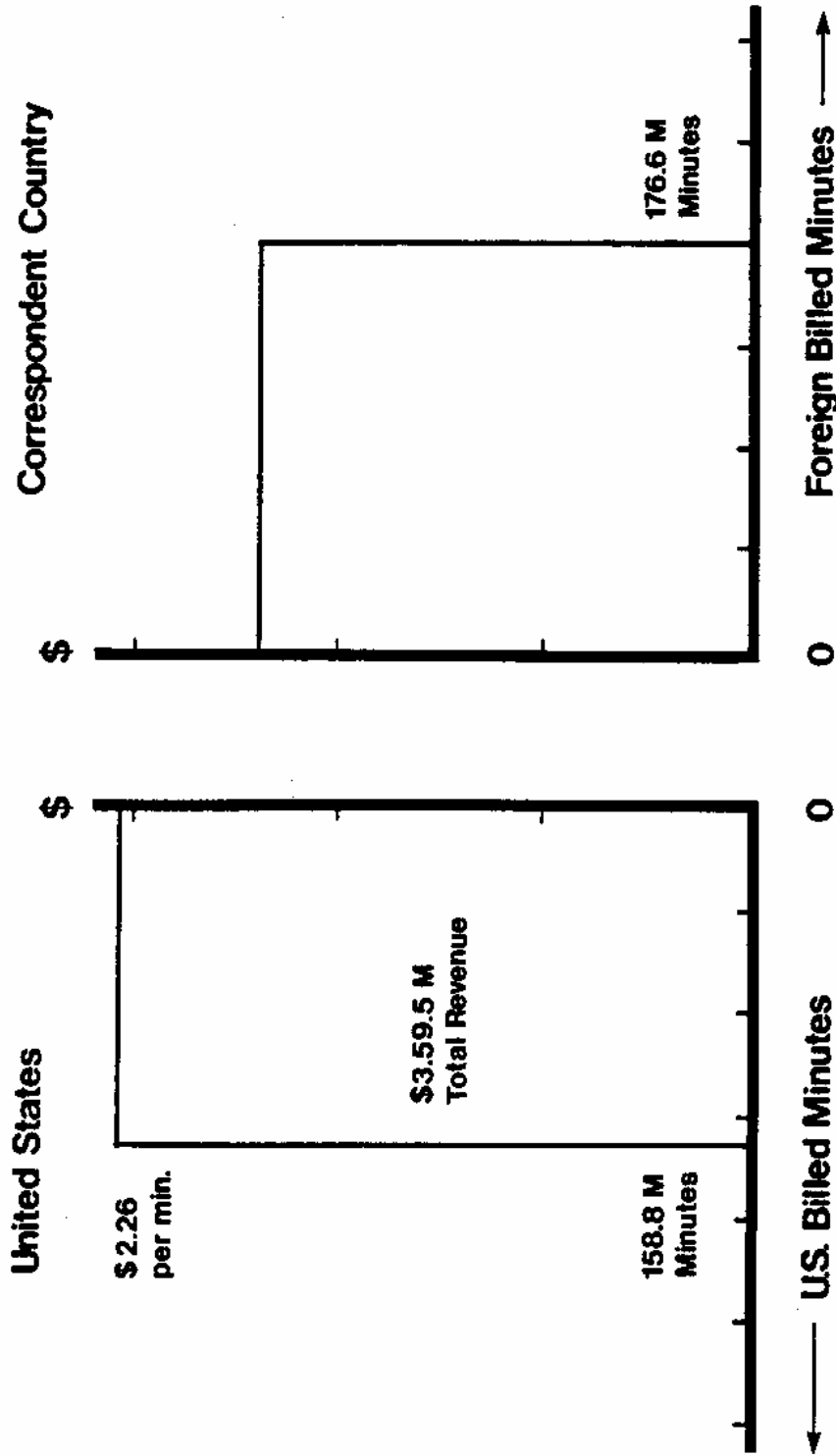


Figure II-3.6

Effects of Rising Dollar Value: Changing Collection Rate

Figure II-3.7 illustrates the traditional traffic distribution of the record carriers. While not as pronounced as the imbalance of telephone traffic from the United States to other countries, the inbound telex volumes in 1982 of 176.6 million minutes are slightly greater than the 1982 outbound telex volumes of 158.8 million minutes from the U.S. If the accounting rate is denominated in dollars, what is a benefit in the telephone relationship is a severe exchange penalty in the telex relationship. What is a case of an outbound cost burden in settlements for voice traffic, is an inbound revenue contribution of \$8.5 million to the IRCs. It compensates for their increased costs for completing foreign traffic. But it also represents an increasing burden on foreign collection rates. In 1982, this world inpayment to the U.S. IRCs contributed only \$0.05 to the revenues of the IRCs per U.S. billed minute of telex traffic while burdening foreign telex rates by a similar small amount.

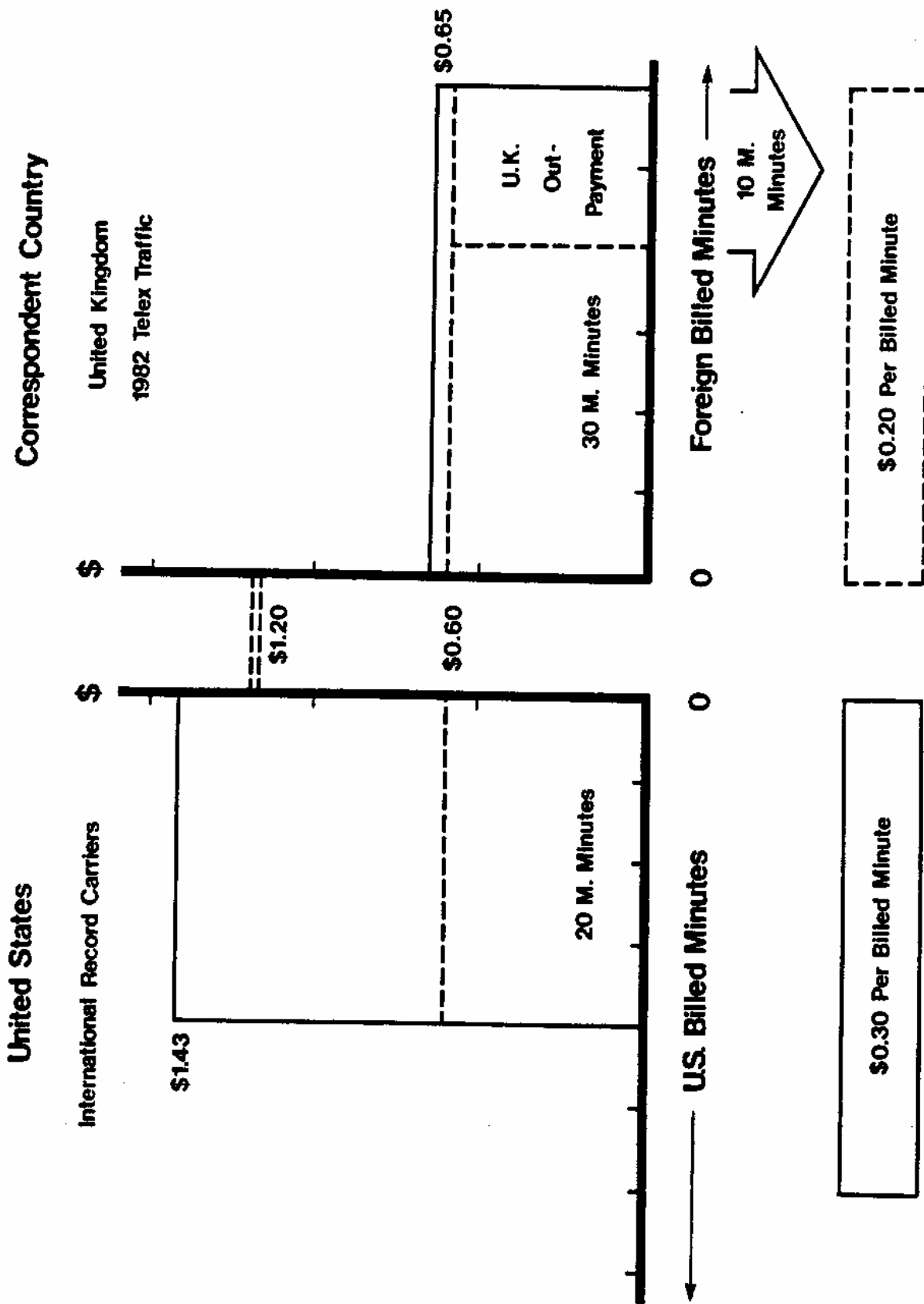


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Figure II-3.7

Telex Traffic of the International Record Carriers

Broad averages, however, can mask specific problems: Consider the telex rates and traffic volumes illustrated for the United Kingdom in Figure II-3.8 for the year 1982. With rates of \$1.43 for the three major IRCs (\$1.34 for FTCC) and nearly 20 million minutes of outbound traffic, the billed revenues of these carriers exceed \$28.6 million. At \$0.65 for British Telecom International and nearly 30 million minutes inbound, the billed revenues of BTI comprise only \$19.5 million from which the inpayment from BTI of nearly \$6 million must be subtracted. The three major IRCs, therefore, divide nearly \$34 million as their share of the U.S.-U.K. telex stream, while BTI retains only \$13.5 million. On a per-billed-minute basis, nearly \$0.20 must be subtracted from the \$0.65 collected by BTI in order to add \$0.30 per U.S. billed minute (at \$1.43) to the major IRCs. Because FTC Communications and two other IRCs have net outward balances of traffic, their situation is exactly reversed: They pay BTI and subtract these payments from their lesser collection charges. Seen in this light, the Uniform Settlements policy prevents any consensus from emerging among the IRCs since one company's gain is another's loss. When the effects of foreign exchange are considered in the equation, the dramatic rise of the U.S. dollar against the English pound has eroded the already meager margins of BTI. Since the policy mandates that an apparent outbound cost structure of one company must equal its inbound revenue structure, and that these structures must be uniform between IRCs under any conditions of traffic volume or exchange rates, it has produced a deadlock in the negotiations between companies and their foreign correspondents, each of whom have significantly different costs. From the perspective of BTI, the Uniform Settlements Policy seems to be a subtle barrier protecting the singular financial interests of three IRCs, to the financial detriment of BTI and some smaller record carriers. Reportedly, BTI has served notice on the IRCs that when the contractual arrangements by which return traffic is allocated between carriers lapse, BTI will allocate return traffic according to its own internal considerations.



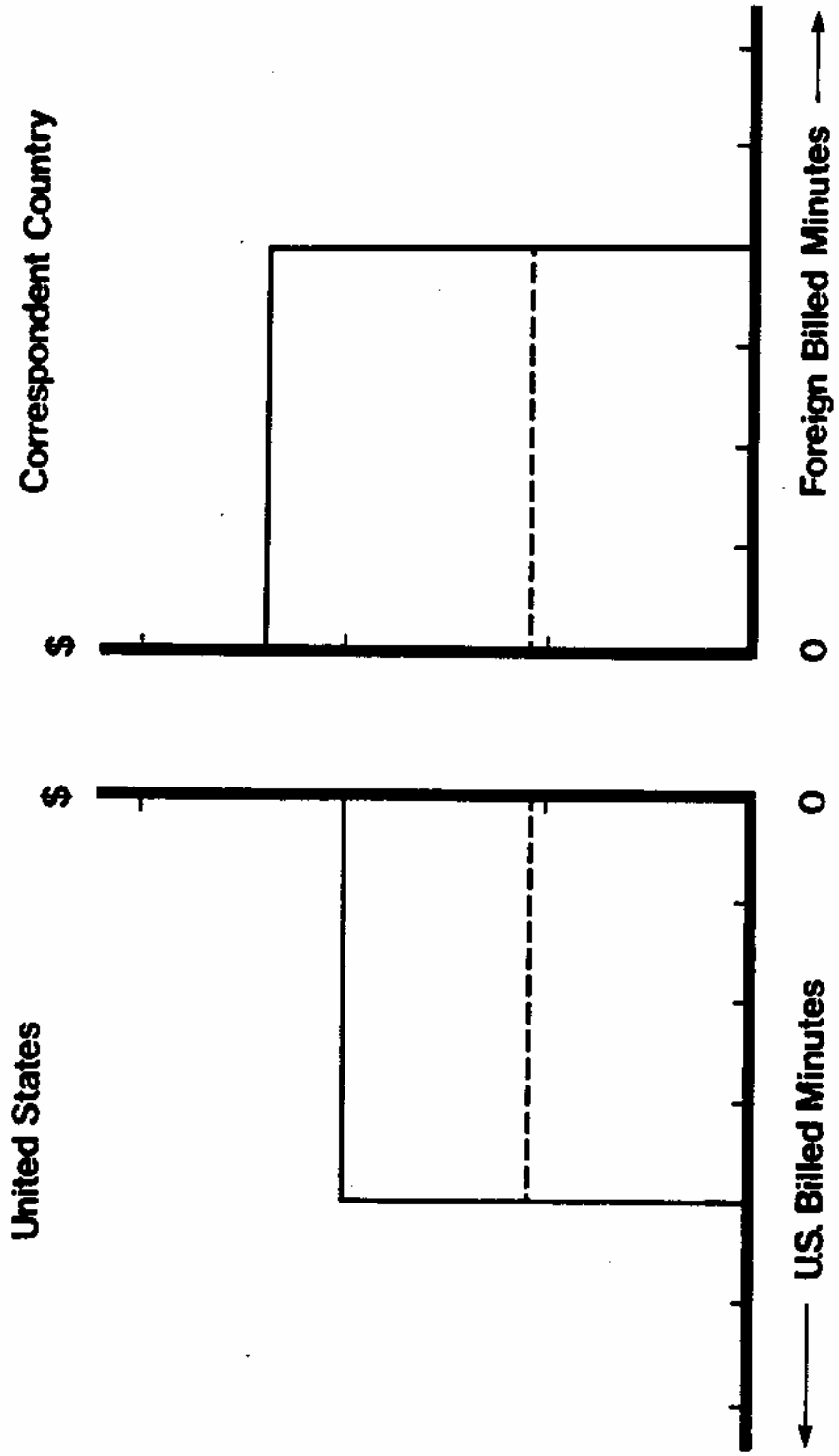
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Figure II-3.8

Telex Traffic: U.S. vs. U.K., 1982

Presumably, this new instance of "whipsawing" by a foreign correspondent will begin to favor the smaller IRCs, and bring the traffic distributions between the IRCs and BTI into closer balance. In the meanwhile, three agencies of the U.S. government -- the FCC, the Department of State, and the Department of Commerce -- have all voiced their concern to officials of the British government, including the minister of industry, Geoffrey Pattie. In a letter addressed to Ann Letford, the marketing director of BTI, the FCC Common Carrier Chief Albert Halprin noted that while disadvantaging BTI in telex traffic allocations, the accounting arrangements favor BTI in telephone settlements where BTI received \$10.2 million in 1983.<sup>12</sup> Perhaps unwittingly, this remark seems to suggest that telephone traffic should support the shortfall in British telex revenues.

The special case when inbound calling volumes exactly equal outbound calling volumes (the balance point) deserves special attention: When the two are equal in a minute-based accounting arrangement, there is no transfer payment (see Figure II-3.9). Unlike revenue-based settlement processes, no monies need to be transferred from one country to another. More importantly, the level of the accounting rate becomes insignificant. Since there is no transfer payment, the accounting rate could be doubled or tripled, and it would have no effect on either administration. In this special circumstance, the revenues that derive to each administration are exactly equal to its billed revenues. Its costs are borne only by its own nation's customers. No cost allocations or subsidies need to be considered in accounting rate negotiations. Undoubtedly, as BTI has served notice on the IRCs that it intends to allocate its return traffic according to its own operational criteria, it is mindful that a more equitable distribution of traffic between it and the IRCs will produce a more favorable negotiating climate. "The redistribution is aimed at gaining a better balance of east-west traffic," said a BTI spokesman who disclaimed any connection between the reallocation and the proposed reduction in accounting rates.<sup>13</sup>



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Figure II-3.9

The Balance Point: No Transfer Payment

When outbound volumes increase, they occasion greater and greater obligations to foreign administrations. These payments come from U.S.-billed revenues, and consequently, as they grow, become increasingly burdensome on rates charged to U.S. customers. This is not to say that they are unfair, or necessarily represent a case of subsidy of foreign telecommunications services, or even a transfer of benefits to the PTTs. Quite the contrary, they may merely represent payment for the greater use of foreign equipment and facilities by U.S. customers. As traffic distributions shift dramatically, however, the underlying cost relationships between financial structures may have fundamentally been altered, and should lead to new accounting agreements.

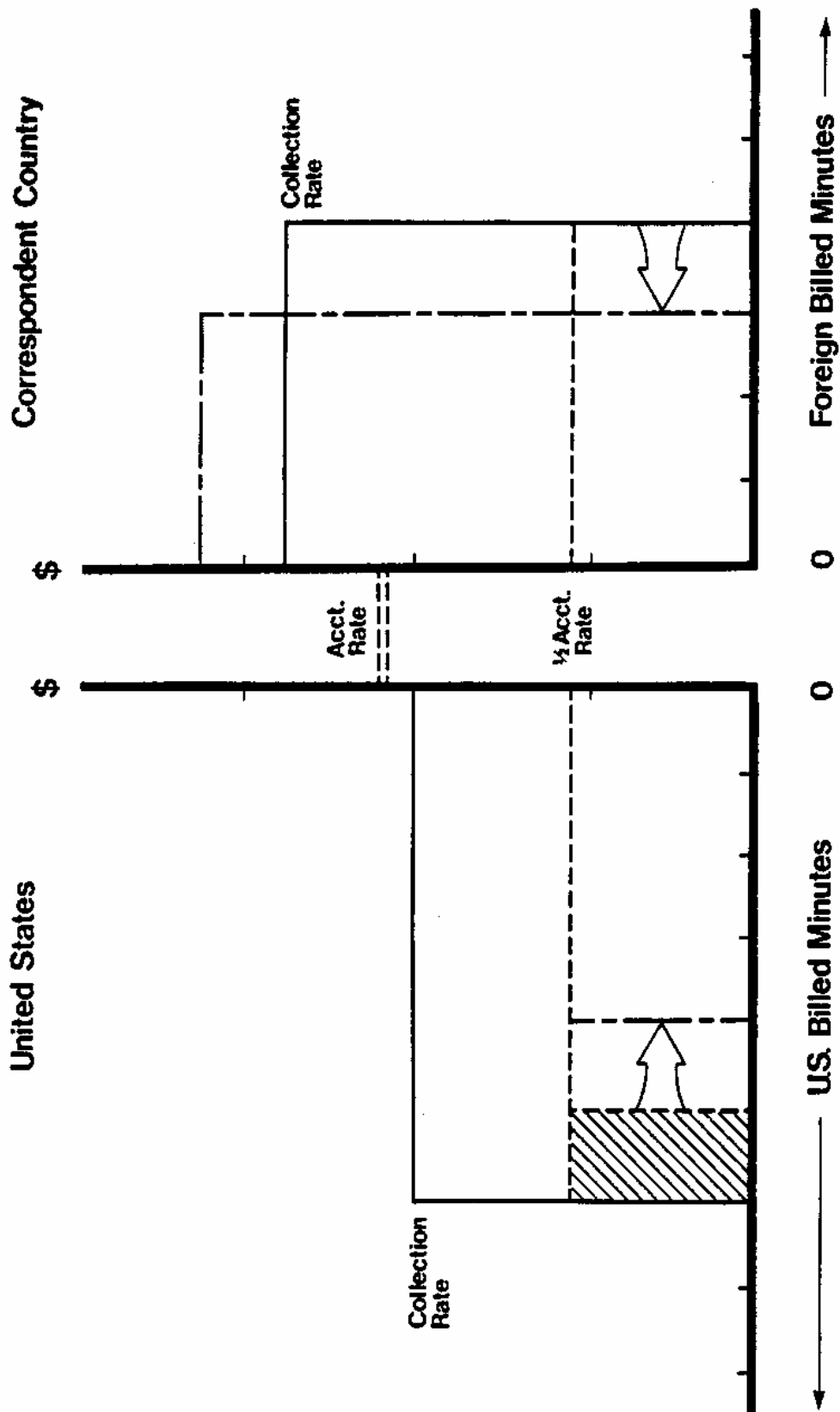
It is noteworthy that in the balance point when two traffic streams are equal, the next call placed determines which administration and whose costs are being compensated. As the transfer payment shifts from one direction to the other, it now covers costs for an entirely different national network. Whether a nation's customers are geographically dispersed (as in the United States), or concentrated in a narrow band of territory (as in the developed southern border of Canada), or confined to an island (as in the United Kingdom), the accounting arrangements negotiated between countries must provide the revenue requirements that support the development of their respective networks. Moreover, regardless of the currency in which the revenues were collected, the obligation incurred must be valued at the rate of exchange specified by the accounting rate negotiation. In the case of some third world countries, the conversion of their billing currencies into U.S. dollars can only be accomplished with considerable difficulty or penalty, and an outpayment in U.S. dollars from such a country represents a significant financial burden on the foreign economy.

Many factors affect the balance of traffic between countries. For developed countries, cultural differences and rate levels may be significant. Business calling from the United Kingdom, for example, may be much more peaked and confined to the overlap of business time windows. A culture with a highly unionized labor force may be reluctant to do business from residence telephones outside of "normal" working hours,



thereby causing more peaked traffic levels. From the United States, by way of contrast, business calls are quite frequently made from residential stations. For less well-developed economies, rate levels may be prohibitively high for the ordinary citizen, leading to a significant pattern of collect calling or a practice of originating calls at lower rates from the United States. Technological factors, such as the availability of direct dialing (called international subscriber dialing, ISD, throughout most of the rest of the world), can also have a significant impact on calling patterns. Obviously, each of these factors and others can affect the calling volumes and balance of payments between administrations.

We should emphasize the cross-elastic effect of rate levels on volume and the resulting effect on accounting rate arrangements (see Figure II-3.10). As rate levels decrease, calling volumes increase. Said another way, downward rate pressure forces minute calling volumes to expand. The increase in minutes of traffic represents an increased obligation to be paid to the foreign administration. Each additional minute prompts an additional payment of one half of the accounting rate. Notice that the rate of growth of the outpayment can be dramatically different from the rate of growth of the traffic base. If one million minutes of outbound traffic is growing at the rate of 10% per year, that represents a growth of 100,000 minutes. If the previous imbalance of traffic was 100,000 minutes, the new imbalance is now 200,000 minutes. The rate of growth of the imbalance, and of the outpayment, is 100%!



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Figure II-3.10

Cross-Elastic Effect of Decreased Rate Levels

The converse effect is also significant. If foreign rate levels are raised, traffic to the United States is reduced (see Figure II-3.11). The minutes of traffic volume decline because customers find it more expensive to place their calls. An increase in the United States out-payment results, since the imbalance of traffic between countries has been correspondingly increased. To some degree, foreign rates need to be high as a matter of national policy of developing countries in order to hedge against potential currency effects of the developed nations. Rather than a usurious monopoly practice, the high rate protects against disaster if the currencies of their major trading partners suddenly strengthen.

The combined effect of these actions, significant reductions in rate levels in the U.S. and continued high rate levels in other countries, has contributed to the accelerating increase in the level of outpayment from the U.S. to other countries. Figure II-3.12 illustrates the growth in traffic volumes and billed revenues for the years 1980 and 1982.<sup>14</sup> A foreign collection rate of \$2.70 is assumed. From these figures, the growth in the U.S. outpayment is evident over the two years. In fact, the outpayment has nearly doubled while rates were cut from \$2.01 to \$1.39. More than 438 million more minutes of traffic were sent from the United States in 1982 than were received. By 1984, 750 million more minutes were billed by the U.S.<sup>15</sup> This figure represents nearly as much traffic as the foreign country billed in 1982, and a growth in the imbalance that was nearly double all foreign traffic in the year 1980, just four years earlier. Because the foreign correspondent's domestic and international networks completed this additional traffic on behalf of U.S. customers, a revenue contribution was made by U.S. customers for this additional investment. Per foreign-billed minute, this contribution averages \$0.65 and supplements the \$2.70 rate collected by the PTTs from their national customers. While 1982 traffic represents nearly half of the PTTs' billed traffic, it represents only one quarter of the PTTs' billed charges. Such calculations clearly reveal the individual pricing philosophies of the United States in contrast to other countries, as well as the accommodations that individual carriers make in the joint provision of telecommunications services.

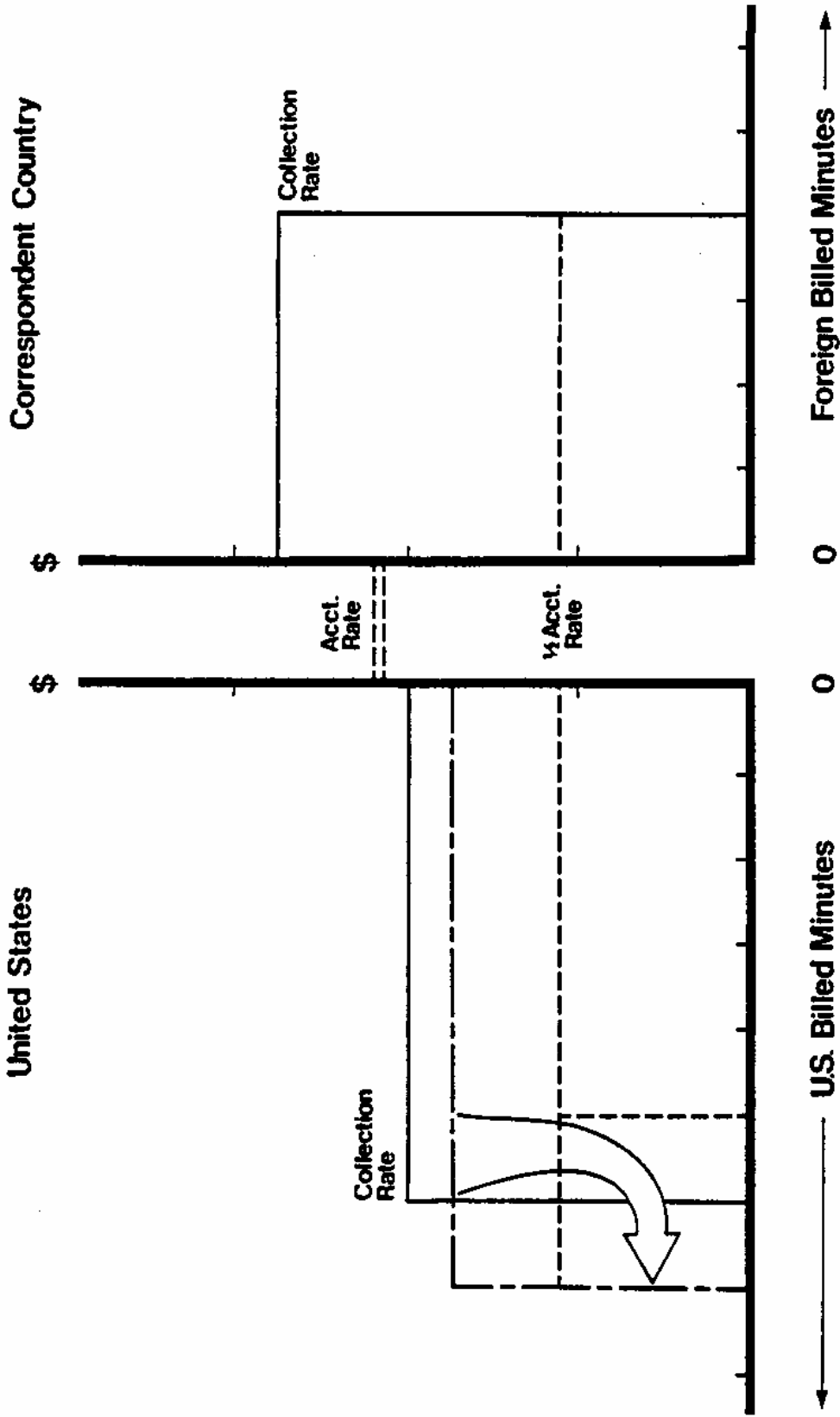
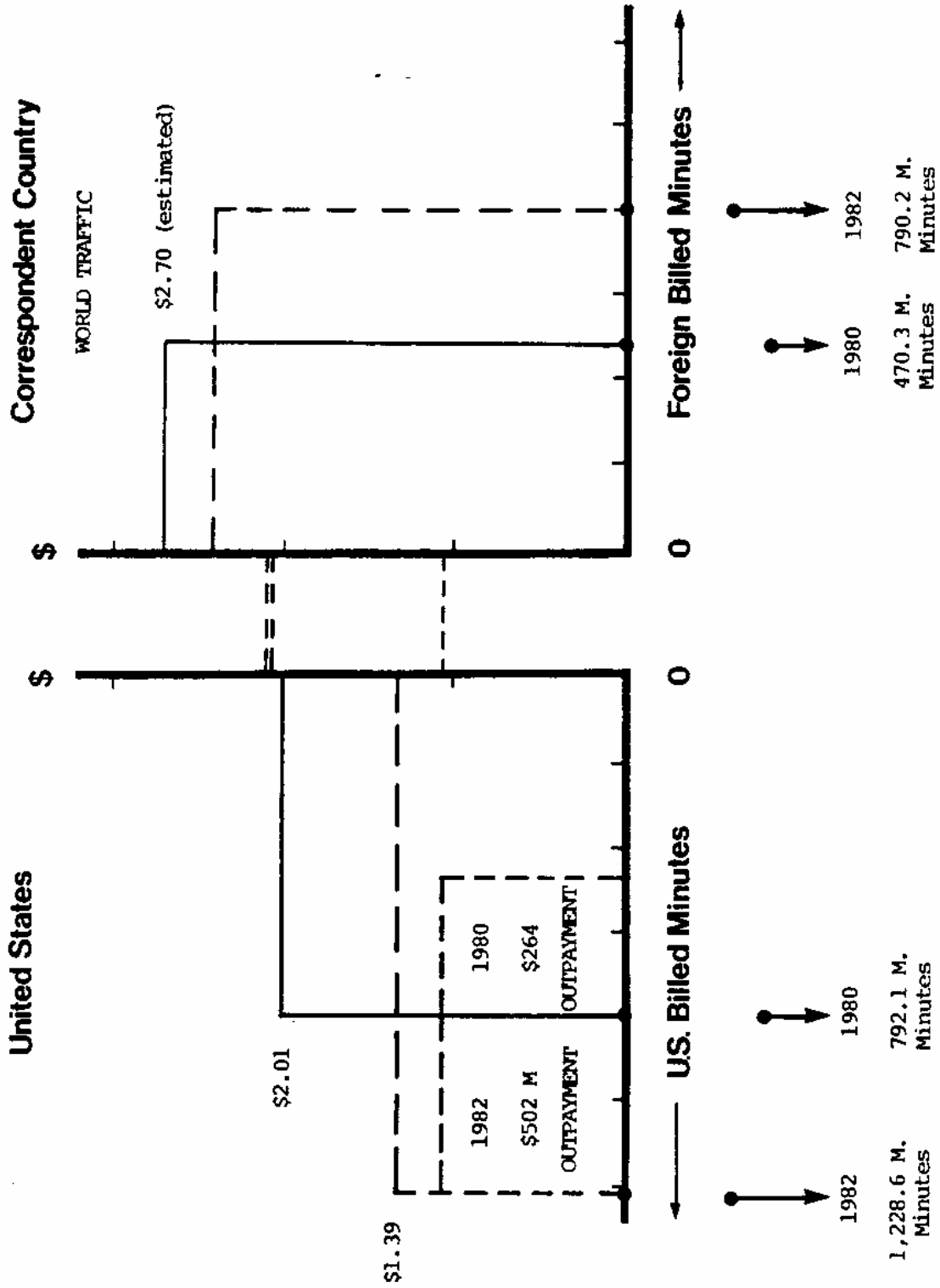


Figure II-3.11

Effect of Increased Rate Levels



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Figure II-3.12

Growth in Minute Volumes and Revenues, 1980 and 1982

Rapidly approaching \$1 billion per year for all U.S. carriers, the outpayment is becoming a measurable part of the national imbalance of payments. It begs a reexamination of international ratemaking principles and rate-of-return regulation in a competitive environment which pushes U.S. rates downward. While of benefit to international users of telephone service, low international rates that raise the level of outpayment to U.S. carriers beyond a fair contribution to costs of the foreign administration can sap the vigor of the national economy. In the correspondent relationship between nations, one nation's ratemaking policies must be adjusted in a spirit of cooperation with its sovereign neighbors while balancing the potential impact of other nations' ratemaking principles.

Notes for Section II, Chapter 3

- 1 66 FCC 2nd 359 [1977] and 84 FCC 2nd 121 [1980].
- 2 "In the Matter of Mackay Radio and Telegraph Company, Inc. (Delaware) For Modification of Fixed Public Service Licenses of Point-to-Point Telegraph Stations WIV, WIH, and WJH at Sayville, N.Y., to add Oslo, Norway, as a Primary Point of Communications," Docket Nos. 3336, 3337, 3338; 2 FCC 592, June 3, 1936.
- 3 2 FCC 599, June 3, 1936.
- 4 "Mackay Radio & Telegraph Co., Inc. v. Federal Communications Commission (R.C.A. Communications, Inc., et al. Intervenor)," No. 6970, U.S. Court of Appeal for the District of Columbia, 97 F.2d 641, page 645.
- 5 "Mackay Radio," as above.
- 6 Norfleet, et al., "International Communications Case History" (Washington, Federal Communications Commission, 1944), mimeo no. 76654, as cited by David Reed in his Doctoral Dissertation, section 2.2 History of Whipsawing, (draft) page 4.
- 7 FCC Common Carrier Statistics, 1980, 81 and 82 Editions, Table 15.
- 8 Reply Comments of AT&T, Notice of Proposed Rulemaking, CC Docket No. 85-204, September 20, 1985, page 2.
- 9 Address by Diane Lady Dougan, Coordinator for Telecommunications and Information Policy, before the "Forging a Global Telecommunications Strategy" in Washington, D.C., February 28, 1984.
- 10 Lynch, Karen, "FCC Rejects FTC Communications Bid for Lower Telex Rates," Communications Week, May 20, 1985, page 52.
- 11 FCC Statistics of Common Carriers, 1981, Table 16.
- 12 Lynch, Karen, "British Telecom Rejects U.S. Protests Of Plan To Redistribute Telex Traffic," Communications Week, April 1, 1985.
- 13 As above, Communications Week, April 1, 1985.
- 14 FCC Statistics of Common Carriers, as cited by Evan Kwerel, Promoting Competition Piecemeal in International Telecommunications, Washington, D.C.: Office of Plans and Policy, Federal Communications Commission, December 1984, Table 2.
- 15 FCC Statistics of Common Carriers, "International Message Telephone Service from the Continental United States to Overseas Locations for the Year 1985," in FCC News Release, December 15, 1986.





## A BALANCE OF POLICIES IN INTERNATIONAL COMPETITION

U.S. outpayments to foreign administrations have grown dramatically in recent years, both in size and in their rate of growth: from \$264 million in 1980 to \$502 million in 1982 and nearly \$1 billion in 1984 and the years beyond. The sheer size of these payments gives strategic significance to the method and policies affecting their transfer both for developed and developing economies, and for the international carriers who are involved in the provision of voice and record services around the globe. Consequently, when the FCC issued its Notice of Proposed Rulemaking<sup>1</sup> to review the applicability of its longstanding policy of "Uniform Settlements Rates on Parallel International Communications Routes,"<sup>2</sup> one would have expected significant controversy and a protracted proceeding. Given that the subject is also addressed by the CCITT, and by the laws of some countries, one would also have expected considerable interest abroad. Surprisingly, the potential for conflict between American policies and foreign laws was largely not addressed, despite the tremendous changes that have appeared in trade balances and the regulation of U.S. telecommunications since the divestiture of AT&T. The subject was played out from an American perspective between the U.S. International Service Carriers and a few interested parties such as the NTIA and the International Communications Association. In a relatively uneventful proceeding, the "Uniform Settlements" policy was extended to the voice environment and in an Order on Reconsideration quietly renamed the "International Settlements" policy.<sup>3</sup>

The potential for future conflict, however, is real, given that fluctuating values of U.S. and foreign currencies can bring the newly extended U.S. policies into conflict with foreign laws and the recommendations of the CCITT. An example of such conflict appeared in the history of telex accounting between the International Record Carriers (IRCs) and British Telecom, Intl. (BTI). The history of accounting rate changes between the U.S. and the U.K., as cited by the

Notice of Proposed Rulemaking, reflects one accounting rate change between inception of telex service in 1955 and 1977. In July of 1977 the rate dropped from \$2.55 to \$1.85; only two and a half years later, the rate dropped again to \$1.20 (a 46.7% decline).<sup>4</sup> The FCC rejected a further lowering of the rate of \$0.77 proposed by FTCC, arguing that U.S. carriers' revenues are adversely affected by lowered accounting rates.<sup>5</sup> Effective April 1 of 1985, BTI served notice that it would distribute return traffic to the American IRCs according to its own "operational and commercial criteria."<sup>6</sup>

Because return traffic largely determines the financial impact of accounting rates on transfer payments (as explained in the previous chapter), this message was interpreted as a warning shot that awakened the concerns of the FCC for "whipsawing," a term that has come to describe the leverage applied by foreign monopoly administrations against multiple U.S. carriers to seek a more favorable accounting rate for the PTT. On July 3, 1985, the FCC served notice of its proposed rulemaking, in response to petitions by RCAGC and WUI. It expressed the concern that whipsawing reduces the total revenues of U.S. carriers, and, most importantly, decreases the ability of U.S. carriers to lower the collection rates they charge their customers. It charged that accounting rates have increasingly become the target of the PTTs' goal of minimizing costs and maximizing revenues. The Department of State also expressed its concern to the British Minister of Industry, Geoffrey Pattie; and the chief of the Common Carrier Bureau remarked, "We are . . . perplexed that BTI should unilaterally undertake a change in operation which would adversely affect service quality and have adverse consequences here."<sup>7</sup>

In the subsequent proceeding, Western Union chided the FCC for "undisguised cynicism at the motives of the PTTs" and went on to reflect:

we believe there is nothing inherently unreasonable in BTI or other CEPT [Conference of European Posts and Telecommunications] administrations (or for that matter, any other administration where accounting rates for telex service are

not lower than such rates for telephone service) and their U.S. correspondents seeking reductions in accounting rates for telex traffic, even though corresponding reductions are not being made in telephone rates.<sup>8</sup>

It was subsequently revealed in AT&T's comments, however, that in contrast to the FCC's observation and Western Union's belief that relatively few changes had been made in telephone accounting arrangements, in fact 140 changes had been negotiated with foreign administrations in just the last five years, resulting in \$470 million dollars increase in AT&T's retained revenues, as reproduced in Table F, below:<sup>9</sup>

Table F  
Net Increase in U.S. Retained Revenue

	Number of Agreements	1982 (\$M)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)
1982	18	15.0	27.0	34.0	42.0	50.0
1983	33		16.0	36.0	45.0	56.0
1984	42			15.0	32.0	40.0
1985*	41				22.0	36.0
1986*	6					4.0
Totals (annual)		15.0	43.0	85.0	141.0	186.0
Cumulative Total						470.0

\*as of March 10, 1986.

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Thus it is ironic that the "monopolistic" PTTs abroad, who are responsible for both voice and record traffic in their home countries, have been negotiating with separate voice and record service carriers in the U.S., only to be blocked in accounting rate negotiations for telex while making \$470 million dollars in concessions for voice message traffic. The significance of these concessions by foreign

administrations can be put into perspective if one considers that the value of the negotiations above are roughly equal to the value of the entire record business, approximately \$500 million dollars per year in 1986. From the vantage point of the PTTs, the arbitrary application of the international settlements policy and refusal to grant waivers because they merely "reduce U.S. retained revenues" could be characterized as "whipsawing" by the U.S. administration.

It is also remarkable that AT&T's accounting rate negotiations were begun as early as 1982, before divestiture. Of the many tremors resulting from the breakup, affecting first of all the local exchange companies in the U.S. and ultimately other carriers and administrations in faraway countries, the shift in telephone financial structures and its consequences was evidently anticipated. To speculate on the chain of logic which compelled the negotiations: A breakup of the Bell system would result in restructuring of AT&T's domestic rate schedules, reducing long distance and international message telephone rates; rate decreases would stimulate outbound calling, resulting in higher foreign payments; higher outpayments would drive directly to AT&T's bottom line, putting pressures on earnings and calling for renegotiations of accounting rates with its correspondents overseas.

Despite the significant savings described above, however, AT&T's and other U.S. voice carriers' outpayments are still rising, as continued rate base regulation of AT&T forces reductions in international rates. International message traffic is consequently stimulated. As AT&T's rate decreases are matched by other competitive carriers, their traffic volumes are also stimulated, resulting in an increased outpayment obligation to other administrations.

It is at this juncture that the significant issues are joined: The market dynamics for voice and telex traffic are different. The balance of voice traffic is primarily outbound; in contrast, the balance of record traffic primarily inbound. Consequently, equivalent changes in accounting rates have opposite effects on U.S. retained revenues, as well as on the U.S. national interest. The problem is exacerbated by

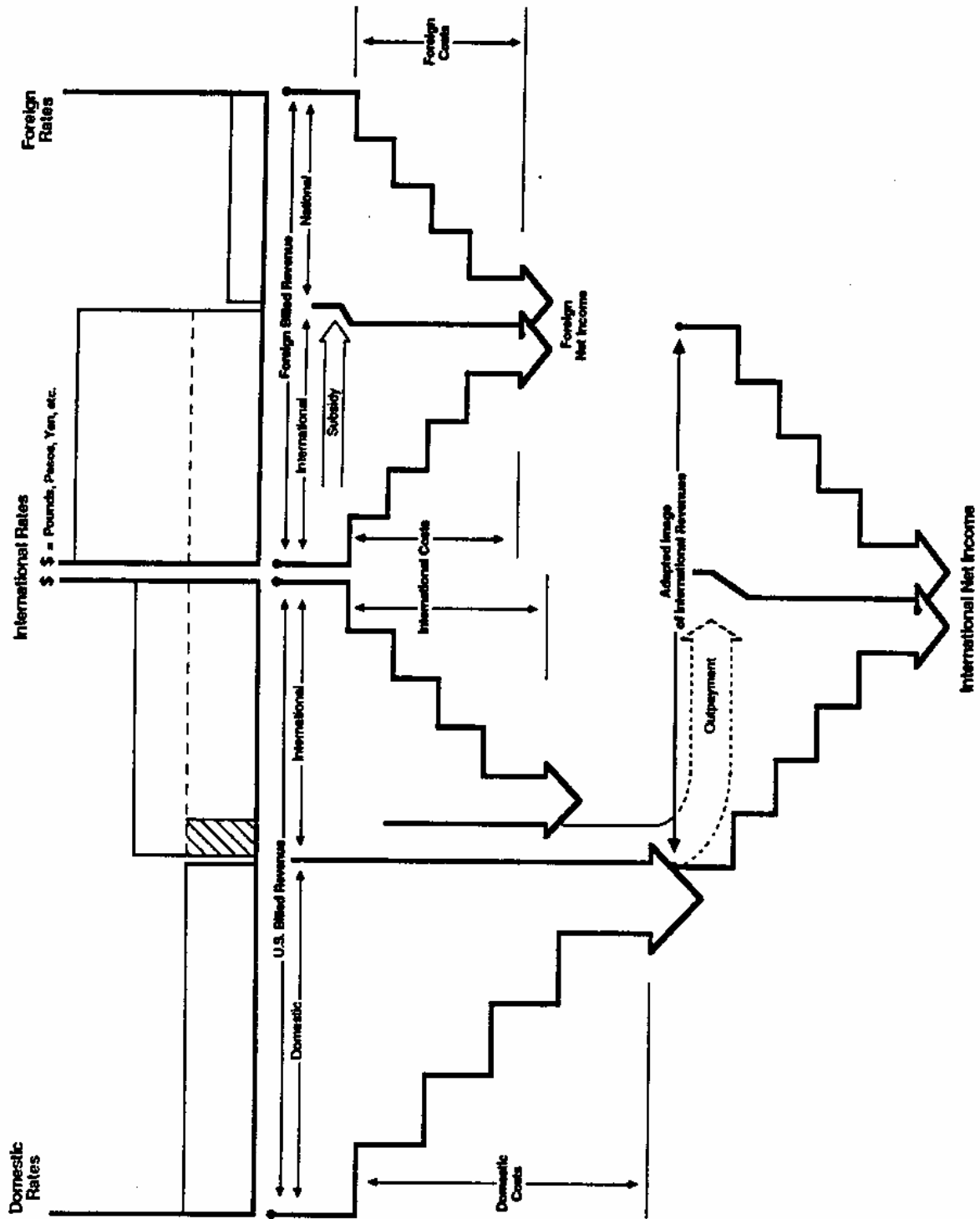
the dominance of AT&T in voice markets, and the concentration of the remaining International Service Carriers in telex, as well as the relative size of the two markets. Changes in accounting rates, therefore, polarize the U.S. telecommunications industry, with AT&T on one side and the IRCs on the other. Yet divestiture, deregulation, and new market entrants often require accounting rate changes to preserve the balance of conflicting policies and the profitability of existing revenue streams. Within the record business small carriers such as TRT and FTCC often find themselves at odds with their larger counterparts, since accounting rate concessions to foreign PTTs would enable them to gain entry to the crowded record market. The FCC for example, has refused to grant a request for waiver of the Uniform Settlements Policy to FTCC to allow it to lower its accounting rate with BTI, and other CEPT members.<sup>10</sup> The larger IRCs contend such a change would cause them loss of revenue, through forced renegotiations of accounting rates i.e. whipsawing. So far, the FCC has agreed, suggesting an adverse impact on U.S. customers' rates, despite the willingness of the smaller carriers to pass these reductions on to their customers. Despite the poor fit of this position with its otherwise pro-competitive policies, the FCC has affirmed the continued application of its policy to both record and voice services.<sup>11</sup>

At issue here is a fundamental concept of ratemaking for the international telecommunications business: Is the correspondent relationship comprised of two one-way businesses, or one two-way business? If ratemaking is applied to a one-way business, outbound collection charges would have to recover one-half of the accounting rate as well as other costs. For example, MCI suggests, on the one hand, that, "Any off-peak rates should be sufficient to cover settlements as well as the other short-term marginal costs. Rates which do not recover revenues sufficient to cover settlements payouts in addition to other costs thus would be unlawful under the Communications Act of 1934."<sup>12</sup> This concept of the business is clearly uni-directional. FTCC apparently agrees by saying "This is prima facie evidence of predatory pricing."<sup>13</sup> AT&T, on the other hand, has a different concept in describing accounting rates as merely a device for determining the

divisions of revenue between administrations for two-way traffic,<sup>14</sup> clearly a view of a cooperative relationship with a correspondent in a two-way business.

The distinction between one- or two-way businesses becomes important in the question of market entry. If each revenue stream, inbound and outbound, is self-supporting, outbound rates would have to rise dramatically in order to earn a reasonable rate of return making entry by new carriers easier. Presumably, any return revenues -- determined by the foreign partner -- would be unaccounted for, for the purposes of rate-of-return regulation (to do otherwise would violate the international convention for equal division of toll revenues or mandate a higher authorized rate of return). A higher outbound collection rate would provide an umbrella for accounting rate concessions to foreign administrations, compensating them for their increased costs of interconnection, and allowing easier entry to foreign markets. The FCC tacitly recognized that "nonuniformity may increase a U.S. carrier's flexibility in negotiating with a foreign administration and thus provide . . . a greater incentive to enter into an operating agreement."<sup>15</sup>

Figure II-4.1 illustrates the linkage between the revenue streams of two countries. Both domestic and international calling contribute to the profits of the international carriers. In the U.S. these two streams are considered one rate category by the FCC, simply MTS (message telephone service). In other countries, international service commonly subsidizes domestic (foreign national) rates. As rates change, however, message traffic is either stimulated or depressed, consequently altering the allocation of the costs between domestic and international segments. These changes then ripple through the international portion of the business and cause accounting rate changes. Any attempt to restrict these financial effects would merely put the carrier or his overseas correspondent in a financial double bind.



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Figure II-4.1

Combined Domestic and International Revenues

The direct division of revenue between international correspondents is a matter of obvious interest to foreign nations and to prospective entrants competing for a direct route. The administrations involved are direct parties to negotiations that would set the terms of competitive entry and the divisions of revenue for future relations. Because traffic can also be routed indirectly via a third country to reach a foreign terminal, not only is the single direct relation of accounting important, but also the two applications of accounting between the three nations involved. A more subtle issue arises. When two telecommunications links involving three administrations comprise the facility relationship between the originating and terminal country, the indirect traffic via the intermediate point competes with direct traffic between the two terminals. A private carrier can establish leased facilities in dense corridors of traffic via nearby countries whose accounting relations may invite skimming of revenues or whose collection rates in this transit arrangement may be averaged and therefore attractive for bypass of the direct relationship. By international convention and the CCITT recommendations, the terms of the accounting relationship involve the terminal country and require its approval: Members "reserve the right to cut off any other private telecommunications which may appear dangerous to the security of the State or contrary to their laws, to public order or to decency."<sup>16</sup> But having the "authority" to disconnect an offending carrier does not guarantee that severing the relationship is practical or that other "authorities" will not be brought to bear to challenge the established rate relationships.

Two examples may bring home the point: In the U.S., when MCI first established itself as a "specialized carrier" between St. Louis and Chicago, its application disavowed any interest in switched message telephone services. As financial pressures mounted, it established "Execunet," a switched voice service that used dedicated leased lines to route traffic between the major corridors of traffic, but connected to the local exchanges of the Bell operating companies to complete the call. Because long haul rates were supporting local costs, they were able to undercut Bell system rates for long distance, and also obtain a subsidized connection to the more expensive completing field. The FCC



approved its applications to establish competing private line services, but denied operating authority for this network when AT&T protested MCI's entry into the switched voice market.<sup>17</sup> In a landmark decision, Judge Skelly Wright of the D.C. District Court overturned the FCC's decision. Reasoning that the FCC had never determined that AT&T's monopoly on long distance service was in the public interest, he established MCI as a switched voice competitor to AT&T and to the other existing carriers.<sup>18</sup> Upon reconsideration, the FCC reversed its long-standing policy and established open entry to the provision of telecommunications services.<sup>19</sup>

In the international arena, a similar situation is illustrated by the telex refilers. With recent advances in data communications and in computer capabilities, entrepreneurs discovered they could aggregate messages from large users of telex services between two countries, send groups of messages at high speed over leased data lines or the voice network, and then "refile" them at domestic rates in the country of destination. This practice is forbidden by the tariffs of many countries and by CCITT recommendations; in fact, many countries took exception to it since it deprived the telecommunications monopoly of the higher tariff revenues that they would otherwise have received for international traffic. Moreover, it deprived the terminal country of its share of the accounting revenues because no usage charges apply to leased lines that bypass the message network. The accounting charges on the switched voice network provide less revenue from these aggregated messages, sent at high speeds, than do the individual telex messages sent at 50 Baud over the telex network. In addition, this diversion of "outbound" messages altered the balance of traffic on which accounting arrangements are based, and made outpayment countries out of nations that formerly received payments from the United States. When such calls made use of the switched voice network, they increased the outpayments of the United States, to the disadvantage of AT&T as well as the IRCs who lost the telex revenue.

While efforts were made by some administrations to uphold the conventions that prohibited this form of "value-added network," the

applicants eventually obtained FCC approval because U.S. consumers benefited from the services. In other ways, certain foreign administrations also benefited: As direct connections between certain European administrations were resisted by the PTTs, the refilers established service between the U.S. and the United Kingdom, taking advantage of the low tariff rates between the U.K. and the continent. Telex messages were thus routed to the U.K. over private lines or the switched voice network, and were then refilled in the U.K. with destinations on the Continent. The British Post Office (then the telex provider) benefited from a share in U.S.-to-European traffic in which they previously had no share. While they paid their accounting shares to the European PTTs, the rates in effect were so low (and continue to be) that the new traffic was extremely lucrative. This raised issues of national sovereignty; the right of an administration to regulate its own telecommunications transmissions has been recognized between nations since the Paris Convention of 1865.<sup>20</sup> In response to protests, the U.K. reluctantly served notice on the British correspondents of American refilers, Telespeed Services, Limited, and to others, to cease operations. On June 12, 1979, Telespeed Services sued, charging "Restrictive Practices, Dominant position, Abuse, and other violations of the treaty conventions of the European Economic Community."<sup>21</sup> Treaties have precedence in most countries over domestic law. In the atmosphere of the British Telecommunications Act of 1981 which liberalized telecommunications in Great Britain and established British Telecom from the British Post Office, Telespeed won: The decision cited approximately 100 message-forwarding agencies in the U.K., 11 of whom were believed to be forwarding traffic between third countries at the time.<sup>22</sup> The decision was appealed by Italy, but in March 1985, the position was affirmed.

By February 1984, then Minister of Industry John Butcher claimed that the U.K. had stolen a march on other European PTTs because of the government's policy of liberalizing British Telecom: "This would lead to London becoming the value added network services (VANS) center for the world."<sup>23</sup> Butcher was then speaking at the opening of Mohawk Data Sciences electronic mail center in London. Called WINC, the Worldwide

Integrated Communications Center, it is tied into the international network and charges 50% less than telex going from the U.S. to the U.K., and 10 to 15% less from the U.K. to the U.S. At the time, 72 companies were licensed in the U.K. for more than 200 VANS.

FTCC estimates that the BTI refiling operation costs the U.S. record industry \$105 M per year, citing that the " . . . Uniform Settlements Policy has consistently operated to block attempts by individual IRCs to reduce this outpayment."<sup>24</sup>

Potentially, the continued entry of these refilers of telex traffic represents the restructuring of the tariff relationships between all countries, for the regulatory authority over telecommunications services of any one country can no longer be assured. As one country's collection rates, traffic volumes, or divisions of revenue are altered by competitive carriers, all countries will be affected.

It may be apparent that, like the domestic telecommunications environment in the United States, international financial structures and prices are characterized by a thicket of implicit and explicit cost allocations, cross supports, and contributions. Unlike the domestic environment, however, international stakeholders enjoy no common court of appeal. No central authority acts the role of the Federal Communications Commission, the Department of Justice, or Congress. Because decision making is decentralized, and a matter of negotiation between sovereign nations, the issues, once engaged, will only slowly be resolved.

Notes for Section II, Chapter 4

- 1 Notice of Proposed Rulemaking, "Implementation and Scope of the Uniform Settlements Policy for Parallel International Communications Routes," CC Docket No. 85-204, July 3, 1985.
- 2 66 FCC 2nd 359 (1977) and 84 FCC 2nd 121 (1980)
- 3 "Order on Reconsideration," CC Docket No. 85-204, February 19, 1987.
- 4 NPRM, "Implementation and Scope of the Uniform Settlements Policy," as above, paragraph 6, page 4.
- 5 NPRM, as above, paragraph 6, page 4.
- 6 Telex from Ann Letford, Director of Marketing, BTI, to officials of the IRCs, dated February 1, 1985.
- 7 As reported by Karen Lynch, "British Telecom Rejects U.S. Protests of Plan to Redistribute Telex Traffic," Communications Week, April 1, 1985.
- 8 Comments of The Western Union Telegraph Company, "Implementation and Scope of the Uniform Settlements Policy for Parallel International Communications Routes," CC Docket No. 85-204, August 30, 1985, pages 4-6.
- 9 Comments of AT&T, "Implementation and Scope of the Uniform Settlements Policy," as above, Attachment A, March 10, 1986.
- 10 Memorandum Opinion and Order, FCC 85-249, May 14, 1985.
- 11 Report and Order, FCC 85-204, January 30, 1986, paragraph 61.
- 12 In the Matter of American Telephone and Telegraph Company, Revisions to Tariff FCC nos. 258, 259, 260, 262, 263, 265, 266, 267, and 268, Transmittal Nos. 13703-13708, et al.; Transmittal Nos. 13775, et al. and The Associated Bell System Companies, Transmittal nos. 637 et al. (Docket No. 81-412) "Comments of MCI," August 10, 1981, page 3.
- 13 In the Matter of American Telephone and Telegraph Co., Long Lines Department. Proposed Revisions to Tariff FCC No. 263 Providing for New Rates for Overseas Message Telephone Service, Transmittal No. 13775, Reply Comments of FTC Communications, "Petition to Reject or to Suspend and Investigate," June 5, 1981, page 3.
- 14 In the Matter of American Telephone and Telegraph Co., Long Lines Department. Proposed Revisions to Tariff FCC No. 263 Providing for New Rates for Overseas Message Telephone Service, Transmittal No. 13775, Reply Comments of ATT, June 1981, page 2 and 3.
- 15 Notice of Proposed Rulemaking, "Implementation and Scope of the Uniform Settlements Policy," as above, paragraph 5.

- 16 ITU Convention, Article 19, paragraph 110, page 16.
- 17 Execunet, FCC Docket No. 20640, Decision, 60 FCC 2d 25 (1976).
- 18 MCI Telecommunications Corp. v. FCC (Execunet I), 561 F.2d 365 (D.C. Circuit, 1977), cert. denied, 434 U.S. 1040 (1978); MCI Telecommunications Corp. v. FCC, (Execunet II), 580 F.2d 590 (D.C. Circuit), cert. denied, 439 U.S. 980 (1978).
- 19 The FCC continued to investigate the proper market structure for these services in MTS and WATS Market Structure Inquiry, CC Docket No.78-72.
- 20 Coddling, George A. Jr. and Rutkowski, Anthony M., The International Telecommunications Union in a Changing World, (Dedham, Mass: Artech House, 1982).
- 21 Telespeed Services Limited v. United Kingdom Post Office, Before the Commission of the European Communities (82/861/EEC), 10 December 1982.
- 22 Telespeed Services Limited, page 461.
- 23 Moran, Nuala, Computer Weekly, February 6, 1984.
- 24 NPRM, "In the Matter of the Implementation and Scope of the Uniform Settlements Policy," as above, Comments of FTCC, August 29, 1985, page 6.



### SUMMARY AND CONCLUSIONS

The divestiture of AT&T in the United States created seven new financial entities out of the fabric of the integrated Bell system. It transformed AT&T and left it to compete with other interexchange carriers for interLATA long distance and international business. The event sparked political controversy domestically, affected nearly every U.S. citizen, and provided valuable lessons to other nations who had been considering the liberalization of their telecommunications policies. For the industry it was a period of dramatic change: litigation, restructuring, reevaluating, and resizing. For customers it was a period of confusion, new service options, and altered rate schedules. Local service rates increased and long distance rates declined, revealing as never before the financial underpinnings and social pricing structures of U.S. telecommunications to economists, regulators, competitors, and ultimately, attorneys.

Unique financial entities emerged from the breakup of the Bell system. On the one hand, the early concern for the financial health of the RHCs was shown to be unwarranted, as access charges from interexchange carriers supported a sizeable portion of their capital requirements and their fixed costs became less burdensome with increases in traffic volumes; on the other hand, the financial volatility and vulnerability of the interexchange carriers was revealed as the companies struggled to shed their high unit costs and labor-intensive characters.

The financial forms which were embedded in the structure of the old Bell system become evident when they are graphically portrayed as a hierarchy of financial levels; from this vantage point it is clear that portions of the telecommunications business have inherent economies while others consume inordinate amounts of resources. Without discriminatory regulatory policies to support inefficient customer demand or restrict competitive entry to only lucrative parts of the

business, the existing system of social pricing breaks down and needs to be replaced by a new one. In a process of electronic Darwinism, new financial forms evolve which inherently embody a different form of discrimination, create new stakeholders, and produce new coalitions.

At least two, and perhaps three, financial entities are now involved in the provision of interLATA telecommunications services in the United States today. Each call involves an interexchange carrier and is connected through at least one Bell operating company or an independent telephone company. They are linked financially by access charges which are paid by the interexchange carrier to each terminal to complete each end of a call. The same equipment, however, is used to provide intraLATA calling, giving rise to inherent mechanisms to allocate costs to the regulatory jurisdictions in order to determine the proper level of access charges.

After the Balkanization of telecommunications in the U.S., the provision of telecommunications services by the new entities strikes a remarkable parallel to the provision of international telecommunications services: Two administrations are connected by an intermediate international carrier, whether a voice or record provider. If the recommendation that the Department of Justice made in early 1987 to Judge Greene is adopted to permit the RHCs into manufacturing and interexchange services, the analogy becomes complete. Two administrations can directly interconnect their services. Consequently, the same financial structures which are useful in visualizing rate and volume effects domestically can now be used to evaluate the consequences of policy decisions internationally.

One financial structure is unique, however. Rather than the payment of access charges, the international settlements process determines the flow of monies between international administrations. This results in a correspondent relationship which links two administrations into a consensual network in the form of a cooperative partnership. Rather than a cost of doing business, such as access charges paid to terminate calls, the international settlements process results in a division of



the tolls of the two-way business between the two partners. As Figure II-2.3 makes clear, it is a transfer mechanism between business associates, not a cost of doing business.

In its 1985 review of its Uniform Settlements Policy, the FCC stated that its tentative conclusions were intended to "maximize the revenue retained or received by U.S. carriers" and to enhance the carriers' "ability to lower collection rates."<sup>1</sup> Consequently, from its inception, the policy is at odds with the cooperative nature of international accounting agreements and intrudes on the business partnership. To maximize the revenue retained by one partner is to minimize the revenue retained by the other, resulting in a contentious partnership and little incentive for market development.

By reducing the ability of the partnership to respond to market conditions or ever-changing currency fluctuations, the policy also intrudes on ratemaking principles and other policies. A fixed rate of return on investment and a Uniform Settlements Policy are inherently at odds since traffic fluctuations will determine the amounts of money to be paid from one administration to another. The amounts of money transferred can dramatically alter rates of return, forcing frequent collection rate changes or a subsidy or burden on the domestic MTS category, affecting other competitive carriers who may not be involved in the international business. Because nearly 60% of the international facilities are provided by satellites (an expense item), the international rate base is not sufficiently large to avoid wide swings in earnings from year to year, making it difficult to abide by any authorized rate of return or to shield an international competitor from financial volatility with respect to rate of return on assets.

In brief, from this perspective, neither rate-of-return regulation in the international marketplace nor a policy requiring uniformity of settlement rates between international carriers serves the public or national interest of the United States.

Notes for Section II, Chapter 5

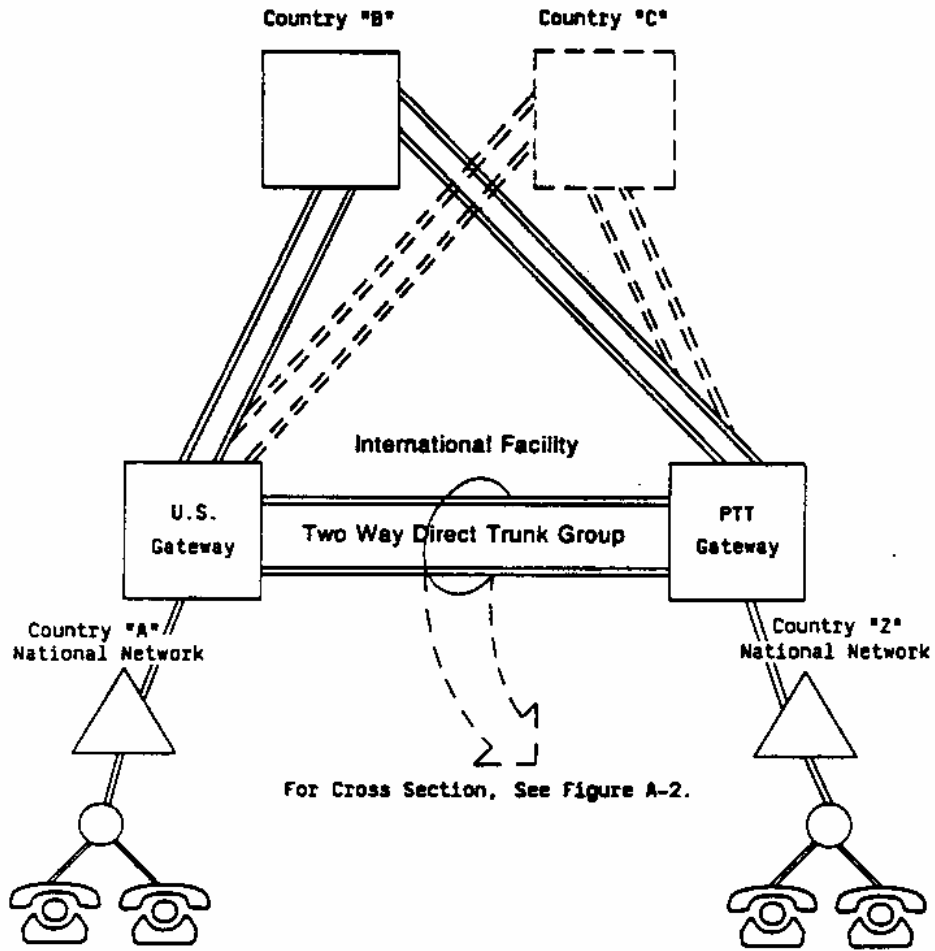
- 1 Notice of Proposed Rulemaking, "Implementation and Scope of the Uniform Settlements Policy for Parallel International Communications Routes," CC Docket No. 85-204, July 3, 1985, paragraph 42.
- 2 Order on Reconsideration, "Implementation and Scope of the Uniform Settlements Policy for Parallel International Communications Routes," CC Docket No. 85-204, February 19, 1987.

APPENDIX A

INTERNATIONAL FACILITIES

International facilities are jointly provided between telecommunications administrations: the competing international service carriers (ISCs) in the United States and the Posts, Telegraph, and Telephone administrations (PTTs) in foreign countries. The costs of circuits are shared by both terminals, and for this reason a language convention of "half circuits" has evolved in discussions of international telecommunications. As will become evident, however, while each country pays its one-half circuit share for each international facility, the share of costs per minute of billed traffic will not be equal between correspondents.

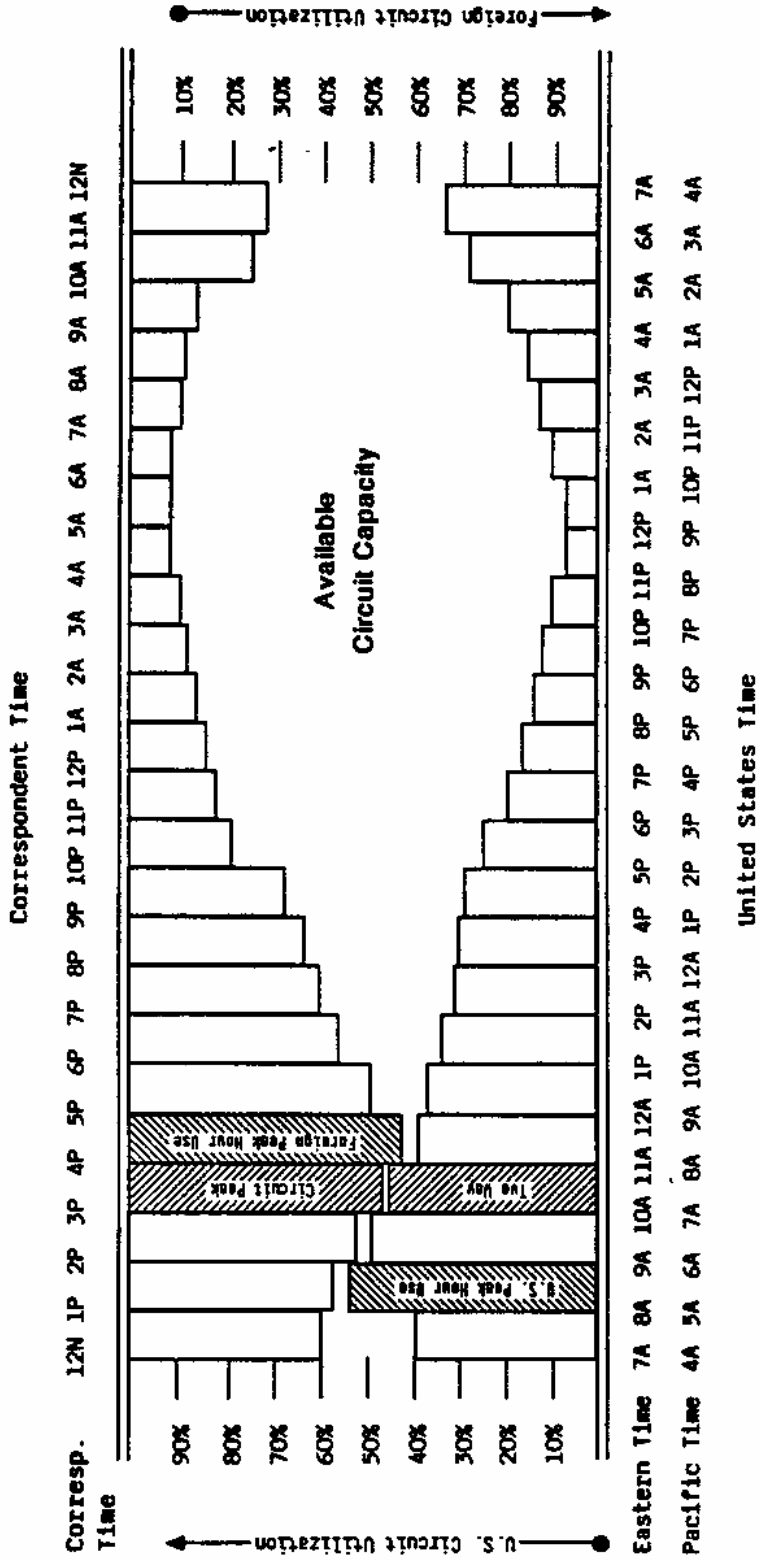
Figure A-1 illustrates a typical configuration for circuits between countries. In this case, a sizeable trunk group (let's say 100 circuits) interconnects the national network of Country A with that of Country Z. The national networks are each represented by the symbols for two telephones connecting to a central office switch that is connected to a higher level switch and ultimately to an international gateway. (Dedicated land lines, which are necessary to connect the international gateway to either a satellite earth station or to a cable head before picking up the international facility, are not depicted.) Other trunk groups of circuits are shown to interconnect country A with countries B and C, and B and C with country Z. A call from country A traverses its national network and seizes the first circuit outbound from the gateway switch. A second call from A will seize the second circuit. Similarly, a call from country Z traverses its national network, but instead of attempting to access the first, second, or third circuit, it will seize the 100th circuit; the next call will seize the 99th. In this way a condition known as "glare," where a circuit is seized simultaneously by both ends, can be minimized. Conveniently, it also allows a simple display of the calling pattern between two countries as traffic volumes build (see Figure A-2).



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Figure A-1

Circuit Routing between Countries



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Figure A-2  
 Illustrative Circuit Utilization by Time of Day  
 (Five-Hour Time Zone Difference)

This figure superimposes a hypothetical traffic pattern generated over a 24-hour period of time in the United States (represented by ascending bar graphs of one hour's width) with the simultaneous traffic pattern of a correspondent country (represented by descending bar graphs) five hours displaced in time zones. Notice that when it is 12 noon in the correspondent's country, it is 7 a.m. on the East Coast of the United States, and 4 a.m. on the west. Two simultaneous calls from opposite coasts, one placed at 7 a.m. and the other at 4 a.m., will compete for the same international facility and ultimately for the same domestic circuit in the foreign country at 12 noon. As traffic volumes build up with the business day, the U.S. traffic will peak, as here illustrated with right-hand shading of the bar graphs between 8 and 9 a.m. on the East Coast. At this time, the U.S. is using more than half of the total circuit group, even though it pays for only half of the facilities. A similar point of peak hour usage is reached by the correspondent between 4 and 5 p.m., his time. Notice that the peak hours of two-way use for the circuit group as a whole fall between 10 and 11 a.m. for the United States, and simultaneously between 3 and 4 p.m. for the correspondent (illustrated by the left-hand shading). For each country pair, these peak hours of usage can be different, depending on the community of interest, the cultural patterns of calling, and on the "window" of convenient calling hours between the time zones of the countries involved.

It is worth noting, also, that despite the heavy usage illustrated by this example, a considerable portion of time remains when circuit capacity is available for customer use. Even though rates may be significantly reduced to encourage calling at this time, few customers wish to rise at inconvenient hours to either place their calls or be disturbed at night by receiving them. This idle circuit capacity can be used, however, by business customers sending data or facsimile transmissions during reduced off-peak rate periods to remote machines or databases. Telex refilers such as Consortium Communications, Inc., for example, can aggregate demand by buffering the messages of many telex customers in a U.S. database, and then transmitting these messages at high speed over dial-up message circuits during reduced rate periods

(or, if their traffic volume warrants, over leased private lines.) More recently, video teleconferencing services offered in the evenings have also attempted to make use of this "fallow" circuit capacity. Voice messaging -- the recording of a voice message within one network and delaying its delivery to the foreign terminal until the facilities are more readily available -- is considered an "enhanced service" under the FCC's Computer Inquiry II decision, and has not been offered to customers.

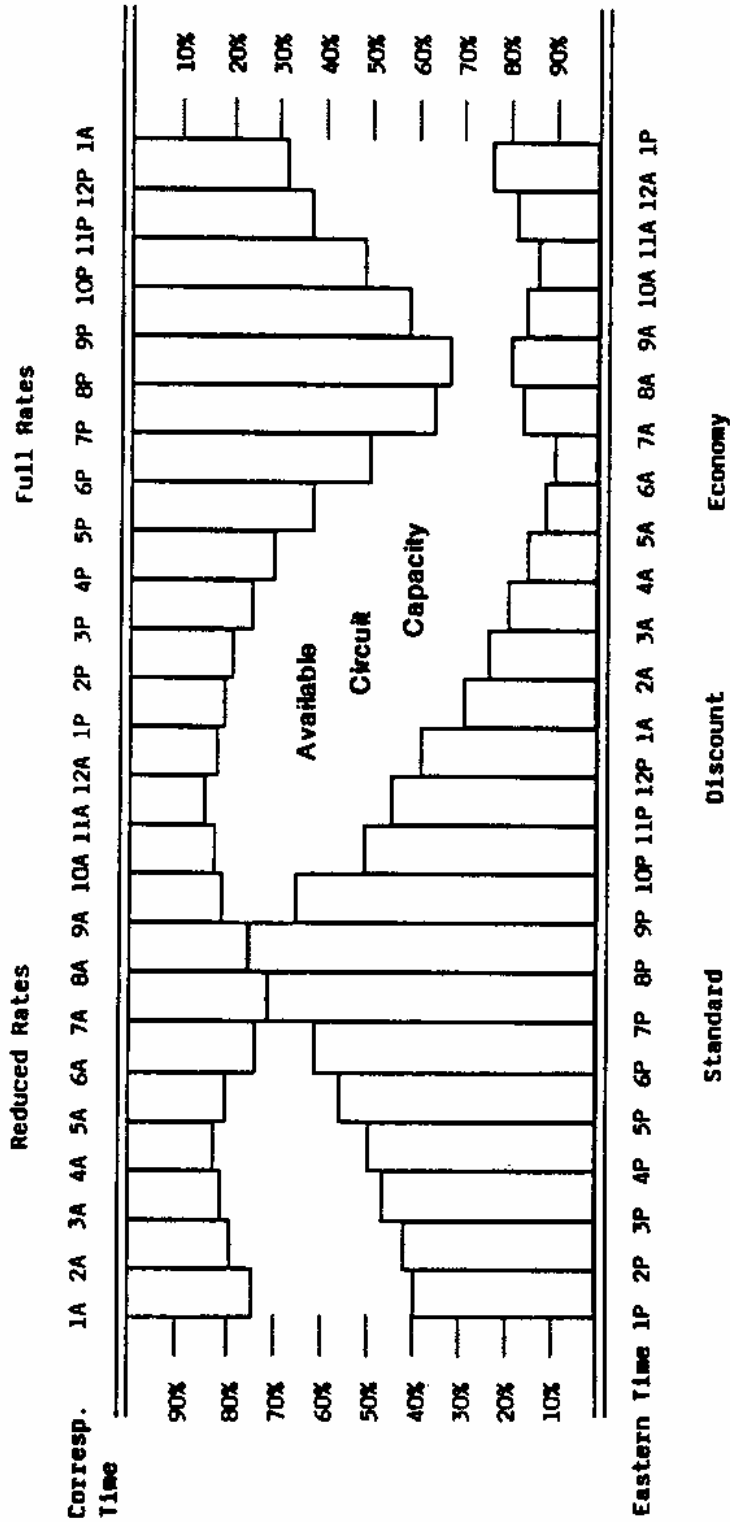
When all 100 circuits are in full use, it does not necessarily mean that calls will subsequently be blocked between the two direct terminals A and Z (see again, Figure A-1). If circuit capacity exists between an intermediate route, A to B to Z, the call can be "alternate routed" via this third country. If country B can not complete the call, another country C may wish to negotiate a traffic arrangement to complete this traffic for its two correspondents, A and Z. In fact, extensive use is made of "transit" routes and both intermediate points may be employed, with the choice of first alternate route being decided by the most favorable rates offered for "transit" of a PTT. In this way, administrations B and C are international competitors for worldwide transit traffic. For the U.S. service carriers, this service constitutes a fully competitive market from which the FCC forebore from regulation in 1979.

Through skillful engineering of circuit capacity and appropriate price schedules to the customer, the demand for direct facilities can be minimized. Consider the traffic profiles illustrated in Figure A-3. In this case, the terminals are 12 hours separated in time zones, and the circuits between them are well utilized. Nevertheless, if the traffic peak between 7 and 9 p.m. in the United States can be alternate routed via a third country, significant savings can be had in facility costs. As illustrated, 10 circuits (and the expenses associated with their termination in switching capacity) can be eliminated by routing through an intermediate point during the U.S. busy hours. In practice, either correspondent may alternate route without financial penalty (see Appendix D) under conventional international transit arrangements, and

both administrations would share in the half circuit savings for facilities not needed.

Figure A-4 illustrates the facilities saved as well as the compression of the traffic profiles into 90 rather than 100 circuits. Circuit utilization has improved, and a total amount of 10 circuits times \$12,720 per half circuit per year (under current Comsat rates for international satellite capacity) has been saved. While a transit charge is incurred by the administrations per minute of use of the intermediate facility route, it would be rare that these charges would exceed the total savings of \$254,400 per year for the two correspondents.





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Figure A-3  
 Illustrative Circuit Utilization (12-Hour Time  
 Zone Difference)

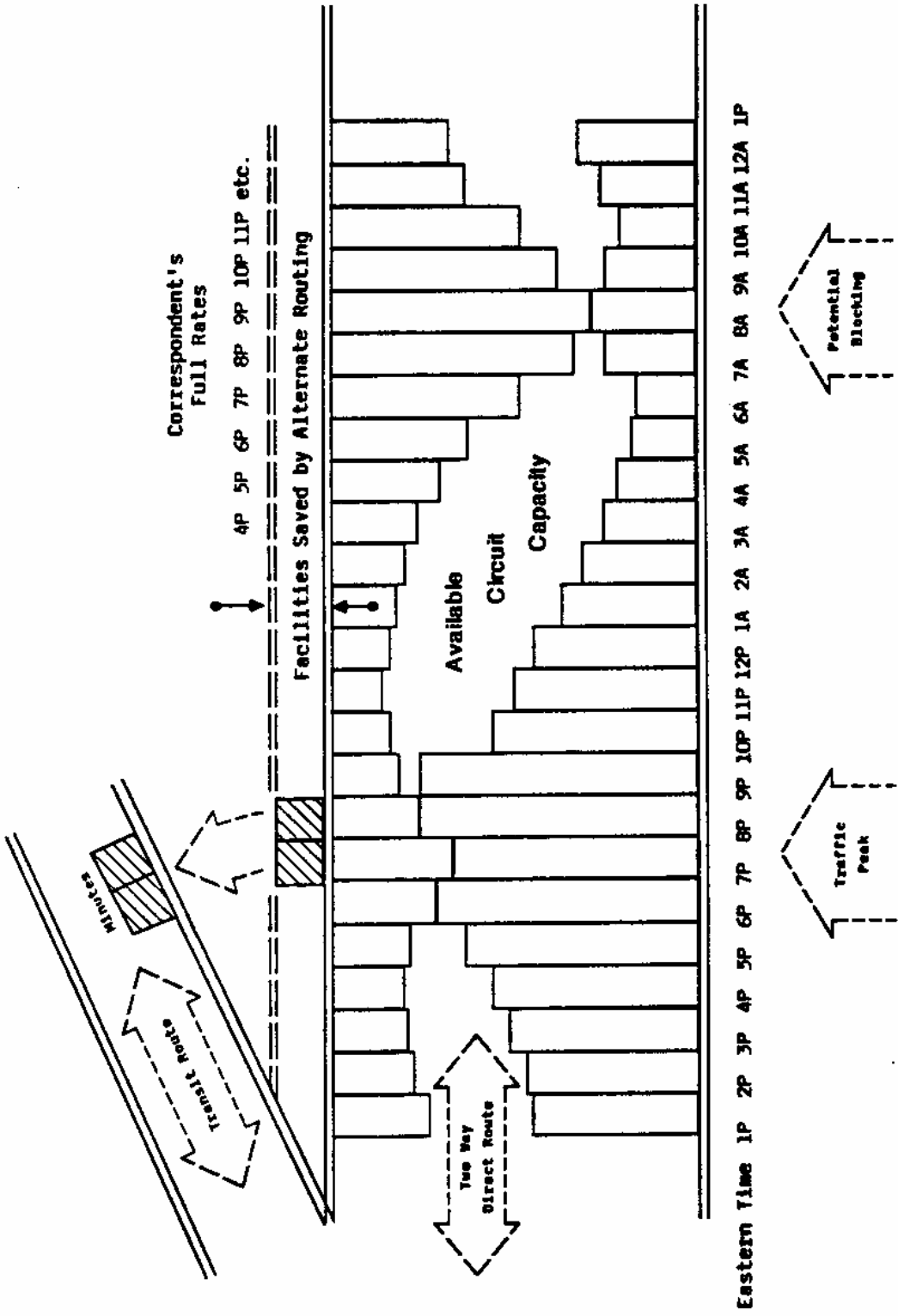


Figure A-4

Facility Savings Through Transit Utilization

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Collection rate decisions, however, are now more difficult to make and explain to regulatory authorities for each country. Two peak periods of utilization must be considered, since the via administration may not wish to accept transit traffic in the later time period which could correspond to its peak pricing hours and periods of domestic network congestion. Consequently, calls can be blocked at periods of circuit congestion that now fall in the reduced collection rate period (the "Economy" rate) in the United States. Controversy may also arise over which time periods are "causing" circuit growth in this international cross section, a matter of some concern to regulators who may be trying to assign costs to the "cost causer." Before the alternate routing arrangement, clearly the 7 to 9 p.m. peak caused circuit growth. After negotiation of the alternate route, additional circuits are required for growth in the 8 to 9 a.m. period. How two international competitors would view a change of rate schedules occasioned by changing costs from this secondary peak in traffic is not yet known. Would it contest the filing as "predatory pricing"? Would it ask for legal review and opinion concerning this engineering decision?

The practice of sharing the costs of international facilities between administrations has even more important effects. For 100 circuits, at \$12,720 per half circuit, each administration incurs a total expense of \$1,272,000 per year, or \$106,000 per month. But the traffic volumes between the two countries may not be equal, and the cost per minute of billed traffic may be dramatically different. Consider the two-way traffic volume between them to be 1 million minutes per month. If one country billed 200,000 minutes of traffic volume, while the other billed 800,000, the costs to the first would be \$0.5030 per minute, while the cost to the other would be \$0.1325 per minute. This relationship can be seen more clearly in Table G.

Table G  
International Facility Costs

Terminal A ←		→ Terminal Z	
Outbound Billed Minutes	Cost Per Min.	Cost Per Min.	Outbound Billed Minutes
200,000	\$0.503	\$0.1325	800,000
300,000	0.353	0.1714	700,000
400,000	0.2515	0.285	600,000
→ 500,000 ←	→ 0.212 ←	→ 0.212 ←	← 500,000 ←
600,000	0.285	0.2515	400,000
700,000	0.1714	0.353	300,000
800,000	0.1325	0.503	200,000

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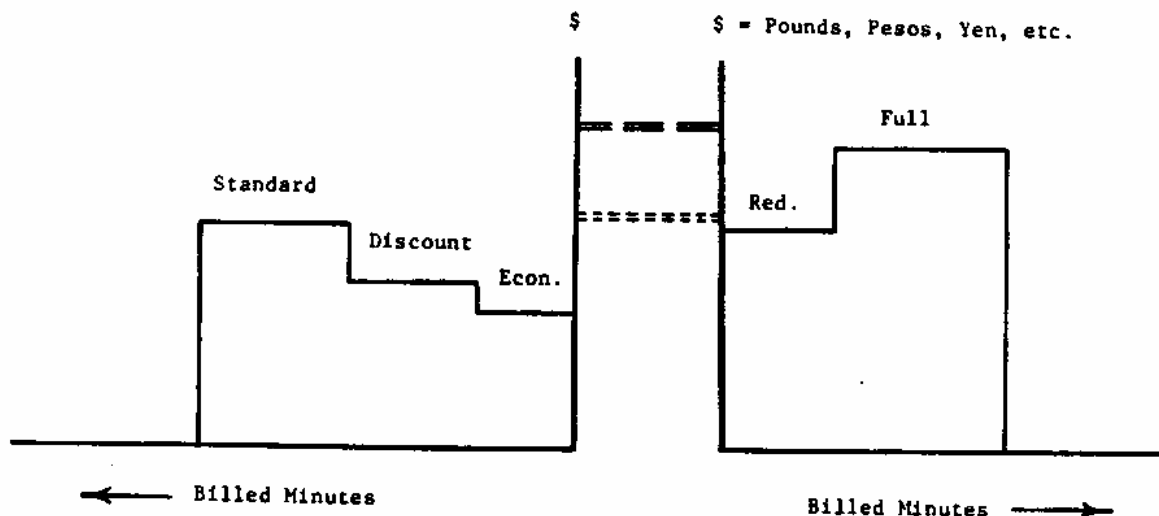
As this table illustrates, as outbound calling volumes rise in proportion to inbound volumes from the foreign terminal, the facility costs per outbound minute decline. Since U.S. telephone calling volumes tend to be significantly higher than its correspondent's, the U.S. derives significant benefits from the economics of efficient facility use. The foreign terminal, however, wants to be reimbursed for the disproportionate expense it bears for facilities when its calling volumes are low. It calculates these costs into the determination of an appropriate accounting rate to be applied to minutes of traffic between the two administrations.

For the International Record Carriers, the pattern is reversed. Telex traffic, for example, shows fewer minutes of outbound traffic than inbound from foreign countries. In their position on telex accounting, therefore, the IRCs tend to reflect the posture of the correspondents in the voice environment in supporting higher accounting rates.

APPENDIX B

TWO-TIERED ACCOUNTING RATES

International telephone calling makes demands on two nations' telephone networks. Not only are the two countries' international tariff rate structures related, therefore, but the domestic rate structures are also, for domestic traffic can compete with international for the connecting portion of the domestic facilities used. Domestic voice services are commonly priced by time of day in the country in which the telephone conversation is billed. Collection charges are often higher during peak periods of calling and are reduced in subsequent billing periods in an effort to level the demand for telephone services. (See Figure B-1.) In the United States, a three-tiered price structure exists for domestic telephone service: "Day" rates for peak hours during the five-day business week, lower "Evening" rates for off-peak periods and weekends, and "Night" rates which are lower still to encourage calling when the facilities are least used.



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Figure B-1

Tiered Accounting Rates

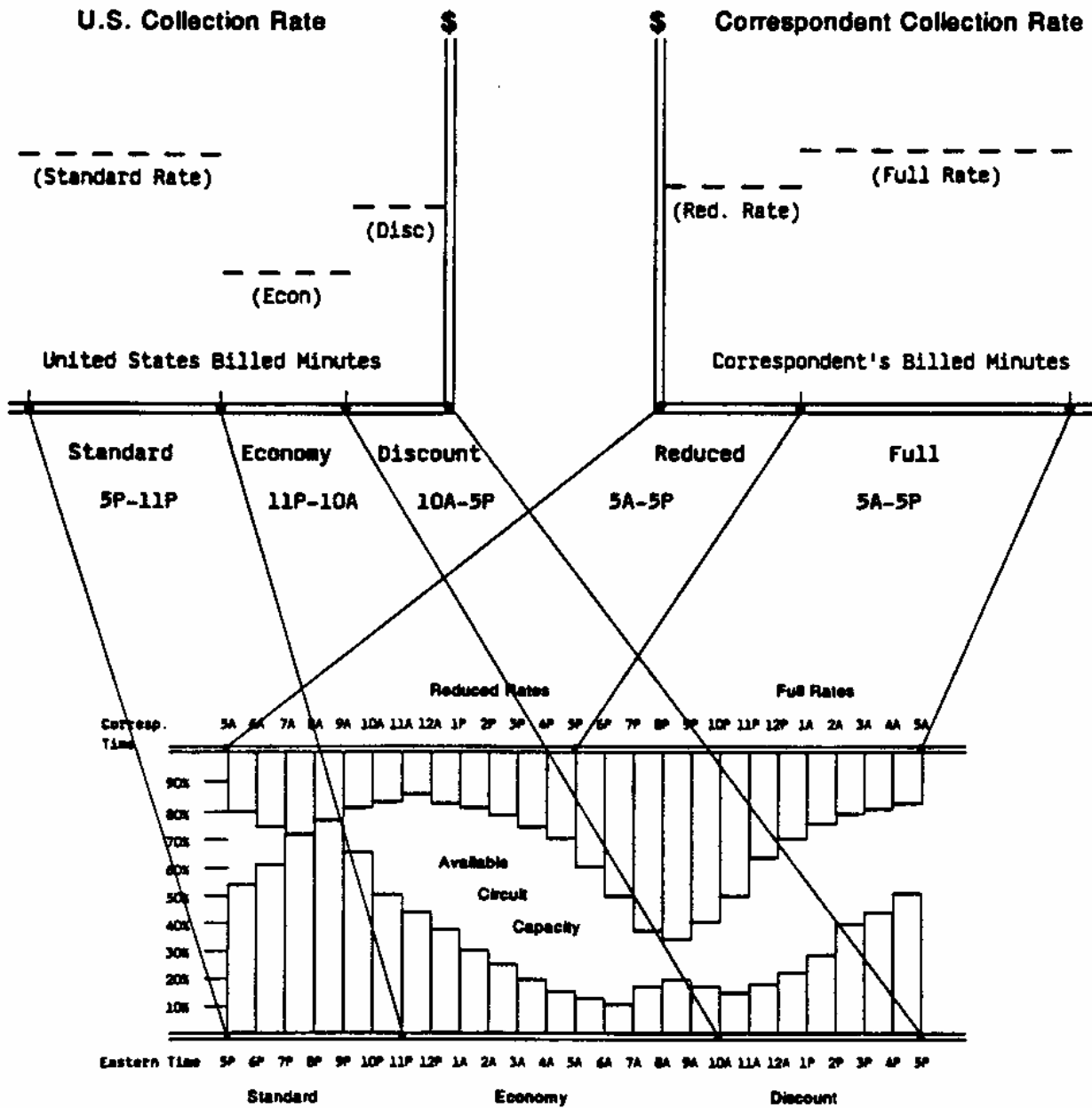
In most other countries, only two tiers of pricing are commonly used: "Full" rates for the 12-hour busy period, and "Reduced" rates for the remaining 12 hours of the day and for "weekends" (not necessarily comprising Saturday and Sunday, as in the U.S.). Regardless of the time periods applied, peak-hour pricing can discourage sharp surges in calling and minimize the construction of new facilities.

An international call placed at one time in one country may traverse facilities that reside in different time zones. When the call terminates in another country the time of day may be several hours separated from that of the point of origin. The terminating network may be experiencing a traffic peak from domestic calling patterns related to the social structure or predominant religion of this country. It becomes evident that several calling peaks may be important to the engineering of international networks: the peak load on the originating national network, the peak load on the terminating national network, and the peak load on the international facility connecting the two. While collection rates to U.S. customers can moderate calling patterns in the United States, they do not reach the behavior of customers in other nations. Since accounting rates comprise a significant cost component of the charges to customers, they can be negotiated to influence the engineering of the international network for economic efficiency.

While variations in collection rates provide incentives to telephone customers to call when one nation's facilities are most available, the correspondent country may want to discourage calling during that same period because its national network may be experiencing its peak hours of congestion. Any international calls that arrive at this time would compete for circuit capacity with domestic calls. If additional facilities were constructed to accommodate international calls, it is unlikely that they would be utilized later in the day when the domestic traffic peak has subsided. For this reason, two tiers of accounting may be negotiated. In this way an administration will have an incentive to manage the utilization of its national network not only through customer pricing but also through accounting structures with its correspondent.

Through bilateral negotiation, the two nations determine a structure that will best serve both of their interests.

Traditionally, international calling in the United States has been priced in two tiers called "Full" and "Reduced." The three-tiered customer pricing structure (called "Standard," "Discount," and "Economy" in the international environment) was introduced in May of 1982 in response to an FCC Notice of Inquiry that expressed concern for the management of international facility capacity and costs (see Figure B-2). It was hoped that higher prices during the few hours of the traffic peak would discourage calling during this time and reduce facility costs. Except for the United Kingdom and Japan, the three-tier structure implemented for collection rates has not been adopted by other countries, possibly because facility costs are not as significant to an international correspondent as the payments made to foreign countries in consequence of the accounting rates that exist between country pairs. Any gains made in the management of facility costs by one administration can be lost by another in having to build capacity for new peak hours of traffic caused by the correspondent's new pricing structures.



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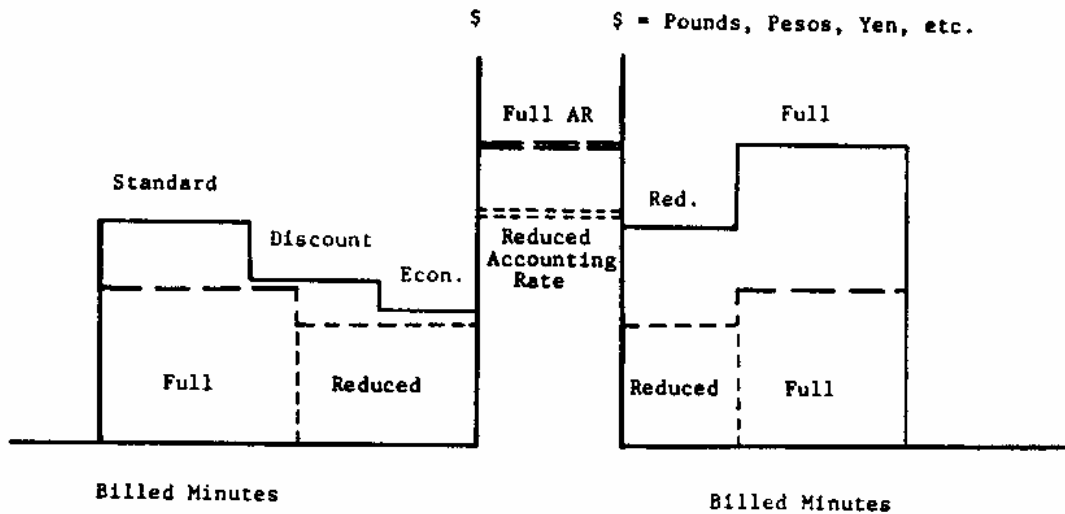
Figure B-2

International Collection Rates

For this reason and others, higher accounting rates may apply to certain periods of the day and lower rates to others: Any new rates contemplated unilaterally by one administration can result in a higher outpayment to the country that has to provide circuit and switching capacity to complete the call. Where tiered accounting structures



exist, consequently, they largely resemble the time periods for collection in other countries rather than those in the United States, since calling volumes for telephone traffic are generally higher outbound from the U.S. (see Figure B-3). Moreover, because these arrangements are the result of negotiations between administrations in consideration of peak demand on national networks, the time periods for accounting need not coincide, but could be unique to each country. Collection rate periods, as well as accounting time periods, may be completely separate between countries. Because accounting rates are negotiated, however, and must be approved by very high level officials of foreign governments, their structure changes slowly, and it is not uncommon to see price and structure changes in collection rates that are not reflected in accounting rate negotiations for some time.



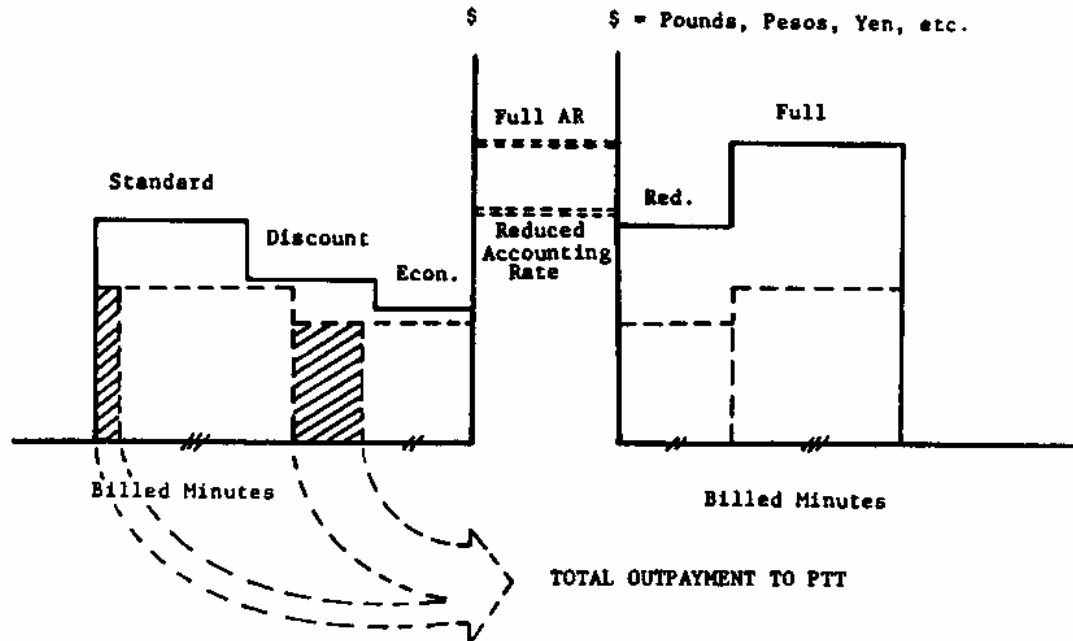
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Figure B-3

International Impacts of Rate Reductions

As collection structures and accounting structures multiply, traffic engineering and financial analyses become quite intricate and increasingly complex. Consequently, as competitors proliferate and introduce additional structures, financial analysis takes on new, political consequences between administrations. Collection rate periods

that are maintained high to discourage peak-hour calling and excessive load on the domestic networks of other countries can be easily undercut by competitive carriers. The resulting stimulation in traffic can cause construction expense for peak-hour loads on the PTTs' international facilities as well as the national network, which may be managed by a separate organization. Consequently, it is important not only to assure the proper payment in total to a foreign PTT to compensate for the use of its facilities, but also to consider the source and cause of the obligation. For example, in Figure B-4, the total outpayment to the PTT is the sum of the amounts owed for both "Full" and "Reduced" accounting periods. More of the total obligation is caused by traffic originating in the reduced accounting period, at U.S. discount and economy collection rates. Even though the payment per minute of traffic is higher for the bulk of the standard minutes, most of the imbalance of traffic that occasions the outpayment is derived from lower priced calls to the customer. If new traffic were stimulated at peak traffic hours, the U.S. outpayment would rise at a faster rate than if new traffic were stimulated in off-peak periods. Since new entrants would undoubtedly concentrate their marketing efforts where the market is most lucrative, the natural result of competition in this instance would be to increase facility costs as well as payments from the United States.

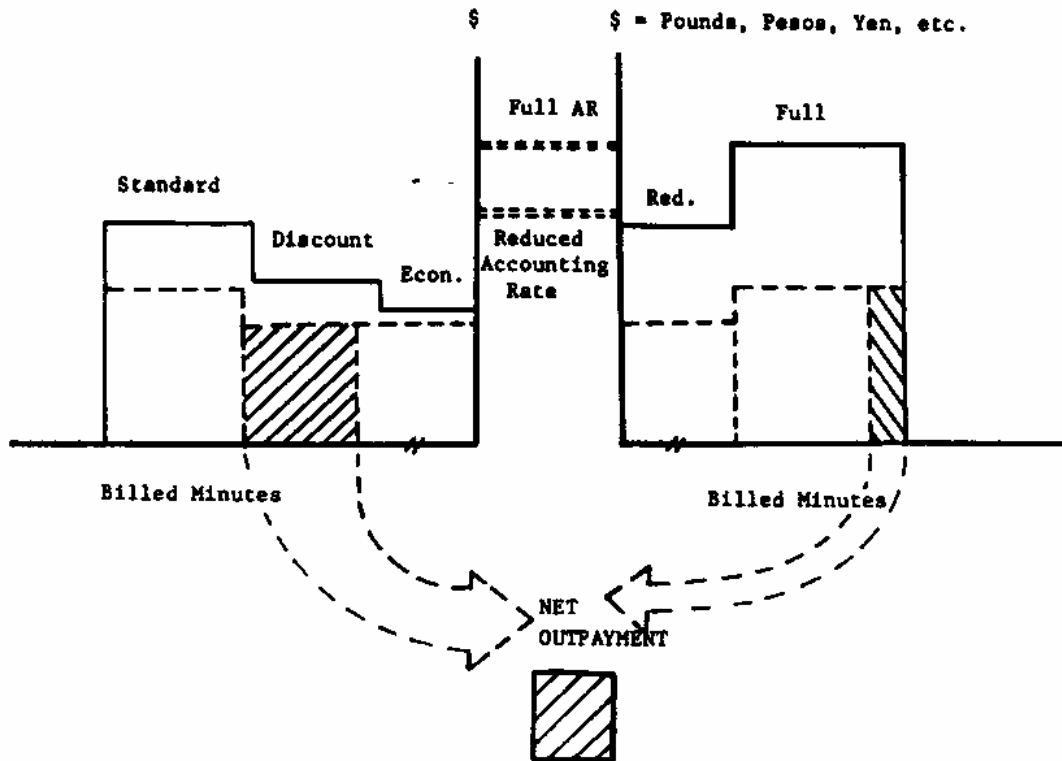


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Figure B-4

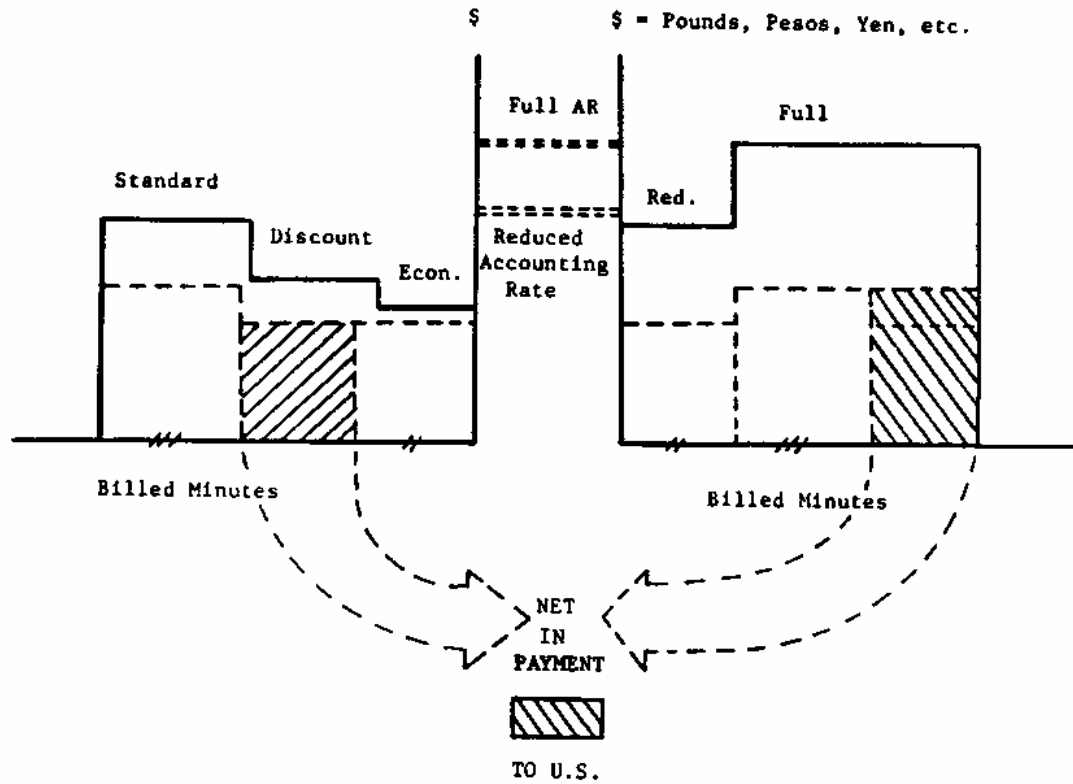
Composition of the Total Outpayment to the PTT

The situation could, indeed, be even more complicated (see Figure B-5). In this case, the U.S. outpayment derives totally from the reduced accounting period, and is even partially offset by an inbound obligation from the correspondent's full accounting period. As illustrated, the net of these obligations favors the PTT, and an amount is shown owing to the foreign country. If the traffic from the other country were extremely peaked, as happens between countries that have a very limited "window" between each nation's business calling hours, the situation could produce an imbalance favoring the United States (see Figure B-6). In this example, even though the total traffic between countries is approximately equal, the traffic is not balanced between the full accounting periods and the reduced accounting periods. As illustrated, the U.S. has a net obligation outbound for its imbalance of reduced traffic, and the correspondent has an obligation to the U.S. for its imbalance during the full accounting period. The net of these obligations produces an inpayment to the U.S.



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Figure B-5  
Net Outpayment



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Figure B-6

Net Inpayment

It is of particular significance to the competitive environment of U.S. telecommunications, and a relevant distinction between "one-minute accounting rates" (discussed in the main body of this paper) and "two-tiered accounting rates" (discussed here), that one structure may produce no outpayment for a particular volume of traffic while the other yields a net flow of funds from one country to another. This distinction reveals the averaging nature of the one-minute structure, and sheds additional light on the Uniform Settlements Policy of the FCC. While useful in protecting against "whipsawing" by PTTs, the policy may obstruct the effective management of traffic patterns for maximum network efficiency and minimum facility cost. Between competitors, the "average" accounting rate may be the same, consequently legitimizing an assertion that they are "uniform." Yet one structure may produce an outpayment, while the other does not.



APPENDIX C

REVENUE-BASED ACCOUNTING  
(APPORTIONMENT SHARE RATIOS)

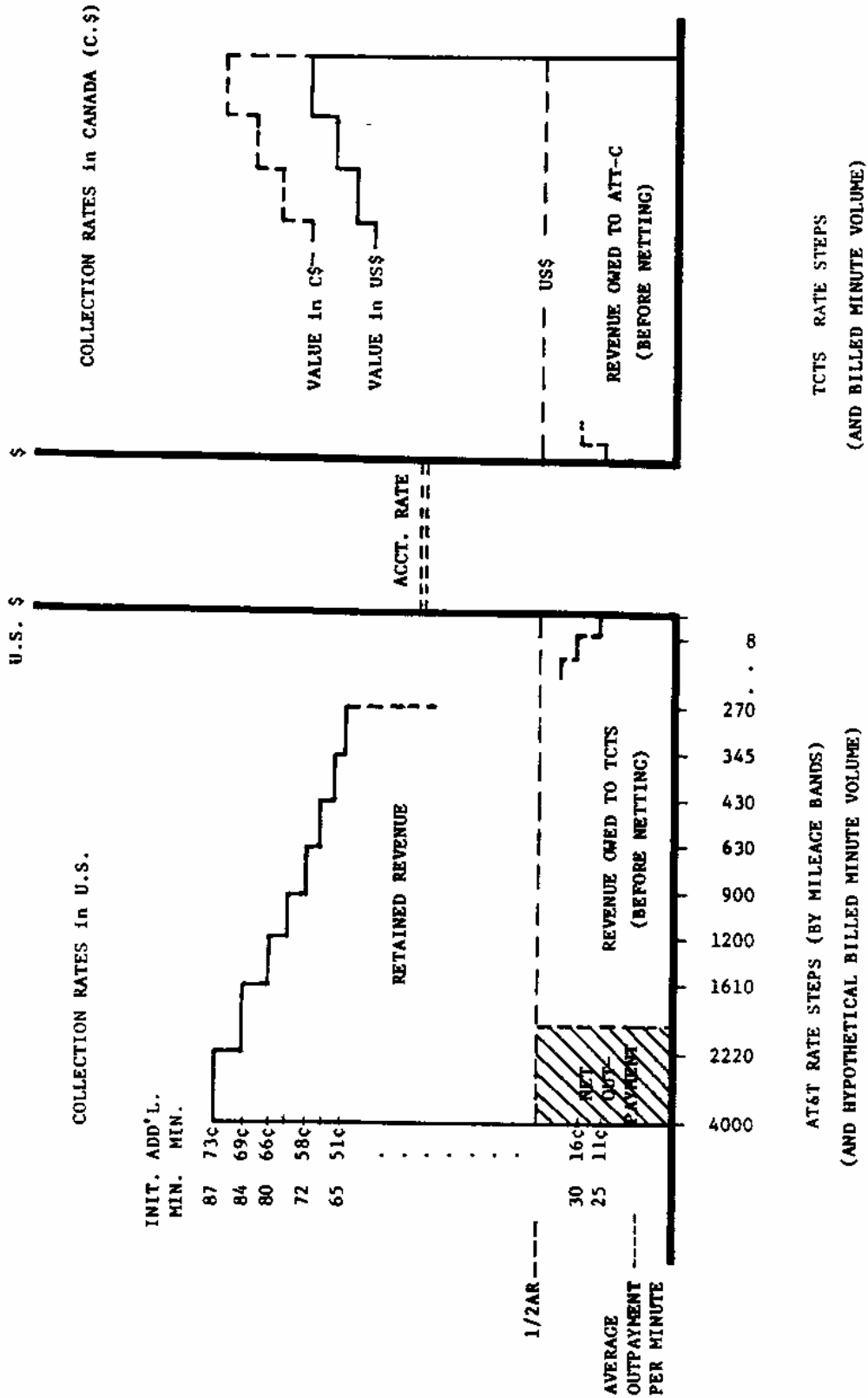
International accounting arrangements need not be based on minutes of billed traffic as under the accounting rate systems discussed in the previous chapters of text. They can also be negotiated on the basis of the revenues collected by each administration. Such has been the case between AT&T and the Trans Canada Telephone System (TCTS -- now renamed Telecom Canada). Revenue-based systems are still the principal form of compensation employed between Telecom Canada (TC) and the new U.S. international carriers such as MCI/SBS, and GTE Sprint. By precedent, these revenue-based accounting systems would also apply to CNCP, another significant Canadian carrier.

For many years, international telephone calls between the U.S. and Canada were priced under the principle of "joint thru rates." A call from New York to Montreal, for example, would be priced at the same nominal rate whether it was placed in New York or in Montreal, excepting that the revenues collected would be either in U.S. dollars or in Canadian dollars (see Figure C-1). A call from another city such as Miami or Los Angeles would be priced at a different rate step, but the return call would again apply the same joint thru rate (in Canadian currency) when the terminals of the call were the same. Because the rates charged and the value of both currencies were for all practical purposes the same, the nominal value of a "dollar," whether U.S. or Canadian, was quite convenient to use as a basis of accounting between administrations. The apportionment share ratio (ASR) method of accounting emerged between AT&T and TCTS. Each administration counted its revenues in its respective currency and compared its total against the nominal share it was due. The share itself was derived through cost comparisons and negotiations, and for many years stood at 48.26% of the two-way total revenues for the U.S. and 51.74% of the two-way total for Canada (perhaps reflecting its higher development costs in its arctic communities). The party collecting more than its apportioned share would therefore owe the other the difference between what it collected

and its ASR share. The administration would make this outpayment, half in U.S. dollars and half in Canadian dollars, to compensate for any small difference in the values of the two currencies.

While convenient as an accounting system, the revenue-based method of settlement was quite inconvenient for setting collection rates. As one administration found it necessary to adjust its collection rates, it was obligated to discuss these changes with its correspondent since both its customers and regulators would be affected by a change in joint through rates. Company officials, intervenors, and regulators on both sides of the border could delay a needed change in rates for either party. Moreover, as the value of the U.S. dollar rose dramatically in relation to the Canadian dollar (in early 1985 it stood at nearly \$1.00 U.S. equal to \$0.75 Canadian), the recovery of each administration's revenue requirements through rate changes became increasingly difficult. Application of customer surcharges to the joint thru rates did not alleviate the basic problem, and AT&T and Telecom Canada found it desirable to negotiate a change to the minute-based accounting rate system of compensation. In this way, each administration was free to change its collection rates without materially affecting the revenue share of its correspondent (see again, Figure C-1). Once renegotiated, the outpayment became a function of the imbalance of minutes of total traffic between the two administrations, rather than their total revenues. The "average outpayment per minute," however, was still negligible in relation to the revenues collected. Whether a call was made from Miami or New York to Montreal, the revenue paid to Telecom Canada was the same. Because the Canadian portion of the facilities used was virtually the same, this method of compensation made intuitive sense and was attractive to both parties. Notice that while the one-half level of the accounting rate per minute is illustrated as higher than the actual revenues collected in the lowest rate bands (e.g. from one to eight miles), the actual outpayment per minute is quite small per minute and in relation to the total traffic billed. When the traffic distributions are equal, there is no payment between administrations, and each derives its revenues from its own customer base.



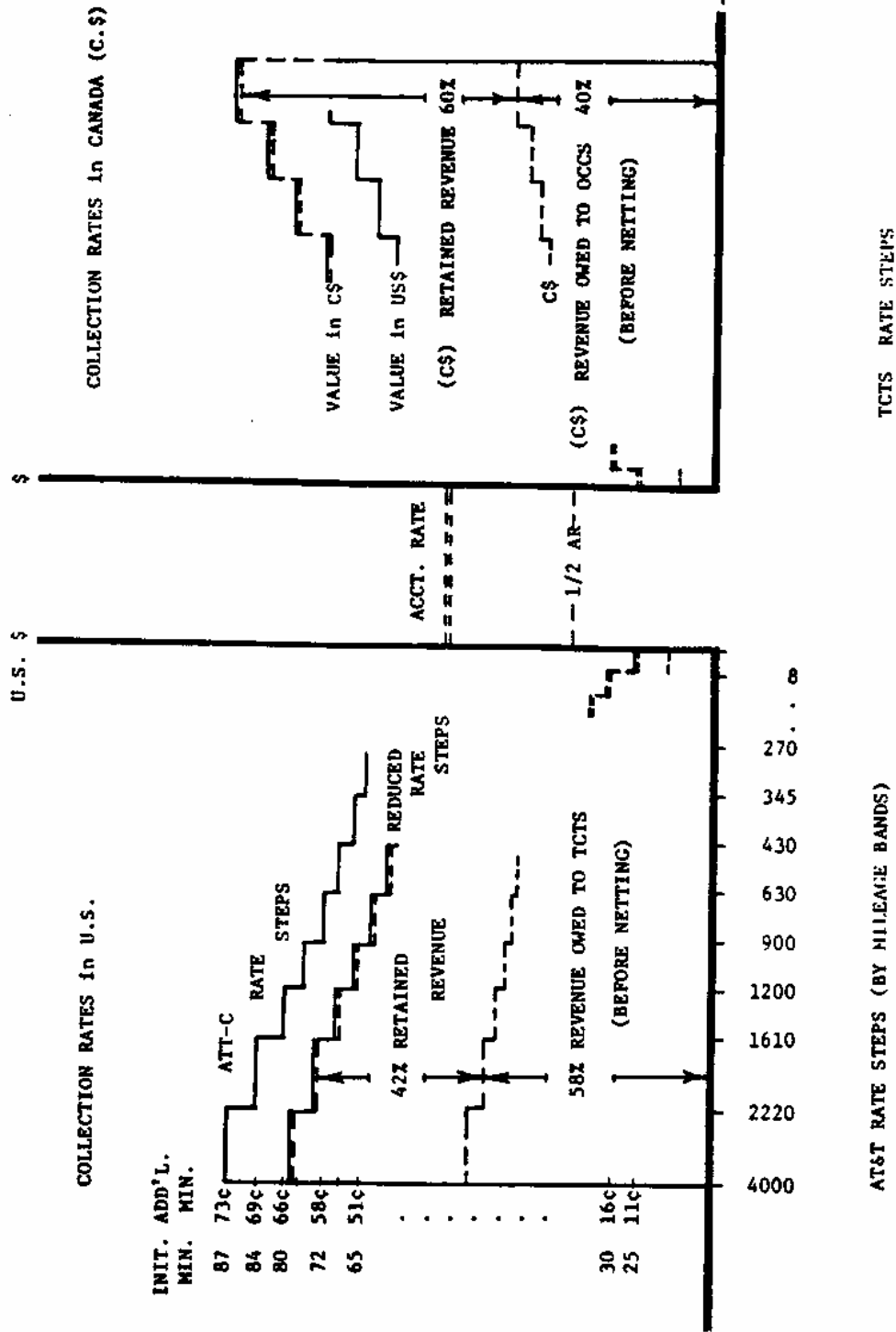


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Figure C-1

Traditional Joint Thru Rates: Revenue-Based Settlements

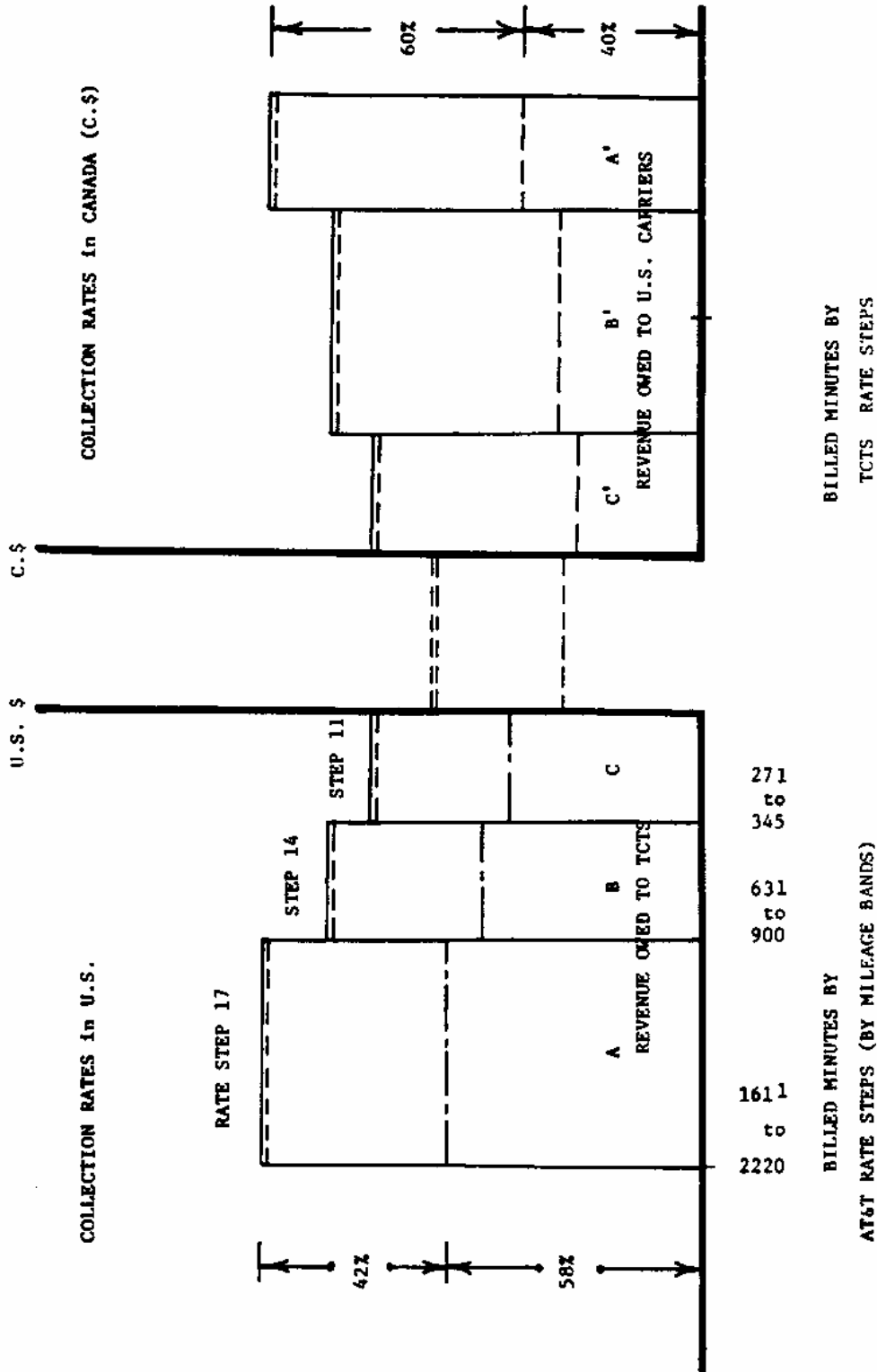
During 1983, MCI applied to the FCC for the provision of service at reduced rates between the U.S. and several Canadian cities. While MCI and Telecom Canada requested confidentiality for their accounting arrangement from their respective regulatory commissions, the Canadian Radio-television and Telecommunications Commission (CRTC) declined. Consequently, their revenue-based accounting method became part of the public record. As SBS and GTE Sprint also applied for service in 1984, their accounting arrangements also were revealed as revenue based. In broad form they mirrored the former arrangement of AT&T (see Figure C-2), but included provisions that altered the shares payable to and from Telecom Canada in favor of Canada. Since the new carriers offered collection rates advertised as "5% to 40% below AT&T," the revenue share payable to Canada under the ASR method would have been less than that received had the former ratios with AT&T been unchanged. In order to be "kept whole," Telecom Canada negotiated a 58% share of U.S. revenues, and a 60% share of Canadian revenues, leaving the new entrants with 42% and 40% of their respective billed revenues. Moreover, the payments from the U.S. were to be made 55% in U.S. currency, and 45% in Canadian (whose value at this time was approximately 20% lower than that of the U.S. dollar). Payments for traffic from Canada to the U.S. contained even more favorable conditions for the Canadians, but were less significant because most of the traffic between Telecom Canada and the new entrants originates in the United States.



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Figure C-2  
Revenue-Based Accounting

Occasionally described as "lucrative" by Canadian officials, the arrangement increased the amount of money paid to Canada per minute over that paid by AT&T, at the then existing collection rates. The full impact can be illustrated by displaying the lower rates of the Other Common Carriers (OCCs) in comparison to three illustrative AT&T-C rate steps (as a simplification of the total AT&T schedule of rates). For purposes of illustration, consider the calling volumes displayed in Figure C-3. Rate step 11 is displayed as having equal calling volumes for traffic from and to the U.S. Rate step 14 is shown as having twice as much calling volume from Canada to the U.S., as from the U.S. to Canada (it also is twice as much calling volume as from Rate step 11). Rate step 17 is shown having twice as much calling volume from the U.S. to Canada as in return. The revenues owing to the other party, per the negotiated arrangements, are displayed as rectangles A, B, and C for the U.S. carriers, and as A', B', and C' for Telecom Canada (before netting and currency adjustments).



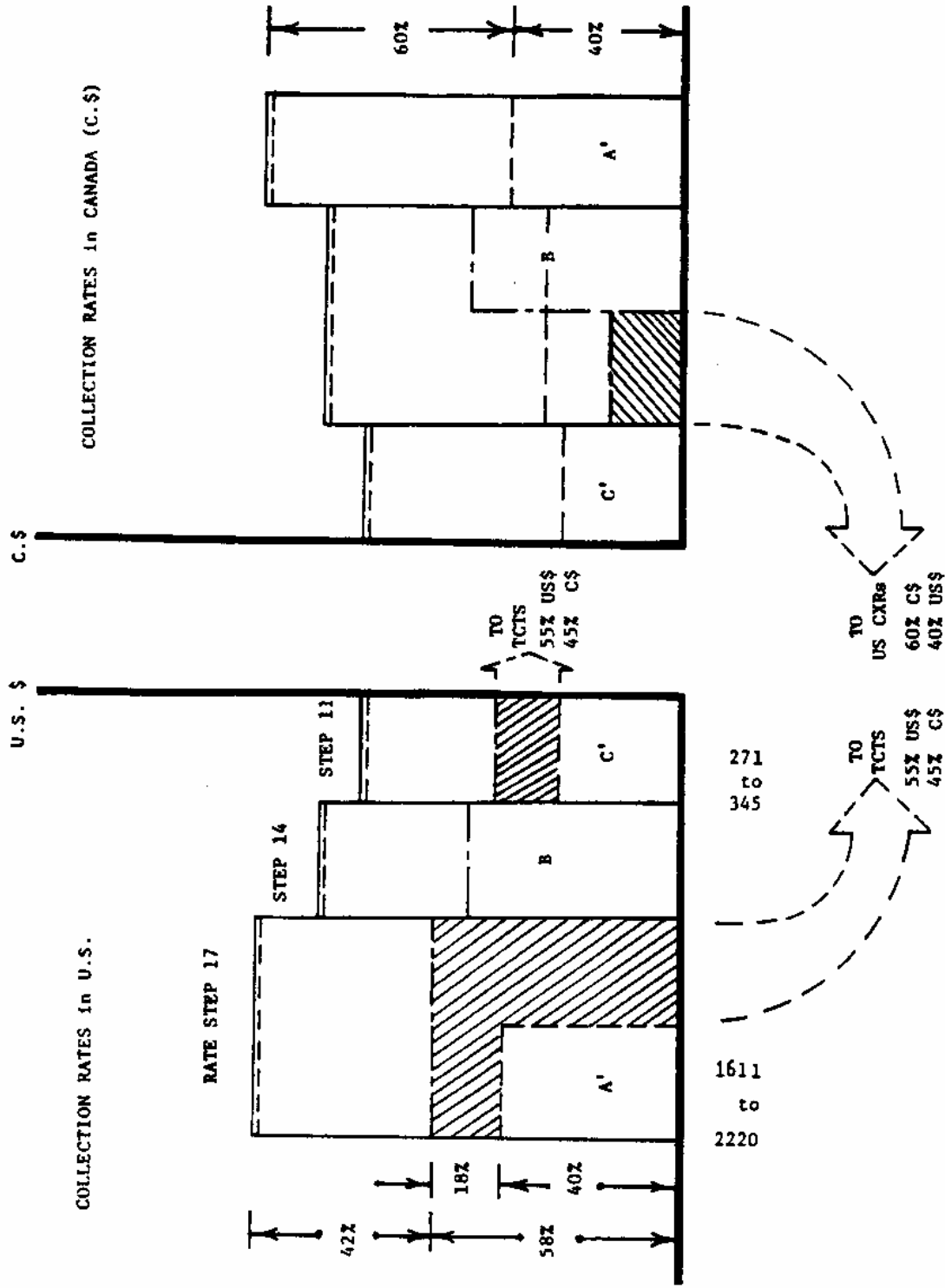
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Figure C-3

Rate Schedule with Illustrative Calling Volumes

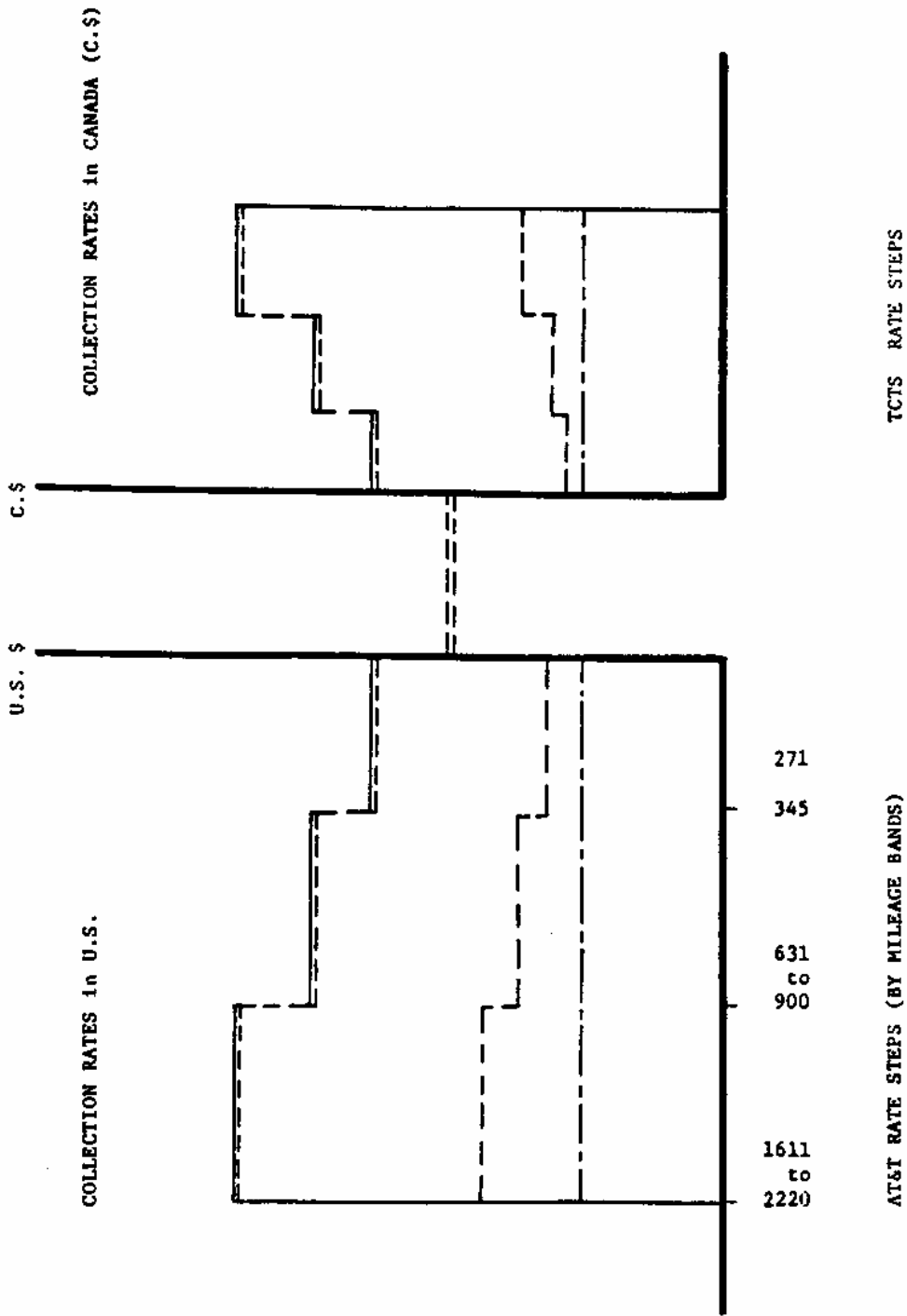
Had the settlement arrangement been the accounting rate system, no monies would be transferred because the total minutes of traffic between the two countries are the same. To find the outpayment obligation under the revenue-based arrangement, however, the individual obligations by rate step must be compared (see Figure C-4). In this illustration, the hypothetical amounts owed by one carrier are compared cell by cell (A, B, and C) with the amounts owed by its correspondent in Canada (A', B', and C'). As represented visually, A', the amount owed by Telecom Canada, is inset into A, the amount owed by the U.S. carrier. The difference is shaded, and represents the amount owed by the U.S. to Canada for rate step 17. Similarly, B is inset into B', showing a shaded difference which represents an amount owed by Telecom Canada to the U.S. for rate step 14. The shaded difference between C and C' reveals a net balance owing to Telecom for rate step 11. As illustrated, the total outpayment is comprised of two rate steps owing to Canada, and one owing to the U.S., with the difference being exchanged between administrations partly in U.S. dollars and partly in Canadian. It is clear, however, that the total dollars exchanged are more than under the accounting rate arrangement for an equivalent amount of traffic. The difference between the two represents a net outflow from the U.S. economy to Canada, a "national interest" concern, even though the U.S. customer received a beneficial rate from the new carriers, a matter of U.S. "public interest." Both the U.S. customer and Canada benefit.

In practice, a more representative illustration of the balance of U.S. traffic flows to Canada is portrayed by Figure C-5. In this example, all rate steps show a balance of traffic favoring Canada -- here displayed as a two-to-one ratio of outbound to inbound minutes. Under the accounting rate arrangement (see Figure C-6), the amount owed to Telecom Canada is represented by three shaded units, each equal to one-half the accounting rate times the imbalance of traffic per rate step. The average outpayment per minute, as illustrated, would equal one-fourth of the accounting rate -- approximately 10.5 cents.



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Figure C-4  
 Outpayment Obligation under Revenue-Based Accounting



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Figure C-5  
U.S. vs. Canadian Traffic



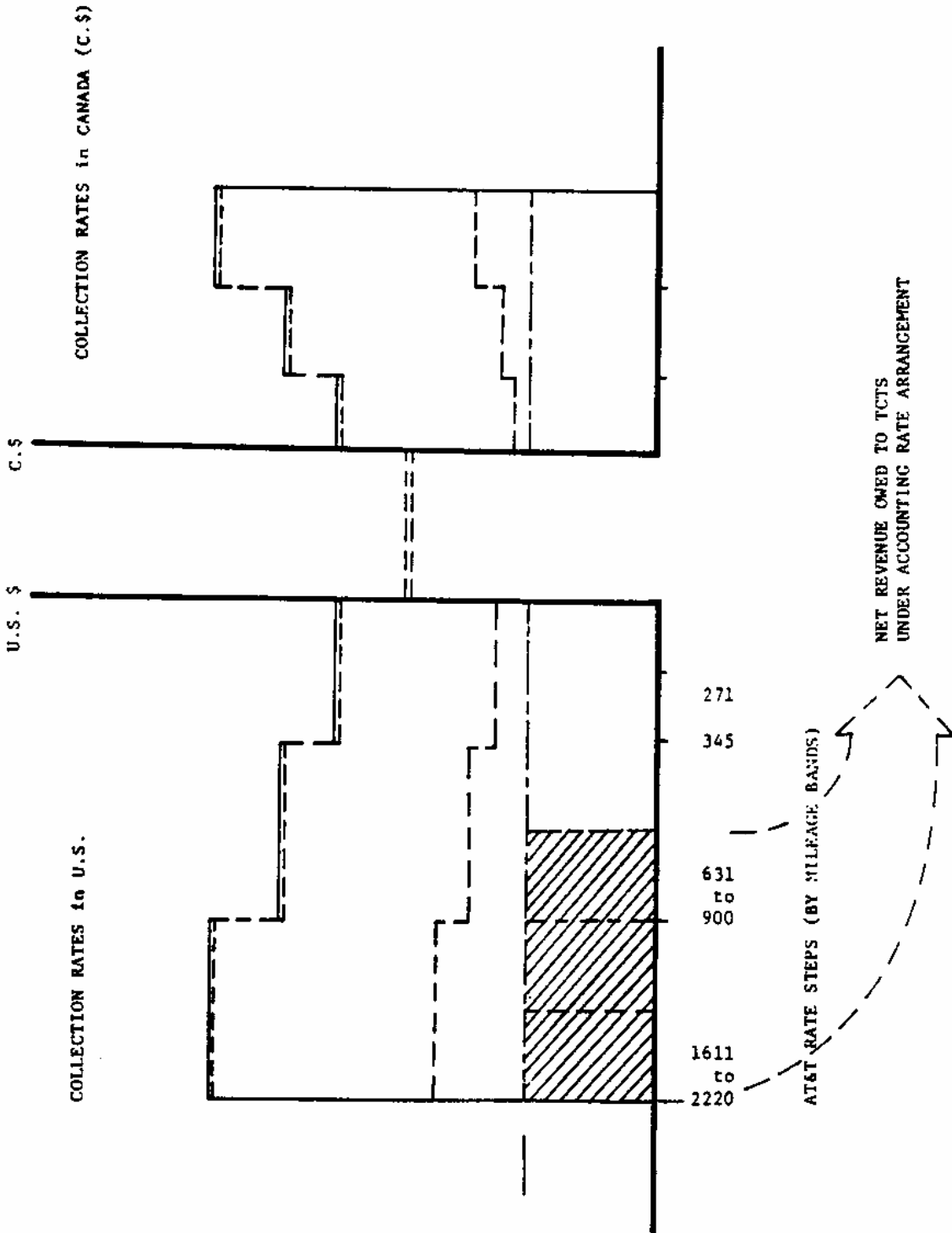


Figure C-6  
Net Revenue Owed under Revenue-Based Accounting  
Rate Arrangement

Depending upon the collection rates charged to the customer, under the revenue-based system of MCI/SBS and GTE Sprint, the amount owed to Telecom Canada is considerably more (see Figure C-7). This difference is the price of competitive entry to Canada. It also illustrates the shift in negotiating advantage in the relationship of international correspondents in a competitive environment.

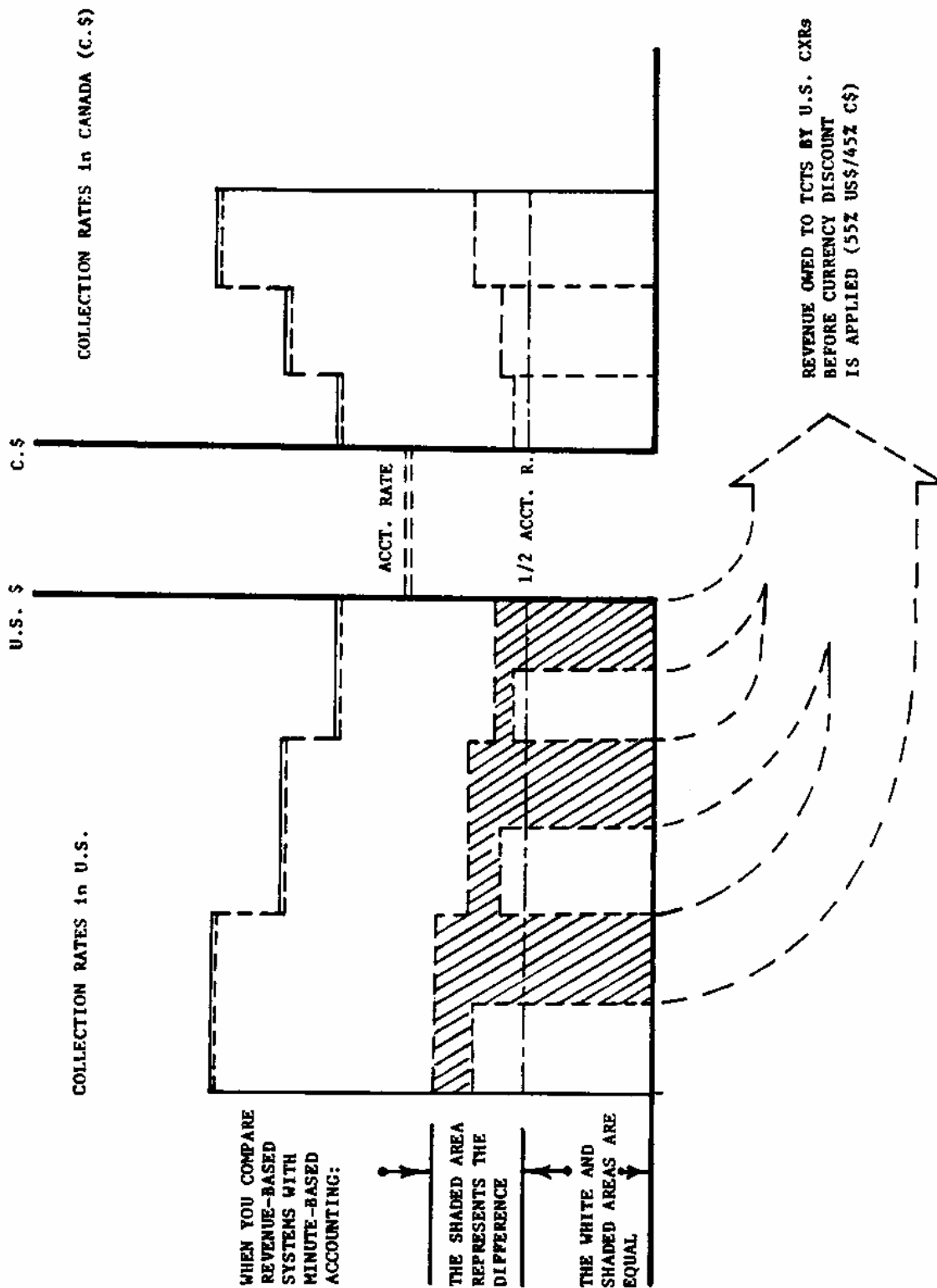


Figure C-7

Revenue-Based vs. Minute-Based Accounting



APPENDIX D

INTERNATIONAL TRANSIT ACCOUNTING

International telephone calls between two administrations are frequently routed through a third country with spare trunk capacity when the direct circuits between the two terminals are fully utilized. This is called "via" or "transit" service, and is an example of an existing competitive service that the FCC has foreborne from regulating. Using another country's facilities for transit occasions an outpayment obligation from the originating carrier, not only to the terminal country, but also to the via country that lent the use of its switching and transmission facilities. Accounting for this traffic on a usage basis can be done by either of two methods: the Switched Transit Plan (STP), or the Par Cours Plan, as discussed in the recommendations of the CCITT and negotiated between the administrations concerned. Because both plans either affect or key on accounting rates between administrations, they also bear on the Uniform Settlements Policy of the FCC.

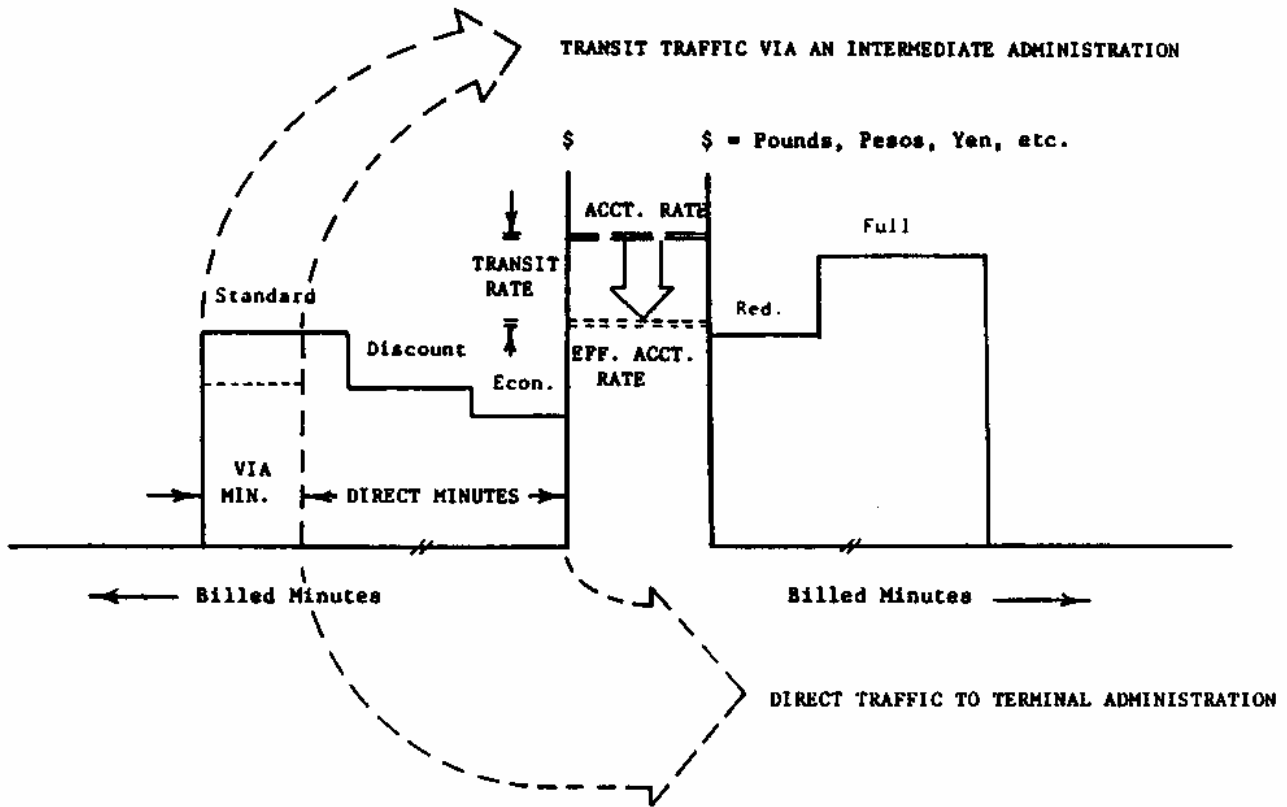
In the case of the Switched Transit Plan, rates are published by the via administration, either in Gold Francs, Special Drawing Rights, or in the currency of the country offering the transit service. These rates are frequently segregated into world regions (both originating and terminating, as defined by the administration offering the service) and can range from \$0.59 to \$0.79 per minute for terminals using the United Kingdom as a via point, for example, or from \$0.20 to \$1.25 per minute for transit of the United States. Needless to say, each country will price its services in consideration of its costs and the availability of idle circuit capacity between the desired destinations.

Time zones play an obviously important part in transit arrangements since one country may find itself ideally positioned, by virtue of its geography, to offer circuit capacity to other nations. The United States, for example, can easily serve as the via point between Pacific countries and Europe since the community of interest between these

territories peaks during hours when the facilities between the United States and both the Pacific and Europe are idle. The United Kingdom, in contrast, by virtue of its proximity to the Continent, would share the business hour peak with the Europeans and may block transit traffic, even though it has idle capacity on its circuits to the Pacific. The United States could experience a similar disadvantage with traffic to Canada, because it shares time zones and some cultural calling patterns with its northern neighbor.

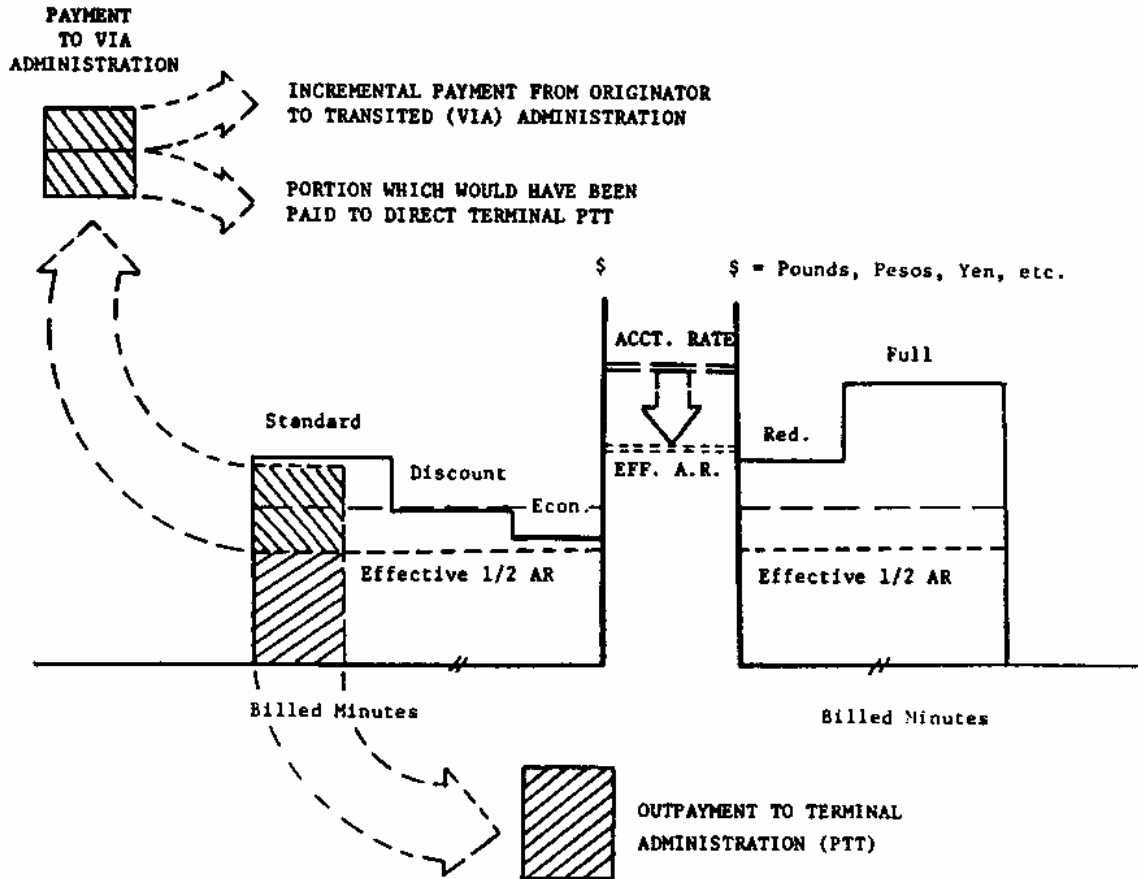
Other competitive advantages may derive from the availability of cable circuits, since satellite circuits introduce a 600-millisecond delay into the voice path (the time it takes the voice signal to reach the orbiting satellite 22,300 miles above the earth, and down again). While this single increment of delay is not significant, when two satellite links are connected end to end, the 1.2 second pause seriously degrades the quality of voice conversations. Since many countries do not have the cable capacity of the United States, the stateside carriers are important transit hubs for the rest of the world. The revenues derived from transit services support message services in the U.S.

Figure D-1 illustrates the switched transit arrangement. Of the total traffic between two administrations, a significant portion of the billed minutes is routed over direct facilities to the terminal country. The remainder, usually occurring during the peak calling hours and billed at "Standard" rates, is routed via a third country. Notice that, as a simplification, all of the billed minutes of traffic that represent the imbalance of traffic between the two administrations are illustrated as transiting the third country. This traffic, if directly routed, would have occasioned an outpayment equal to one-half of the accounting rate times the number of billed minutes (as defined by the single dashed lines in the diagram.) Under the transit arrangement, however, this payment takes a different form: The transit rate is subtracted from the accounting rate (illustrated by the lowering of the accounting rate level to the "Effective Accounting Rate.") This "EAR" is now "shared 50/50" between the two terminal administrations. (See Figure D-2).



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Figure D-1  
Switched Transit Arrangement



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Figure D-2

Effective Accounting Rate (EAR)

When the total outbound and inbound traffic volumes are compared, an outpayment is shown by the right-handed cross-hatch owing to the terminal administration (one-half the effective accounting rate times the number of imbalanced minutes). A payment is also owed to the transited administration (the transit rate times the number of transited minutes -- here equal to the imbalance minutes). When one examines the derivation of this payment, however, it is clear that one half of it would have been paid to the terminal PTT if the traffic had been directly routed. Consequently, only the other half of this outpayment represents a new obligation to the originator due to transit. In this way even the transit charge has been "shared 50/50" between administrations, and the issue of which administration should route its traffic



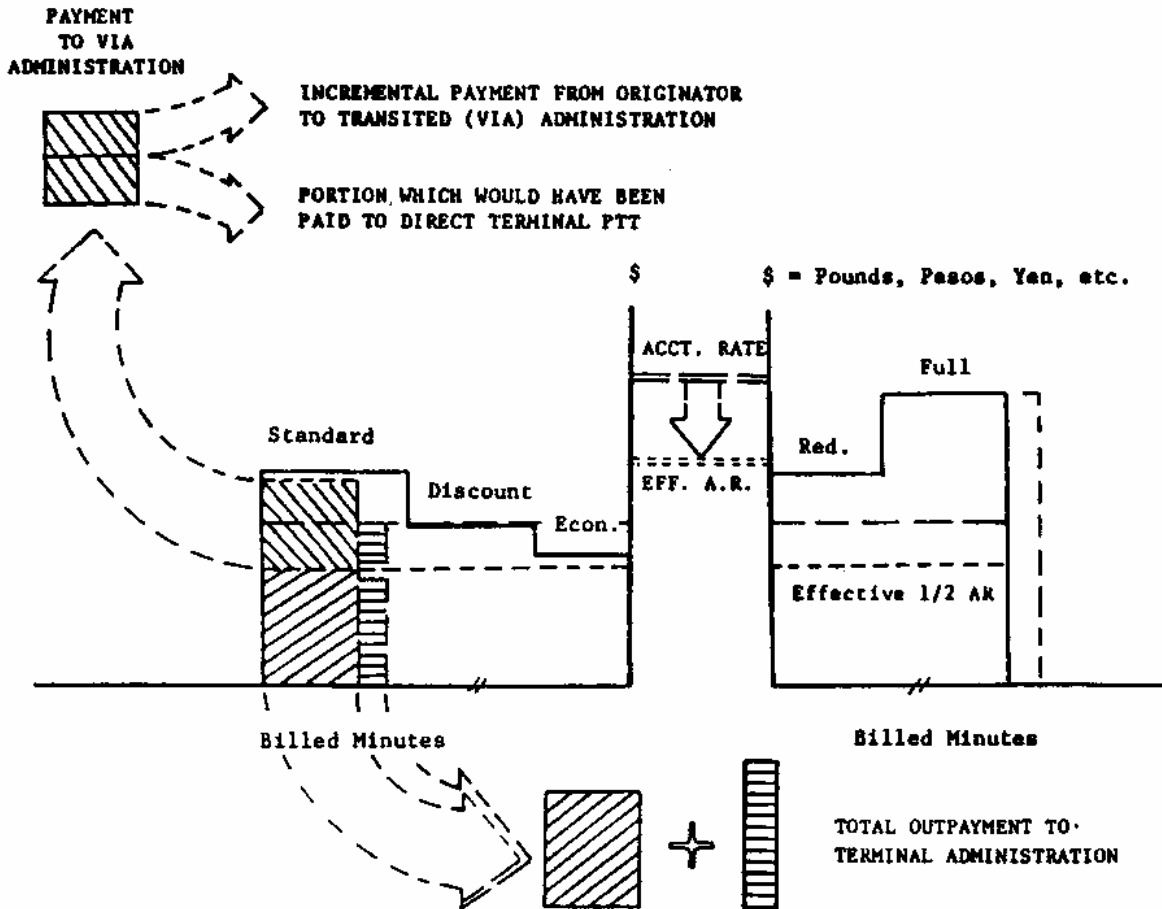
via another country is averted. Either country may economize on the use of direct facilities by authorizing an alternate route through a transit country without incurring an economic penalty greater than its correspondent. In addition, the technological development of each country does not come into question. It no longer matters if one developed country's electronic machine seizes an international circuit faster than another's less technologically advanced mechanical switcher, since each administration shares equally in the cost of transiting.

In their efforts to reach agreements for telephone service with foreign administrations, the new competitive carriers may need to make concessions to the intermediate and terminal PTTs. Any concessions, of course, may alter these financial structures. MCI, for example, has reportedly reached agreements with Greece and with Belgium to transit their administrations to other countries. The agreement with Belgium, for example, calls for routing traffic via RTT (Regie des Telegraphes et des Telephones -- the Belgian PTT) to eight other countries in Europe, the Middle East, the Pacific, and South America. Since the terminal countries do not want to receive less than their share of revenues derived from directly routed traffic from the United States, they may insist on continued payment of the one-half accounting rate share they have received from AT&T for direct traffic. The via administration could also insist on payment of both halves of the additional international facility, rather than each purchasing half circuits, as in the previous convention. The Belgians and the Greeks, in addition, would benefit by receiving transit traffic, and deriving a revenue share, from service that had previously been directly routed. (This is true unless substantial new traffic can be stimulated by customer discounts from the new entrants. These are reported to be "in the area of 15-20%," compared to AT&T's rates.) The intermediate administrations would receive full transit rate compensation for each minute of traffic. The financial effect is a net increase in the total outpayment from the United States to the foreign carriers equal to the transit rate times the number of minutes now transited. Unless the displaced traffic from AT&T comes solely from the peak hours of service, there would be no

concomitant facility savings to any U.S. carrier to offset the imbalance of payments.

While the accounting arrangements that the new entrants have forged with Canada for telephone traffic have received waivers of the Uniform Settlements Policy, the filings for service through Belgium have stated that the accounting rates would remain uniform with those of AT&T. In practice, however, while the accounting rate remains technically the same as AT&T's, its application under the transit arrangements described above would provide half again as much revenue more to the distant terminal as is paid to the intermediate carrier for transit service. The application of this surcharge could be considered "whipsawing," the price of competitive entry to American firms for access to foreign telephone markets.

Figure D-3 illustrates the situation where fewer minutes of traffic are routed via a third administration than the imbalance of traffic between terminal countries. In this case, the transit minutes are accounted as previously discussed with Figure D-2, but an additional obligation is owed to the foreign terminal for that portion of the traffic that does not transit but nevertheless exceeds the inbound direct traffic volume. It is accounted at the full accounting rate rather than the effective accounting rate that results from discounting the transit traffic (one-half the accounting rate times the imbalance of direct traffic).



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Figure D-3

Accounting for Imbalance of Direct Traffic:  
Full and Effective Accounting Rates

The Par Cours method of accounting for transit traffic is also in use around the world, even though its popularity is declining with the introduction of AT&T's switched transit plan. The Par Cours method keys on "link rates," the charge for the initial three minutes of calling for a person-to-person call between countries. This "link rate" is divided equally between the originating ("A") and transit country ("B"); a second "link rate" between the transit country and the distant terminal ("Z") is similarly divided. The transit country shares two portions of the revenue, therefore, while the two terminals receive their respective one portion each.

An example may clarify this arrangement: Consider countries A, B, and Z, with link rates of \$9.00 between A and the intermediate point B, and \$12.00 between B and Z. The shares to each of these administrations are noted in Table H.

Table H

Par Cours Method: Link Rates

	Country A	Country B	Country Z
Link Rates	\$9.00/Z	\$9.00/Z + \$12.00/Z	\$12.00/Z
Share	(\$4.50)	(\$10.50)	(\$6.00)

Notice that the portion of revenues derived by each administration varies according to the link rates. Each of the direct terminals receives a different portion of the revenue available, and the via country may receive yet another unique amount. The price of transiting for one terminal is more than the other, even though either country may generate the call that causes facility costs between them. Moreover, as link rates change between correspondents, the accounting shares for transit traffic must be revised, creating an administrative burden. For this reason, their use is declining around the world.