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TELEPHONE COMMUNICATIONS

Bypass of the Local Telephone Companies

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GAO

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Comptroller General
of the United States

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To the President of the Senate and the
Speaker of the House of Representatives

This report provides the results of our work on customers bypassing local telephone companies. We discuss the extent of and reasons for bypass, the impact that bypass may have on local telephone company revenues, and observations on some regulatory actions and proposals that address bypass.

We conducted the review because of the concern that local telephone companies could lose billions of dollars if large-volume customers avoid or bypass local telephone company facilities. The report provides the Congress information that may be helpful in oversight and regulation of the nation's telecommunications industry.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairman, Federal Communications Commission; and other interested parties. We will also make copies available to others upon request.

Charles A. Bowsher
Comptroller General
of the United States

Executive Summary

Purpose

Local telephone customers could face billions in rate increases if the local telephone companies lose their large-volume customers due to bypass. Bypass occurs when customers use available technologies, such as microwave and satellite transmission facilities, to avoid using certain local telephone company facilities. Increased local telephone rates could reduce the affordability of telephone service.

This report provides the Congress with data that will be useful in its oversight and regulation of the nation's telecommunications industry GAO's review relates to:

- the extent of and reasons for bypass. The results are based on GAO's interviews with 82 large-volume telephone users in Colorado and Massachusetts and review of 3 other bypass studies.
- the impact that bypass may have on local telephone company revenues. GAO analyzed two simulation models that can estimate nationwide bypass revenue loss associated with long-distance calls.
- observations on current regulatory actions and other options available to policymakers for addressing bypass concerns.

Background

The Federal Communications Commission is concerned about bypass because it can affect the Commission's ability to ensure that the nation's telecommunications policy of reasonable charges, universality of service, efficiency, and innovation is met.

Bypass occurs because the regulated rates of local telephone companies can exceed the costs and prices of unregulated competitive suppliers of telephone service Regulated prices can be higher because they include both the actual or economic costs of providing service and an allocated share of overhead or fixed costs of the local telephone company.

In 1982 the Commission changed its method for recovering certain interstate telephone costs, in part, as a way of limiting bypass. This "access charge" decision provided for local telephone companies to recover a part of their costs from all customers rather than a previous method that recovered these costs only from those making interstate long-distance calls. Accordingly, local telephone companies were permitted to add to their regular charges, a monthly charge for each telephone line. While the Commission has changed the amount since 1982, the current monthly charge can range up to $6.

In changing its method for recovering telephone costs, the Commission stated that the access charge decision may deter customers from bypassing the local telephone company because the decision permits a reduction in interstate long-distance usage charges. Various groups have voiced concerns about the monthly line charge because it increases telephone bills for customers who do little or no interstate calling and reduces the affordability of telephone service.

Results in Brief

GAO's survey and 3 other studies indicate that 16 to 29 percent of large-volume telephone company customers are bypassing their local telephone companies. In addition, 19 to 53 percent of the large-volume customers are considering plans to initiate or increase bypass activity. These customers were bypassing to reduce their costs and improve service and will continue to bypass for these reasons.

Bypassing could significantly reduce local telephone company revenues. For example, the Bell operating companies estimate that the loss of 1 percent of their business customer locations could represent from 14 to 48 percent (depending on the state) of their total long-distance revenues. GAO's review of two simulation models showed that the two models overestimated the actual amount of 1984 revenues that local telephone companies could have lost in interstate markets due to bypass. Despite their weaknesses the two models do indicate that substantial future revenue could be lost.

The Commission initiated in June 1986 an evaluation of bypass issues and its access charge decision Because increased bypass could reduce telephone service affordability, GAO agrees with the Commission that a reassessment is needed which addresses specifically the relationship between bypass actions and national telephone goals, including universal service and reasonable charges.

GAO's Analysis

Extent of and Reasons for Bypass

From its interviews, GAO found that 20 out of 68 large-volume customers were using bypass systems. Of the 68 customers, GAO found that 25 had future bypass plans, including the 14 who already had bypass systems and 11 others. These bypassers were continuing to use local telephone companies for more than 75 percent of their telecommunications use.

GAO also found that (1) bypass systems are being used for both voice and data transmissions, (2) several bypass technologies are being used, with the most popular being microwave, cable/wire, and fiber optics, and (3) the typical bypass system is owned and used by a single company for mostly local or intrastate services.

The customers reported that they were bypassing because the telephone company could not provide a particular type of service or could not provide the same reliability, flexibility, and security that a bypass system can. The customers also said that bypass alternatives offer similar services at a lower cost and allow them to better control and budget for telecommunications service.

Impact on Revenues

GAO found that no definitive studies are available to show the impact that bypass could have on local telephone company revenues. However, in late 1984 the Commission's staff and Bell Communications Research developed simulation models that determine how interstate access revenue could decrease due to bypass in a fully competitive market. The two models suggest widely differing losses at current prices—the Commission model suggests $4 billion while Bell Communications Research suggests a $10 billion loss per year. As a matter of perspective, local telephone company revenues were about $74 billion in 1984, of which $14.5 billion were from interstate access services regulated by the Commission.

The two models contain estimates of revenue loss due to bypass. However, the model results were not precise and should not be used as forecasts of revenue loss. The models overestimate near-term bypass because they assume that all customers and long-distance carriers have fully adjusted to financial incentives to bypass. In practice, such adjustments may take some time, during which market conditions are changing so that the actual outcome can be expected to vary from the model results

Observations on Current Regulatory Options

GAO's review of survey and simulation model results demonstrates limitations with the current bypass data available to address the question of how effectively the access charge decision will deter the undesirable consequences of bypass associated with long-distance calls. The decision has been criticized for its potential negative impact on two of the nation's telecommunications goals—reasonable telephone charges and universal service In response, the Commission has reconsidered and

modified its original decision, in part, to give local telephone companies more flexibility to set charges for interstate access services. In addition, the Commission initiated a review in June 1986 of the effect of its access charge decision, including bypass issues. Other regulatory options have been proposed by states and other interested parties that are available for further consideration by the Commission. These include reducing the regulatory control over local telephone companies and changing the pricing structure for certain telephone services.

Recommendations

GAO is making no recommendations

Agency and Industry Comments

GAO requested comments on a draft of this report from the Commission and Bell Communications Research. The Commission's Managing Director stated that overall the report reflects the views of the Commission. The Director, Regulatory Policy Analysis of Bell South Corporation (previously Director of Governmental Affairs at Bell Communications Research and responsible for the bypass model), commented that the critique of Bell Communications Research bypass model was fair and well reasoned. Both commenters also suggested clarifications or revisions which were incorporated where appropriate.

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Abbreviations

AT&T	American Telephone and Telegraph
BCR	Bell Communications Research
BOC	Bell operating company
FCC	Federal Communications Commission
GAO	General Accounting Office
LATA	local access and transport area
LTC	local telephone company
MCI	MCI Telecommunications Corporation
MTS	Message Telecommunications Service
NECA	National Exchange Carrier Association
OCC	other common carrier
PBX	private branch exchange
PSTN	public switched telephone network
PUC	public utility commission
SDN	Software Defined Network
SLC	subscriber line charge
WATS	Wide Area Telecommunications Service

Introduction

Telecommunication users "bypassing" the local telephone company and the potential impact on local telephone rates have emerged as significant policy concerns to the Congress, the Federal Communications Commission (FCC), and state legislatures and regulatory commissions. Bypass occurs when customers (usually large businesses) do not use the local telephone company facilities that are widely used by the general public to meet all or a portion of their communications needs. Instead, customers use alternative facilities for their telecommunications services and thus bypass the local telephone company. Since the revenues from these large businesses comprise a sizable share of local telephone company revenues, their loss could induce the local telephone company to recover its costs through increased rates to remaining customers. Increased rates may reduce the likelihood of the nation maintaining two of its telecommunications goals—universality of service and reasonable charges.

Bypass of the local telephone company is not just a recent occurrence. In the past two decades, many organizations bypassed the local telephone company to meet specialized communications needs not generally offered to the public. For example, utilities and railroads established private telecommunications systems for their monitoring and emergency purposes. Telephone companies also provided certain services to their customers over specialized facilities that differed from those available through their switched network.

However, rapid technological change in the telecommunications industry has paved the way for a more competitive industry structure which can encourage alternative providers to offer services that bypass the general offerings of the local telephone company. One contributor to this change has been the development of alternative transmission technologies such as microwave and satellite systems.[1]

Telecommunications users now have greater choices of telecommunications services, with many more providers and a wider range of transmission technologies. Users have the opportunity to consider the telecommunications service provider's price, quality, and technical capability before choosing their telecommunications service. Price is a particularly important factor, since regulated telephone company prices may not reflect the actual cost the telephone company incurs in providing the service and may be higher than the prices charged by other providers. If regulatory pricing policies do not enable the local telephone company to

[1]Alternative technologies are described in appendix V

offer prices that compete with alternative providers, users have an incentive to select a provider that can offer a similar service at a lower price, and thus bypass the local telephone company.

The regulatory concern regarding bypass focuses on the potential adverse impact that bypass could have on available, affordable telephone service, especially residential service. Large numbers of customers reducing subscribership to telephone company services could reduce telephone company revenue to the extent that the company might have to cover its costs by raising its rates to remaining customers. Rising service rates could lead to more bypass, further rate increases, and a loss of residential subscribers. If many subscribers can no longer afford telephone service, then the effects of bypass could limit satisfying the nation's goal of universal service—providing widespread telephone service to the American public.

Regulatory and Congressional Actions on Bypass

The Congress, FCC, and state regulatory commissions, each with a responsibility for regulating the local telephone company, have expressed concerns about the potential effects of bypass on local telephone company rates and subscribership. Their concerns have led them to consider whether a need exists to change both the way the local telephone companies are regulated and the way services, particularly access for interstate long-distance services,[2] are priced.

Bypass was a significant issue in an FCC proceeding dealing with the pricing of access for interstate long-distance services. In December 1982, FCC decided that the traditional practice of recovering a large share of the costs of the local telephone company from interstate long-distance calls was inefficient and led to discrimination among users. FCC also determined that this method of pricing provided incentives for high-volume customers to bypass the local telephone company's facilities for access to interstate service. Without a change in pricing, FCC was concerned that bypass would lead to increases in local telephone rates and, therefore, pose a threat to continued customer subscribership.

FCC, therefore, adopted its access charge decision (93 FCC 2nd 241 (1983)), which changed its method of pricing for interstate long-distance access services. Before the access charge decision, costs for interstate access were included in customers' interstate long-distance rates, thus

[2]Access for interstate long-distance service is one service offered by the local telephone company that enables customers to make long-distance calls (See ch 2)

recovering the interstate allocation of local telephone company costs only from those who made long-distance interstate calls. With the access charge decision, this method of pricing changed to include a flat monthly charge to all subscribers. Through this "subscriber line charge," FCC planned to recover certain costs of the local telephone company from all subscribers rather than only from those who make interstate long-distance calls by requiring them to pay flat monthly charges ranging up to $6 per month per line. The subscriber line charge has the effect of increasing each customer's telephone bill by the amount of the charge; but at the same time, it decreases the customer's per-minute charge for interstate long-distance calls.

State regulatory commissions, consumer representatives, many small and rural telephone companies, and others voiced concern over these subscriber line charges because of the potential impact on rates and customer subscribership. Their concern was that requiring subscribers to pay additional charges could raise the total cost of telephone service for those who make limited use of interstate long-distance service and, consequently, could cause some residential subscribers to discontinue telephone service.

The Congress also expressed concern about the impact of the subscriber line charge on telephone affordability and subscribership. During the 98th Congress, the House of Representatives passed legislation which prohibited subscriber line charges for residential and single-line business customers. The Senate considered legislation (S. 1660) to postpone such charges for 2 years while further study on issues such as bypass was conducted. In February 1984, FCC decided to implement the subscriber line charge on multiline businesses but postponed the charge for residential and single-line business customers while it studied the bypass issue. Consequently, congressional action on the subscriber line charge was suspended.

FCC, in March 1984, initiated a study of bypass and issued its findings in a December 1984 report. At the same time, in a separate action, FCC modified its access charge decision in which it established a subscriber line charge for residential and single-line business users limited to $1 per month beginning in June 1985 and capped at $2 beginning in June 1986. Any increase in this amount will be subject to further study. Accordingly, FCC began proceedings in June 1986 to determine whether any modifications to its plan are necessary. Bypass again is likely to be a significant issue in FCC's determination.

The Nation's Telecommunications Policy Goals

The Communications Act of 1934 (47 U.S.C. 151 et seq.) provides FCC's enabling legislation. Title I of the act contains the national policy for common carrier[3] telecommunications. The act created FCC

"...for the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges "

FCC in recent years has interpreted this policy statement, although general in nature, to encompass several goals—efficiency, universality of service, reasonable charges, and innovative services.

FCC's Common Carrier Activities

FCC is an independent federal agency headed by five commissioners, one of whom serves as Chairman. Commissioners are appointed by the President and approved by the Senate for terms not to exceed 5 years. The commissioners supervise all FCC activities, delegating responsibilities to staff units, bureaus, and committees of commissioners.

In fiscal year 1986, FCC budgeted about $12.5 million and 332 staff positions for its common carrier activities Most FCC work in this area is carried out by its Common Carrier Bureau, whose functions include

- developing, recommending, and administering common carrier policies;
- conducting adjudicatory and rulemaking proceedings, including rate and service investigations;
- determining the lawfulness of carrier tariffs;
- acting on applications for service, facility, and radio authorizations;
- reviewing carrier performance;
- conducting economic research and analysis;
- administering Commission accounting and reporting requirements;
- conducting compliance and enforcement activities; and
- recommending, for FCC prescription, annual depreciation rates for classes of communications plant.

Objectives, Scope, and Methodology

Our objectives in this review were to (1) obtain information about bypass of local telephone companies and (2) provide the results to the Congress for its use in oversight and regulation of the nation's telecommunications industry. Specifically, we are providing information on

[3]A common carrier is a company, organization, or individual providing wire or electronic communications services for hire

(1) the extent of bypass, (2) why bypass is occurring, (3) the impact that bypass may have on telephone company revenues and rates, and (4) current and proposed regulatory policies that might deter bypass.

To understand bypass and the telecommunications environment, we obtained legislative and regulatory histories on the domestic common carrier industry, all recent FCC decisions, and information collected and presented by FCC in its bypass proceedings. This included our reviewing responses to FCC's (1) March 1984 request for information on bypass, (2) access charge proceeding, and (3) investigation of certain tariffs. We also obtained information at several state commissions, including all information provided to the New York State Public Service Commission investigation of bypass. We also interviewed numerous officials from FCC, state public utility commissions, local telephone companies, and interexchange carriers such as American Telephone and Telegraph (AT&T) and MCI Telecommunications Corporation (MCI).[4] In addition, we hired six consultants knowledgeable in the field of telecommunications. The consultants met with us to discuss relevant issues and to identify specific information we would need for our review. They also reviewed our technical analyses and draft material and provided comments. These consultants are listed in appendix I.

To determine what is known about the extent of bypass and why telecommunications users bypass the local telephone company, we obtained numerous surveys conducted for telephone companies, user groups, and other organizations. We used only published survey information or information presented to FCC. We did not evaluate the validity of the data or the methodologies used for the various surveys. Additional information about the surveys we used is contained in chapter 3 These surveys are listed in Appendix II. In addition, we interviewed 82 organizations in Colorado and Massachusetts that currently bypass or are likely to consider bypass in light of their large telecommunications costs. We chose telecommunications users in these two states because both had large metropolitan areas where a variety of large businesses are located. As noted earlier, large businesses are generally viewed as the most likely bypass candidates. The organizations we interviewed do not represent a statistically valid sample. Our results are not projectable to overall bypass activity in either Colorado or Massachusetts nor are bypass activities in these states necessarily representative of bypass activity in other states. From these interviews, however, we obtained useful information on these organizations' bypass activities, their reasons for

[4]An interexchange carrier is a provider of telecommunications long-distance service

bypass, and their use of local telephone company facilities Appendix III contains summary information on the organizations we interviewed and the methodology we used to select interviewees.

To determine the impact of bypass on telephone company revenue and telephone rates, we reviewed the available information on revenue loss due to bypass. Most of the information did not focus on historical evidence but presented estimates of potential revenue loss due to bypass for interstate services. We considered all nationwide and regional economic estimates but concentrated on the estimates by Bell Communications Research (BCR) and FCC.[5] As chapter 4 details, the two models we reviewed were the only available simulation models that were nationwide and structured to allow for our analysis BCR actually developed two models. One was detailed and widely circulated. The other, a more abbreviated model, was made available to FCC and GAO. Since BCR was not able to fully document the detailed model due to its proprietary data, we could not fully evaluate its logic or assumptions. Thus, we analyzed the abbreviated model which, BCR suggests, corresponds to the detailed model in approach, assumptions, and results. To assess the quality of the data and the limits of the specific models, we (1) evaluated the models in terms of standard economic modeling approaches, (2) discussed the models with FCC and BCR staff and certain model alterations with FCC staff, and (3) considered additional cost information and tariff offerings.

Finally, as a basis for discussing how bypass activities and goals of the Communications Act of 1934 would be affected by current and proposed regulatory decisions concerning bypass, we considered (1) the act's legislative and regulatory histories as well as recent FCC decisions, (2) the economic information on public utility regulation and industrial organization as it applies to telecommunications, (3) information collected and presented by both FCC and the New York State Public Service Commission in their investigations on bypass and related matters, and (4) information from the states on current and proposed regulatory activity concerning bypass.

[5]The FCC model is not an official document of the FCC Instead, it is a staff working paper which was prepared by FCC's Office of Plans and Policy

Our field work was conducted from June 1984 through April 1985 at FCC headquarters, Washington, D.C.; the New York Public Service Commission, Albany, New York; and at several locations in Colorado and Massachusetts. We performed our work in accordance with generally accepted government auditing standards.

How This Report Is Organized

In addition to this introductory chapter, this report contains four key chapters as described below:

Chapter 2 provides the background for understanding the telecommunications industry and the services it provides. It details the structure of local telephone company facilities and discusses how bypass generally avoids use of these facilities. Readers who have sufficient working knowledge of the communications industry and local telephone company facilities may wish to go directly to chapter 3 after reading chapter 1.

Chapter 3 discusses the results of several surveys conducted by other groups and our interviews with telecommunications users. Included is information on the amount of bypass, characteristics of bypass, reasons for bypass, and impact of bypass on use of telephone company services.

Chapter 4 contains information on how bypass affects telephone company revenues and rates. It assesses two simulation models that evaluate the potential for revenue loss due to bypass of interstate access services.

Chapter 5 presents observations on bypass regulatory actions. It also discusses current and proposed regulatory policies affecting the local telephone company and whether these policies could both mitigate adverse bypass effects and continue to achieve the nation's telecommunications goals.

Understanding How Bypass of Local Telephone Company Services Has Developed

Bypass of the local telephone company is now more viable due largely to the evolution occurring in the telecommunications industry. Domestic common carrier telecommunications is changing from a highly monopolized structure to a more competitive one. To obtain a detailed understanding of bypass, one needs information about the telecommunications common carrier industry—particularly the domestic transmission market—the services it provides, and the technical elements that establish its structure. This chapter addresses the following four questions that are beneficial for an in-depth understanding of bypass:

- What telephone transmission services are available?
- How has the domestic transmission industry changed to provide users with more alternative carriers?
- What essential features of the local telephone company provide transmission services?
- How does bypass of the local telephone company occur?

Telecommunications Transmission Services

Voice telephone communications is the primary telecommunications transmission service in the United States. Other services include transmission of telegraph, data facsimile, and radio and television programming. The common carrier industry provides these services for hire in the form of local or long-distance services. Both local and long-distance services include "switched" services, which allow customers to reach numerous points not specified in advance, or "dedicated" services, which allow customers to reach only specified locations. The following describes the major categories of local and long-distance services.

Local Services

Local services range from basic telephone service used by most residential customers to more specialized services used primarily by businesses.

Local Exchange Service is a service that provides users with the ability to originate and receive calls within a defined local calling area. It also allows users to access multiple interexchange carriers through its switched network. This basic service is typically provided under a tariff[1] that allows the customer either flat-rate or measured-rate billing. With flat-rate billing, the customer can make an unlimited number of local calls for a fixed monthly charge. With measured-rate billing (also

[1]A tariff is filed with FCC and state public utility commissions and provides a schedule governing any generally applicable charge, characteristic, regulation, or practice associated with a regulated telecommunications service

called measured service), the customer pays a lower fixed rate plus an additional charge for local calls in excess of a specified monthly allotment.[2]

Two services that are used mostly by businesses are Centrex and tie line. Centrex is a switched service that provides special features such as calling within an intracompany location by dialing only a few numbers. Like the basic service, Centrex has the ability to originate and receive calls within a defined calling area and provide access to interexchange carriers. Tie line is a dedicated service used to link, on a continuous basis, two or more private branch exchanges (PBXS) in different locations. PBXs are private switching systems that are usually located on the user's premise to serve the telephones at that location.

The local telephone company also provides access services that enable customers and interexchange carriers to access one another Switched access is a service that uses the local company's switched facilities to access the interexchange carrier. As mentioned above, switched access is a component of local exchange service. It is billed on a per-minute-usage basis. Special access is a service that does not use the local company's switching facilities. Instead, the local company transmits the call to the interexchange carrier over a line dedicated to the customer's use Special access is billed on a flat monthly basis.

Long-Distance Services

Long-distance services generally provide transmission between two or more local calling areas. These services can be provided using switched or dedicated facilities. These services are generally provided on both an intrastate and interstate basis. The following describes long-distance services provided by AT&T. Other interexchange carriers offer similar services which are often referred to as "like" services.

Message Telecommunications Service (MTS) is a switched service that permits a user to reach potentially any telephone customer in the United States. It is used by both residential and business customers and is the most frequently used long-distance telecommunications service. The customer is generally billed for this service on a message-by-message basis.

[2]Measured service charges per local call can also vary by the time of day, day of the week, distance, and length of call

Wide Area Telecommunications Service (WATS) is a switched service that is similar to MTS. Customers are predominantly businesses with a substantial volume of long-distance calls to or from a wide geographical area. WATS permits a customer to be billed based on volume rather than on a per-minute basis. WATS customers are billed on the basis of the service areas from which they choose to receive or originate calls. For example, for an interstate WATS customer, the United States is divided into six service areas, or bands, that extend outward from, but do not include, the customer's home state. Service area 1 contains the states contiguous to the home state (but not including it) and sometimes one or two nearby states. Each successive service area includes the previous service area plus additional states. Service area 6 encompasses the entire United States (including Alaska, Hawaii, and Puerto Rico) but not the home state. Intrastate WATS is also available in most states. However, under current tariff provisions, customers must purchase separate lines to terminate interstate and intrastate WATS calls.

Megacom is a switched service that requires customers to make arrangements for access via their own facilities, AT&T private line service or local telephone company special access service. Megacom has both a flat minimum monthly charge and distance and usage sensitive charges. AT&T began offering Megacom service in November 1985. It differs from previous AT&T services, since the access portion of the long-distance service is provided separately. The demand for Megacom service comes primarily from businesses.

Private line services are services provided between or among two or more points over facilities dedicated to a particular customer's use. Various types of services are available on a private-line basis, including voice, data, facsimile, and audio/ video programming transmission The demand for private line services comes primarily from businesses.

While many private line services can be approximated using switched services, private lines offer the following advantages:

- Private lines incur a specified charge that is independent of the amount of use. They may be more economical when a customer's traffic is heavy enough and the geographic calling pattern lends itself to such use.
- Private line services often require less time to establish a connection.
- Private line services are dedicated to the customer and not shared, thereby ensuring connection at all times.

Software Defined Network (SDN) is a private line service that integrates use of AT&T's MTS switched network and customized, computerized, network features to create a private line network for customers. Customers identify the specific points they wish to connect via SDN service and have a specific numbering plan to call these locations. SDN also allows customers to call points off their networks by dialing a single digit for off-network access. SDN customers receive access to this service via (1) their own facilities, (2) special access service, or (3) a new type of switched access developed for SDN and referred to as standard switched access.

Changing Structure of the Telecommunications Transmission Industry

Over the last 30 years, the number of telecommunications transmission providers who offer telecommunications services has increased The following discussion traces the evolution of the telecommunications transmission market.[3]

Establishing a Nationwide Telephone Network

The Bell System[4] and the independent telephone companies established the early structure of the industry. Since the 1930's, these companies' facilities have been interconnected to provide a nationwide telephone system; the Bell System controlled the bulk of transmission and switching facilities and services.

The Bell System designed, built, and operated a communications system that dominated the nation's $75 billion telephone and telecommunications industry. The Bell System provided long-distance services through AT&T (who was in partnership with the Bell-owned operating companies (BOCs)) and the independent telephone companies It provided local services to over 80 percent of the nation's telephones in 48 contiguous states through the 6,874 local exchanges of the BOCs.

[3]In analyzing the industry's evolution, telecommunications is often viewed in terms of two types of service markets, terminal or customer premises equipment and transmission offerings This chapter focuses on transmission offerings, since bypass of these services is the subject of this report

[4]Before the January 1, 1984, divestiture, the Bell System was a partnership of AT&T, 22 BOCs, the Western Electric Company, and Bell Telephone Laboratories, Inc AT&T was defined as the parent company The BOCs were the system's principal domestic telephone operating companies, the Western Electric Company, the system's manufacturing arm, and Bell Telephone Laboratories, the system's research and development arm

More than 1,400 non-Bell telephone companies (independents) served the remaining 20 percent of the market in primarily rural areas. The independents are generally municipal or cooperative systems, except for a few medium-sized companies that are subsidiaries of five independent holding companies.

Over the years, the Bell System and the independents developed an interconnected telephone network that essentially served all of the United States, extending telephone service to over 95 percent of residences and businesses. This network enabled customers to call nationwide through the interconnection of these companies' transmission and switching facilities.

Competition for Long-Distance Services

Competition in the interstate market developed gradually, starting in 1959, when FCC ruled that individual businesses could construct and operate private long-distance microwave transmission networks for their own private use The advent of computers and the electronic revolution, in conjunction with changing social and economic developments and needs, created new demands for specialized intercity communications services. In addition, technological development had improved the capabilities of microwave transmission equipment. These developments provided the impetus for many large businesses and other entities to build their own networks and receive telecommunications services at lower costs than they might pay under telephone company prices.

Several other FCC and court decisions followed from 1969 to 1981 that enabled new entrants to provide customers with interstate telecommunications services. These decisions allowed entry of the so-called other common carriers (OCCs). The OCCs include specialized common carriers, domestic satellite carriers, and resale carriers. Appendix IV contains a chronology of key FCC and court decisions allowing competition.

The specialized common carriers and domestic satellite carriers provide private line services and services similar to MTS and WATS. Specialized common carriers generally provide these services via their own intercity microwave transmission facilities and leased facilities from AT&T while domestic satellite carriers use satellites for transmission. Resale carriers also provide private line services and services similar to MTS and WATS. In addition, resale carriers can add specialized services such as data processing capabilities to existing services thereby creating enhanced services. These resale carriers are more specifically referred to as value-added carriers or enhanced service providers. All resale carriers lease

circuits from other carriers and use these circuits to provide service to the final user.

The long-distance transmission market structure was significantly changed when the Bell System was divested as part of a negotiated settlement that took effect on January 1, 1984. In 1974, the Department of Justice instituted an antitrust suit against AT&T, Western Electric, and Bell Telephone Laboratories. Justice alleged that the Bell System had used its dominant position in the telephone transmission and equipment markets to suppress competition. In 1982, the various parties reached a negotiated court settlement known as the Modification of Final Judgment.[5]

The Modification of Final Judgment required AT&T to divest itself of its corporate connection with the BOCs in exchange for the right to enter unregulated markets such as the computer industry. The Judgment divided the former Bell System territory into about 160 geographic areas. The BOCs were given local exchange and exchange access service, including local service and long-distance service, within their designated geographic areas. AT&T was given long-distance services among the various geographic areas

Today, as a result of FCC and court decisions, some competition exists for virtually all of AT&T's interstate transmission offerings, including private line and switched voice services. Competition for intrastate long-distance service, however, is not universal, since intrastate telephone service regulation rests primarily with each state As of August 1985, 32 states had agreed to permit OCCs to provide some intrastate telephone service.

Monopoly Status for Local Service

According to the Modification of Final Judgment, the BOCs were separated from AT&T to isolate the monopoly elements of telecommunications supply from competitive markets. The Modification of Final Judgment considered only the provision of local exchange service provided by the BOCs and independents to be a true "natural" monopoly, everything else, including interstate long-distance telephone service, was considered competitive.

Many telecommunications experts have suggested, however, that recent technological developments will lead to competition in local services.

[5]United States vs AT&T, 552 F Supp 131 (D D C 1982)

New technologies such as digital termination systems, local area networks, cellular radio, fiber optics, and teleports can be used to bypass the local telephone company.[6] None of these technologies, however, are currently considered to be a competitive alternative for providing ubiquitous calling within an entire local area. However, some can provide a service, similar to the local telephone company service, that provides access to long-distance services.

How the Local Telephone Company Plant Provides Local Services

Many telecommunications users can now bypass as a result of competition in the long-distance market and available technologies that can provide private telecommunications facilities. Recent concerns regarding bypass focus on bypass of the local telephone company plant—specifically, access to interstate long-distance service. FCC, telephone companies, and users indicate that the local telephone company customers have bypassed and will bypass the local company for this service. The following section describes features of the local telephone company plant to demonstrate how it provides local calling and access to long-distance service.

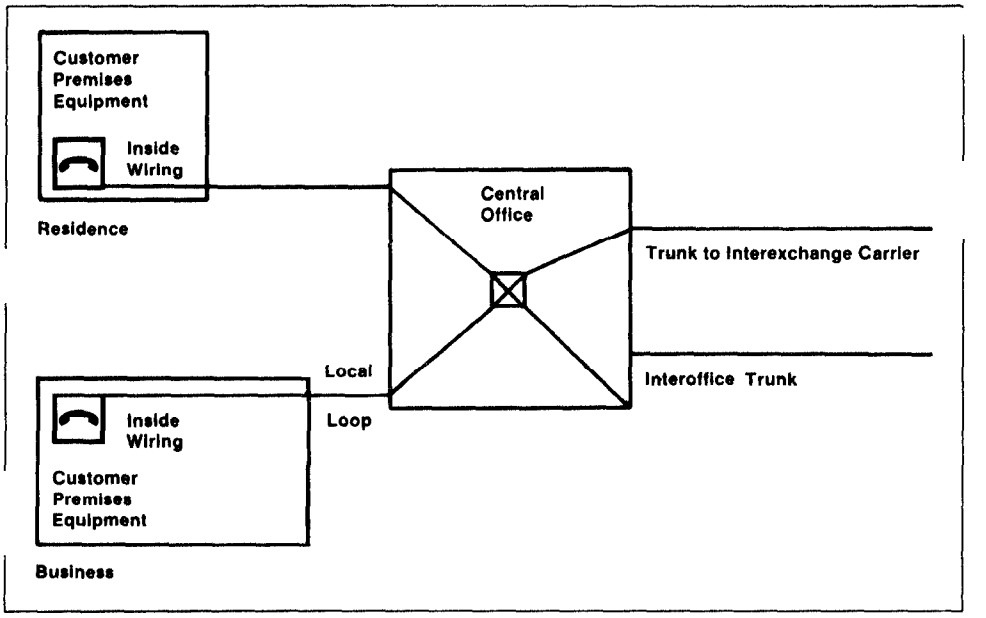
Technical Features of the Local Exchange

The local telephone company serves a geographic area comprised of one or more local exchange(s).[7] Each exchange consists of a group of individual users located in the same geographic area whose telephones have been connected by wire to switching systems. Local exchange facilities and equipment necessary to make both local and long-distance calls are broken down into several principal components: customer premises equipment, inside wiring, local loop, central switching office, and trunks. These components are illustrated and defined in figure 2.1.

[6]The glossary defines these technologies and appendix V provides a detailed description of these technologies as well as other technologies that can be used to provide local or long-distance transmission services

[7]Since divestiture, the federal courts have redefined exchange as a geographic area known as a local access transport area (LATA) for the BOCs This exchange area is usually larger than the exchange area discussed above and can also be used to provide some long-distance services

Figure 2.1: Local Exchange Facilities and Equipment



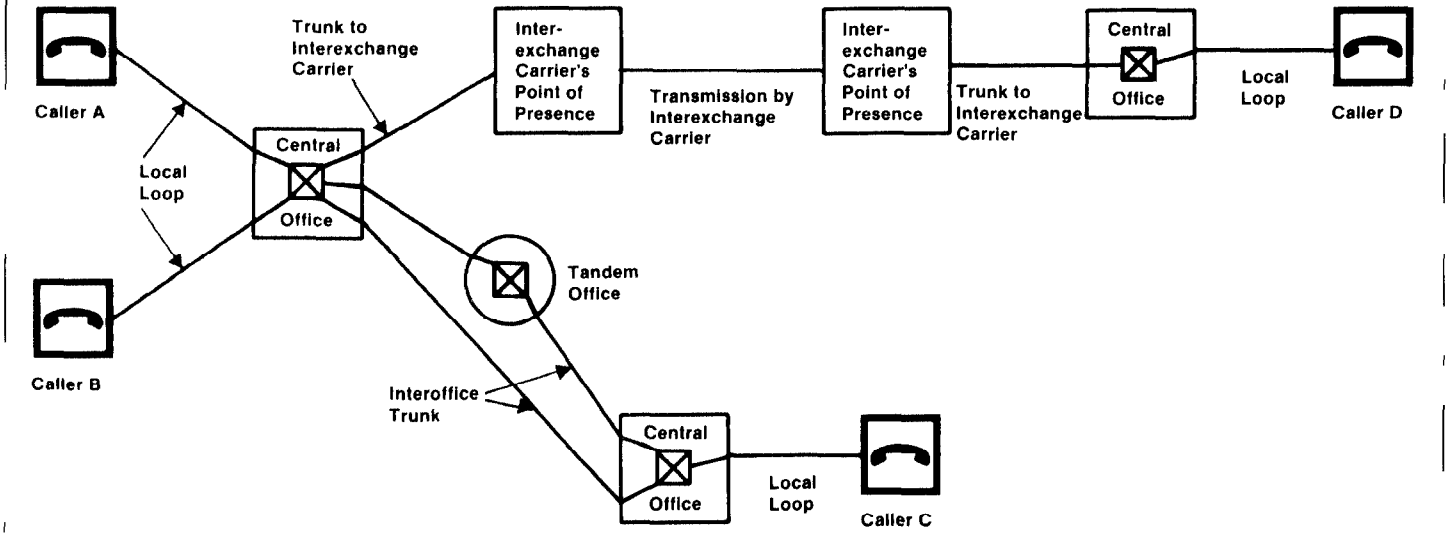
- Customer premises equipment includes telephones and other equipment, such as switchboards, on the customer's premises.
- Inside wiring is the copper wires that run from the telephones and switchboards to the outside of the customer's premises.
- Local loop is the copper wires that run from outside the customer's premises to a central office.
- Central office contains electromechanical or electronic switching systems that connect local loops to each other or to other telephone company facilities or to interexchange facilities.
- Trunks are circuits connecting one central office to another or to interexchange facilities.

Local Calls

Figure 2.2 illustrates how a telephone call between two customers (A & B) served by the same local exchange is handled entirely by that exchange's facilities. For example, a call originating from customer A would be carried along A's local loop to the central office, where the switching system would link A's local loop with B's, thereby establishing an electronic communications pathway from A's telephone to B's telephone. In urban areas, this pathway might be slightly more involved, since large exchanges may have several central offices in order to handle the greater volume of telephone customers. These central offices are interconnected by "tandem offices." If caller A in figure 2.2 wished to call C—who is served by a different central office within the same

exchange—the communications pathway may be routed via a tandem office. In either of these cases, however, the call is completed using only the local exchange's facilities

Figure 2.2: Illustration of Telephone Calls



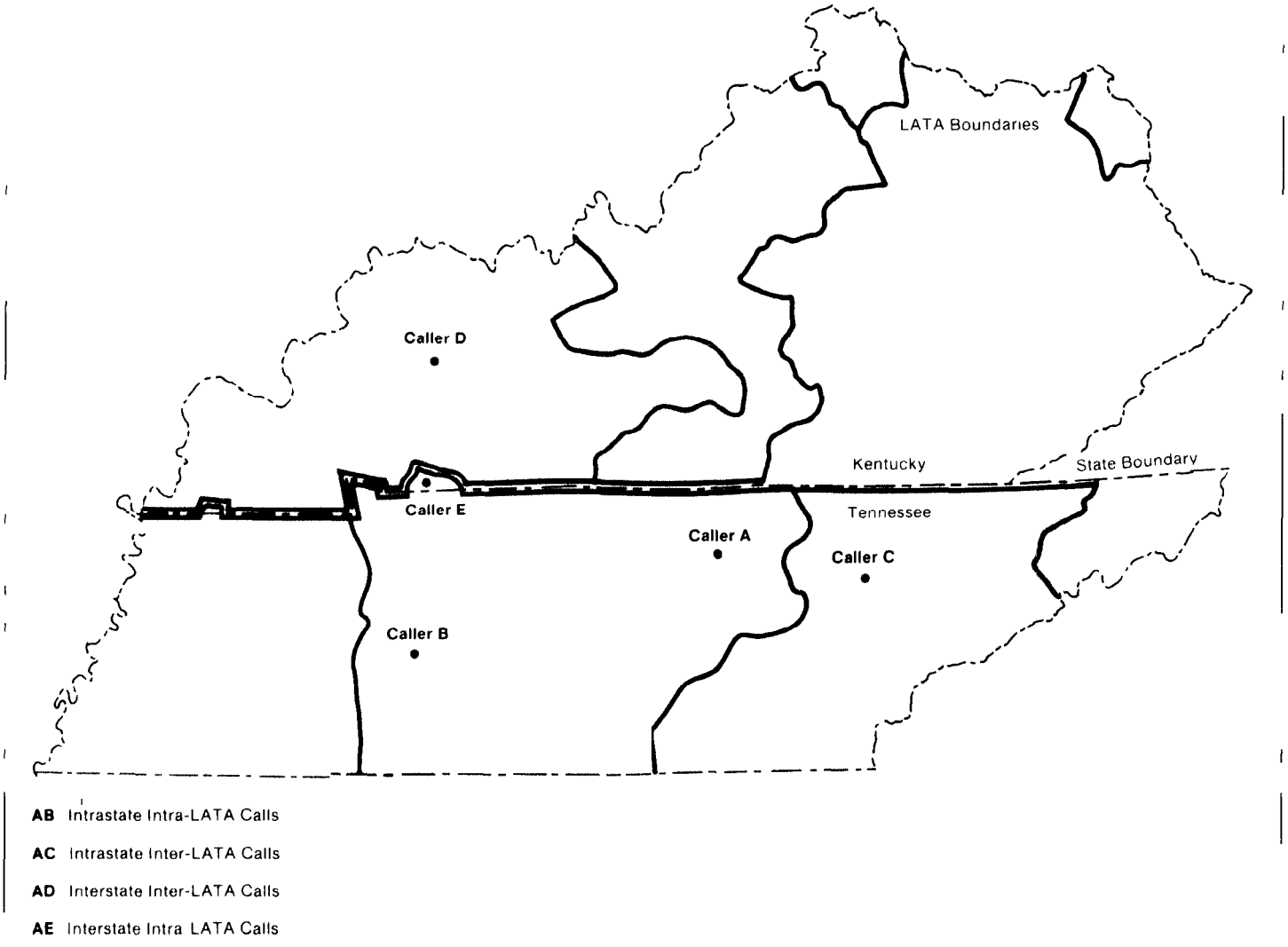
Local Access for Long-Distance Calls

When a customer wishes to telephone someone served by a local exchange outside his or her telephone company's jurisdiction, the customer's local exchange can generally provide only the first part of the communications pathway. This service is referred to as access for long-distance service. The remainder is provided by a long-distance network and by the receiver's local exchange.

Figure 2.2 shows a simplified communications pathway between the two local exchanges. The pathway begins with customer A's local loop. Customer A's central office routes the call to the facilities of an interexchange carrier. These facilities are often referred to as the interexchange carrier's "point of presence." The interexchange carrier carries the call from the interexchange facilities that serve the customer's local exchange to the interexchange facilities that serve the receiver's exchange. The call is then routed to D's central office, where it is switched to D's local loop, thereby completing the communications pathway.

Long-distance calling has been complicated since the divestiture of AT&T. As previously mentioned, the divestiture established new geographic areas to govern AT&T's and the BOCs' jurisdictions. These are called "local access and transport areas." With the creation of LATAs, four different types of long-distance calls become possible: (1) intrastate intra-LATA calls, (2) intrastate inter-LATA calls, (3) interstate inter-LATA calls, and (4) interstate intra-LATA calls. These are illustrated in figure 2.3.

Figure 2.3: Local Access and Transport Areas



Intrastate intra-LATA calls. Service between local exchanges located within the same LATA (caller A to caller B) is generally provided by the BOC that serves that LATA. Only 10 state public utility commissions have allowed AT&T or the OCCs to offer intra-LATA service

Intrastate inter-LATA calls. Calls made between different LATAs within the same state (caller A to caller C) are governed both by the provisions of the AT&T divestiture settlement and by state regulatory commissions.

The divestiture settlement prohibits the BOCs from providing inter-LATA service. In some states, AT&T provides this service exclusively, while in others OCCs have obtained certification from the state public utility commissions to compete in this market.

Interstate inter-LATA calls. Service between different LATAs in different states (caller A to caller D) is regulated by FCC and is provided by both AT&T and OCCs. The caller can choose either AT&T or any of the OCCs available in the area.

Interstate intra-LATA calls. Service between local exchanges within the same LATA but between different states (caller A to caller E) is governed by the provisions of the AT&T divestiture settlement and FCC. The caller can choose either the (1) BOCs that serve the LATA, (2) AT&T, or (3) any of the OCCs available in the area.

How Bypass of the Local Telephone Company Occurs

The FCC defines bypass as occurring when customers no longer use the facilities of the local telephone company that are available to the general public. These facilities (described in figure 2.1) are used both to transmit local calls and to provide access for long-distance calls (figure 2.2). FCC's definition focuses only on bypass of telephone company services used for long-distance calls and excludes bypass for local calls.

When customers bypass these local telephone company facilities, they have a choice of bypass alternatives. FCC has defined two distinct types of bypass—service and facility bypass. Service bypass uses specialized facilities of the local telephone company; facility bypass uses private telecommunications facilities. The following discussion describes how customers substitute these bypass forms for local telephone company service in order to gain access to long-distance services.

Service Bypass

Service bypass involves the use of private lines leased from the local telephone company. Unlike the local company's general facilities, private lines are traditionally believed to be dedicated to a customer's use and do not share the local exchange's general switching facilities. Figure 2.4 illustrates the differences in the way calls are routed through the local company from the caller to the interexchange carrier.

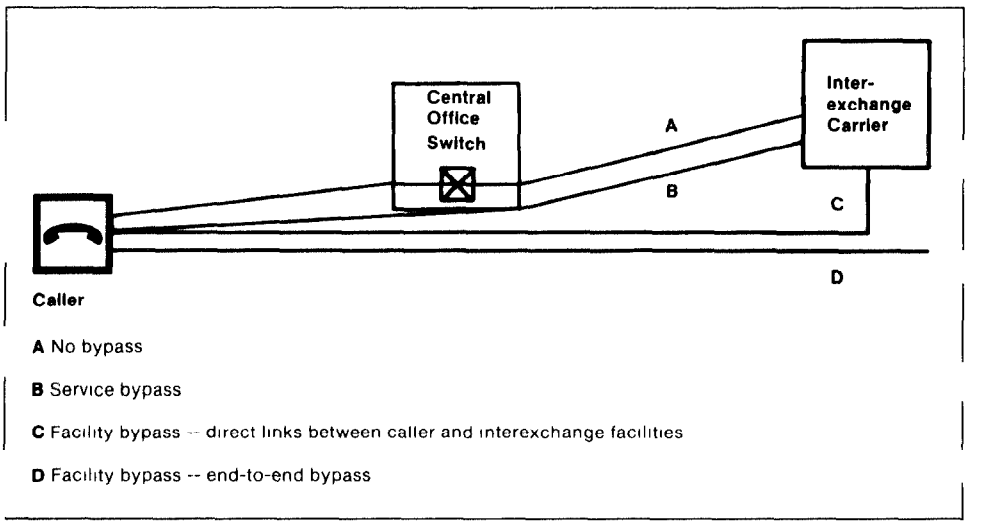
FCC states that, at times, private line services may be routed much the same as services routed over the general facilities; however, the price generally will differ. Private lines incur a charge that is independent of

the amount of use, whereas ordinary access (switched access) incurs a per-minute usage charge.

Facility Bypass

Facility bypass involves the use of private telecommunications systems that avoid all local telephone company facilities. Figure 2.4 also illustrates the two types of facility bypass for access to long-distance service. One type uses private facilities to link directly to the interexchange carrier in order to receive long-distance services. The other uses private facilities from end-to-end which means it uses no common carrier facilities, including interexchange carriers, for long-distance services.

Figure 2.4: How Bypass of the Local Telephone Company Occurs



A. This telephone company service is commonly referred to as switched access and allows the customer to receive MTS/WATS long-distance service. The caller places a long-distance call that uses the local company's switching facilities to access the interexchange carrier The interexchange carrier then routes the call to the receiver's local telephone company where switched access is also used to complete the call.

B. This telephone company service is commonly referred to as special access. The caller places a long-distance call that does not use the local company's switching facilities. Instead, the local company transmits the call to the interexchange carrier over a private line dedicated to the customer's use. A customer generally receives this type of service for private line long-distance services. However, some interexchange carriers

use special access to originate switched long-distance services similar to MTS and WATS. The interexchange carrier then routes the call to the receiver's local telephone company where the call would be completed by special access (service bypass) or through switched access (no bypass).

C. With direct links, the caller uses private facilities rather than local telephone company facilities to access the interexchange carrier. In this instance, the caller and the interexchange carrier agree to establish transmission links between the caller's premise and the interexchange carrier's facilities in order to provide the caller direct access to the interexchange carrier's services. The interexchange carrier can then complete the call in one of three ways (1) through a direct link to receiver's premise (facility bypass), (2) through the telephone company's special access service (service bypass), or (3) through the telephone company's switched access service (no bypass).

D. With end-to-end bypass, the caller does not use either local telephone company facilities for long-distance access or interexchange carrier facilities for long-distance service. The caller completes the entire long-distance call by using a private system. Users can construct various types of private systems for long-distance calling, including point-to-point microwave networks and systems that use a combination of technologies (satellites, microwave, and fiber optics).

Conclusions

For more than 25 years, FCC and court decisions concerning the long-distance transmission market have allowed for the entry of many new providers of long-distance services. Technological developments have both increased the types of facilities available and enabled some telecommunications users to receive long-distance services at lower costs than they might pay under telephone company prices. The evolution of these developments provided several options for telecommunications users who can choose among these technologies and providers for their telecommunications needs.

Competition in the local service market has not developed to the same degree Although recently developed technologies provide users with alternatives to some services in the local area, the local telephone company is still considered to be the monopoly provider of local exchange service

As the telecommunications market has changed, bypass of the local telephone company has become more viable—particularly for access to interstate long-distance service. FCC has identified two forms of bypass that avoid the general facilities of the local telephone company. These are service bypass, involving the use of private lines leased from the local telephone company, and facility bypass, involving the use of private systems that completely avoid local telephone company facilities.

Bypass: A Growing Alternative for Telecommunications Users

Various surveys of large telecommunications users have indicated that from 16 to 29 percent of their respondents are using alternative transmission facilities that bypass local telephone companies. These surveys revealed that bypassers continue to use local telephone companies for more than 75 percent of their telecommunications services. The typical bypass system is privately owned, single user, and provides mostly local and intrastate services. The surveys also disclosed that users plan to initiate or increase their bypass activity in the near future with ranges that vary widely from 19 to 53 percent. These surveys indicated that future bypass systems may be shared more often by multiple users and may bypass for access to long-distance services by linking directly to an interexchange carrier. The surveys reported that existing and future bypass by telecommunications users occurs both for reasons related to the telecommunications service's price and for reasons related to the service's quality, availability, and security.

These survey results did not provide a nationwide assessment of bypass activities. They also did not always allow for precise comparisons, since they often presented questions and results differently. They did provide some useful information, however, on the extent, nature, and reasons for bypass.

This chapter presents information from the various surveys and our own interviews with telecommunications users on existing and future bypass activities. It specifically addresses the following questions:

- To what extent do telecommunications users bypass the local telephone company?
- To what extent do users who bypass continue to use local telephone company services?
- Does bypass substitute for or reduce users' telephone company switched access services?
- Does bypass occur for intrastate or interstate services?
- What are the major reasons for users' bypassing?

Assessing the Bypass Activities of Telecommunications Users

Large-volume business customers have financial resources and incentives to bypass the local telephone company due to the extensive telephone bills they can incur. These customers provide a large revenue source for the local telephone company. Depending upon the state, 1 percent of Bell operating company business customer locations can represent from 14 to 48 percent of the total BOC long-distance revenues in a state.

During the last couple of years, telephone companies and specific industry and user groups have conducted surveys of telecommunications users and their bypass activities. At the time we began our review, the surveys did not all address many of the necessary bypass questions such as the percentage of total communications traffic that users carry over bypass systems or the expected timing of users' future bypass plans They also reported conflicting results regarding the extent of bypass activities and reasons for bypass.

Since that time, we have conducted our own interviews with telecommunications users while FCC has sought more data, information, and studies on bypass. By the end of October 1984, when FCC concluded its investigation, it had received over 30 surveys that provide information on users' bypass activities.

In this chapter, we describe telecommunications users' bypass activities by discussing key surveys and our own interview results. These include:

- A summary of surveys conducted in 25 states for local telephone companies by Touche Ross and Company, an international consulting and accounting firm. These surveys include interviews with about 2,000 large local telephone company customers who spend over $250,000 annually on telephone company services in a given state. For purposes of our discussion, we will present results from a Touche Ross summary of these surveys and refer to it as a single survey.
- A survey conducted for the International Communications Association, which represents about 550 of the nation's largest telecommunications users. In order to qualify for membership, organizations must spend at least $1 million annually on telecommunications services. This survey includes responses from 187 members.
- A nationwide survey conducted for the National Regulatory Research Institute, which carries out research related to state and federal regulators' needs. The survey resulted in a report prepared by the National Regulatory Research Institute, but the views and opinions of the authors do not necessarily represent National Regulatory Research Institute views, opinions, or policies. For purposes of our discussion, we will refer to this work as the National Regulatory Research Institute survey. This survey includes responses from large manufacturers and financial institutions in 561 locations that each have at least 500 employees.
- Our interviews with 24 organizations identified from an FCC listing of approved private microwave applicants that are known bypassers and interviews with 68 organizations identified by Mountain Bell and New

England Telephone Company that have large long-distance telephone bills and therefore might have an incentive to bypass.

Table 3.1 highlights results from each group of interviews which are discussed further in this chapter. Appendix II contains a detailed summary of the surveys discussed in this chapter as well as other surveys submitted to FCC. Appendix VI contains a detailed summary of our interview results.

The following discussion is not meant to be a comprehensive discussion of the survey data, but it relates how key surveys and our own interviews help to address major questions regarding bypass activities. We chose these surveys to represent (1) surveys with a large number of respondents and (2) the results of work conducted by two of the major groups conducting surveys, i.e., telephone companies and large users. We reviewed only published survey information or information presented to FCC and not the original data source for these surveys. Again, our intent was to obtain a better understanding about the bypass issue from available information and not to analyze the merits of the individual surveys. We realize that the surveys may differ in their methodologies and assumptions. We did not evaluate the validity of the survey data or the veracity of the conclusions reported in the individual surveys.

We also conducted our own interviews to gain a view of bypass independent of these surveys or any industry or user group. FCC has noted that the various groups conducting or commissioning the surveys often have different economic stakes in the communications market that can affect their surveys' focus. (See appendix II.)

We were not always able to compare all surveys' results on each bypass issue since the surveys often gathered different information on users' bypass activities and did not all provide detailed information for all the various issues discussed in this chapter. Furthermore, the survey respondents were not able always to provide information to answer certain questions. We have noted these discrepancies and omissions in our discussion of the following survey and interview results and further discuss some of these points in appendix II. We also at times cite surveys not previously mentioned because they can clarify issues or provide additional descriptive information.

FCC has noted some of these limitations in its own bypass report It acknowledged that the surveys submitted to FCC (including the Touche

Ross and the International Communications Association surveys and others detailed in appendix II) are based on diverse assumptions with a variety of definitions that identify a large number of different forms of bypass. In addition, FCC noted that some of the bypass studies had little documentation and could not be verified. FCC said that it had not attempted a detailed analysis of the merits of the individual studies but said that further analysis of these studies would be undertaken in connection with monitoring the impact of the access charge decision.

Table 3.1: Survey and Interview Results of Existing and Future Bypass

			Percent				
Survey or interview for	Definition of bypass	Number of respondents	Users by-passing[a]	Users with future bypass plans[a]	Major type of bypass system	Main location(s) served	Reasons for by-passing
Telephone companies	Facility bypass	2,000	25	33[b]	Point-to-point	Intrastate	Cost
International Communications Association	Facility bypass	187	29	53	Point-to-point	Intra-LATA	Service
National Regulatory Research Institute	Facility bypass	561	16	19[b]	Not provided	Local, intrastate or interstate	Cost and service
GAO	Facility bypass	68[c]	29	37	Point-to-point	Local	Cost and service

[a]Percentages reflect the extent of bypass as defined by each survey

[b]Only users who were nonbypassers

[c]Large volume users of local telephone company which includes 10 of the private microwave users

Extent of Bypass Is Limited, but Future Growth Could Be More Substantial

The three surveys and our interview results showed that 16 to 29 percent of the telecommunications users surveyed bypass, but, in the future, as many as 53 percent of the users plan to initiate or increase bypass activities.

Extent of Existing Bypass

All results indicated that most users surveyed do not bypass

- The telephone company survey reported that 25 percent of its respondents operate a bypass system.
- The International Communications Association reported that 29 percent of its respondents operate a private communications system

- The National Regulatory Research Institute found that 16 percent (89 of 561) of its respondents bypass.
- Our interviews found that about 29 percent (20 of 68) of large-volume telephone company users bypass. These large users include 10 private microwave users who are also represented in our interviews with known bypassers.[1]

To measure the extent of bypass, each survey used a definition similar to the one we used in our interviews with telecommunications users. We defined bypass as ". . . the origination or termination of two-way voice, data, or video telecommunications traffic for which local telephone company facilities are not employed." This definition is referred to as facility bypass and includes the use of private transmission systems that are provided or leased by the user for his or her telecommunications services.[2] The definition does not include bypass involving the use of local telephone company private lines (service bypass). If service bypass were included, the surveys' bypass definition would be broader and users' bypass activities might be greater

Extent of Future Bypass

All results indicated that bypass would continue in the future, though results varied widely among surveys.[3] More specifically:

- The telephone company survey indicated that an additional 33 percent of its respondents not bypassing were planning to bypass within the next 3 years.
- The International Communications Association found that 53 percent of its respondents are considering future bypass plans.

[1]We interviewed 24 private microwave licensees who were known bypassers. Thus, of the 82 organizations we contacted, 34 were currently bypassing. Other bypass surveys, including those conducted by utility and energy companies, have based their results on responses from users that have a long history of operating private systems. These surveys reported a higher percentage of bypass than the surveys we discuss in this chapter. They are discussed in appendix II.

[2]While the three surveys and our interviews all defined bypass as facility bypass, some definitions excluded certain types of telecommunications services. The telephone company and International Communications Association surveys excluded local area network services, while the National Regulatory Research Institute and our interviews included them. Local area networks combine telephone and computer technology to provide voice and data communications in a limited geographic area. The Institute noted that the use of such networks could have a significant effect on local telephone company revenue loss, particularly, if bypassers use these services to replace telephone company local switched services.

[3]Users were surveyed differently in the various surveys. In some surveys only nonbypassers were questioned about their future bypass plans while others included both bypassers and nonbypassers.

- The National Regulatory Research Institute reported a slight increase—19 percent of respondents not bypassing are considering future bypass plans.
- Our interviews also indicated that 37 percent of large-volume telephone company users (25 of 68) reported plans for either increasing their bypass activities or initiating bypass systems in the future [4]

The International Communications Association and our interview results indicated that many users' future plans may only be in preliminary stages The Association reported that two-thirds of its respondents who are considering bypass have not made an economic commitment to future plans. In other words, these users have not included their plans in a capital budget or begun constructing a system. Our interviews also indicated that about half of the users planning to bypass were only in preliminary stages of assessing bypass options. The other surveys did not report this information.

Two of the surveys and our interview results reported that users' future plans include not only constructing and leasing private systems for their own use but also sharing the systems with or selling capacity on them to other parties. The telephone company survey reported that the percentage of bypass systems used by more than one firm will increase in the future. The Association reported that 10 percent of its respondents expect to share a system with one or more companies Our private microwave interview results also disclosed that 58 percent of the users interviewed (14 of 24) are interested in sharing systems with other users [5]

Local Telephone Companies Continue to Provide Users With Most Telecommunications Services

Two of the surveys and our interview results suggested that most bypassers continue to use the local telephone company to provide most of their telecommunications service Telephone companies generally provide from 75 to 90 percent of these users' total telecommunications traffic. The impact of bypass on future telephone company services is harder to assess, since the surveys we reviewed did not always contain this information.

[4]About 70 percent of the remaining private microwave bypassers (10 of 14) also plan to increase their future activities In total, 35 of the 82 organizations we contacted had plans to increase their bypass activity

[5]In this regard, an FCC decision (PR Docket 83-426) allowing private microwave licensees to resell excess capacity for profit may encourage future bypass Though no formal assessment has been made

Bypassers' Existing Use of Local Telephone Company Services

The telephone company and the International Communications Association surveys as well as our interview results suggested that the local telephone company provides bypassers with most of their services, since their bypass systems carry only a small percentage of total traffic. The National Regulatory Research Institute did not report this type of information.

- The telephone company survey reported that bypassers generally divert 10 to 20 percent of their originating telecommunications traffic to bypass systems.
- The International Communications Association found that bypassers' private systems carry about 15 percent of total traffic
- Of those respondents to our interviews who indicated that they could measure the percentage of total traffic their bypass systems carry, most said that their bypass systems carry less than 25 percent of their total traffic.

Two of the surveys and our interview results[6] showed that, at times, users' bypass activities replace telephone company services, but in other cases they do not. For example, bypass systems may provide services not available from the local telephone company or additional services that the telephone company never provided. Other users said that their bypass activities may even increase use of telephone company services.

- The International Communications Association reported that 30 percent of bypass systems do not replace services provided by telephone common carriers. It suggested that this indicates that bypass is occurring not just to replace telephone company services but to receive services not otherwise available from the telephone company.
- The National Regulatory Research Institute found that over 50 percent of the bypassers have bypass systems that can provide services that are newer than (or different from) those that the telephone company provided them in the past. It suggested that in some cases bypass facilities are being acquired for growth in customer needs or for backup facilities. It also reported that 60 percent of bypassers, with systems that provide

on whether this decision will encourage other users to bypass, comments received as part of the FCC proceeding on this matter suggest that resold capacity on these private systems could be attractively priced below telephone company prices and therefore would encourage bypass On the other hand, one telecommunications expert said that in order to resell, private microwave licensees would have to operate like a telephone company with specialized staff to handle customers' problems, inquiries, and bills This expert believed that since telecommunications is not the primary business of most licensees, their involvement in resale activity may be limited

[6]The telephone company survey did not provide information on this point

services the telephone company provided in the past, reduced their telephone company services to some extent.

- Our interviews disclosed that 46 percent of the private microwave users (11 of 24) expect to reduce their telephone company services as a result of their bypass systems Thirty-three percent (8 of 24) reported that their bypass systems would not affect telephone company usage which infers that these systems are used for new growth. The remaining 21 percent (5 of 24) reported that their telephone company usage would grow. One of these five users specifically noted that additional telephone company services were required to join newly installed bypass equipment with the local telephone network.

Bypassers' Future Use of Local Telephone Company Services

Only the telephone company survey and our results provide information on how bypass may affect future telephone company services. Both suggested that bypassers will use fewer telephone company services.

- The telephone company survey reported that 75 percent of bypassers will increase the volume of traffic diverted to bypass but did not state a specific percentage increase
- Our results indicated that 64 percent (16 of 25) of the large-volume users who plan to bypass are more likely to decrease local telephone company services and use bypass systems to carry more of their traffic

Inadequate Information to Determine Whether Bypass Services Substitute for or Reduce Local Telephone Company's Switched Access Services

The survey and our interview results generally did not indicate whether users' bypass systems substitute for or replace telephone company switched services. The issue of bypass focuses on users bypassing the local telephone company for switched services, specifically for interstate switched access service, since these service revenues largely contribute to covering the costs of the local telephone plant If users bypass these services, FCC and others are concerned that the local telephone company will have to recover its costs from remaining customers who may have to pay higher and, perhaps, unaffordable rates for telephone service.

The survey and our interview results described users' bypass systems. The three surveys and our interview results all reported that most of the systems are used for services dedicated to reach specific locations. This suggests that systems may be used to replace private line services, although they could also replace switched services used to communicate between locations served by the bypass system. Other descriptions, particularly of future bypass systems, suggested a growing use of "direct

connections " These are bypass facilities that directly link users to an interexchange carrier. These descriptions suggested that private facilities will replace local telephone company switched and special access services in order for users to receive private access for long-distance services. These descriptions did not adequately specify whether replacement will be for switched or special access

Bypassers' Substituting or Reducing Switched Access Services

Only the National Regulatory Research Institute survey indicated whether its respondents' bypass systems can substitute for or actually replace local telephone company switched services However, descriptions of bypass systems and the limited available information from the other two surveys and our interview results suggested a greater similarity with and replacement of telephone company private line services.

- The telephone company survey reported that customers' bypass systems are generally dedicated from point-to-point.
- The International Communications Association described its respondents' systems as analogous to telephone company private line services.
- The National Regulatory Research Institute described respondents' bypass systems that can provide dedicated services (152 times) about as frequently as switched services (156 times). Our analysis from information presented in their survey indicated that users may actually use their systems to replace telephone company dedicated services more often (122 times) than switched services (102 times). The Institute cited various local services (72 times), interstate private lines (49 times), and state private lines (40 times) as the three most frequently decreased common carrier services.[7]
- Our results were that 83 percent of the private microwave users interviewed (20 of 24) have systems that are private line systems. Also, 17 of the 34 current bypassers interviewed had decreased telephone company services, most frequently replacing local (6) and private line services (6).

Bypassers' Substituting or Reducing Future Switched Access Services

Neither the surveys nor our interview results reported the extent to which future bypass systems will further reduce bypassers' use of local telephone company switched services. The telephone company survey and our interview results generally disclosed that users plan to continue

[7]For these and other National Regulatory Research Institute results, numbers may exceed 89 because respondents could indicate multiple responses

using end-to-end or dedicated systems but also reported a greater likelihood of using private links to interexchange carriers for access to long-distance services. These links will enable users to bypass local telephone company switched and special access services. The International Communications Association and National Regulatory Research Institute did not provide information that characterizes future bypass system architecture or telephone company services that these systems might replace

- The telephone company survey suggested that users will continue to use dedicated point-to-point systems but also reported that 80 percent of its respondents are willing to consider directly linking to an interexchange carrier. Twenty-five percent of the respondents reported being approached by interexchange carriers offering direct links.
- Our interview results reported that 60 percent of those users planning to initiate or increase existing bypass (21 of 35), plan systems which are private end-to-end systems. Twelve percent of users interviewed (10 of 82) expect to use direct connections for access to long-distance services Seven percent of users currently have these direct connections.

Existing Bypass Most Frequently for Intrastate Services, Inadequate Information to Determine Whether Future Bypass Will Be for Intrastate or Interstate Services

The three surveys and our interview results generally indicated that bypass systems most often carry local and intrastate long-distance traffic—traffic that is within the states' regulatory jurisdiction. Future bypass systems are likely to carry more long-distance traffic and reduce usage of local telephone company long-distance access services. Results, however, do not always distinguish whether these will be intrastate or interstate access services.

We believe that both FCC and the states are concerned about bypass effects since they share the responsibility for regulating the local telephone company and its services. Each jurisdiction is faced with assessing the bypass concern for the services it regulates and responding with the appropriate regulatory decisions. FCC's jurisdiction includes telephone company services for interstate calls (access for interstate long-distance services), and the states' jurisdiction includes services for intrastate calling, including intrastate access.

Existing Bypass of Intrastate and Interstate Services

The three surveys and our interview results all indicated that bypass systems generally carry more intrastate rather than interstate traffic.

- The telephone company survey reported that bypass systems generally carry intrastate (and frequently intra-LATA) traffic but did not report specific percentages.
- The International Communications Association found that 55 percent of the private systems were analogous to LATA private line services that covered areas no greater than 16 miles in distance.
- The National Regulatory Research Institute indicated that bypass systems are more likely to be able to provide intrastate services than interstate services. The 89 bypassers cited various intrastate service capabilities in their bypass system a total of 193 times, whereas they cited interstate service capabilities 124 times.
- Fifty-six percent of the bypassers we interviewed (19 of 34) reported that their systems served exclusively local areas.

The available results from International Communications Association and the National Regulatory Research Institute indicated that in cases where the bypass system replaced telephone company services, bypass replaces intrastate services slightly more than interstate telephone company services.

- The International Communications Association only reported a distinction between local and inter-LATA service, with bypass systems replacing local services (37 percent) slightly more than inter-LATA services (33 percent). (As mentioned earlier, the remaining 30 percent did not consider their bypass systems to replace telephone company services.)
- The National Regulatory Research Institute found that the 89 bypassers cited a decrease in intrastate services a total of 141 times as opposed to 91 times for interstate services. However, for specific services, an interstate private line service was the second most frequently decreased service (29 times), with intrastate services such as intracompany trunks, tie-lines, off premises extensions most frequently reduced (33 times).

Future Bypass of Intrastate or Interstate Services

The three surveys and our results did not report whether future bypass will be for interstate or intrastate services. Some information as previously discussed inferred that a greater number of users will bypass (or consider bypassing) for access to long-distance services This information did not specify whether this bypass will be for access to FCC-regulated (interstate) or state-regulated (intrastate) long-distance services.

Bypass Occurs for Various Reasons

The three surveys and our interview results all disclosed that users bypass for a mix of cost and service reasons and will continue to bypass for these reasons in the future. However, two surveys found that their respondents bypass primarily for either cost or for service reasons. The telephone company survey indicated that bypass occurs to reduce users' cost, while the International Communications Association reported that bypass occurs because comparable telephone company services are unavailable.

Cost and service are the key reasons that motivate users to bypass the local telephone company. Users often find that bypass alternatives offer similar services at a lower cost than those provided by the telephone company.[8] Users also reported that they bypass because the telephone company provides inadequate services For example, the telephone company may not provide adequate customer service. It also may be unable to provide a particular high-speed data service, guarantee service security, or offer the reliability and flexibility that a bypass system can provide.

Reasons for Existing Bypass

The telephone company survey found cost and the International Communications Association found service to be the major reason for bypass. National Regulatory Research Institute and our results did not point to a predominant reason for bypass; rather, the results indicate that bypass occurs for a mix of cost and service reasons.

- The telephone company survey indicated that in at least five states in which interviews were conducted, over 70 percent of the respondents bypass to reduce cost. The telephone company survey states that price is the primary decision factor leading users to bypass and that users are likely to bypass if they can save at least 10 percent over equivalent telephone company services.
- The International Communications Association said that more users cite limits in telephone company service quality or availability, rather than cost, as a reason for bypass. The Association reported that 42 percent of the private systems that respondents use provide services that the telephone company did not offer at the time the private system was installed.

[8]Industry officials and others asserted that this occurs because telephone company services are priced higher than the actual cost of service FCC changed its pricing for access to MTS and WATS service in order to prevent bypass for this reason Chapter 5 discusses this in more detail

- The National Regulatory Research Institute found that the 89 bypassers cited telephone company prices (49 times), greater flexibility of bypass systems (41 times), and stability of prices over time (40 times), as the most frequent reasons for bypass
- Our results indicated a mix of reasons: 53 percent of bypassers (18 of 34) reported a service concern (usually that the telephone company did not provide a particular service that they needed) and 29 percent (10 of 34) cited cost reasons. The remaining 18 percent (6 of 34) cited other reasons for bypass.

Some users who cited cost as a reason for bypass were not always concerned solely with the actual price of service but were also concerned with the need to stabilize costs over time Seven telecommunications managers told us that they bypassed primarily to achieve better control over their telecommunications budget. One manager said that frequent changes in telephone company prices did not enable his organization to effectively manage its telecommunications budgets. The organization's private bypass systems enabled him to identify and stabilize telecommunications costs over the long term. Another organization decided to increase bypass activities in order to contain costs and gain better control over its telecommunications budget.

Other users, particularly energy and utility companies, stated strong service reasons for bypass. They reported that they bypass in order to have complete control over critical communications facilities necessary to monitor their operations or to provide redundant circuits in case local telephone company services fail.[9]

Results from two other surveys[10] indicated that in some cases users would prefer not to bypass the local telephone company even if the telephone company prices are somewhat higher than the cost of using a bypass system. They indicated that telephone companies can set prices 5 percent higher and still retain most of their customers.

[9]Surveys conducted by the American Petroleum Institute and the Utilities Telecommunications Council reported that users bypass in order to maintain control over their communications facilities and to achieve a level of reliability that the telephone companies cannot provide them

[10]Surveys by the Committee of Corporate Telecommunications Users and New Jersey State reported that most users will remain customers of the local telephone companies even when their prices are 5 to 10 percent higher than bypass alternatives as long as the companies respond to customer needs in a superior fashion and offer high-quality service

Future Bypass Reasons

The National Regulatory Research Institute's survey was the only survey that provided detailed information on the reasons for future bypass. Along with our interview results, it reported that users will bypass for a mix of service and cost reasons, as they have done in the past.

- The Institute found that users who are considering bypass cite price (87 percent of respondents or 78 of 90), price stability (62 percent of respondents or 56 of 90), and flexibility (60 percent of respondents or 54 of 90) as the three most frequent reasons for future bypass.
- Our results again displayed a mix of reasons: about half of the users will bypass for cost and half for service reasons.

Conclusions

Results of the three surveys and our interviews with telecommunications users provide useful information about bypass. The results imply that bypass could increase significantly in the future—with 16 to 29 percent of large telecommunications users using bypass alternatives as contrasted with 19 to 53 percent giving consideration to plans for initiating or increasing future bypass activity. Results indicate that local telephone companies continue to provide bypassers from 75 to 90 percent of their telecommunications services. Results also indicate that users' bypass systems carry mostly local and intrastate long-distance traffic, and that users choose to bypass for both cost and service reasons.

The results of the three surveys and our interviews, however, do not provide definitive answers to questions regarding the extent, nature, and reasons for bypass. The results often had wide ranges. The surveys had different approaches, often asked different questions, and did not always report detailed results. In addition, many users who were surveyed were uncertain about future plans and could not always elaborate about future bypass activities.

FCC has noted some of these limitations in its own bypass report and also noted that some of the bypass studies submitted to FCC had little documentation and could not be verified. Though FCC has not yet attempted a detailed analysis of these studies, it has said that further analysis of these studies would be undertaken in connection with monitoring the impact of the access charge decision.

Limitations of Two Models Used to Estimate Bypass Revenue Loss

In 1984 local telephone companies (LTCs) had an estimated revenue of $73.9 billion to cover their total regulated costs, according to the United States Telephone Association. Of this amount, $14.5 billion was from interstate access revenue that is under FCC's jurisdiction and becoming more susceptible to bypass. During 1984, FCC and Bell Communications Research released the results of separate simulation models that estimated how a fully competitive interstate access market with current 1984 access prices would have affected 1984 LTC revenues. FCC and BCR tested the effects in a fully competitive interstate market because full competition is likely to develop as a result of the divestiture of AT&T and current FCC policies. Using the FCC model we determined such full competition would have decreased interstate access revenue by $4 billion in 1984. The BCR model estimated a $10 billion loss. Such losses could have created pressure to raise rates on other LTC services to permit the LTCs to recover their costs. We analyzed the two models of potential LTC interstate access bypass revenue loss to understand how access bypass could decrease LTC revenues and why the FCC and BCR estimates differ.

In summary, we found that the two models

- used several similar assumptions consistent with fully competitive markets that individually or in combination overestimated actual short-run bypass revenue loss;
- had differences in access costs and options that in general resulted in the BCR model estimating a larger bypass loss than the FCC model;
- were not designed to consider the effects of new bypass technologies currently under development, and thus may have underestimated potential long-run bypass revenue loss;
- indicated that large-volume interstate telephone traffic at a few locations is highly subject to bypass;
- provide policymakers an opportunity to better understand the important determinants of future bypass loss; and
- should not be used to forecast future bypass revenue loss for any particular year.

Local Telephone Companies' 1984 Revenue Requirement

Generally, FCC and states try to limit a regulated carrier's revenues to those necessary to cover its reasonable cost of service, including funds needed to pay reasonable interest payments and a fair return for investors. The amount of revenue that a carrier is allowed to earn during a given year is called a revenue requirement. After the carrier's revenue requirement is determined, commissions establish rates for the carrier's various regulated services that should permit the carrier to recover the

total amount of revenue required. These rates, in the case of telecommunications firms, are contained in tariffs that are filed with FCC and the states.

Economic theory suggests a natural monopoly, an industry in which the lowest cost of production is attained when there is only one producer, should continue to operate but be regulated [1] Having a natural monopoly ensures the lowest cost of production because high fixed costs—the costs that are constant in the short run no matter how much service is produced—can be spread over larger levels of production. Regulating a monopoly may ensure a more efficient allocation of resources by curtailing monopoly profits and inefficient restrictions of production. Regulation is an attempt to preserve the technical efficiency of a natural monopoly, while ensuring that prices and quantities approximate the more efficient results of competitive markets.

Regulated rates for a natural monopoly serving several markets, however, may be arbitrary or inefficient from an economic perspective and encourage bypass. Economic efficiency, in general, requires the price of each service to equal the economic (marginal) cost of providing the service. Rate-of-return regulation requires rates that permit the local telephone company to earn revenues that cover the costs of all services, including fixed costs. To cover all costs, regulators generally create rates for each service that cover the marginal costs of that service and an allocated portion of the fixed costs. However, local telephone companies provide services in both competitive and monopolized markets. In the monopolized markets, regulators can allocate fixed costs to services because the customers have no alternative to the services provided by the local telephone company. However, in competitive markets, too high an allocation of fixed costs may create local telephone company rates that exceed competing providers' prices and encourage large users to abandon or bypass the local telephone company. Furthermore, because local telephone companies are regulated, revenue losses due to bypass in competitive markets are likely to be recovered from other services where competition is less developed. In general, rate-of-return regulation implies fixed costs not recovered in competitive markets due to bypass may be recovered from the less competitive residential service market.

[1]Some economists believe that regulating monopolies and limiting competition may limit innovation and the development of new technologies that would better serve the public

Bypass can be classified as economic or uneconomic. Bypass is economic whenever the economic (marginal) costs of the competitor are less than the economic costs of the local telephone company. Bypass is uneconomic whenever the economic costs of the local telephone company are less than the economic costs of the competitor. Uneconomic bypass decreases network efficiency because the low-cost carrier is not carrying the traffic. Furthermore, uneconomic bypass is inefficient because it leads to socially unneeded capacity and reduces the use of the local telephone company that could have carried the traffic more efficiently.

LTCs provide services in both federally regulated interstate markets and state-regulated intrastate markets. To establish the revenue requirement and appropriate rates in both state and interstate jurisdictions, LTC costs must be allocated between the state and federal jurisdictions [2] Table 4 1 shows the allocation of the estimated $73.9 billion 1984 revenue between the federal and state jurisdictions.

Table 4.1: The Estimated 1984 National Revenue for Local Telephone Companies

Dollars in billions

Costs	Revenue under FCC's jurisdiction	Revenue under states' jurisdiction	Total
Nontraffic-sensitive	$9 0	$25 6	$34 6
Traffic-sensitive	5 5	33 8	39 3
Total revenue	**$14.5**	**$59.4**	**$73.9**

Source GAO calculations based on FCC and United States Telephone Association data

FCC considers LTC facilities to be either traffic- or nontraffic-sensitive. Traffic-sensitive costs are often viewed by FCC as varying with the telephone traffic carried or used. As traffic increases, so will traffic-sensitive costs, according to FCC. Similarly, a decrease in traffic or use would decrease traffic-sensitive costs. Nontraffic-sensitive costs are generally viewed by FCC as varying over time as the number of local telephone company customers increases or decreases. According to FCC, the costs do not vary with the amount of telephone use. The costs are present even when no calls are made and are considered to be equivalent to fixed costs by FCC. Both BCR and FCC models assume that the total nontraffic-sensitive costs were predominantly local loop costs and averaged $26 per line per month. The federal jurisdiction's share of these costs

[2] A Federal/State Joint Board (currently comprised of four state public utility commissioners and three FCC commissioners) develops recommendations for the jurisdictional cost-separations procedures and presents them to FCC for final approval

was $7. (Evidence discussed in chapter 5 indicates that traffic-sensitive costs may not be all marginal or economic costs.)

How the FCC and BCR Models Estimate Potential LTC Revenue Loss

Before mid-1984 the available bypass studies focused on discussions of customers' incentives to bypass. Often the studies provided detailed examples of how telephone company prices and facility bypass costs created significant financial incentives to bypass at large-volume locations, but these detailed analyses did not provide estimates of revenue loss based on the regional companies' actual traffic patterns. In late 1984, two models were published that developed nationwide estimates of potential telephone company revenue loss due to bypass:

- Bypass of Local Exchange: A Quantitative Analysis by Gerald Brock, FCC's Office of Plans and Policy, September 1984.[3]
- The Impact of Access Charges on Bypass and Universal Telephone Service by Bell Communications Research, September 1984.[4]

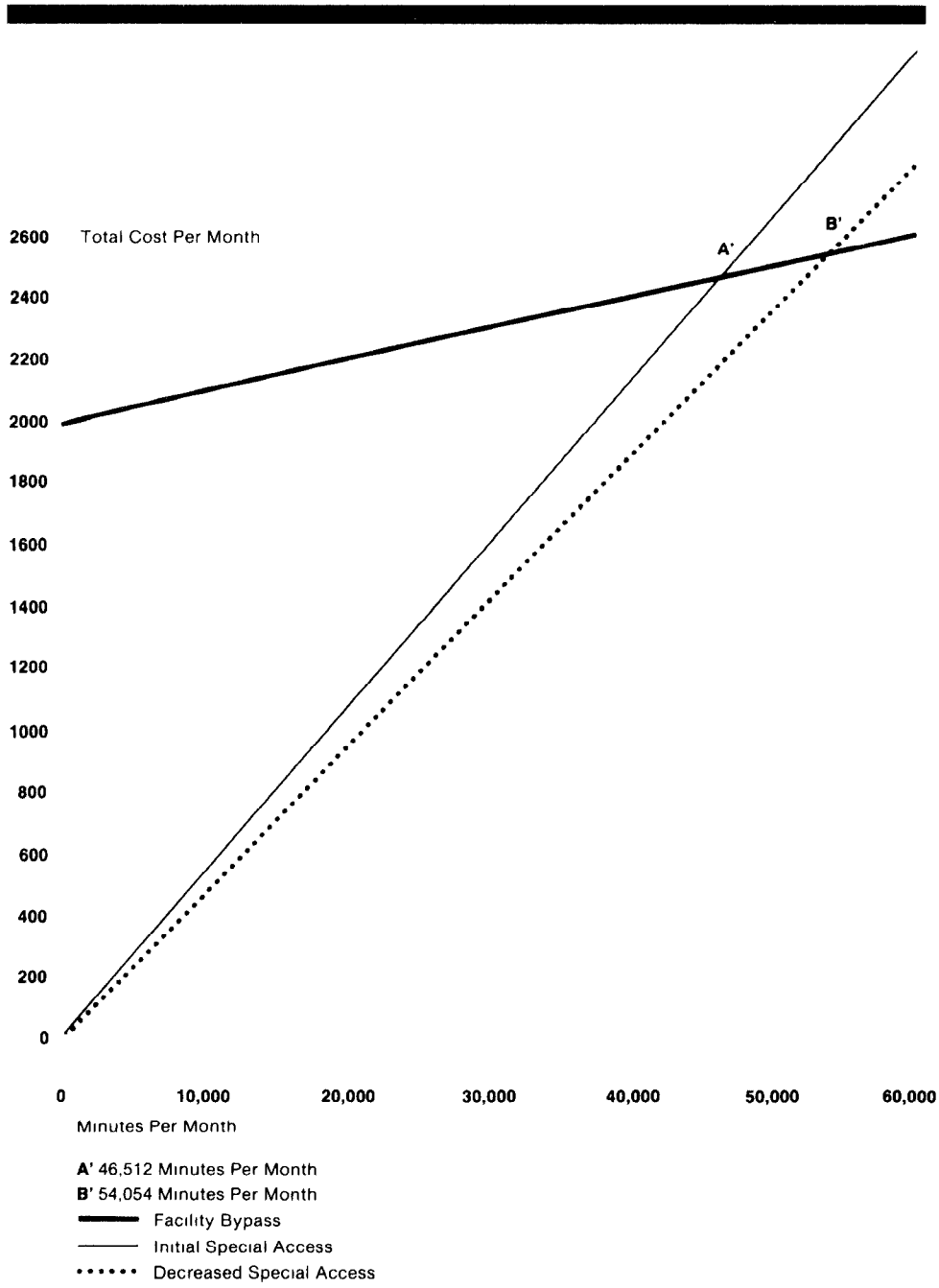
The FCC and BCR models use mathematical equations and statistical evidence to estimate how customers' bypass behavior responds to changes in access costs. This is done to calculate LTC revenue loss at different access prices. In the models, customers with specified monthly amounts of long-distance telecommunications traffic choose among access alternatives—switched access, special access, facility bypass, or resale.[5] The models assume that (1) customers will choose the least costly access method for carrying their telecommunications traffic, (2) all access options provide identical service quality, and (3) the customer can choose any form of access. Figure 4.1 illustrates how changing access prices affect access choices.

[3]The FCC model is a staff study of the Office of Plans and Policy and has not been endorsed by the Commission.

[4]BCR is a central research organization for the seven regional BOCs. Its research is used by the companies to evaluate various policy options and plans. BCR actually developed two models. One was detailed and widely circulated. We asked BCR for information on this detailed model, but BCR refused for proprietary reasons. BCR did provide FCC and us an abbreviated model which, according to BCR, corresponds to the detailed model in approach, assumptions, and results. The abbreviated model is the one we analyzed. The output of the two models is compared in appendix VIII.

[5]Resale permits smaller subscribers to share in large bulk discounts that the reseller can obtain when purchasing interstate services from interexchange carriers. The reseller embeds the access service costs in its prices and may use LTC public-switched network facilities to provide access without paying appropriate access charges. The reseller can charge subscribers less for interstate calls than they would pay for calls placed over the public-switched network, given the value of the bulk discounts and lower access costs.

Figure 4.1: Illustrating the Financial Incentives to Crossover From Special Access to Facility Bypass



In this illustration we show how altering special access costs can affect a subscriber's or interexchange carrier's decision about when to cross-over from special access to a private facility system. To calculate the crossover point between the two access options, we will assume special access lines are always used to their full capacity so that the special access user always minimizes special access costs. Thus, if special access costs initially $160 per-line per-month and has a 3,000-minute per line per month capacity, special access cost 5.3 cents per minute at full capacity utilization. These costs are represented by the solid line.

Facility bypass costs $2,000 per month and 1 cent per access minute, and it is represented by the bold solid line. At point A, or 46,512 minutes per month, special access costs equal facility bypass costs. To the left of point A, special access is cheaper, and to the right facility bypass is cheaper. Given the large fixed cost associated with facility bypass, a location needs a large number of access minutes to justify a facility bypass system.

If special access costs are decreased to $140 per line per month, special access costs decrease to 4.7 cents per minute. These costs are represented by the dotted line. At these lower costs, crossover occurs at 54,054 minutes per month or point B. Thus, decreasing special access costs decreases the financial incentives to adopt facility bypass.

NOTE: Facility bypass costs and the initial switched access costs were used by FCC in its bypass model.

The models can be used to calculate total interstate bypass revenue loss and determine the effects of tariff changes in interstate access costs. First, the models can calculate LTC access revenues at 1984 access prices and 1984 traffic levels while assuming that no new interstate access bypass occurred due to the enhanced availability of access bypass that could be created by the divestiture.[6] This calculation basically reflects

[6]The FCC model also permits the price of access services to affect the total amount of access traffic as well as the access option chosen The model assumes that each 1-percent increase in the total cost per minute of long distance will lead to a 75-percent drop in interstate traffic Because access costs currently represent about 50 percent of the total price per minute of interstate traffic, a 1-percent increase in access prices creates about a 375-percent decrease in traffic This implies bypass revenue losses for LTCs are based predominantly on the access option choice rather than changes in total traffic

the actual situation in 1984.[7] Second, the models can calculate LTC revenue at 1984 prices and traffic levels as if all customers chose the least costly access alternative and followed the models' assumed marketplace behavior. The difference between the first and second calculation is the LTC revenue shortfall due to interstate access bypass based on actual 1984 prices. Third, each model can test the effects of a proposed pricing policy by calculating revenues that would be produced with a proposed set of prices. The resulting revenue loss and price changes for 1984 are then compared to the results in the second calculation. This comparison suggests what the impacts of the proposed prices on bypass and revenue loss would have been in 1984 if all customers followed the models' assumed behavior.

Both models estimate the potential interstate access bypass revenue loss for LTCs that would have occurred in 1984, if access markets had been fully competitive and adjusted to access prices.[8] As designed these models provide insight into the long-run implications of equal access, changing access charges, and removal of the limits on AT&T's use of special access services. However, the models do not include information on changing traffic patterns, various state regulatory policies, or emerging low-cost bypass technologies that will also effect LTC bypass revenue loss in the future. Thus, these models are neither a forecast of expected actual 1984 LTC interstate access revenue loss nor a forecast of expected loss at some future date. Instead, the models permit policymakers to examine how specific LTC access charges and increased competition by themselves might affect potential LTC revenues in the long run. To fully evaluate actual future LTC revenue loss, policymakers must also consider how changes in other determinants of bypass will actually affect future revenues and costs.

What the Models Estimate

The models use 1984 telephone industry data to evaluate how bypass might affect telephone company revenue and how various policy options could affect this revenue. The BCR model estimates a $10 billion decrease in interstate access in 1984 in a fully competitive market. We calculated that the FCC model would estimate a $4 billion decrease. Our

[7]In 1984, AT&T dominated the interstate market and did not bypass for two reasons First, its access options were designed to work with the recently divested local companies and second, AT&T's tariffs generally prohibited AT&T from using special access services for switched long-distance services

[8]Both models employ comparative statics to test how changes in specific LTC prices could affect LTC revenue in a competitive market in long-run equilibrium As a result, the models only change LTC access prices and assume all other factors affecting access choices are unchanged.

calculation was discussed with an FCC official responsible for the FCC model and he agreed with our result.

The BCR model addresses the question of how the imposition of fixed monthly charges called subscriber line charges (SLC) in conjunction with decreases in usage-switched access charges will affect the revenues and traffic. The model estimates a base case and an alternative pricing policy. In the base case, the model assumes the current 1984 switched access charge of 8.5 cents per minute and a $6 SLC on each line for multiline business subscribers. In the alternative case, the model assumes that a $4 SLC for residential and single-line business subscribers has been implemented and the switched access charge has been reduced to 6.05 cents per minute. The implementation of the residential and single-line business SLCs generates revenues that compensate for the reduction in the switched access charges. The decrease in the switched access charge decreases the financial incentive to bypass and reduces revenue loss due to bypass.

The BCR model calculates the financial effects of these price changes for BOCs that dominate the local telephone markets. In addition, the BCR calculations assume that the total revenues from the SLC and switched access charges need only cover the nontraffic-sensitive portion of the costs allocated to the interstate jurisdiction. It assumes that traffic lost in the interstate sector reduces traffic-sensitive costs and revenue in equal proportions. As a result, decreases in revenues for the traffic-sensitive portion of switched access charges are matched by decreases in traffic-sensitive costs. To facilitate comparisons with the FCC model, we will report the results for the interstate jurisdiction on a dollar amount per residential line per month.

At the BCR 1984 switched access charge of 8.48 cents per minute, the switched access revenue shortfall is $7.99 per residential line per month in the BCR model. At a switched access charge of 6.05 cents per minute, the switched access revenue shortfall declines to $3.19 per residential line per month This suggests the decline in the switched access charge reduces the financial incentives to bypass and thus helps the BOCs forestall revenue loss due to bypass.

The FCC model addresses the question of whether the interstate revenue requirement can be met exclusively by increasing the switched access charge. The model does not include either a business or residential SLC and addresses the interstate revenue requirement of the total local telephone company industry. To facilitate comparisons with the BCR model,

we will report the estimates as a dollar amount per residential line per month and use the version of the FCC model that assumes that only non-traffic-sensitive costs have to be recovered.[9]

The FCC model suggests that bypass at the prevailing 1984 switched access price of 8.45 cents per minute (which is not significantly different from the BCR 1984 price) would create a switched access revenue shortfall of $2.47 billion per year or about $2.51 per residential line per month. The model also suggests that increasing the switched access charge to 12 11 cents per minute would generate enough switched access revenues to eliminate the shortfall in switched access revenues needed to meet the interstate nontraffic-sensitive revenue requirement. The increase in the switched access charge would cause 22 percent of all business-access minutes to use facility bypass systems and 55 percent of all business-access minutes to use special access services provided by the LTCs. The author of the model suggests that under varying assumptions, the switched access charge needed to recover the interstate non-traffic-sensitive revenues could vary between 10.21 and 13.31 cents per minute

The shortfall in switched access revenues can also be used to compare the two models as shown in table 4.2. In this table the FCC model results were used to estimate the switched access revenue shortfalls created by the two pricing alternatives tested by the BCR model. At prevailing 1984 switched access charges, the BCR model produces a larger shortfall than does the FCC model. At the lower switched access charge of 6.05 cents per minute, the FCC model produces a larger bypass revenue loss from switched access revenues. The reasons for these differences will be explained in subsequent sections of the chapter.

[9]If both the nontraffic-sensitive and traffic-sensitive costs must be recovered, the increases in the switched access rate would have to be higher

Table 4.2: Estimated 1984 Interstate Switched Access Revenue Shortfall Per Residential Line Per Month[a]

	Without an SLC	With an SLC[b]	Difference in shortfall[c]
BCR[d]	$7 99	$ 3 19	$ 4 80
FCC[e]	$2 51	$ 4 75	$(2 24)
Difference in the model	$5 48	$(1 56)	

[a]The shortfall estimates do not address the effects of shortfalls in intrastate access markets

[b]A $4 SLC for residences and single-line businesses is included, and the switched access charge decreases to 6 05 cents per minute

[c]The shortfall calculation assumes that the original 1984 nontraffic-sensitive costs must still be recovered because they are fixed while decreases in traffic permit equal decreases in traffic-sensitive revenues and costs

[d]The 1984 access charge was approximately 8 5 cents per minute and there is a $6 SLC for multiline businesses

[e]The FCC model has total access minutes vary with access price, while the BCR model assumes total minutes do not vary with access prices Also, FCC assumes intra- and interstate access charges are equal

A primary policy concern about bypass is that revenue losses due to bypass may be recovered directly from residential subscribers in the form of further increases to the fixed portion of the residential bill. Thus, large shortfalls in the switched access revenues might lead to large increases in the fixed portion of the residential bill. In 1984 the average fixed portion of the residential telephone bill was $12.72 per line per month. If the base case interstate switched access revenue shortfalls in the FCC model were recovered from subscribers in the form of additional monthly charges, the new fixed bill would be $15.23. In the base case for BCR, the new fixed residential bill would be $20.71 per month

In the second FCC alternative, there would be no increase in the fixed monthly residential bill because increases in the switched access charge would cover the revenue requirement. In the second BCR pricing alternative, the residential bill would be increased by both the residential SLC and the assignment of the remaining shortfall to residential subscribers. The new residential bill would be $19 91. This amount is less than the $20.71 in the base case BCR model. The second BCR alternative creates a smaller residential fixed bill because the revenues gained from decreased bypass are larger than the costs of the residential SLC. However, these comparisons only address the effects of lost interstate switched access revenues. Losses of intrastate access revenues or revenue losses from bypass of other LTC services are not considered. Furthermore, the second alternative in the BCR model would lead to

decreases in the long-distance portion of the average residential bill which is not considered in this discussion.

Both Models Use Similar Assumptions That Overestimate Actual Short-Run Bypass

The FCC model and BCR model both employ some basic assumptions that either individually or jointly combine to estimate greater short-run bypass activity than is likely to occur. An overestimate of actual bypass occurs because:

- The models estimate revenue loss based exclusively on cost considerations. However, they do not consider other factors such as the actual availability of an alternative access service or the quality of alternative access services.
- The models assume that all customers fully adjust to changing access costs. Thus, they do not address the time needed for customers to consider, plan, and actually procure an access alternative.
- The models assume all interexchange carriers have equal access which was not true in 1984 and is not expected to be achieved until the fall of 1986.[10]
- The models assume that all interexchange carriers could technically provide all access options. For example, the models assume that AT&T could use special access for all services, although in 1984 it was unable to provide such service.
- The models may understate facility bypass costs for many services.

Access Cost Is Not the Sole Determinant of Access Choices

Both models let the choice of access mode depend exclusively on access costs. This permits both models to directly address how changes in FCC pricing for switched access services can affect potential bypass and LTC revenue losses. But available evidence (see chapter 3) suggests the access choice depends on several other factors discussed below.

Interviews with telecommunications users indicated that the choice of access services will not be based exclusively on access price because access options can offer different service quality. Users indicated that other factors such as service reliability and security influence their bypass decisions. Therefore, LTCs that often provide superior service could charge a higher price for their service than alternative providers and still not lose traffic. Thus, since price is only one among many bypass incentives, models based exclusively on price may overstate the influence of access prices on the customer's bypass decisions.

[10]The equal access requirement does not necessarily apply to small non-BOCs

Interviews with telecommunications users suggested that a stable access price is an important determinant of access choice because it permits long-run planning. Users indicated that a desire to establish predictable and stable costs to facilitate their telecommunications planning and budgeting motivated facility bypass This concern was not included in the simulation models and, to a certain extent, it cannot be incorporated into any simulation model. The instability and level of LTC prices depend on many things, including state and federal regulatory decisions. Such variations could lead to difficulties in users' long-run planning. In contrast, facility bypass costs may be more stable in the long run. Therefore, to the extent modelers cannot model regulators' decisions, they also cannot model LTC price levels or price stability and their effects on bypass.

Current customer access choices also indicate that total access minutes and revenues are not just dependent on access prices and services. The National Exchange Carriers Association (NECA) which monitors LTC access minutes to propose access prices to the FCC indicates that LTC access minutes are expected to increase in 1986. The Association suggested that the recent economic recovery has increased the use of telephone access services enough to compensate for any loss due to bypass of interstate access services. Similar comments were made by an economist at the National Regulatory Research Institute. This, too, is consistent with econometric evidence, which suggests that the amount of telephone access minutes grows with increased business activity and personal income. In addition, available econometric evidence suggests total telephone traffic is not very responsive to price changes and that changing prices will not substantially affect traffic levels.

Subscribers Do Not Respond Immediately to Changing Access Costs

Both models assume that all subscribers fully adjust to changing access costs. This permits both models to estimate the potential or long-run total revenue effects of changes in FCC-regulated prices as if all customers had minimized cost. This assumption is not always representative of how customers would actually behave in the short run

Generally, customers do not immediately adjust to financial incentives for bypass. Our interview and survey results indicated that large users take time to consider, plan, and implement bypass systems. Adoption of new access options may take time because subscribers have to determine whether the costs of acquiring new access options are warranted given the savings. As a result, models that assume a full adjustment to

financial bypass incentives overstate the actual short-run LTC revenue loss

Equal Access Is Assumed but Did Not Exist in the Year Modeled

Both models assumed all interexchange carriers enjoyed equal access to all LTC access services. This assumption permits the models to investigate the long-run implications of full and equal competition among interexchange carriers. Thus, subscribers to other common carriers no longer dial extra digits to access their other common carrier over the LTC switched network, or need to use a touchtone telephone, and all interstate common carriers pay the same access charge for the same access services In addition, both models assume AT&T is allowed to use special access lines for all of its long-distance services. In effect, the models assume AT&T and other common carriers provide equivalent service, pay the same access charges, and compete exclusively based on prices charged to subscribers.

This assumption did not represent the state of affairs in 1984. Equal access for BOCs' switched access services is mandated for all other common carriers and is supposed to be substantially completed by the end of 1986 However, AT&T is generally not authorized to provide switched access, long-distance services using special access lines for MTS traffic and, in many cases, needs to re-engineer its plants before such services could be offered. However, as of November 1985, AT&T can use special access services for some forms of switched services (e g., Software Defined Network and Megacom) As a result, AT&T subscribers can access AT&T for some interstate switched services using special access or facility bypass.

Interexchange Carriers May Not Permit All Subscribers to Bypass

Both the BCR and FCC models assume that an interexchange carrier will permit all customers to bypass based exclusively on price This may be an inappropriate simplifying assumption in the short run According to some experts, other common carriers have concentrated flows of traffic. As a result, other common carriers may not be able to accept access from less concentrated access traffic providers such as resellers or facility bypassers. Also, according to some experts, other common carriers have a fixed ratio of ports (places to receive access lines) to switching capacity. If these ports are used to provide access to relatively low-volume resellers or facility bypassers, the switching capacity

may be under used Of course, future refinements of switching technology may alleviate this factor in the long run if the pricing structure encourages added switching capacity.[11]

Although AT&T's reputation for superior service can maintain and attract subscribers, AT&T, as a fully regulated common carrier, has one important competitive disadvantage compared to its interexchange competition. AT&T can neither refuse service nor charge different prices for the same service to different subscribers, as can its competitors. However, if FCC lessens regulatory limits on AT&T and grants them the flexibility enjoyed by the other common carriers, AT&T also could have a financial incentive to refuse bypass access to low-volume customers. Therefore, the extent of bypass may be less than predicted by either model.

Facility Bypass Costs in Both Models May Not Reflect the Total Costs of Bypass

Our review of facility bypass costs in appendix VII shows that the facility bypass costs used by BCR are somewhat inexpensive compared with current bypass costs, and the costs used by FCC are within the cost range reported. In addition, determining bypass systems costs especially for microwave facilities also depends on the reliability and capacity of the bypass system to carry traffic at all times during the day, regardless of peak load surges in interstate access traffic. Furthermore, many analysts indicate that microwave reliability depends on weather conditions that can diminish transmission quality This problem can be handled by (1) building backup systems that increase the microwave bypass facility costs or (2) permitting transmission failures and overflowing traffic into LTC switched access facilities. This limited reliability could decrease the microwave system's use or require added costs to improve the reliability of the microwave system. In either case, bypass levels may be overstated since current microwave costs are understated. (For an extended discussion of these points see app. VII.)

[11]Recent tariff submissions for Softwave Defined Network and Megacom indicate AT&T is developing the capability to permit all types of access for its subscribers

Reasons the BCR Model Estimates Higher LTC Revenue Loss at Prevailing 1984 Access Prices

The BCR and FCC models differ in specific assumptions that can cause the BCR model to estimate greater bypass activity than the FCC model when using similar access prices as shown in table 4.2. For example, the models use different specific assumptions about

- who bypasses and which bypass options are available,
- the amount of telecommunications traffic at a customer's location that is subject to bypass, and
- the costs of bypass options which determine when alternative options are adopted by customers.

Table 4.3 summarizes the important differences between the two models and the affects of these differences.

Table 4.3: Comparing Specific Assumptions in the BCR and FCC Models

	FCC	BCR	Implications of the different assumptions
Who Bypasses			
	Businesses, interexchange carriers	Businesses, interexchange carriers, residences	BCR permits residential customers to bypass which increases total bypass
Types of Bypass			
	Special access, facility bypass	Special access, facility bypass, resale	BCR includes resale which increases bypass
Traffic Distribution			
Source of the distribution	-A sample of Pacific Northwest Bell and Northwestern Bell business and residential customers	-A 20-percent sample of businesses -A representative sample of residences	FCC's traffic distribution is more concentrated and creates more facility bypass for business locations
Intrastate Access Minutes To Interstate Originating Minutes			
Businesses	61 to 1	228 to 1	The higher FCC ratio creates more business bypass while BCR's residential intrastate traffic increases BCR's bypass levels
Residences	N/A	5 to 1	
Interstate Originating Minutes To Interstate Terminating Minutes			
Businesses	53 to 1	1 to 1	The higher BCR ratio creates more bypass
Residences	N/A	N/A	
Bypass Cost and Capacities			
Facility bypass costs	$2,000/month+ $ 0/minutes	$40/month/line	BCR's lower facility bypass costs permits more bypass
Capacity	unlimited	2,000 min/line	
Resale cost	N/A	$ 0424/min[a]	BCR's resale option permits lower volume locations to bypass
Capacity	N/A	unlimited	
Special access cost	$160/month/ line	$40/month/line	BCR's lower special access costs permit more bypass
Capacity	3,000 min/ month/line	2,000 min/ month/line	

[a]The customer must save at least $5/month to justify resale to adopt resale

Who Bypasses and Which Bypass Options Are Available Affect the Amount of Bypass

The FCC and BCR models make different assumptions about who can bypass and how they can bypass. In both areas, the BCR model makes bypass more likely. In the FCC model only business subscribers and interexchange carriers can bypass, while in the BCR model interexchange carriers and business subscribers as well as residential subscribers can bypass.

Both the FCC and BCR models permit a limited set of access options. Both permit facility and special access bypass. The BCR model also includes resale—the sale of volume discounted services from interexchange carriers to resellers which are resold to smaller customers at prices below the rates provided by interexchange carriers. Resale expands the number of subscribers who can bypass since resale is attractive at low traffic levels. However, both models exclude several bypass alternatives that could become important in the future. For example, shared tenant services and teleports are not included, although both access options are being actively pursued currently.[12] (See app. X.) Discussions with several state officials suggested concerns about LTC revenue loss due to shared tenant services. In addition, some states are deciding whether regulation of shared tenant services is appropriate.

How Changes in Total Traffic Amount and Traffic Type Per Location Affect Bypass Revenue Loss

Both models assume bypass depends primarily on the traffic per customer location, because bypass system costs are based on the amount of traffic per location. Both models suggest traffic is concentrated at a few locations which makes bypass more likely, since high-volume concentrated traffic permits the use of cheaper bypass alternatives as discussed in appendix VII. If, on the other hand, traffic is well dispersed, much of the traffic could occur at locations where bypass is not cheaper. This would decrease bypass revenue loss. As a result, the extent to which traffic is concentrated is a key determinant of bypass loss.

Both models account for different traffic types at each location. This is important because available evidence suggests certain types of traffic, such as terminating traffic, may be less likely to bypass. Therefore, including terminating or intrastate traffic may lead to an overstatement of bypass.

[12]Both shared tenant services and teleports are specialized forms of resale where the subscriber reaches the reseller over dedicated facilities Shared tenant services use a PBX to serve several firms located in the same building or adjacent building The PBX is used to concentrate all tenants' telephone traffic and can enable the tenants to pay lower telephone bills Teleports are facilities that concentrate traffic from numerous locations using their own access facilities and provide both special services, such as high-speed data transmission, and lower cost long-distance services for regular telephone conversations

The extent to which traffic is concentrated and the mix of traffic by type can be discussed in terms of a traffic distribution. A traffic distribution assigns traffic by volume and type to each location. In this section we will discuss originating interstate traffic, terminating interstate traffic, and intrastate inter-LATA traffic because these categories reflect the types of traffic that bypass in both the BCR and FCC models. The FCC model assumes a distribution of traffic created from traffic in Pacific Northwest Bell's and Northwestern Bell's markets. BCR uses a 20-percent national sample of current business traffic and a national distribution of residential traffic. However, these distributions may not reflect the future distribution of traffic.

Originating Traffic

FCC's business distribution tends to assign more originating traffic[13] to fewer locations, with 1 percent of the business locations generating 53 percent of business traffic while the BCR model has 1.7 percent of the locations generating 43.80 percent of the traffic. This difference would tend to increase bypass in the FCC model.

Although these distributions are not identical, they are consistent with other regional and state studies which suggest a few large locations generate a significant portion of traffic. Therefore, bypass at these few large-volume locations could lead to revenue shortfalls, since a large share of interstate traffic is likely to bypass as both large customers and interexchange carriers adopt bypass to curtail costs.

The FCC model assumes that decreases in the cost of access services will increase originating interstate traffic while the BCR model assumes total interstate traffic is constant irrespective of price. The FCC model assumes that a 1-percent decrease in the total price of a long-distance call will lead to a .75-percent increase in the amount of traffic. This implies that the total revenue from interstate traffic collected by interexchange carriers will decrease as the price of the call decreases. On the other hand, increases in the total price will increase total interexchange revenues. However, the total price of a long-distance call is the sum of the cost of the transmission by the interexchange carrier and the costs of access at both ends of the call. Because the prevailing 1984 switched access price represents about half of the total costs of interexchange carriers, the FCC model suggests that the total amount of traffic is only slightly responsive to the access cost in a long-distance call because it

[13]Originating traffic is defined as traffic between the originator of a call and the interexchange carrier

would take large changes in the price of access to significantly alter the total amount of traffic

Terminating Interstate Traffic

The FCC model assumes that each minute of originating interstate business access traffic at a location generates 0.53 minutes of terminating interstate business access traffic.[14] The BCR model assumes each originating interstate minute generates one terminating minute at a location. Both assume originating and terminating minutes are equally susceptible to bypass. Therefore, the higher rates of terminating-to-originating interstate business minutes in the BCR model makes bypass more likely. It is not clear which assumption is more appropriate or whether both overestimate terminating access traffic.

Both models assume that all terminating traffic can be bypassed. Discussions with our consultants indicate such bypass may not be possible. This is especially true for residences with low-volume terminating traffic Terminating traffic may be hard to route to a customer since the interexchange carrier delivering the call may not be the interexchange carrier that carries the originating calls from a residential subscriber Thus, to terminate a call an interexchange carrier, at its own expense, would have to acquire a bypass system linked to the receiver of the call when the receiver does not subscribe to the interexchange carrier that is carrying the call. In addition, the interexchange carrier's network may not be equipped to terminate traffic directly. As a result, no bypass link may be available. Of course, at high-volume terminating traffic locations, an interexchange carrier may want to place a bypass link even if the location does not subscribe to that interexchange carrier because the interexchange carrier could then avoid LTC access charges on terminating traffic.

In general, if the number of interexchange carriers increase and if AT&T no longer dominates the interstate market, terminating bypass is less likely since each location receives a smaller amount of traffic from each interexchange carrier. But if AT&T continues to dominate the market and if many other common carriers terminate calls through AT&T facilities, the likelihood of terminating bypass increases because AT&T terminates a larger number of calls per location. No available study discusses the future distribution of terminating traffic among interexchange carrier

[14]Terminating traffic is defined as traffic between the interexchange carrier and the receiver of a call

facilities and the implications of this distribution for terminating bypass.

Intrastate Traffic

The FCC model assumes that for each interstate business access minute there is .61 intrastate access minute, while BCR assumes for each interstate business access minute there is .228 intrastate access minute. The FCC assumption yields more business bypass. In addition, BCR assumes each residential interstate access minute yields .50 intrastate minute while FCC excludes residential bypass.

Both models assume that intrastate and interstate access rates are identical in 1984. This implies that financial bypass incentives are identical in both jurisdictions. As a result, the revenues susceptible to bypass are the sum of all interstate and intrastate access minutes at a location multiplied by the common access charge. The inclusion of intrastate access minutes makes bypass attractive at some locations that would not bypass based exclusively on interstate traffic because their inclusion increases the total traffic and access charges.

In the future, state access charges may not mirror federal access charges as they tended to do in 1984 for two reasons. First, intrastate access charges may not be set to equal federal charges and second, intrastate access competition may be limited by the states through regulation or tariffs. As a result, the total extent of access bypass incentives may have to be calculated by separately estimating intrastate and interstate incentives.

Lower Access Costs Make Bypass More Likely in the BCR Model

Access costs in the two models differ for three reasons. First, BCR assumes a lower facility bypass cost at low traffic volumes. Second, BCR assumes a lower special access rate which also tends to increase bypass levels. Third, BCR permits resale that provides low-cost access for low-volume subscribers. Together these assumptions suggest higher bypass levels for small users and easier adoption of facility bypass systems than can occur in the FCC model.

BCR's Facility Bypass Costs Increase Bypass

In the FCC model, facility bypass costs $2,000 per month and $.01 per access minute based on a Pacific Northwest Bell analysis The BCR model assumes a facility bypass line costs $40 per line per month and a 2,000-

minute per-month capacity.[15] In addition, no added costs per access minute are in BCR's facility bypass system. Therefore, at full capacity the BCR facility bypass system costs are $.02 per access minute [16] The average cost per minute in the FCC model varies with use. All these costs are within the range of bypass costs discussed in appendix VII.

Because of the large fixed costs ($2,000 per month) and the low variable costs ($.01 per minute), facility bypass is adopted in the FCC model at 46,153 minutes per month. In the BCR model, a facility bypass system is adopted at 475 minutes, using 1984 access prices. In other words, the large facility bypass fixed costs in the FCC model delay the adoption of facility bypass.

The FCC model generates larger shortfalls at the lower switched access charge associated with the $4 SLC, as shown in table 4.2. This occurs because the large subscribers who bypass find bypass attractive even at a reduced switched access charge. In contrast, the BCR model has relatively low costs for facility bypass at low traffic volumes which permits lower volume subscribers to bypass. Thus, decreases in the LTC switched access price could decrease the extent of bypass by lower volume subscribers and reduce the LTC revenues lost to bypass, as shown in table 4.2

As discussed in appendix VII, available evidence indicates that bypass costs tend to increase with the distance between the customer and the interexchange facility. The FCC model assumes the interexchange facility is 2 miles from the customer. Our calculations indicate, at least in Northwestern Bell's service area, many locations are more than 2 miles from the interexchange carrier. For example, in Minnesota about one-half of the 108 customers analyzed by Northwestern Bell were 6 or more miles from these facilities. Therefore, the FCC model may underestimate facility bypass costs and thus generate more bypass. The BCR model does not explicitly address this point. Thus, either model may be overestimating potential revenue loss.

BCR's Lower Special Access Cost Increases Bypass

Special access costs differ in the two models. The FCC model assumes a special access line costs $160 per month while BCR assumes $40 per month. The BCR figure is identical to the BCR facility bypass costs and

[15]In the published BCR model, facility bypass costs per line per month range from $20 to $490

[16]BCR facility bypass costs per minute are the costs per line per month divided by the capacity or 2 cents per minute = $40/2,000 minutes

thus the BCR model implies an equal likelihood that a customer might choose special access or facility bypass. The FCC assumptions, on the other hand, imply special access may be adopted when the traffic per location does not warrant paying the $2,000 fixed cost for a facility system. At higher traffic volumes, the low cost per added access minute in the FCC facility bypass system creates a financial incentive to switch from special access to facility bypass.

BCR's Resale Model Increases Bypass

The existence of resale in the BCR model increases bypass as compared with the FCC model. In the BCR model, resale costs 4.24 cents per minute and is adopted if a subscriber saves $5 per month. Such costs are less than switched access costs even at relatively low traffic levels.

The resale arrangement in the BCR model decreases resellers access costs, in part, because it permits resellers to use the LTC facilities without paying usage charges that contribute to nontraffic-sensitive costs. This arrangement is cheaper than the currently allowed WATS resale where the reseller pays reduced usage charges to the LTCs. According to several experts, the BCR resale arrangement violates current FCC regulations. BCR believes, however, that policing such violations would be expensive for both regulating commissions and LTCs. Furthermore, BCR believes its resale arrangement will become more common in the future as all interexchange carriers are free to purchase all LTC access services in a fully competitive market

The BCR model's bypass estimates are higher due to resale. Resale in the BCR model increases the shortfall per residential line per month. At 1984 access prices without resale, the BCR model estimates a residential shortfall of $5.26 per line per month, while with resale the shortfall increases to $7.99 as shown in table 4.4. Similarly, the shortfall per residential line with a $4 subscriber line charge without resale is $2.29 while with resale the shortfall is $3.19. Thus, resale contributes to the differences between the FCC and BCR shortfall estimates.

Table 4.4: How Resale Increases Revenue Shortfalls Per Residential Line Per Month in the BCR Model

	Revenue shortfall at 1984 prices	Revenue shortfall with a $4 SLC	Difference in shortfall
BCR without resale	$5 26	$2 29	$2 97
BCR with resale	$7 99	$3 19	$4 80

Crossover Minutes Among the Access Options Depend on Costs

In both models the total amount of bypass depends on the crossover minutes among access options and the number of subscribers that find each access option financially attractive. In this section, we discuss the crossover minutes among access options in both models and show how the models' assumptions generate lower crossover minutes in the BCR model. The crossover minutes are summarized in table 4.5.

The lower BCR special access and facility bypass costs permit fewer minutes to justify crossover to a bypass option. For example, using 1984 prices for switched access, the FCC model permits crossover to special access at 1,893 minutes per month while BCR only needs 475 minutes. In addition, resale permits small traffic originators to avoid switched access rates with only 100 minutes per month in the BCR model. Thus, the generally lower BCR bypass costs increase LTC revenue losses due to bypass because more locations with more traffic can adopt bypass.

BCR calculates LTC revenues after lowering the switched access price from 8.5 to 6 cents which increases the minutes needed to justify bypass. At the new prices, customers adopt facility bypass or special access prices at 675 minutes per month instead of 475 minutes. The adoption of resale requires 275 minutes rather than 100 minutes.

The FCC model increases switched access prices to eliminate any revenue shortfall By increasing the switched access price from 8.5 to 12.11 cents per minute, the LTCs meet their nontraffic-sensitive interstate revenue requirement. This price increase decreases the minutes needed to justify bypass At the new price, customers adopt special access and abandon switched access at 1,321 minutes per month rather than 1,893 minutes per month The crossover point between special access and facility bypass does not change because their costs do not change.

Table 4.5: Crossover Minutes in the Two Models at Different Prices

	FCC		BCR	
	1984 prices[a]	Price for no shortfall[b]	1984 prices	$4 SLC[c]
Switched to special access	1,893	1,321	475	675
Special access to facility bypass[d]	46,153	46,153	N/A	N/A
Switched access to resale[e]	N/A	N/A	100	275

[a]The switched access price in 1984 was 8 45 cents per minute in the FCC model and 8 48 cents per minute in the BCR model

[b]In the FCC model the switched access price increases to 12 11 cents per minute where the shortfall is eliminated

[c]In the BCR model the imposition of a $4 subscriber line charge on residential and single-line business subscribers is accompanied by a reduction in the switched access price to 6 05 cents per minute

[d]In the FCC model a change in the switched access price has no effect on the choice between special access and facility bypass Also, in the BCR model the special and facility access have identical costs

[e]Resale does not exist in the FCC model

A Sensitivity Analysis of the FCC Model Indicates That the Model Is Slightly Sensitive to Changes in Certain Assumptions

Our discussion of the difference in the BCR and FCC models and our review of bypass technologies in appendix VII indicate there is some disagreement on both the appropriate bypass cost and types of traffic that can be carried over bypass services. To determine how these differences might affect revenue loss, we altered specific assumptions in the FCC model. If the altered assumption significantly changed the FCC model's results, the model is considered sensitive to that assumption. If the model's results did not change significantly when the altered assumption is used, the model is not considered sensitive to that assumption. In general, the FCC model is not sensitive to the assumptions we tested. However, we were not able to test several assumptions that could have changed the extent of bypass estimated by the model. (See appendix IX for a detailed discussion of our tests of specific assumptions.)

The sensitivity of the FCC results to changes in specific assumptions does not limit the value of the model because it was not designed to forecast actual revenue loss due to bypass. Instead, it was designed to simulate the potential effects of existing LTC usage-sensitive access charges, given current traffic concentrations and bypass costs in a fully competitive access market. Thus, the model was designed only to highlight the implications of current LTC access prices and not to forecast actual LTC revenue loss in the future.

Technological Developments May Increase Bypass in the Future

The actual extent of bypass depends on the costs and services the customer faces when choosing an access alternative. As discussed in appendix VII, future facility bypass costs are expected to decrease In addition, facility bypass service quality is expected to improve. Such improvement creates added incentives to adopt bypass and permits lower volume locations to bypass the LTC. Therefore, bypass will become more likely in the future unless regulators permit LTCs to provide a competitive set of access charges and service types.

The bypass decision depends on the access prices and services offered by both the regulated LTC and its often less regulated competitors. To the extent the less regulated competitors can more quickly introduce new services and offer lower costs, the LTC may lose traffic to its competitors. In the long run, the LTC may also adopt new low-cost technologies and provide more services, as commissions permit LTCs to either invest in new plant and equipment or offer improved or specialized services to customers who could bypass. However, once traffic is lost to competitors, reduced regulated prices may not enable the LTC to recover the lost traffic because regulated prices must include overhead costs the competitors may not incur.

The Models Should Not Be Used to Forecast Actual Revenue Loss

The two national bypass models provide estimates of how access competition and changing access charges could affect telephone company revenues. However, they were not developed to provide exact or precise forecasts of future bypass losses.

As discussed in the previous sections, the limitations of the models as forecasting tools include

(1) the assumption that customers fully adjust to changing access prices in order to minimize total access costs;

(2) the assumption that access markets are fully competitive because equal access exists and AT&T is free to offer all LTC or facility bypass access services to its subscribers;

(3) a BCR assumption that resellers can and will be able to directly access interexchange carriers and use the LTC for local access without paying usage access charges to the LTC;

(4) an assumption that it is always in the interexchange carrier's financial self interest to permit bypass by even small subscribers;

(5) cost calculations which may make facility bypass appear unreasonably inexpensive because the costs do not take into account the limitations of some forms of facility bypass in the short run;

(6) an assumption in the FCC model that state access charges perfectly mirror FCC access charges; and

(7) an assumption that current bypass costs adequately reflect the costs potential bypassers will face in the future.

To make these models more closely reflect the actual conditions, these limitations would have to be overcome. However, even these changes would not make them "perfectly" mirror reality. In addition, future changes in technologies and market structures may limit the ability of even these "improved" models to assist policymakers to forecast actual future revenue losses.

State and Federal Regulatory and Pricing Policies Can Create Bypass in Many Markets and Services

Both models estimated revenue loss due to bypass of interstate access services. In addition, the BCR model also discussed revenue loss due to bypass of intrastate access services. But, LTCs are concerned with all types of bypass revenue loss, including those from intrastate long-distance and local services, because current trends in costs and technology suggest bypass is possible for many services besides interstate access.

Federal pricing and cost allocation policies that deter interstate bypass by limiting costs assigned to the interstate jurisdiction and lowering interstate access prices may force increases in state-regulated rates and bypass on intrastate services causing revenue losses. As a result, deterring interstate losses may not solve all LTC revenue loss problems due to bypass. This shifting of the LTC costs to the states, in conjunction with the technical limitations in the models discussed above, limits the usefulness of such models for analyzing the total revenue and policy implications of various prices that the FCC could adopt. In addition, the actual LTCs costs vary with the amount of traffic for various services, and these LTC cost changes also affect its revenue requirement.

Revenue Loss Does Not Determine the Revenue Requirement Shortfall

The two bypass models suggest the gross revenue shortfall that could result from bypass of access services for interstate and intrastate toll services. But this potential shortfall does not represent the potential revenue requirement shortfall for two reasons. First, if less long-distance traffic uses LTC switching facilities, LTC costs may decrease and

decrease the revenue requirement. Thus, the decline in the LTC revenue requirement for access services is the loss in access revenues minus the decrease in LTC costs associated with access services. As a result, because costs could decrease these models could overestimate the shortfall. Second, any changes in LTC interstate access prices to curb access bypass can lead to price changes on other services, such as local business and residential rates. These price changes, in turn, can lead to changes in revenue and costs that also affect the LTC revenue requirement. Therefore, a complete evaluation of LTC revenue requirement changes due to bypass of interstate access services requires an analysis of the prices, traffic, and costs associated with all LTC services.

Stranded Investment and Traffic Growth

Telecommunications experts often discuss the problem of large fixed costs for LTCs in terms of stranded investment—plant and equipment installed to serve a certain type of traffic which no longer uses LTC services. The extent of truly stranded investment depends on (1) the extent to which such plant and equipment can be used to provide other services, such as local and intrastate long-distance and (2) the extent to which overall traffic growth could permit the LTC to use once stranded investment for other services.[17] If either use of the plant occurs, the shortfall in the revenue requirement due to stranded investment would decrease. Unfortunately, little evidence is available on either the ability to shift stranded investment to other services or the extent to which traffic growth can use stranded investment.

Jurisdictional Shifts of Bypass

Bypass is a phenomenon that can occur for all types of traffic as indicated in chapter 3. FCC has addressed interstate access bypass, in part, by limiting the interstate share of costs and changing prices to include an SLC. However, its pricing plan could create added bypass at the local service level. For example, as the SLC increases, some subscribers may decide to drop lines and bypass for local traffic. As a result, the LTCs may lose local revenues even as the low usage access charges on interstate calls could be deterring interstate access bypass. As a result, state commissions may become responsible for recovering larger shortfalls in the state revenue requirement. In addition, states have historically been reluctant to increase the fixed portion of residential telephone bills. Therefore, the states rather than FCC may be facing a bypass problem if

[17]LTC traffic and thus its revenues are affected by many things other than service prices For example, a growing economy and increasing personal income create increased demand for LTC services and increase LTC revenues even as some traffic bypasses due to LTC prices

rates on nonresidential local or intrastate long-distance services are set above bypass costs.

Service Shifts of Bypass

Rate-of-return regulation requires that an LTC's total revenues cover total costs and often requires revenues from a particular service to cover total costs of that service. However, because a significant portion of costs are common costs,[18] it is difficult to identify the costs of any particular service. Furthermore, competition might require LTCs to match prices in competitive markets and recover any shortfall in less competitive or monopolized or regulated markets. If the competitive price is not met, the LTC may lose more revenues due to lost traffic than it would lose by lowering its price and retaining some traffic that is subject to bypass. This implies that LTCs may ask for rates that are higher in less competitive markets and lower in competitive markets. As a result, prices for similar services may differ across markets. In particular, residential rates may increase since the LTC may face less competition in this market.

Conclusions

Our review of the models indicates that both were constructed to test how the implementation of different LTC access charges in the presence of "full and fair" competition in access markets could have affected the LTC revenue requirement shortfall in 1984. Neither model, as designed, can provide a forecast of LTC actual revenue requirement shortfall in either the immediate or more distant future. Instead, the models are intended to assist policymakers in understanding the potential revenue implications of competition and different LTC access charges when substantial amounts of LTC access charge revenue are generated at only a few locations.

Although the models may not provide actual forecasts of LTC revenue shortfalls for either the short or long term, they still provide policymakers insight into potential LTC revenue shortfalls. The structure and logic of the models indicate that current and future lower bypass costs could create revenue shortfalls in a competitive access market. Furthermore, they indicate that if regulators permit LTCs to lower access charges, the extent of access revenue losses may diminish.

[18]Common costs are costs of plant and equipment that simultaneously serve all services and cannot be easily assigned to one particular service A good example is a local loop which carries local calls as well as intrastate and interstate traffic

However, reassigning costs from access to other services, which permits the decrease in usage access charges, could create bypass on other services and affect universal service if residential rates are increased. Therefore, regulators may have to consider the effects of all price changes on revenues, costs, and customers as they establish LTC access charges.

Our analysis of bypass costs in this chapter also suggests that continued dependence on usage access charges for switched access may lead to irreversible revenue loss due to bypass. Such usage charges tend to increase the use of special access, facility bypass systems, and resale. In addition, once a facility bypass system is adopted, its operating or economic costs are often lower than the costs of using any LTC service. Thus, even a future decrease in LTC charges may not recapture traffic lost to facility bypass systems. As a result, policymakers may have to consider whether potential and possibly irreversible future traffic losses to facility bypass systems justify decreasing existing LTC access service prices toward economic costs.

Agency and Industry Comments

The Managing Director of the FCC commented, "Overall, we find that the report reflects the views of the Federal Communications Commission." FCC provided three technical comments relating to the models discussed in this chapter. We have revised the report to reflect these comments and have provided in appendix XI our views on the three comments.

The Director, Regulatory Policy Analysis, Bell South Corporation,[19] commented that the ". . . report presents a fair and well reasoned critique of Bellcore's bypass models. I also concur with the concluding section of the chapter (chapter 4) . . . ." The Director also provided a number of technical comments on the models which we considered in revising the report. Appendix XII provides the Bell South letter and includes our views on each of the comments raised.

[19]The Director was formerly Director, Governmental Affairs, at Bell Communications Research and developed the BCR model

Observations on Regulatory Actions for Deterring Bypass

In 1982 FCC changed its method for recovering certain interstate telephone costs, in part, to address uneconomic bypass and establish fairer pricing policies for a competitive telecommunications marketplace. In general, FCC added a flat monthly subscriber line charge for each telephone line and permitted a reduction in the per-minute charge for long-distance service. FCC believed this change would reduce incentives for large-volume, long-distance customers to bypass the local telephone company and help avoid the loss of telephone company revenues due to bypass, which, it believed, could result in the need to increase telephone rates.

A key component of FCC's access charge decision is a subscriber line charge which ranges from $2 for residential and single-line business subscribers up to $6 for multiline business subscribers. FCC has stated that it will evaluate the SLC to determine its effect on bypass and other issues before it considers raising the SLC above the $2 monthly charge. FCC initiated such an evaluation in June 1986.

At the time of our fieldwork in 1985, the access charge with its SLC had just been implemented, and no comprehensive assessments were available relating to its effectiveness in deterring uneconomic bypass. We found that much uncertainty and controversy exist about the access charge decision in deterring uneconomic bypass and contributing to the Communications Act's goals of reasonable charges, universality of service, efficiency, and innovation. Any attempt to evaluate the access charge decision will be complex due to the many facets that are involved. For example, issues include how the decision affects competition in the telecommunications industry, short- and long-term effects on local telephone company revenues and subscribership, and whether each of the Communications Act's goals are met.

This chapter provides (1) a discussion of considerations important in any attempt to evaluate the access charge decision or other regulatory policies that address bypass, (2) information on the access charge decision's ability to deter uneconomic bypass, (3) criticisms offered by interested parties on the access charge decision and its ability to deter uneconomic bypass, and (4) a discussion of selected regulatory options that interested parties have suggested that address bypass.

Background on the Access Charge Decision

In December 1982, FCC adopted the access charge decision which set forth rules that determine the rates interexchange carriers and subscribers pay for access to local telephone company facilities used to

complete interstate services. There was much opposition to the access charge decision, and by late 1984, FCC had revised its guidelines for structuring and gradually phasing in this decision. The key parts of the decision include

- a $6 or less monthly subscriber line charge for each telephone line for multiline businesses; a $1 monthly SLC per line for residential and single-line businesses beginning June 1985 and capped at $2 in June 1986, these charges have permitted the per-minute usage charge for interstate long-distance service to be reduced;
- a Universal Service Fund which targets a portion of the access charges paid by interexchange carriers to telephone companies with high plant costs;[1]
- guidelines for implementing alternative tariffs by local telephone companies. These tariffs allow for alternatives to recover the interstate non-traffic-sensitive costs not recovered by the SLC and enable telephone companies with concurrence of state regulatory officials or the Federal-State Joint Board to address local bypass concerns;
- a mechanism to allow more comprehensive, experimental tariffs that would recover interstate plant costs differently than the FCC plan; and
- a mechanism that permits the equivalent of a waiver of the SLC for low-income households.

When FCC initiated its access charge proceeding, it concluded that it would be necessary to prescribe the compensation that LTCs should receive for use of their facilities to complete interstate services. The OCCs were not members of the partnership between AT&T, the Bell companies, and the independents that pooled costs and shared revenues. Instead, the OCCs paid for their use of the local telephone company on a tariffed basis under an FCC agreement known as the Exchange Network Facilities for Interstate Access The agreement determined that the OCCs should pay a lower rate for using the local telephone facilities than AT&T in order to compensate the OCCs for what was considered to be their inferior service connection.[2]

Before the access charge decision, local telephone companies recovered most of their costs incurred in providing interstate services through the

[1]These are local telephone companies who have higher than average interstate non-traffic-sensitive costs The fund helps these companies keep their basic local service rates at an affordable level It is also referred to as the High Cost Fund

[2]Because of these connections, OCCs could only provide service to touchtone telephones, often had inferior quality, and required the subscriber to dial extra digits

settlements/division of revenue process.[3] AT&T, the local Bell and independent telephone companies pooled both operating and capital costs assigned to interstate telephone service. Uniform, nationwide rates were then established to produce revenue that would cover these costs and provide for a return on investment. The revenue was then distributed to the companies to first cover their interstate operating costs. The remaining revenue was then distributed to the companies in proportion to the size of their plant investment relative to all the companies' combined investment assigned to interstate services. FCC's access charge decision resulted in an end to the pooling arrangement. Instead, FCC required that each BOC and independent company recover its interstate costs by levying "access charges" on both the interexchange carriers and individual customers.[4]

FCC established access charges for interstate services. For dedicated services, such as special access, telephone companies recover the amount of costs associated with private lines by an access charge which is a flat monthly fee. For switched services such as MTS/WATS, the access charge combines a usage and flat monthly fee. Originally FCC planned to recover most nontraffic-sensitive costs by a flat charge to subscribers that would be phased in over time. Local companies would add the SLC to each subscriber's monthly bill, basing it on the number of telephone lines that a subscriber had. The usage charge would cover all traffic-sensitive costs as well as continue to cover that portion of the nontraffic-sensitive costs not yet recovered by the SLC.[5]

Communications Act's Goals in Brief

The nation's policy for common carrier telecommunications encompasses several goals, including reasonable charges, universality of service, efficiency, and innovation. Sections 202 and 205 of the Communications Act of 1934 forbid "undue preference" and "unfair and

[3]Settlements refer to this process as it relates to the independent telephone companies, division of revenues refer to this process for the BOCs

[4]The access charge decision also established an Exchange Carrier Association, now called the National Exchange Carrier Association NECA prepares and files interstate access charge tariffs and administers revenue pools created by the tariff NECA was designed to take over tariff filing and revenue pool administration functions previously performed by AT&T NECA is composed of telephone companies participating in various pools which represent components of the access charges Local telephone companies are required to participate in the carrier common line pool (which represents the revenue for the local loop) but not in the others They can instead file their own tariffs to recover these access charges

[5]These charges also would cover the cost of the Universal Service Fund and the National Exchange Carrier Association's operating expenses

unreasonable rates." FCC interprets the act to mean that common carriers should avoid price discrimination for their services by pricing like services similarly and maintaining rational and reasonable price differences for unlike services.

The act also states that telecommunications service should be "available to all." FCC interprets this to mean that preservation of universal telephone service is one of the nation's telecommunications goals FCC has said that the term universal service has rarely been defined, but has concluded that the act's language suggests that nationwide telephone service should be available at reasonable rates. FCC has said that in 1985 about 92 percent of all households had telephone service compared with about 33 percent in 1934.

The act refers to a telephone system with ". . . rapid and efficient services . . . with adequate facilities" and "reasonable charges " FCC has interpreted this to mean that economic efficiency is an objective of the act. FCC also says that achieving economic efficiency also means promoting efficient network use by establishing rates that minimize the cost of communications services to users.

Innovation involves encouraging the introduction of new services and low-cost technologies in order to offer the people of the United States the widest possible opportunities for communication. The technological developments of the last 20 years have both created demand for new communications services and offered the means to satisfy these demands while generally decreasing users' costs.

Regulatory Policies Aimed at Bypass Have Multiple Objectives to Consider

Regulatory policies to prevent uneconomic bypass must also be concerned with the Communications Act's multiple objectives of reasonable charges, universality of service, efficiency, and innovation. These regulatory policies are being made in a telecommunications environment that is in the midst of an evolution—from a highly monopolized structure to a competitive structure.

Technology has been the driving force behind this change that has eliminated the natural monopoly in long-distance markets. FCC and the courts have reacted to the impact of technological change by removing regulatory restrictions on long-distance entry and, as a result, numerous firms have sought to enter the industry. Furthermore, this changing technology has increased the number of service and product markets in which any common carrier might want to compete. In general, FCC

assumes competition serves regulatory goals. FCC has said that competition, where feasible, is the best form of regulation. This implies that a regulatory policy aimed at discouraging bypass must also consider whether it effectively works to achieve FCC's established policy of favoring increased competition in the interexchange market.

According to FCC, it sought regulatory policies such as the access charge decision to discourage uneconomic bypass because of its undesirable potential consequences of increased rates that could reduce universal service and result in inefficient use of the nation's telephone network. However, FCC's access charge decision also considered other objectives, such as eliminating price discrimination, especially as it relates to access services.

The need to balance the various objectives and goals was recently reported[6] to also be the major concern of state officials as shown below:

"When asked to describe the 'single biggest policy dilemma' their PUC[7] will face in telecommunications in the next few years, most respondents focused on the need to find a balance among competing goals, such as competition, new technology, access charges, operating company health, and low basic rates "

Too Early to Tell If Access Charge Decision Deters Uneconomic Bypass

FCC stated in its access charge decision that this regulatory policy would help to deter large-volume, long-distance customers from bypassing the local telephone company. At the time of our review, the access charge decision with its SLC had been implemented for less than a year, and no comprehensive assessments were available relating to its effectiveness in deterring uneconomic bypass. FCC's monitoring efforts have focused on monitoring universal service and indicate that universal service has not significantly changed since the access charge decision. FCC initiated a study of bypass in June 1986.

FCC's Monitoring Efforts in Initial Phase

FCC officials report that 1983-1985 data show no significant change in universal service. However, it may be too soon to know the full effect of the access charge decision, since the SLC for residential and single-line

[6]Issues in Telecommunications Regulation and Competition Early Policy Perspectives from the States, Center for Information Policy Research, Harvard University, April 1985.

[7]Public Utility Commission

business customers was only implemented in June 1985. FCC began monitoring telephone penetration data[8] in 1984 to assess universal service. In its access charge decision, FCC stated that it would avoid any actions that would cause a significant number of local exchange service subscribers to cancel their service.[9] Many in the telecommunications community expressed concern that the higherfixed monthly charges incurred by the SLC would reduce universal service.

FCC plans to continue monitoring universal service through study of penetration rates. These rates provide statewide information but do not report on specific areas within states Thus, this information cannot identify areas within states that may have a large percentage of customers discontinuing service FCC officials have said that they believe these situations would be reported to them by the relevant telephone companies, state regulatory commissions, and consumer groups in the areas. Our June 1986 report, Telephone Communications: The FCC's Monitoring of Residential Telephone Service (GAO/RCED-86-146) discusses the results and limitations of this effort to monitor universal service.

In October 1985, the Chief, Common Carrier Bureau, also indicated plans to monitor bypass. He responded to FCC commissioners' questions about two recently approved AT&T tariffs that could increase bypass of the local telephone company for interstate access services. Our discussions with FCC staff indicate that FCC plans to monitor and evaluate bypass and the access charge decision in 1986, and in late June 1986 FCC initiated a proceeding to examine the effects of the SLCs.

[8]Data collected from the Current Population Survey conducted by the Bureau of the Census The survey determines the percent of the residential population with a household telephone

[9]FCC indicated that interstate access charges alone would not affect customer subscribership Rather, customer subscribership would be affected by the combination of charges paid for all services—local, intrastate long distance, and interstate access FCC acknowledged, however, that if all these service costs increased by a certain magnitude, it could be sufficient to cause a significant number of subscribers to cancel service and thwart the goal of universal service FCC established both a transition period and Universal Service Fund in its original access charge decision to protect the needs of certain subscribers After issuing the decision, FCC modified the plan by adopting a program to reduce the SLC for low-income households and initiating a study of lifeline assistance measures that would be available for low-income subscribers At the same time, it also reduced the amount of the SLC for residential and single-line business subscribers Currently, the SLC recovers only a portion of non-traffic-sensitive costs, the remaining costs are still recovered through usage charges

Limited Information to Assess SLC's Ability to Deter Uneconomic Bypass

We found that available information did not allow us to assess the ability of the access charge decision to deter uneconomic bypass. The bypass models discussed in chapter 4 were developed after the access charge decision and estimate the interstate access bypass revenue loss for LTCs that would have occurred in 1984 if access markets had been fully competitive and adjusted to access prices. However, as discussed in chapter 4, the designs of these models preclude their use in forecasting the precise impact SLCs will have on bypass revenue loss.

Criticisms Offered on the Access Charge Decision's Ability to Prevent Uneconomic Bypass

FCC wanted to prevent uneconomic bypass and encourage network efficiency with the access charge decision. FCC believed that the access charge decision was a more appropriate method to charge for nontraffic-sensitive costs of interstate switched access service than the previous method of usage charges, since it believed that service charges needed to be based on the true cost characteristics of telephone company plant.

Various parties have criticized the access charge decision since its issuance Some believe that the access charge decision may not be an economically efficient policy because allocated costs of telephone services are arbitrary and not based on economic costs. Others believe that it may not prevent many forms of current or future bypass.

Telephone Costs Not Based on Economic Costs

Prices for telephone company services are not based on economic or marginal costs but rather accounting costs. Furthermore, these prices are tied to the jurisdictional separations process, a regulatory process developed by a federal-state Joint Board and adopted by FCC that assigns the amount of local plant costs to be recovered from intrastate and interstate calling. Economic theory suggests that prices developed under such cost allocations would be inherently arbitrary and inefficient because the prices would not represent generally the economic costs of the various services[10]

[10]Some economists believe, however, that basing local telephone company costs exclusively on the economic costs of the local telephone company would not be efficient They suggest that the economic costs of the local telephone companies may not be the lowest possible economic costs because traditional forms of public utility regulation encourage overinvestment and do not ensure that the telephone companies operate in the most efficient manner Other economists believe that economically efficient prices must reflect all the benefits society obtains from a particular service Therefore, total benefits should be equated to the costs of the service For example, each additional subscriber to the telephone network benefits both himself and all other subscribers who might wish to call him As more people come or stay on the network, all subscribers enjoy added benefits Furthermore, if access prices are kept low, even at below economic costs of providing access for subscribers, the network would remain large and all subscribers would benefit Thus below cost prices for low-income families

There also has been some debate over the traditional belief that nontraffic-sensitive costs are in fact fixed and should be paid entirely by the subscriber. It has been contended that line concentrators and remote switches can be used on the local loop to reduce its length. Use of these facilities raises questions about the degree to which switching and loop costs are interchangeable and, therefore, the extent to which loop costs are fixed and should be recovered by a SLC.

FCC and others have noted that there are numerous problems in identifying and measuring economic costs of telecommunications systems. Bypass systems and local telephone companies may not provide identical services which makes exact cost comparisons difficult. Local telephone company costs may be higher because the company would have to accommodate any overflow traffic from bypass systems. Also, bypassers might price their services below marginal costs to gain market entry. Furthermore, technical improvements may change service costs over time—what began as uneconomic could become economic

These difficulties in measuring and comparing the economic costs of telecommunications services led FCC to steer away from using the concept of uneconomic bypass to distinguish the types of bypass it originally chose to deter. Instead, FCC decided to define bypass by the way telecommunications services are routed as the transmission of long-distance messages that do not use the facilities of local telephone companies that are available to the general public, but that could use such facilities.

Bypass Does Not Always Occur for Economic Reasons or Services Affected by the SLC

FCC planned to discourage uneconomic bypass for interstate switched access services with the flat monthly SLC and reduced usage charges for nontraffic-sensitive costs. Survey results and our interview results discussed in chapter 3 did not always identify whether users bypass because of the price of interstate switched access services.

The three surveys and our interview results indicated that existing bypass systems most often carry traffic that is similar to telephone company services regulated by the states, services whose price would not be generally affected by the access charge decision. These results also suggested that future bypass will increase for long-distance services but did not indicate whether these services would include use of interstate

might be efficient because the total benefits to society might exceed the total economic costs of keeping low-income families on the network

switched access In fact, the various survey and interview results did not fully address a key policy question related to the FCC access charge decision—whether users bypass because of the uneconomic pricing of switched access for interstate MTS/WATS service. These interview results did not always specify which telephone company service users bypass or identify whether specific telephone company prices were their reasons for bypass.

All these results indicated that though price of service often affects users' reasons for bypass, bypass also occurs for a variety of service reasons. For example, users bypass because the telephone company may not be able to provide a particular high-speed data service, guarantee service security, or offer the reliability and flexibility that a bypass system can provide. Thus, these results suggested that many users bypass the local telephone company for reasons that the access charge decision does not address.

Regulatory Alternatives Other Than the Access Charge Decision That Address Bypass

While the public debate related to bypass regulatory policies has focused on the access charge decision, various parties have recommended other approaches to address bypass concerns. They suggest these alternatives for numerous reasons First, the SLC may be effective only for bypass of MTS/WATS services and not for much of the bypass that is actually occurring. Second, the SLC could lead to bypass of local services. The parties argue, for example, that the SLC is a national uniform policy and local services can have different cost/price relationships depending on state jurisdictional policies If a business line is priced at or near cost prior to the imposition of an SLC, there is the risk that the SLC will raise the price of the service above its cost and create an incentive for bypass. Third, the parties suggest that other alternatives may be more effective in deterring bypass while furthering the goals of the Communications Act.

The following briefly discusses the various types of regulatory responses that have been proposed and some of their potential strengths and weaknesses. Two of these alternatives, changing the jurisdictional separations process and restructuring tariffs, have received particular attention in comments provided to FCC and are discussed in greater detail.

Wide Range of Alternatives Suggested

Interested parties have recommended various regulatory responses to deter bypass. These include

- providing state jurisdictions greater flexibility to address specific bypass concerns by changing the allocation of nontraffic-sensitive costs,
- restructuring tariffs in order to make local telephone company services more competitive with bypass alternatives,
- streamlining administrative requirements (such as reducing tariff notice periods and cost-support requirements) to permit telephone companies greater flexibility in responding to the changing competitive environment,
- changing entry and exit restrictions for all providers of telecommunications service to enable them to deter bypass, and
- establishing industry and/or societywide subsidies or taxes in order to moderate the negative effects of tariffs designed to deter bypass

Groups within the telecommunications industry differ on the regulatory response they favor for deterring bypass. For example, some state regulatory commissions believe that states can best address the bypass concern by having greater control over the nontraffic-sensitive plant costs assigned through the jurisdictional separations process. The commissions recommend that states be assigned all or at least more of these costs so that each state can then design cost recovery methods that best deter bypass in its jurisdiction and serve its community's needs. Telephone companies, on the other hand, often recommend both pricing and procedural flexibility in order to allow them to compete more effectively with alternative providers while also endorsing the SLC.

One Alternative: Changing the Jurisdictional Separations Process

One frequently discussed regulatory alternative would provide greater state flexibility in addressing local bypass concerns. This alternative would change the jurisdictional separations process by changing the percentage of nontraffic-sensitive costs allocated to the interstate jurisdiction and assigning these costs to the state jurisdiction. In doing this, states could then have greater control and responsibility for telephone rates since they would devise rates to recover these costs to further their particular policy concerns.

One method to approach this alternative would be to assign the responsibility for recovering all the nontraffic-sensitive costs of the local telephone company to the state jurisdiction. One such proposal, the St Louis

plan, has been supported by many states. This plan would allow for unified state and interstate access charges to be filed with state commissions subject to general federal guidelines.[11]

Proponents of this method see two benefits. They believe that it can provide states the flexibility to determine pricing for all telephone company services. They note that each state can experience varying degrees of bypass activity and may need the flexibility to fashion innovative price structures to forestall bypass and sustain other goals such as universal service. They also indicate that states can have greater flexibility if they are in greater control of all costs to be recovered.

Further, this method may allow for a more efficient way to price services than the current method which requires jurisdictions to recover costs that have been assigned to services based on the jurisdictional separations process. As mentioned earlier, the jurisdictional separations process is arbitrary since it is not based on any precise determination of economic cost. One example to price services more efficiently that has been suggested would require local telephone companies to design a rate structure that would track so far as possible the actual economic costs of exchange access and usage.

Another method for changing jurisdictional separations would be to change the amount of the allocation assigned to each jurisdiction so that costs are allocated to jurisdictions based on their use of the facility. The percentage of nontraffic-sensitive costs assigned to interstate service has risen steadily from 3 percent in 1943 to 26 percent in 1981. This increase was only partly due to actual increases in interstate calling which rose from 3 to 7.9 percent Most of the increase resulted from crucial changes in the allocation procedure.[12] New procedures adopted by FCC in December 1983 eliminate the old system of allocating nontraffic-sensitive costs to interstate service. However, these procedures are also not based on use of plant for interstate service. Instead, the new

[11]A former FCC commissioner proposed a similar idea at the time of the access charge decision She recommended that FCC assert federal jurisdiction over all nontraffic-sensitive costs and appropriate traffic-sensitive costs involved in accessing local exchange facilities for long-distance services FCC would provide rules that would grant state public utility commissions considerable discretion in setting rate levels for access tariffs but would require them to implement and enforce certain general rules and principles

[12]The allocation process combined a weighting factor with the existing usage factor in order to determine the local exchange plant's relative interstate usage The factor that emerged from this process was called the subscriber plant factor Over the years, the subscriber plant factor was changed repeatedly so as to shift an increasing portion of the local exchange's nontraffic-sensitive costs to interstate service

procedures include a uniform measure that allows most telephone companies to allocate 25 percent of their nontraffic-sensitive plant costs to interstate service.

Proponents of this method suggest that the amount assigned to the interstate jurisdiction should be based on usage and not other allocation factors that have arbitrarily increased the cost of interstate service. They suggest that this method could create more efficient pricing for interstate service by decreasing the amount of interstate costs assigned to the interstate jurisdiction. They also suggest that this method would not require an SLC and could reduce the threat of uneconomic bypass They also indicate that even though this change would increase the state's jurisdictional revenue requirement, the state jurisdiction together with local telephone companies would have the flexibility and responsibility to recover costs through combinations of basic local rates and other charges responsive to the particular mix of policy considerations presented in their respective jurisdictions.

In order to adopt either of these methods, FCC would have to change the jurisdictional separations process. Currently, costs assigned to each jurisdiction by the jurisdictional separations process must be recovered by that jurisdiction, though FCC and states each can determine the particular means of cost recovery.

The Joint Board stated in a report adopted by FCC that bypass represents a national problem that cannot be solved exclusively at the state level. The Joint Board noted that if costs allocated to the interstate jurisdiction were significantly reduced (as in the latter method), states would be required to increase local exchange and other intrastate rates to recover the increased intrastate costs and interstate rates would be reduced to reflect a decreased revenue requirement. The Board believed that this method would not address bypass as a national problem The Joint Board believed that interexchange carriers should continue to bear some responsibility and pay a major portion of interstate nontraffic-sensitive costs at least through the interim period covered by the Board's recommendations.

Since its original access charge decision, FCC has acknowledged the need for states to have some degree of flexibility in addressing local bypass. As mentioned previously, FCC revised its access charge decision and provided states and local telephone companies some alternatives for interstate nontraffic-sensitive plant cost recovery.

Another Alternative: Restructuring Tariffs

Another regulatory alternative would provide local telephone companies and interexchange carriers greater flexibility in structuring tariffs that could encourage customers to continue using their services rather than bypass alternatives.[13]

FCC has approved one form of tariff restructure that would allow AT&T to offer an interstate switched access service through the local telephone company's special access service. Traditionally, AT&T's interstate switched services have generally been provided through the local telephone company's switched access service, though the OCCs have been able to offer interstate switched service through special access.

The advantage of this type of tariff restructure is its ability to keep large-volume users as customers of the local telephone company. Chapter 4 describes the cost advantage provided when interstate switched services are provided through special access. Large-volume, long-distance customers have an incentive to purchase special access services instead of switched access services, since they would probably be less costly to them. Interexchange carriers also would incur less cost, and telephone companies would still retain customers, although these customers would shift from one service offering to another.

The disadvantage of this form of tariff restructure is the fact that customers create service bypass when they move from switched access to special access. Since local telephone companies depend on switched access revenue to help pay for the nontraffic-sensitive plant costs, large amounts of service bypass which make only a limited contribution to local plant costs could threaten the local telephone company's interstate revenue base. Revenue loss by the local telephone company could then adversely affect goals such as universal service if local telephone rates were increased.

Service bypass could be limited if tariffs such as this were denied AT&T. However, this restriction might not promote certain policy goals. AT&T has said that if it were not allowed this form of tariff restructure, the goal of equity among service offerings is not furthered since some interexchange carriers can already offer this type of service. In addition,

[13]Several methods of tariff restructure have been adopted or considered Each may address the bypass concern and affect telecommunications goals somewhat differently These include volume discounts, such as tapered rates, and contract pricing

denying AT&T the right to offer this service could inhibit the development of competitive markets that FCC believes best serves regulatory goals, because a major market participant would be restricted.

Increasing the price of special access has also been considered as a way of discouraging service bypass. However, this solution could discourage the goals of economic pricing and efficient network use and cause customers to bypass the local telephone company entirely with their own private facilities.

FCC has acknowledged that use of special access appears to be the major form of bypass to occur in the near future. In the initial access charge decision, FCC expressed concern about customers using special access services in order to "leak" calls onto the public network.[14] FCC required a surcharge on special access services in order that they provide some contribution to local telephone company nontraffic-sensitive plant costs. However, FCC later recognized that use of special access to bypass the public switched network was far greater than just the "leaky PBX" problem, since local telephone companies might be able to routinely provide special access for services traditionally routed by switched access.

However, FCC has allowed certain AT&T tariffs such as Megacom which could increase future bypass, including service bypass. In its decision to allow this tariff, FCC noted that AT&T conceded its tariff would allow high-volume users of interstate long-distance services an opportunity to bypass switched access services. FCC also noted that it has not identified bypass as either unreasonable or unlawful because it realizes that some forms of bypass can have positive effects and because of the difficulty in determining economic bypass. It also noted that broader bypass questions such as those that deal with the effects of service bypass are most appropriately addressed in the comprehensive setting of a rulemaking rather than tariff proceeding.

[14]Calls using special access are supposed to end at the customer's premises. However, if the customer has switching equipment like a PBX which handles local calls as well as long-distance calls, the customer can receive interstate calls and then have its PBX switch and route them to the local exchange without paying the appropriate switched access charge for these calls. This is called a "leaky PBX." To address this problem, FCC imposed a monthly special access surcharge on each special access line. Special access facilities are exempt from the surcharge if the customer provides written certification to the local telephone company that the private line terminates at a device which is not capable of interconnecting the service with the local network.

Current Information Does Not Support One Regulatory Response

Though alternatives such as jurisdictional separations and tariff restructure have been proposed or approved, there is a lack of knowledge about actual telephone company service costs or customer response to regulatory alternatives which would constrain any evaluation about whether one or more of these alternatives provides a preferable response to bypass. Furthermore, it is difficult to identify alternatives that serve all telecommunications goals simultaneously, as is illustrated by the discussion of these two examples. As discussed below, the evidence does not suggest a best method, and interested parties have different views on the ability of various alternatives to deter bypass while satisfying other goals such as universal service.

Some telecommunications experts believe a combination of alternatives may be required to meet multiple policy goals For example, to further multiple goals, FCC adopted several regulatory responses in its access charge decision—the SLC, Universal Service Fund, reductions for low-income households, and experimental and alternative plans to recover interstate nontraffic-sensitive plant costs. Some were a part of the original decision; others as previously discussed were revised and adopted as various parties expressed concern about the ability of the original decision to further certain goals.

In June 1986, FCC initiated an evaluation of the access charge decision and SLC for its effect on bypass and other issues. It also plans to monitor tariffs such as Megacom. Some states are currently investigating bypass activities in their jurisdictions. We spoke with representatives from all 50 states and the District of Columbia Some states have adopted measures that they believe will make telephone companies more competitive with bypass providers These include deregulating competitive services and granting some forms of administrative and pricing relief. Other states are requesting telephone companies to provide regular reports on bypass in their company's area in order to monitor the bypass levels. Appendix X provides a description of the states' activities.

Conclusions

FCC concluded that uneconomic bypass could lead to undesirable consequences that could hinder the nation's telecommunications goals. First, FCC was concerned that bypass by telecommunications users could cause sizable telephone company revenue loss which could lead to rate increases that could adversely affect universal service. Also, because of users' incentive to avoid any uneconomic price which might be charged

by the local telephone company, FCC said that bypass could lead to inefficient investment and operation of the nation's telecommunications resources.

FCC concluded that bypass is a national concern which required uniform rate structure reform at the federal level. It addressed the bypass issue with the access charge decision and its SLC. FCC reevaluated its decision after comments by telephone companies, state regulatory commissions, consumer groups, and others suggested that alternative methods were needed to ensure that local bypass concerns could be addressed and that universal service would be preserved.

It may be too soon to tell about the access charge decision's effectiveness in deterring uneconomic bypass. FCC's monitoring results indicate no decline in the current status of universal service. Survey results described in chapter 3 suggest that future bypass will be greater than existing bypass. FCC's bypass report states that service bypass is likely to be the greatest form of bypass in the near future, and as of October 1985, FCC approved tariffs that now allow AT&T, the largest interexchange carrier, to offer long-distance services that can bypass local telephone companies.

Since FCC adopted the access charge decision, interested parties have criticized the decision. Some observers state that it is not necessarily an economically efficient approach because it is based on allocated regulatory costs and not economic costs of telephone services. Others state that it does not best address state bypass concerns nor other reasons for which users may bypass.

Our review of available information has demonstrated limitations in current data on bypass. We assessed two simulation models that estimate the potential interstate access bypass revenue loss that might have occurred in 1984. These models are policy analysis tools—their limitations preclude using their estimates as forecasts of how the SLC will affect actual bypass revenue loss. We also reviewed several user surveys and interviewed telecommunications users. Though these results provided helpful information on the extent, characteristics, and reasons for bypass, they often use different definitions, collect different information, and report wide-ranging results that did not allow for comparison or quantification of bypass issues or a nationwide assessment of users' bypass activities.

FCC has recognized the need to monitor bypass and evaluate the access charge decision and initiated such an assessment in June 1986. We agree that the bypass issue requires further monitoring and evaluation as FCC proposes. Bypass of the local telephone company is occurring in a telecommunications environment that is rapidly changing as the industry adapts to a climate with new technologies, new providers, and more sophisticated telecommunications users. As FCC monitors changes in the industry as part of its regulatory responsibilities, it will have the opportunity to assure its current regulatory policies effectively prevent uneconomic bypass and maintain the nation's telecommunications goals. FCC has already identified some of the areas that it needs to address—survey data validity, inconsistent bypass definitions, and effects of AT&T's Megacom tariff on bypass. We agree that these should be incorporated into FCC's continuing review of the effect of bypass on local telephone company revenues and subscribership.

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Summaries of Selected Surveys of Telecommunications Users

This appendix summarizes surveys of telecommunications users' bypass services and facilities. Most of these surveys were conducted and submitted to FCC between May and October 1984 in response to a public notice issued on March 28, 1984.[1] In this public notice, the FCC requested data, information, and studies pertaining to bypass of the public switched network. Surveys of telecommunications users were received from a variety of telephone companies and users groups.

In summarizing these surveys, we reviewed only published survey information or that information presented to FCC and not the original data source. We recognize that the surveys may differ in their methodologies and assumptions even though these are not always detailed in the materials presented to FCC. For example, the surveys do not always report how participants were sampled, that is whether participants were randomly selected or whether they voluntarily responded to a marketing mailing. Further, the surveys do not always report their response rates or reasons for participant nonparticipation. Therefore, we are not able to always determine the appropriateness of the surveys' methodology or the possibility of bias in the surveys' methodological approach

Surveys often defined bypass differently, which can directly affect the surveys' results on the extent and nature of bypass. Some surveys' definitions included both service and facility bypass, others included only facility bypass, and others included facility bypass but specifically excluded certain telecommunications services.

FCC has said that bypass definitions reflect the individual party's choice as to what bypass should mean. FCC also noted that given the current controversy over bypass, parties choose definitions that support their economic stakes in the communications market FCC suggests that one cannot simply assess the parties' definitions objectively but that they have to also be assessed subjectively by analyzing the impact of the definitions on the parties who submitted them. We have not evaluated the differences in definitions, but rather note that different definitions exist. The following paragraphs provide FCC's evaluation of the differences in these definitions.

[1]Five surveys included in this appendix were completed after FCC had closed its record These are studies conducted for Bell Atlantic Telephone Companies, the Conference Board, the National Regulatory Research Institute, New Jersey State, and Washington State

FCC says that local telephone company revenues at stake will differ depending on how bypass is defined. FCC notes that local telephone companies use broad definitions of bypass that would make revenue loss appear as large as possible and encourage policymakers to take immediate action. On the other hand, user groups or alternative providers fear regulatory measures that would restrict their use of alternative services. They usually adopt narrow definitions of bypass in order to minimize the revenue threat, to argue that its services are not bypass services, and to make it less likely that restrictions on bypass (particularly, its own service) will be imposed. Users also state that they use certain alternative services that are not directly substitutable for telephone company services because the telephone company cannot provide or does not offer the services these users need. Therefore, users believe these services should be excluded in any bypass definition

FCC also notes that some parties, specifically some telephone companies, have disagreed with FCC's conclusion that a bypass definition should include service bypass. FCC believes that this disagreement may be because telephone companies have provided private lines for many years, long before the present bypass concern appeared. Further, these companies may be less concerned with the revenue loss from private lines (service bypass) than from facility bypass for two reasons. Facility bypass provides no contribution to the costs of the local plant; service bypass contributes $25/line per month. Facility bypass could also grow into more sophisticated and permanent systems that could eventually pose a greater competitive threat to the local telephone company.

1. American Petroleum Institute

The American Petroleum Institute is comprised of 40 of the nation's leading petroleum and natural gas companies. During the spring of 1984, the Institute surveyed 56 petroleum and natural gas industry licensees in the Private Operational - Fixed Microwave Service administered by FCC. While the Institute provided no explicit definition of bypass, members were surveyed on their use of private microwave systems.

Results of the survey report that respondents' private microwave systems have generally been in place for over 20 years and carry approximately 75 percent voice and 25 percent data traffic, are located in remote environments (offshore or in sparsely populated rural areas), and serve predominantly intracompany locations. Survey results did not specifically state the percentage of respondents' total telecommunications traffic that is carried over private systems but did indicate that

respondents expect to increase their use of private systems while remaining large-volume users of telephone company services. The Institute respondents use private systems mainly for service reasons such as a need for high system reliability or because local telephone company facilities are not available. Twenty respondents also said that economic considerations are not generally important in their decisions to use private microwave facilities.

The Institute concluded that since respondents' private microwave systems are used primarily to locate, produce, and deliver essential energy products to the American public, they should not be restricted or penalized in any way.

2. Association of American Railroads

The Association of American Railroads represents railroad companies that collectively operate approximately 97 percent of the United States railroads. During the spring of 1984, the Association surveyed 14 members on their use of private communications systems. The Association said that members' private communications systems should not be categorized as bypass systems. It defined bypass as only those communications systems that (1) carry traffic that telephone companies have historically carried, (2) serve locations that telephone companies serve, (3) provide a service that the telephone company could provide, and (4) bypass the telephone company uneconomically.

Survey results indicated that respondents' private systems have generally been in place for over 20 years and serve intracompany locations often over a quarter of a mile from any local telephone company facilities. Most of the traffic that these systems carry (over 90 percent) was never carried by the local telephone companies. Results did not indicate the type of traffic nor the percentage of total telecommunications traffic that respondents' private systems carry. Results reported that respondents bypass in order to meet strict operational requirements that the telephone company cannot meet. The Association said that while cost was a factor in some respondents' decision to shift traffic from telephone company facilities to private systems, it was probably only a minor factor in this decision. The Association reported that, in many cases, railroads simply do not view telephone company service as an alternative to private communications systems. For example, the average respondent rated reliability, maintenance, repair, and transmission quality as more significant to its decision to use a private system than the availability of telephone company facilities.

The Association concluded that railroads' private communications systems are neither economic nor uneconomic bypass, since they meet unique operational communications needs that the telephone companies cannot meet. Since railroads' private systems often serve remote areas and carry traffic that the telephone company generally has never carried, they do not "strand" telephone company plant.

3. Association of Data Communications Users

The Association of Data Communications Users is a national association representing some 175 companies and institutions that are large-volume users of data communications services. Members include banks, insurance companies, utilities, universities, and manufacturers. The Association surveyed its membership regarding their usage of private communications services during the spring of 1984. Results were based on 47 responses. The Association distinguished between bypass services and private communications services. Bypass services, according to the Association, are only those services that substitute in quality and kind for local telephone company services and significantly subsidize local residential service. Private communications services, according to the Association, are nonprofit, not-for-hire, user-owned and provided communications facilities. The Association maintains all private services are not bypass services under the Association's definition.

Survey results revealed that 13 of 47 respondents (28 percent) have private communications systems and 11 respondents (23 percent) are proposing to install private systems within the next 3 years. The remaining 23 respondents (49 percent) have no existing or proposed private communications systems. Typical private systems use microwave or satellite technologies, substitute for telephone company private line service, carry mostly data traffic, and terminate traffic in intracompany locations ranging from intraexchange, intrabuilding to interexchange, interstate. Results did not indicate the percentage of respondents' total traffic that private systems carry but noted that respondents expect to continue using the local telephone company and plan to increase their payments to local telephone companies by about 10 to 12 percent annually, in part due to users' expanded service needs. The reasons respondents use private systems involve both cost and service factors. Examples include the high costs of local telephone company services and the need for readily available services suitable for high-speed data transmission.

Association of Data Communications Users concluded by proposing that a proper definition of bypass should exclude substitutes for telephone company private line services since these telephone company services traditionally have not been priced to contribute to the cost of local residential service. It further submitted that the definition of bypass should be restricted to systems that circumvent local telephone company services. Finally, the Association supported federal preemption over the states in regulating bypass systems and opposed the imposition of bypass "surcharges" that sanction inferior or unacceptable telephone company services

4. Bell Atlantic Telephone Companies (Bell Atlantic)

Bell Atlantic, representing the Bell Telephone Company of Pennsylvania, the four Chesapeake and Potomac Telephone Companies, and the Diamond State Telephone Company, surveyed 815 large business customers in the Bell Atlantic region in 1983 regarding their bypass plans. In this survey, Bell Atlantic defined bypass as the "origination and/or completion of telecommunications by end users, interexchange carriers, or other providers of communications services, without the use of the local exchange carrier's services or facilities."

Survey results indicated that 10 percent of the 513 respondents bypassed in 1983. Bypass occurred over a variety of technologies, including microwave, satellite, and cable TV, and was most prevalent among organizations with at least 500 employees and/or monthly local telephone service billings of at least $100,000. Survey results did not report the type or amount of respondents' bypass activities. Respondents identified cost as the primary factor in their decision to bypass.

In early 1985, Bell Atlantic conducted a follow-up survey of the 513 respondents to the 1983 survey. For purposes of the 1985 survey, Bell Atlantic specified that bypass by resellers was included in its definition of bypass. Respondents were questioned both on their usage of their private systems and of resold or shared services.

The 1985 survey reported an increase in the extent of bypass activity. Seventeen percent of the 513 respondents were reported to own private systems, an increase of two-thirds among the customers that participated in both surveys. Eleven percent also reported using resold services in 1985.

The 1985 survey indicated that bypass activity will continue to grow. Bell Atlantic reported that 6 percent of the 513 respondents planned to initiate bypass with private facilities by 1987 while 17 percent of the respondents who do own bypass facilities (15 of 88) plan to purchase additional facilities by 1987. Five percent of the respondents plan either to begin using resold services by 1987 or to increase the resold services they now use.

The 1985 survey results reported that typical private facilities use microwave or cable TV technologies, carry 15 percent of the user's total telecommunications traffic, are used for intra-LATA transmission, and replace or substitute for a wide range of local telephone company services, but most frequently intra-LATA private line services. Twenty-two percent of the respondents with private systems have direct links to an interexchange carrier, and more are planning to bypass for long-distance access in the near future. A few of the respondents currently lease excess capacity on their private systems to other establishments, while more are planning to do so in the near future. Users of private systems cited the ability to reduce costs as a key factor in their decision to bypass, both now and in the future.

Typical resold services carry 22 percent of users' total telecommunications traffic, are used for intra-LATA transmission, and also replace or substitute for a variety of local telephone company services, but most frequently local exchange service. The ability to reduce costs was the major factor users of resold services cited in their decision to bypass, both now and in the future

5 Committee of Corporate Telecommunications Users

The Committee of Corporate Telecommunications Users is a nonprofit corporation representing companies in New York and throughout the nation who it characterizes as major telecommunications users. During 1984, the Committee commissioned the Bethesda Research Institute, a Maryland-based consulting firm, to survey Committee of Corporate Telecommunications Users membership on bypass activities and plans. Survey results are based on approximately one-third of the members who use New York Telephone Company services. For the purposes of its survey, the Bethesda Research Institute defined bypass as the usage of nonlocal telephone company services.

Most respondents reported that they are not bypassing. Within 5 to 10 years, however, bypass alternatives will likely be a substantial portion

of respondents' telecommunications budgets. The survey results noted that a variety of technologies will be used for bypass, with no clear trend toward one preferred technology. Survey results did not indicate the type of traffic bypass systems carry, the percentage this traffic represents of respondents' total telecommunications traffic, or the locations served by bypass systems. However, the survey explored in-depth the reasons why respondents bypass and concluded that service considerations such as responsiveness to customer needs outweigh pricing factors in the decision to bypass. Survey results indicated that New York Telephone could price services 5 to 10 percent higher than bypass alternatives and still retain its customer base as long as the company is responsive to customers' service concerns in a superior fashion.

6. The Conference Board

The Conference Board conducted a survey of telecommunications managers of 1,700 companies. Survey results were based on responses from 348 companies (20 percent of the sample) who had sales exceeding $10 million annually and/or were represented on Forbes magazine's list of the top 500 companies in sales, employees, profits, or market value. The Conference Board defined bypass as a form of telephone communication that avoids (or bypasses) any connection to the local telephone company.

Over 66 percent of the respondents expressed significant interest in bypassing. Twenty-five percent of the respondents already bypass, while most of the remaining 75 percent are evaluating the process. Typical bypass systems utilize microwave or fiber optic technologies. Results did not indicate the type or amount of traffic carried over respondents' bypass systems or the locations these systems serve. Survey results reported cost savings as the primary reason for bypass, followed by the availability of new technology. Respondents most frequently said that they would require an expected savings equal to the return on other capital projects if they were to bypass.

7. International Communications Association

The International Communications Association represents approximately 550 of the world's largest telecommunications users who individually spend at least $1 million annually for telecommunications services and facilities. The Association commissioned Economics and Technology, Inc., to survey members during the spring of 1984 on their use of private communications systems. Survey results are based on 187

responses For the purposes of its survey, International Communications Association defined bypass as customer-provided communications systems, which it referred to as

" . any system that is not provided by a common carrier, i e., a system that is owned or leased by a company or shared with another firm that is not principally engaged in providing any telecommunications service or equipment for sale or lease to others."

The definition excludes local area networks, communications systems that exist wholly within one building or within contiguous buildings occupied by the same company.

The Association found that 29 percent of the respondents are operating private systems and 53 percent are considering private systems. Typical private systems provide point-to-point dedicated services over microwave or fiber optics technologies; substitute for telephone company provided private lines; transmit mainly data, mixed voice and data, and video conferencing; carry about 15 percent of the users' total traffic; and cover a distance no greater than 16 miles. Private systems are more often installed in response to perceived limits in the quality or availability of existing common carrier service rather than to achieve cost savings.

The Association's survey results concluded that bypass does not endanger communications common carriers or universal service, nor will it in the near future. The Association indicated that cost-based pricing and improvements in telephone company service quality and reliability should be sufficient to protect against any potential harm from private system bypass.

8. National Regulatory Research Institute

The National Regulatory Research Institute was established in 1976 by the National Association of Regulatory Utility Commissioners to carry out research and related activities directed to the needs of state and federal regulatory commissioners in areas involving electricity, gas, telephone, and water. During 1984, the Institute conducted a telephone survey of a nationwide random sample of large manufacturers and financial institutions. Survey results are based on 561 completed responses from a sample of 891 company locations. The Institute

defined bypass as ". . . the origination and/or termination of telecommunications traffic without the use of established telephone company facilities."

Survey results indicated that 16 percent of the 561 respondents bypass (89 of 561). While the survey was not designed to forecast future bypass, National Regulatory Research Institute interpreted the following results to indicate that bypass will increase. Most systems have been installed since 1980, 22 percent of those bypassing have made firm commitments to expand their bypass facilities; and 19 percent of those respondents not bypassing (90 of 472) are considering bypass. The Institute reported that most bypass systems incorporate several technologies, including satellite, private microwave, digital termination systems, local area networks, cable television, fiber optics, teleports, and cellular mobile telephones.

Typical bypass systems are used for voice or voice grade data communications and serve more or less equally a variety of jurisdictions, including local, state, or interstate. Bypass activity appears to be concentrated in certain states, but the sample size was not large enough for the Institute to draw any conclusions on this matter Bypass activities have replaced many different telephone company services, but rarely has this replacement been substantial. Survey results indicated that bypass systems have replaced telephone company local services most often. In addition, 16 percent of the bypassers have established direct links between their premises and the facilities of long-distance carriers. Survey results stated that respondents most frequently decide to bypass because of the price of telephone company services, the need for greater flexibility than the telephone company provides, and price stability.

The Institute concluded by emphasizing that there is no single pattern or trend to characterize all bypass activity. Bypass is occurring for a variety of services at different rates across the country. Pricing policies should be based on state analyses of the types and extent of, as well as reasons for, bypass in particular locales. The Institute opposed a uniform national policy on bypass but suggested that an alternative to the interstate end user access charge, which would decrease incentives for MTS and WATS bypass, could be to decrease interstate subscriber loop cost allocations.

9. New Jersey State

In December 1984, the Bethesda Research Institute completed a survey of existing and prospective bypass activities in the state of New Jersey for the New Jersey Department of the Public Advocate and the New Jersey Board of Public Utilities. Survey results are based on the responses of 12 of 30 large users contacted from a listing of New Jersey Bell's largest 100 users in terms of 1983-billed revenues and from among New Jersey-based "Fortune 500" companies. For purposes of the survey, bypass was defined as usage of non-New Jersey Bell services.

None of the respondents bypass New Jersey Bell facilities or services, but most (88 percent) use New Jersey Bell special access lines. No respondent has definite plans to bypass New Jersey Bell within the next 2 years, but 25 percent indicated that they will "possibly subscribe" to bypass alternatives within 2 years and spend less than one-fourth of their communications budget on bypass services. Sometime between 5 to 10 years from the time surveyed, about 25 percent of the respondents said that they will "likely" or "definitely" bypass. These respondents also reported that responsiveness to customer needs and technical service quality are the factors most important in the decision to bypass. Respondents indicated that they would continue with New Jersey Bell services even if prices were 5 to 10 percent more than the bypass alternative as long as New Jersey Bell responds to customer needs in a superior fashion and provides high-quality service. Survey results did not indicate the type of traffic that bypass systems will carry or the locations they will serve.

The survey concluded by cautioning against sudden or significant shifts in telecommunications policy by the Board of Public Utilities and pointed out that New Jersey Bell is well situated in terms of its pricing advantage and favored status among customers to respond to potential bypass

10. New York Clearing House Association

The New York Clearing House Association consists of 12 major New York banks, including the 9 largest banks in the state and 6 of the 10 largest banks in the country. In March 1984, it surveyed its members regarding their use of nontelephone company services. Survey results are based on the 11 responses received and on information obtained on the twelth member's telecommunications activities. The Clearing House defined bypass for the purpose of its survey as use of non-New York Telephone Company telecommunications services.

Seven of the 12 Clearing House respondents (58 percent) use bypass services for a portion of their high-speed voice and data traffic. All of the respondents expect to have some bypass facilities in place within the next 3 years. Results indicated that point-to-point microwave is the predominant bypass technology used by respondents. Information was not provided as to the locations served by respondents' bypass systems. The total amount of each bank's telecommunications traffic carried over bypass systems appeared to be relatively minor when compared with the traffic that the telephone company carries for the banks. Together, the respondent banks paid over $100 million to New York Telephone Company in 1983, while they spent approximately $2 to $3 million in 1983 for nontelephone company services. Respondents also indicated that the telephone company would be the likely provider of certain services that the banks increasingly need, such as bank-to-customer links and lines connecting central bank computers with branch locations or automatic teller machines. Survey respondents expected to increase their payments to New York Telephone Company over the next few years, in some cases by 15 to 20 percent annually. New York Clearing House Association results linked bypass to banks' specialized needs and dissatisfaction with New York Telephone Company service and costs. Respondents indicated that they would be forced to consider telecommunications alternatives, such as direct links with long-distance carriers, if telephone company service does not improve and long-distance carriers are forced to pay unreasonably high access fees to the local telephone company.

11. Touche Ross & Company

During 1983 and 1984, Touche Ross and Company surveyed for telephone companies some 2,000 of the largest telecommunications customers throughout the United States. To qualify for the surveys, customers needed to spend at least $250,000 per year for telephone company services in a given state Touche Ross defined bypass as "the origination and/or termination of voice or data traffic without use of the telephone company's local loops." This definition excluded local area networks within a single building as well as telephone company-provided private lines.

Survey results reported that 25 percent of the respondents bypass, and an additional 33 percent of those not bypassing plan to bypass within the next 3 years. Bypass systems typically are single-user systems which use microwave, cable, or fiber optic technology; carry 10 to 20

percent of users' originating traffic; have a point-to-point system architecture; and serve mostly intrastate locations. Future bypass systems are likely to involve more shared use or resale as well as bypass for long-distance access.

Twenty-five percent of the respondents have been approached by interexchange carriers regarding bypass for long-distance access, and 80 percent are willing to consider this form of bypass should it become available. Respondents reported that price is their primary reason to bypass, but that service-related factors are also important, particularly for systems that were built before 1980. Pre-1980 bypass systems were often built because the telephone company would not, or could not, supply the services customers required. Touche Ross noted that customers are likely to bypass when telephone company services are priced at over 10 percent more than bypass alternatives.

Touche Ross concluded by outlining a number of responses that regulatory commissions could take to allow competitive pricing by telephone companies and that telephone companies could take to improve services for large customers.

12. Utilities Telecommunications Council

The Utilities Telecommunications Council is a nonprofit corporation representing the nation's electric, gas, water, and steam utilites on telecommunications matters. Its membership includes some 2,000 utilities of all sizes. The Council surveyed members of its Microwave, Power Line Carrier, and Fiber Optics Committees in 1984. Survey results were based on responses received from 35 members. The Council presented the following definition of bypass:

" the provision of telecommunications service without the use of PSTN (public switched telephone network) plant, in those situations where the PSTN is capable of providing the telecommunications service needed by the user "

Members were surveyed on their use of private systems.

All of the respondents operate and plan to continue to operate some type of private transmission system, such as power line carrier systems or private microwave systems. Private systems generally carry voice and data traffic and serve local, intrastate, and interstate areas. Survey results did not report the amount of total telecommunications traffic that respondents' private systems carry. Respondents annually average

about $3.2 million in telephone company bills and expect annual increases of about 12 percent in their telephone company costs. Respondents reported that they operate private systems to meet unique service and reliability requirements which they believe cannot be provided by the local telephone company. These requirements include the protection, metering, and monitoring of critical energy resources.

The Council concluded by urging FCC to adopt a definition of bypass that is confined to those situations where the user's needs can be met by the public switched network and to preempt state regulation in the area of private system bypass.

13. Washington State

In 1984, the Joint Select Committee on Telecommunications of the Washington State Legislature commissioned Ernst and Whinney, a professional services organization, to study bypass. In order to obtain information on the extent, effects, characteristics of, and reasons for bypass, Ernst and Whinney sought information from three groups. Ernst and Whinney interviewed about 29 large telecommunications users, some 16 vendors of bypass technologies, and Washington State's 24 local telephone companies. This section presents the results of the interviews with large users, although the policy recommendations provided at the end of this summary are based on the results from the three groups interviewed.

Ernst and Whinney interviewed two groups of large users: a group of 11 users known to bypass; and a group of 18 users of telephone company-provided private lines (many of which had been identified by telephone companies as bypassing but actually did not bypass under Ernst and Whinney's definition). For purposes of the interview, Ernst and Whinney defined bypass as ". . . the origination or termination of extra-premises or intercompany traffic by nonlocal exchange carrier facilities that are functionally equivalent to facilities available from a local exchange carrier."

Bypassers included a range of organization types and sizes. Bypassers used predominantly private microwave technology to provide a mixture of voice and data communications in a variety of interpremise, intra-company locations. Many of the bypassers carried the majority of their telecommunications traffic over local telephone company facilities and installed bypass facilities to accommodate growth in their telecommunications needs. Respondents indicated that their bypass systems have not

resulted in a net reduction in their use of telephone company services. No bypasser is involved in resale. Bypassers indicated that bypass facilities were most frequently installed because of the lack of readily available, comparable telephone company facilities. Respondents also cited system reliability and user control as important factors in the decision to bypass, particularly among utilities. Bypassers generally did not consider lower cost to have been important in their decision to bypass, but lower cost was important in users' decisions to expand existing bypass systems.

The characteristics and reasons for bypassers' future systems differed from their existing ones. Users still expect to use private microwave extensively but also expect to increase their usage of fiber optics systems. Users generally expect that the proportion of data traffic carried over bypass systems will increase Plans are typically in the financial planning and engineering stage rather than in the budget cycle. Several users stated that they expect the lack of comparable telephone company facilities to become a less important factor in the decision to bypass. On the other hand, the users cost-related factors become more important.

Most of the private line users that were not bypassing are either considering bypass alternatives or will in the future. These users generally have less sophisticated telecommunications needs than those of existing bypassers. Eighty-nine percent of the users (16 of 18) are very open to the idea of bypass, and 33 percent (6 of 18) are seriously considering it. None of these users' bypass plans is yet reflected in the users' corporate budgets. These users mentioned a wide variety of possible bypass technologies. They indicated various cost reasons as the major reasons for considering future bypass.

Among other things, the survey made three policy recommendations based on the results of interviews. First, it recommended that if federal flat monthly customer charges are imposed, state charges should also be adopted and phased in gradually. Second, telephone companies should be allowed flexibility to compete effectively with bypass system vendors in the private line marketplace. Specifically, the legislation should allow telephone companies to provide private line services under contract and exempt telephone companies from the requirement to give advance notice of new rates where alternative providers are available. Third, the survey recommended that the Washington State legislature should consider repealing the state sales tax on business local exchange service with the immediate objective of reducing the cost of basic service, thereby reducing customer drop-off.

Organizations GAO Interviewed

We interviewed organizations in Colorado and Massachusetts that were either (1) currently bypassing the local telephone company or (2) were likely to bypass due to their large-volume, long-distance costs. We identified the first group from an FCC list of 119 approved applicants for private microwave facility construction. We then interviewed 24 private microwave users from this list by selecting those organizations representing (1) different types of organizations, such as educational institutions, governmental agencies, utilities, manufacturers, and banks and (2) organizations with a greater number of microwave stations. (See table III.1.)

To identify large-volume, long-distance customers, we requested and received customer listings from Mountain Bell and the New England Telephone Company. The two companies provided us with a list of 92 large-volume users based on intrastate intra-LATA revenues only. The telephone companies either did not have inter-LATA revenue data readily available, or would not provide the data because of their proprietary nature. We were particularly interested in obtaining a list of large-volume inter-LATA customers because of the focus of the access charge decision on interstate long-distance services. Representatives of the telephone companies said, however, that their largest intra-LATA and inter-LATA customers would often be the same. We interviewed 68 users from these lists.[1] Not all users identified by the telephone companies were surveyed as part of our review; some organizations did not wish to be interviewed, and we were unable to contact others. Also, we did not contact those organizations who were interexchange carriers or telecommunications resellers, since we were interested in users who would bypass primarily to meet their own telecommunications needs rather than companies whose major purpose is to provide telecommunications services. (See table III 2.) For the purposes of our interviews, we defined bypass as

" the origination or termination of two-way voice, data or video telecommunications traffic for which local telephone company facilities are not employed "

This definition is broad and was used to identify the many types and forms of bypass that a user could employ when not using the local telephone company. It does not include, however, the use of specialized facilities of the local telephone company that are not widely used by the general public. Use of these facilities is often considered a form of bypass.

[1]Ten of these 68 users also appeared on the list of private microwave licensees

Table III.1: Private Microwave Users[a]

Type of organization	Colorado	Massachusetts	Total
Educational institution	0	2	2
Government	4	2	6
Hospital/police/fire	2	1	3
Public utility/railroad	4	2	6
Manufacturing	1	4	5
Bank/insurance	0	1	1
Other	1	0	1
Total	**12**	**12**	**24**

[a]Some organizations we initially contacted were not interviewed because they either were not bypassing, had not yet constructed their microwave facility, or did not wish to be interviewed

Table III.2: Large Users of Telephone Company Service[a]

Type of organization	MTS only	WATS only	MTS & WATS	Total
Educational institution	3	0	0	3
Government	4	2	3	9
Hospital/fire/police	2	1	0	3
Utility/railroad	1	1	1	3
Manufacturing	2	1	9	12
Banking/insurance/financial	6	5	3	14
Lodging	6	1	0	7
Food industry	2	1	0	3
Other	3	6	5	14
Total	**29**	**18**	**21**	**68**

[a]Both Mountain Bell and New England Telephone provided separate lists of their large-volume MTS and WATS customers Although many organizations appeared on more than one list, they were interviewed only once

Chronology of Key FCC and Court Decisions Regarding Competition Among Transmission Providers

Specialized Private Line Services Decisions

Before the 1960's, only the established carriers and Western Union offered private line services, which were usually either telegraph or voice grade circuits. The advent of computers and the electronics revolution, in conjunction with changing social and economic developments and needs, created new demands for specialized intercity communications services. In addition, the introduction of microwave technology promised to lower the costs of intercity transmission and to make it economically feasible for firms other than the established carriers to construct microwave transmission networks to serve the growing demand.

The first FCC decision responding to these demands was the 1959 Above 890 Decision (27 FCC 359 (1959)), which allocated part of the microwave spectrum to private business users. In issuing this order FCC reasoned that an adequate number of frequencies existed in the microwave spectrum to satisfy both the common carriers' and private systems' future needs. In addition, the Commission determined that common carriers were unlikely to be economically harmed by the entry of private communications systems.

Despite this decision, demand for specialized intercity communications systems continued to grow, as a result of the growth of computer technology. To evaluate this demand, the Commission initiated a rulemaking proceeding which culminated in the Specialized Common Carrier Decision (29 FCC 2d 870 (1971)). This decision established a Commission policy favoring new entry into the specialized communications field.

As a rationale for this decision, the Commission argued that the specialized common carriers were not entering a fixed homogeneous market with the same services but rather were seeking to develop new, more heterogeneous markets. As a result, the carriers could be expected to satisfy demands which were not being met by existing carriers and expand the size of the aggregate telecommunications market.

The argument of a natural monopoly in intercity transmission was raised in response to these decisions. The Commission noted that economies of scale largely occur in markets where the technology is stable and the market is homogeneous In contrast, FCC argued that the market for specialized communications is characterized by rapidly changing technology and diverse consumer demands.

In its 1972 Domestic Satellite Decision (35 FCC 2d 844 (1972)), FCC extended its multiple entry policy for licensing specialized common carriers using microwave systems to license specialized common carriers seeking to use domestic satellite systems. As a rationale for this policy, the Commission concluded that a competitive supply market would be more dynamic and would encourage service and technical innovation as well as provide an impetus to minimize costs and prices to the consumer. Other decisions have further broadened FCC policy. In 1973 FCC permitted the establishment of "value-added" carriers, and in 1976 it authorized the resale and sharing of certain private line telecommunications services. Value-added carriers lease channels from other carriers and then add extra services or "value" before reselling them to the final consumer. Resale is the subscription to communications services and facilities by one entity with the subsequent resale to the public for profit. Sharing is a nonprofit arrangement in which several users collectively use and pay for communications services and facilities provided by existing carriers.

Opening Intercity Switched Services to Competition

In September 1974, the MCI Telecommunications Corporation, a specialized common carrier, filed a tariff application with FCC to provide a service known as Execunet. The Execunet customer can dial a local MCI number and be connected through a microwave system to another telephone in another city MCI serves.

After several procedural disputes and an informal letter to MCI in July 1975 rejecting its tariff, FCC in July 1976 issued an extensive final opinion concluding that MCI was not authorized to offer Execunet. In that opinion, the Commission relied on its Specialized Common Carrier Decision, under which most specialized carrier facilities authorizations have been issued. FCC believed that the Specialized Common Carrier Decision dealt only with private line services, which specialized carriers like MCI had applied to provide, and did not open other areas, such as MTS/WATS, to competition.

FCC found that Execunet was not a private line service, but rather had the essential characteristics of the MTS/WATS service offered as a monopoly by AT&T. Therefore, FCC rejected MCI's Execunet tariff as unlawful because it violated FCC's Specialized Common Carrier Decision.

MCI subsequently appealed FCC's decision to the U.S. Court of Appeals for the District of Columbia. In its July 1977 decision,[1] the court said that while FCC had the statutory authority to authorize competition in limited areas with restrictions, Section 214(c) of the Communications Act required FCC to make an affirmative determination that the public interest requires such restrictions. Regarding FCC's Specialized Common Carrier Decision, the court said that FCC had not properly made such a determination. Instead, the court said that:

" . . it appears that the Commission saw benefits accruing to the public from the services which were before it In granting the facilities authorizations on the basis of that public interest finding, the Commission did not perhaps intend to open the field of common carrier communications generally, but its constant stress on the fact that specialized carriers would provide new, innovative, and hitherto unheard-of communications services clearly indicates that it had no very clear idea of precisely how far or to what services the field should be opened. There being no affirmative determination of public interest need for restrictions, MCI's facility authorizations are not restricted and therefore its tariff applications could not properly be rejected."

In reaching its decision, the court did not determine whether the competition in monopolized long-distance service like that posed by Execunet was in the public interest. That determination was left to the Commission. In addition, it did not disturb FCC's finding that Execunet was not a private line service. In January 1978, the Supreme Court denied FCC's petitions for review.

Following the Supreme Court's action, AT&T applied to FCC for a declaratory ruling to clarify and define precisely what obligations AT&T had regarding interconnection with MCI for Execunet. In its ruling, FCC said that AT&T's interconnection obligations were only for private line services and that the Commission had not made the affirmative public interest finding required by section 201(a) regarding the interconnection of Execunet.

MCI subsequently appealed this ruling and filed a motion to require compliance with the court's first Execunet mandate. FCC opposed MCI, stating that the first mandate was not related to interconnection. Rather, the court had found only an error in FCC's decisions regarding section 214.

[1]MCI Telecommunications Corp v FCC 561 F 2d 365 (1977), cert denied 434 U S 1040 (1978), hereinafter referred to as the Execunet Decision

On appeal, however, the court said that FCC read its original decision too narrowly and that its decision carried a broad interconnection mandate.[2] In August 1978, FCC filed for review of this most recent decision with the Supreme Court. In December 1978, the Supreme Court denied FCC's petitions for review of the Execunet II Decision.

In response to the Execunet decisions, FCC in February 1978 began a proceeding to decide whether long-distance service—both MTS and WATS—should be provided as a monopoly by AT&T or should be open to competitive entry. In August 1980, FCC decided not to create a monopoly in these services, stating that it was convinced that competition in all interstate interexchange services was in the public interest and would further the goals of the Communications Act.

In October 1980, FCC allowed resale and sharing of all domestic-switched services, including MTS and WATS (77 FCC 2d 74 (1980)) MCI had filed a petition with FCC asking that tariff restrictions be lifted to allow resale and shared use of switched voice services provided by common carriers. FCC found that resale and sharing of domestic public switched network services were just and reasonable and within the public interest.

Divestiture of AT&T

In 1974, the U.S. Department of Justice instituted an antitrust suit against AT&T, Western Electric, and Bell Telephone Laboratories. The suit generally alleged that the Bell System had used its dominant position in the transmission and equipment markets to suppress new competition in order to enhance its monopoly power. This suit was dismissed in 1982 as a result of a negotiated settlement known as the Modification of Final Judgment.[3] AT&T agreed to divest itself of its corporate connection with its 22 wholly-owned Bell operating companies in exchange for the right to enter unregulated competitive markets, such as the computer industry. The Bell System, as such, ceased to exist on January 1, 1984, when the Modification of Final Judgment went into effect.

The Modification of Final Judgment had several provisions related to transmission services. It split the Bell System's transmission functions in two and divided the Bell territory into about 160 geographic areas called Local Access and Transport Areas. The BOCs were given the facilities, personnel, systems, and information to provide exchange services (both

[2]MCI Telecommunications Corp v FCC 580 F 2d 590 (1978), cert denied 439 U S 980 (1978), also referred to as the Execunet II Decision

[3]United States v AT&T, 552 F Supp. 131 (D D C 1982)

local and long distance) and exchange access services within their designated LATA(s). AT&T was given similar resources to provide interexchange services between LATAs. In addition, the Modification of Final Judgment required the BOCs to provide all interexchange carriers with exchange access services equal in type, quality, and price to those provided AT&T. This "equal access" must be provided over a 2-year period beginning September 1, 1984. By September 1, 1986, all BOC switching systems must provide equal access, although exceptions may be made for electromechanical switches or switches serving fewer than 10,000 lines where costs of providing equal access are prohibitive.

Technologies Available for Bypass

Bypass has become possible with the increased availability and affordability of technologies that can provide private telecommunications systems The technologies most often used for private bypass facilities are microwave, fiber optics, and coaxial cable. Satellite systems offer another bypass alternative, and newer technologies include digital termination systems, cellular radio, and various traffic concentrators used to link multiple users.

Some technologies are primarily used for bypass at short distances; others are mainly used for longer distances. For example, digital termination systems and local area networks are typically used for bypass within a local area, while satellite systems are primarily suited for long-distance communications often over 200 miles in length. Two of the most commonly used technologies, microwave and fiber optics, can be used for both local and longer distance bypass.

This appendix details the various technologies and identifies the key characteristics of each.

Microwave

Point-to-point microwave is a long-established technology that has been used for many years by railroads and utilities Many private businesses have used it since 1959, when FCC allocated part of the radio spectrum for use by the private sector. Microwave systems relay radio signals by utilizing dishes placed on towers or building rooftops to provide point-to-point transmission capability. Microwave systems are suitable for voice and data transmission.

Several advantages of microwave are that it is relatively easy to deploy and is suitable for a variety of transmission media. No right-of-way requirements are associated with installing microwave systems, and installation costs may be lower than they are for cable-based systems. Microwave is suitable for short-haul or long-haul transmissions and can be adapted for additional capacity.

Microwave systems have several disadvantages. Microwave relaying requires a direct line of sight between locations. In hilly and other locations where a direct line of sight is not possible, microwave systems require additional equipment that increases the system costs. Also, radio spectrum congestion can limit microwave use, particularly in urban areas. In heavily populated areas, the most desirable frequencies of the spectrum (generally the lower levels, where distance transmission is greatest) are already in use. At the less congested higher frequency

levels, transmission distances are significantly reduced, at times requiring more equipment (and greater cost) for transmission at these levels than at lower spectrum levels. Microwave also offers less security than some cable-enclosed systems such as fiber optics.

Fiber Optics

Fiber optics is a relatively new cable-based transmission technology that relays information by lasers through hair-thin strands of glass. It is especially well suited for high-volume communications.

A number of advantages are associated with fiber optics; one is its ability to carry a great deal of high-speed data. As an example of its large carrying capacity, a 1/4-inch diameter communications cable containing two optical fibers can carry the same volume of traffic as a 3-inch diameter communications cable containing 20,000 copper wires. Other advantages are that signals transmitted by fiber optics keep their strength for long distances, are immune to noise and electrical interference, and are comparatively secure. Fiber optics is easier to install than copper cable and has low operating and maintenance costs.

The disadvantages associated with fiber optics reflect the "flip side" of its advantages. Since it is a new, relatively immature technology, fiber optics systems are subject to quick design obsolescence. While fiber optics can be ideal for urban, high-capacity applications, it is often prohibitively expensive for mobile and rural communications with low-capacity applications. Another disadvantage associated with fiber optics is evidenced in any cable-based technology—the need to obtain right-of-way or conduit space from a local authority.

Coaxial Cable

Coaxial cable consists of a number of units made up of an inner wire centered within a hollow cylindrical tube by insulating disks. Coaxial cable is well suited for transmitting large amounts of information, since it increases the carrying capacity of ordinary cable.

Coaxial cable has traditionally been used by telephone companies for long-haul telecommunications and by cable television operators for entertainment services. A more recent application of coaxial cable is institutional networks which route voice and data traffic among users within a defined area.

Cable television systems are primarily designed for one-way transmission of video signals. This factor limits their bypass-potential since subscribers are unable to communicate with the system. FCC now requires, however, that all new cable television systems in the top 100 television markets have two-way capability, allowing subscribers to communicate with the system. As cable television operators install new two-way systems or retrofit older systems for two-way capability, cable television's bypass-potential could increase.

Institutional networks differ from traditional cable television in that they are designed to provide two-way transmission of video, voice, and data signals within a defined area. They consolidate and route traffic to and from users in the "network," thereby providing services similar to those of the local telephone company. Institutional networks typically serve such organizations as local governments, hospitals, and universities.

The advantages and disadvantages of coaxial cable may be summarized as follows. Coaxial cable is a relatively inexpensive, mature technology available in many areas across the country. On the other hand, obtaining right of way to construct cable systems can be difficult, and voice transmission over coaxial cable is relatively expensive. In addition, most coaxial cable systems are located not in urban areas, where the need for their use is greatest, but in suburban and rural areas.

Satellites

Telecommunications satellites are microwave radios that cover large geographic areas and use earth stations to relay signals. Earth stations are facilities located on customers' premises that transmit and/or receive radio signals to and from a satellite in geosynchronous orbit.[1]

Most existing satellite systems are associated with cable television and provide only one-way transmission capability; however, satellite systems are being increasingly adapted to serve a variety of two-way business communications needs, including voice, data, and video transmission Such satellite systems can bypass local and interexchange carriers by transmitting messages directly from an earth station located on a customer's premises to a satellite and then back to another customer premises station.

[1]Satellites in geosynchronous orbit travel above the equator at the same speed as the earth rotates, so they appear to remain in the same place

Satellite systems' major advantages are that they have no right-of-way requirements, are well suited to high-speed data transmission, are cost-effective for long-distance transmission, and can interconnect readily with most other technologies. For example, a signal transmitted by satellite to an earth station can be "transferred" onto a cable-based transmission medium to complete the call.

A number of disadvantages are associated with satellite systems, including high installation and operation costs. Such expenses preclude most usage of satellite-based communications networks for bypass at short distances. Long deployment times and problems with the quality of the radio signals are other frequent drawbacks to using satellite-based bypass systems.

Digital Termination Systems

Digital termination systems are a microwave technology approved by FCC for operations as a common carrier service in 1981. Unlike point-to-point microwave transmission, a system is comprised of a central point, called a node, which transmits and receives information from multiple locations. Subscribers use microwave radio antennas located on their premises to communicate with the central node. Once a transmission reaches the central node, it can be switched to another subscriber in the local area or directed over long-distance intercity facilities.

Digital termination systems are primarily designed for local-area delivery of data communications and also has video capabilities. Systems are well suited for organizations with substantial high-speed data transmission needs, but the systems have line-of-sight constraints and do not currently provide a good reproduction of voice transmission.

Cellular Radio

Cellular radio is a mobile telephone technology for voice communications which eliminates the delays associated with conventional car telephones. Cellular systems divide a service area (e.g., a city) into "cells." These range in size from 2 to 10 miles in diameter and each is served by a relatively low-power transmitter or base station. The cells are connected to a central computer by cables or microwave links. Since cellular systems are low-power (each base station has an output of 100 or fewer watts), two or more cells can use the same channel simultaneously without interference.

FCC has reserved places for two cellular radio operators in each market. One franchise is to go to the local wireline carrier, such as the telephone

company, and the other to a non-wireline carrier. Many of the franchises in the larger markets have been decided, and the remaining franchises will be decided during the next few years.

Traffic Concentrators

A number of relatively new technological developments bypass the public switched network by concentrating and routing user traffic. Several of the major traffic concentrators are teleports, local area networks, and shared tenant services systems. Integral to their operations is their use of a private branch exchange (PBX).

Teleports are multiple technology systems that link local and long-distance calls through a combination of technologies and offer sophisticated telecommunications capabilities to their users. Teleports consist of a central PBX located in an industrial area which concentrates business users' traffic and sends it to satellite earth stations for long-distance transmission. Users link into the PBX over a variety of telecommunications technologies, including microwave, fiber optics, or coaxial cable. Teleports are being developed in at least two dozen areas across the country, including New York, Ohio, California, Texas, and New Jersey.

Local area networks are interoffice systems that link telephone and computer technology to communicate between offices within a single or several premises on a user's property. They use fiber optic or coaxial cables to transmit signals. Local area networks are primarily used to link office computers but voice capability is becoming more available.

Shared tenant services systems use PBXs to concentrate and route tenants' local and long-distance calls. Tenants within a building share local lines, thereby reducing the number of lines rented from local telephone companies. Shared tenant services systems can also concentrate long-distance traffic, enabling individual tenants to take advantage of long-distance access options, such as private lines and direct connection to the interexchange carriers.

GAO Interview Results

This appendix presents in tabular form the key results from our interviews with telecommunications users described in chapter 3. We interviewed two groups of telecommunications users, and our methodology is detailed in appendix III. One group had 68 large-volume customers of telephone company services (large users) and the second group had 24 private microwave licenses. Since 10 of the 68 large users also appeared on our list of private microwave licensees, the total number of organizations interviewed is 82. The numbers in the following tables are adjusted where necessary in order not to double-count results from those users who were members of both groups we interviewed. The tables present combined results from both groups unless the table title specifically identifies the results as being from one of the two groups.

Table VI.1: Extent of Existing Bypass

	Total users	Users who bypass
Large user respondents[a]	68	20
Private microwave respondents	14	14
Total	**82**	**34**

[a]Numbers are adjusted in order not to double-count results from organizations who were both private microwave licensees and large-volume customers of telephone company services

Table VI.2: Extent of Future Bypass

Response	Large users[a]	Private microwave users
Will initiate bypass	11	n/a
Will increase bypass	14	10
Will maintain existing level of bypass	3	4
Will decrease bypass	1	0
Will not bypass	16	0
Undecided/do not know	23	0
Total	**68**	**14**

[a]Includes results from 10 microwave users

Table VI.3: Interest in Purchasing Resold Services— Private Microwave Users

Response	Number of users
Would consider	14
Would not consider	9
Unsure	1
Total	**24**

Table VI.4: Existing Traffic Carried by Bypass System— Private Microwave Users

Percent of total traffic bypass system carries	Number of users
Not measurable	10
1 - 24	9
25 - 49	2
50 - 74	3
75 - 100	0
Total	**24**

Table VI.5: Future Effects of Bypass System on Telephone Company Services—Private Microwave Users

Response	Number of users
Use of telephone company circuits will decrease	11
Use of telephone company circuits will be unaffected	8
Use of telephone company circuits will grow	5
Total	**24**

Table VI.6: Services Provided by Bypass System— Private Microwave Users

Services	Number of users
Private line (point-to-point)	20
Switched	1
Switched and private line	3
Total	**24**

Table VI.7: Telephone Company Services Decreased by Bypass System

Telephone company service	Number of users
Local	6
Private line	6
MTS	2
WATS	2
Local, MTS, WATS, and private line	1
Not applicable	15
Unknown	2
Total	**34**

Table VI.8: Use of Direct Connections

Response	Number of users
Use direct links	6
Plan to use direct links	10
Do not use or plan to use direct links	66
Total	**82**

Table VI.9: Geographical Areas Served by Bypass Systems

Area(s) served	Number of users
Local	19
Intrastate	6
Interstate	5
Combination	4
Total	**34**

Table VI.10: Reasons for Existing Bypass

Reason	Number of users
Service-related	
Higher system reliability and control	8
Better service (e g , flexibility, responsiveness of vendor, technical features of network)	4
Availability of digital or video capability	2
Greater security	1
Higher data rates	1
Other[a]	2
Cost-related	
Better cost control	7
Equivalent service at lower cost	3
Other	4
Combination	1
Unknown	1
Total	**34**

[a]These users said that they bypass because of unavailable telephone service in remote areas

Table VI.11: Reasons for Future Bypass—Large Users

Service-related	Number of users
Better service (e g., flexibility,	
responsiveness of vendor, technical features of network)	5
Higher reliability and control	2
Higher data rates	2
Cost-related	
Better cost control	7
Equivalent service at lower cost	4
Other	5
Total	**25**

Costs of Microwave and Fiber Optic Facility Bypass Systems

In this appendix we discuss the cost characteristics of the most likely facility bypass technologies.[1] In general we find that

- facility bypass systems exhibit economies of scale because average costs decrease as the total number of access channels increase at a location and
- facility bypass costs increase with the distance between a subscriber and an interexchange carrier.

In this appendix, we present only generalized evidence on the costs of the technologies. To simplify our discussion, we will determine the cost of each bypass system at full capacity, which ensures the lowest cost per minute of access In addition, our basis of comparison is the cost per channel per month, because this simplifies the comparison between facility systems and special access. This calculation of cost per channel per month includes both transmission equipment and operating costs which is a standard practice in cost comparisons.[2]

To develop the cost per channel per month at full capacity, an analyst must make assumptions about depreciation rates, borrowing costs, equipment costs, operating expenses, and salvage values. If the analyses of various systems do not make compatible assumptions, a comparison of their cost may not reflect the actual cost differences. The information we use to assess the cost of facility bypass contains differences in assumptions. Therefore, an exact comparison of costs in this discussion is not possible. Instead, the information can only be suggestive of the various facility bypass systems' costs.

FCC Cost Information

In 1984, FCC summarized available evidence on facility bypass costs. Its findings are reported in table VII.1 on a cost per-channel per-month basis. The table indicates the cost per channel for a 24-channel system varies from $22 to $178, but most estimates are in the $40 to $50 range. Furthermore, a 96-channel system costs about $22 per channel. Both are quite competitive with the current special access rates which exceed $100 per channel. In general, these costs show economies of scale

[1]For a discussion of the advantages and disadvantages of available facility bypass technologies see appendix V.

[2]This calculation does not address the possibility that large-scale bypass could be deterred by large fixed costs associated with procurement of new facilities

because the average cost per channel decreases as the number of channels per location increases. Therefore, if the customer generates sufficient traffic to fully utilize a facility bypass system that has from 24 to 96 channels, facility bypass could be cheaper than using local telephone company services.

Cost Analyses From Pacific Northwest Bell

In December 1984, we received several analyses of bypass system costs from an engineer at Pacific Northwest Bell. The cost analyses were said to be representative of the costs of these technologies and are presented in table VII.2.

Table VII.1: GAO Estimates of Monthly Costs Per Channel[a] For Bypass Systems

	24 channel microwave systems			Unspecified digital microwave	24-& 96-channel fiber systems 2 miles	
	10-18	23	6		24 channel	96 channel
	—(gigahertz[b])—					
GTE Service Corporation	$178	$69			$53	
Florida Public Utility Commission	$45		$43		$40	$22
BCR		$26				$22
Pacific Telephone and Telegraph	$54			$54		
Pacific Northwest Bell				$50		

[a]A channel is a link between two terminals over which users at each end can communicate with one another

[b]Gigahertz = 1 billion cycles per second

Note Different respondents used different assumptions and this changes the estimated costs per channel

Source Bypass of the Public Switched Network, Table II, Appendix V, a study published by FCC, 12/19/84

Table VII.2: Pacific Northwest Bell Estimates of Bypass Costs Per Channel Per Month (2-Mile System) **In 1984**

System	24 channels	96 channels
Fiber optic	$139 07	$46 48
Coxial cable	$65 80	$43 27
23 gigahertz Microwave	$128 12	$39 06

Source Pacific Northwest Bell

The Pacific Northwest Bell costs for a 2-mile system are consistent with the FCC results discussed earlier. The 24-channel systems are more expensive per channel than the 96-channel systems, and the cost per

channel on any system is competitive with local telephone company access services.[3] Here again, the average cost per channel is lower on high-volume systems.

Cost Analyses Developed for Bell Atlantic

In a 1985 study developed by Shooshan & Jackson Inc., for Bell Atlantic, cost per-channel analyses were presented for various combinations of channels and distances.[4] Table VII.3 summarizes the costs per channel and reveals the sensitivity of bypass costs to distance and number of channels. Cost per channel varies from $3,266 to $20. The cost also implies economies of scale. Costs for a 1-channel system are not competitive with telephone company services, but as the channels per location increase, costs become more competitive. These figures also highlight how any system's cost will be sensitive to the distance between the customer and the interexchange facilities. Either technology would offer access service at less cost than the telephone company if offered on a 24-channel basis

Table VII.3: Shooshan and Jackson Estimates of Bypass Costs Per Channel Per Month in 1985

	Fiber Optics		Microwave	
	1 mile	5 miles	1 mile	5 miles
1 Channel	$420	$3266	$457	$856
24 Channels	$ 20	$ 139	$ 22	$ 39

Source Shooshan & Jackson Inc

Conclusions

The cost analyses discussed in this appendix indicate that the cost of facility bypass can be less than the cost of special access. They also show that the costs per channel tend to decrease as the number of channels on a system increases and costs increase as the distance from the customer to the interexchange carrier increases. This, in turn, suggests facility bypass is often more expensive than special access and may be cost-effective only for large volumes of traffic located near interexchange carrier's facilities

The available data does not permit us to determine if all the systems' costs were appropriately calculated. As previously mentioned, differences in interest rates, depreciation rates, and equipment costs preclude exact comparison across systems. Also, these facility bypass costs may

[3]These calculations do not include a backup system for coaxial cable and thus understate costs

[4]Shooshan and Jackson employed the same cost methodology for all bypass technologies

not have accounted for service quality that may not be comparable to the local telephone company. For example, microwave access by facility bypass can be hampered or limited during severe weather conditions. It can be improved by using larger antennas, but this increases equipment costs. If cost comparisons are not based on a microwave system that is as dependable as local telephone company services, the cost comparison could make microwave look cheaper than it really is, since it does not account for loss of service. A similar problem arises if the facility bypass system permits more busy signals and cannot meet peak demand as easily as the telephone company's switched access service. In this instance, the facility bypass cost per month is less, because the costs of increased busy signals or redialed calls are ignored.

Irrespective of these problems, bypass is still probably cost-effective at large-volume locations. In addition, users may find facility bypass even more attractive as technological developments decrease facility bypass costs and increase the number of users who find it a cost-effective alternative to current telephone company services. But as we stated in chapter 4, telecommunications users will base their bypass decisions on expected local company prices and costs of existing and future facility bypass systems. When either local company prices or facility bypass costs are uncertain or expected to decline, customers may be less likely to purchase or lease a private system, because future prices and costs could prove a bypass facility purchase to have been unwise.

Comparing Both BCR Models and the FCC Model

The BCR model, discussed in its published report, is much more complex than the FCC model, and we cannot fully evaluate it. This occurs because the BCR model was constructed from data provided by regional Bell operating companies that were not identical. Furthermore, some data were proprietary and not available for our review. For example, most Bell LTCs analyzed customer incentives by market segments, where each segment consisted of a number of companies with similar traffic volumes and distances from the interexchange carrier. To determine the extent of bypass, most Bell LTCs calculated the bypass incentives for a representative member of each market segment. If bypass was warranted for the representative member, all members of the segment were assumed to bypass. Ameritech did not perform this analysis so BCR used the results of other regions to determine Ameritech's bypass levels. Pacific Bell, Pacific Northwest Bell, and Northwestern Bell provided bypass analyses based on their own somewhat different methods according to BCR. As a result BCR's methods and analyses are not totally available, and we could not completely review the published model.

In contrast, FCC was able to provide us all the data used in its less complex analysis and a copy of the computer program of the model. Therefore, FCC's model assumptions and data were totally available to us.

Another difference between the FCC and published BCR model limits our ability to directly compare them. The FCC model is based on highly aggregated nationwide numbers and limits bypass to special access and facility bypass. The published BCR model is based on disaggregated numbers that can include information on cost differences by state, user location, and user traffic patterns. Furthermore, the BCR model includes resale for both business and residential customers while the FCC model does not. Because of these differences in detail, we cannot directly compare the two models.

BCR has developed an abbreviated simulation model that it provided to FCC and us. In addition, BCR officials have said that the abbreviated model employs the overall logic of their published bypass study and provides comparable results for our analysis For example, the abbreviated BCR model suggests that the $4 subscriber line charge decreases nontraffic-sensitive and traffic-sensitive revenue shortfalls per line by $7.01, while the published model suggests $6.70 as shown in table VIII.1.

This abbreviated model, which replicates the published model's results, can be compared with the FCC model because the level of detail in the

data is similar and all the data and assumptions of both models were made available to us.

Table VIII.1: Comparing the Abbreviated and Full BCR Models in Terms of Nontraffic-Sensitive and Traffic-Sensitive Revenue Shortfalls Per Line Per Month[a]

	Revenue shortfall using 1984 access prices[b]	Revenue shortfall using $4 subscriber line charge[c]	Difference in shortfall
Full BCR	$16 50	$9 80	$6 70
Abbreviated BCR	$15.43	$8 42	$7 01

[a]Shortfall per line per month includes both single-line business and residential lines

[b]The 1984 switched access price was 8 48 cents per minute

[c]The $4 subscriber line charge is on single-line businesses as well as residential lines The switched access charge is 6 05 cents per minute

A Sensitivity Analysis of the FCC Model

In this appendix we provide a sensitivity analysis of several selected assumptions in the FCC model. The assumptions that were varied were chosen based on reviews of the literature, discussions with consultants, and differences between the assumptions in the abbreviated BCR model and the FCC model. Several other critical assumptions were not tested because the structure of the model prohibited such tests.

In general we found that the FCC model responded in a manner consistent with underlying economic theory. If a change in a specific assumption was expected to increase bypass, it did. Conversely, a change expected to decrease bypass, did so.

The FCC model is a computer simulation of the national market for interstate access services. It estimated how 1984 interstate access revenues would have responded to changing usage-sensitive access charges if access markets were competitive. In the model, mathematical equations are used to represent (1) access costs and capacity of various access services, (2) customer access costs on various services at different traffic levels, and (3) the amounts and types of traffic subject to bypass.

Based on the assumption that customers will and can immediately choose a mix of access services to minimize access costs if costs change on various services, the model estimates the amount of bypass that would have occurred in 1984 at different service prices if all customers with financial incentives to bypass had bypassed. It then calculates the revenues that the LTC would have received at various access price combinations and any shortfalls from the interstate revenue requirement.

Our review of the literature, including the BCR model, indicates several specific assumptions in the FCC model were not accepted by all analysts. To determine how sensitive the FCC model's results were to these specific assumptions, we use variant assumptions supplied by the literature as discussed below. These variations produce slight variations. However, this lack of sensitivity does not provide information on whether the FCC model appropriately reflects how real-world differences imbeded in different assumptions would affect bypass traffic and revenue loss.

To test the effects of changing a specific assumption, we change that one assumption while keeping all other factors constant. However, the model was designed to test how changes in access prices would effect interstate access revenues. Thus, if the model was allowed to run as designed, two assumptions would be changing at the same time. First, our change in a specific assumption could change the revenue estimate

and second the changes in access price would change the revenue estimate. To ensure that we only tested the effects of the specific assumption we changed, we only estimated the revenue loss that would occur at a usage access charge of 8.21 cents per minute which corresponds to a nontraffic-sensitive charge of 5 cents per minute.

In this appendix the following specific assumptions were changed:

- The amount of terminating bypass.
- Banning special access lines for interexchange access.
- Permitting the LTCs to charge a premium price for premium services.
- Changing the capacity of special access lines.
- Increasing the special access surcharge
- Initiating a residential subscriber line charge.
- Banning intrastate bypass.

In the base case, with no alteration in the FCC model's assumption, a 5 cents nontraffic-sensitive price per minute produced $628.7 million per month out of the $750 million per month interstate nontraffic-sensitive revenue requirement as shown in table IX.1. If no bypass had occurred, the model would have generated $726.6 million per month.[1]

[1]This sensitivity analysis calculates revenue shortfalls in the nontraffic-sensitive access revenue requirement Implicitly, this approach suggests traffic-sensitive costs vary proportionately with traffic, and the traffic-sensitive charge covers these costs

Table IX.1: How Changes in Assumptions Change LTC Interstate Nontraffic-Sensitive Access Revenues Per Month in The FCC Model (The Nontraffic-Sensitive Revenue Requirement Is $750 Million Per Month)(The Usage-Sensitive Access Charge Is 8 21¢ Per Minute)

In millions of dollars

LTC revenue changes	Base case	No terminating bypass	Total bypass is twice originating
Lost to facilities	67 9	39 2	98 2
Lost to special access	157 0	101 3	202 2
Gained from surcharge	26 2	25 8	33 7
Estimated revenue after bypass	528 0	612 0	460 1
Base-case revenue minus revenue with changed assumptions		−84 0	67 9

Special access is forbidden	Facility bypass 10% cheaper	Facility bypass 25% cheaper	Special access capacity = 2,000 min	Special access surcharge = $50	Subscriber line charge[a]	No intrastate traffic bypass
84 4	65 1	60 9	83 1	72 3	67 9	59 2
0 0	159 8	164 0	141 9	149 5	157 0	154 4
0 0	26 6	27 3	35 5	49 8	26 2	25 7
642 3	528 5	529 2	537 3	554 7	758 7	538 9
−114.3	− 5	−1 2	−9 3	−26 7	−230 7	−10 9

[a]The model calculates subscriber line charge revenues based on BCR line counts, a $6 per line multiline charge and a $2 per line single-line charge per month Based on these line counts and charges, the subscriber line charge provides $230 7 million

Terminating Bypass

Several sources, including our consultants, questioned whether terminating bypass was always possible. If terminating bypass is not allowed, the LTCs receive $606.9 million rather than the $528.7 million in the base case. This revenue increase was reasonable because revenue losses due to bypass should be less if less traffic is subject to bypass.

In the base case for the FCC model, each originating business access minute yields .53 terminating access minutes. In contrast, the BCR assumes each originating business minute produces one terminating minute, which is a higher proportion of terminating bypass. Using this increased BCR ratio of terminating minutes, the FCC model produces $458.9 million toward the revenue requirement rather than $528 million in the base case or $606.9 million without terminating bypass. The loss is consistent with greater bypass opportunities afforded by the BCR assumption.

Banning Special Access

Special access may create a revenue loss for LTCs because it permits customers to reduce access costs without building a facility bypass system. But it may also increase LTC revenues because its keeps some customers on the LTC who otherwise would have built a facility bypass system. To test the effects of special access on LTC revenues, we ran the FCC model without permitting special access for interexchange access.

A review of the FCC base-case model indicates that bypass due to special access creates revenue loss and that the $25 surcharge per special access line is not replacing the loss. For example, in the base case $157 million is lost to special access while the surcharge only generates $26.2 million. If special access between customers and interexchange carrier facilities is forbidden and if we assume the restriction can be enforced, these losses might be curtailed. The model suggests a prohibition on special access would generate $624.4 million toward the nontraffic-sensitive revenue requirement, which exceeds the base-case amount of $528 million. Furthermore, the prohibition on special access increases LTC losses to facility bypass. In the base case, facility bypass creates $87.9 million in lost revenues, but if special access is prohibited the loss is $84.4 million. Therefore, the prohibition of special access may decrease LTC revenue losses. The absence of special access increases revenues because more traffic reverts to the switched-access facilities rather than transferring to facility bypass.

LTC Charges Premium Prices for Premium Services

Both the FCC and BCR models assume all forms of access provide identical services. Under these conditions only costs affect the customer's choice of access. But the studies reported in appendix II and chapter 3 and discussions with our consultants indicate that LTC services may be superior and even preferred. This preference might permit LTCs to charge customers a price that is 10 to 25 percent over the price of other access providers. To determine whether this preference might change the extent of bypass, we developed two runs of the model. The first one required a facility-based system to be 10 percent cheaper before it was adopted and the second run required facility bypass to be 25 percent cheaper. The 10-percent differential generated $528 5 million and the 25-percent differential produced $529.2 million. The small variation in access revenues was caused by the fact that access traffic is concentrated in a few locations. Customers with a large volume of originating traffic found facility bypass attractive even if they considered LTC services superior. This suggests that if traffic actually is as concentrated as suggested by the FCC and BCR assumptions, even technically inferior facility bypass may create bypass losses.

Special Access Capacity Per Line

Engineering studies of the capacity per special access line indicate the capacity of a single line may not reach 3,000 minutes per month, the figure used in the FCC model. To test the importance of this assumption, we changed the capacity of a special access line to 2,000 minutes, the assumption in the abbreviated BCR study. This capacity change increases the LTC nontraffic-sensitive revenues to $537.29 million, from a base case of $528 million. The net increase occurred for three reasons. First, at the lower capacity, customers using special access needed more lines to carry their calls, and this generated more revenues due to the $25-per line surcharge. Second, because each special access line carried less traffic, it became more expensive, therefore, some users decided to stay with switched access which generated added LTC revenues. Third, some special access customers switched to facility bypass to avoid increased costs and this decreased revenue. Together the three effects increased LTC revenues.

In practice both the BCR and FCC assumptions probably overestimate the traffic that can be carried by a single special access line and underestimate the traffic that can be carried by multiple special access lines For example, Pacific Northwest Bell engineers estimate that a 208-line bypass system would average 6,500 minutes per line per month while a 2-line system would average 372 minutes per line per month. Given

these relationships, customers would tend to need more traffic to initially adopt special access because the capacity per line is lower, and this increased cost for small customers would deter adoption of special access and permits LTC to earn higher switched access revenues. In contrast, large users need fewer lines, because each line carries more traffic, and this decreases their need for special access lines. The decrease in lines for large customers decreases revenues from a surcharge, but the high costs per minute decreases incentives for smaller users to adopt special access bypass which decreases special access revenues. The net revenue effect of these different financial incentives for different size customers is unclear. Both the FCC and abbreviated BCR models cannot address this issue because their analyses are not detailed enough.

Increasing the Special Access Surcharge

In the FCC model, the presence of special access bypass creates a revenue loss due to decreasing switched access revenue but some revenue is acquired from the $25 surcharge on each special access line. Some observers have suggested that an increase in the surcharge would limit bypass revenue losses because it would discourage special access bypass and generate more revenue if such bypass occurred. To test this possibility, we increased the surcharge to $50 per line. The model generated $554.7 million rather than the base case of $528 million. The revenue increase suggests that special access even at a higher price remains competitive with facility bypass. As a result, the model suggests an increased surcharge can generate more revenues. In practice this may not occur because large users who use a large number of lines need fewer access lines than the model suggests, as discussed in the previous subsection. Therefore, special access revenues may be overstated in the FCC model because users need fewer lines.

Initiating a Residential Subscriber Line Charge

In June 1986, FCC increased the single-line business and residential subscriber line charge to $2 per line per month and continued the existing $6 per-line charge for multiline businesses. To test the revenue effects of such charges, we modified the FCC model to (1) explicitly include line counts, (2) recognize the $2 per-line and $6 per-line charges, and (3) assumed the existence of such charges would not cause subscribers to drop off the system. The model generated $778.7 million in nontraffic-sensitive revenues to meet the $750 million per month revenue requirement. The subscriber line charges provided $230.7 million of these revenues and the remainder comes from usage charges.

This implies a lower nontraffic-sensitive usage charge could still generate sufficient revenues for two reasons. First, even with no increase in the use created by a decreased switched access charge, a lower charge would generate sufficient revenues when added to SLC revenues. Second, a lower nontraffic-sensitive usage charge would curtail bypass and increase the quantity of switched access minutes. This, in turn, may permit an even lower usage charge to generate sufficient revenues.

Banning Intrastate Bypass

In the base case, the FCC model assumes that both intrastate and interstate traffic can be carried over bypass services. Therefore, each location has a greater tendency to bypass than it would have based exclusively on interstate traffic. In addition, the model assumes state and federal usage-sensitive access charges are equal. If one assumes intrastate traffic under state jurisdictions will not be allowed to bypass and that such a ban can be enforced by the state, the FCC model generates $620.8 million to meet the nontraffic-sensitive revenue requirement which is more than the $528 million in the base case. This increase occurs because each site has less traffic that can bypass and many sites find bypass is not justified for just interstate traffic. (Several state officials have told us that effectively banning intrastate access bypass is very difficult.)

Conclusions

The sensitivity analysis proved that the FCC model was consistent with theory, but important factors were not tested and these factors could determine actual bypass in the future. These untested factors were:

- The concentration of traffic and the extent to which the FCC model overstates or understates the degree of traffic concentration.
- The extent to which nonaccess cost factors actually affect bypass.
- The extent to which special access capacity per line varies with lines per location and how this effects bypass
- The time it takes customers to adopt bypass based on cost differentials across access services.
- The probable changes in future bypass service costs and how they will affect bypass.

We should note that the FCC report also includes tests of various assumptions, including the price elasticity of demand, different special access costs, and the need to recover both nontraffic and traffic-sensitive costs. The FCC's sensitivity analyses as well as ours indicate the model is slightly sensitive to some assumptions.

Summary of State Responses to Bypass

This appendix summarizes the various initiatives that states are taking to address the issue of bypass. We telephoned staff members from the 50 state public utility commissions as well as the District of Columbia during the period June through November 1985. We asked for information in several bypass-related areas, including (1) bypass investigations that states had conducted at either the staff or commission level and (2) policy alternatives that were being considered or adopted to address the effect of bypass or competition on local telephone company revenues. In addition, we reviewed current trade journals that provided information on state telecommunications regulation.

Bypass Investigations/ Monitoring

Twenty-eight states reported that they were investigating or monitoring bypass in various ways. Regarding investigations, seven states reported that they have conducted a formal study or investigation of bypass, while four states plan to conduct one. Nineteen states (including 3 who conducted formal studies) indicated that they had investigated bypass or were investigating it as part of rate cases or other proceedings

Ten states (including 1 that conducted a formal bypass investigation and 5 that have addressed bypass in other cases) are monitoring bypass in various ways. Of these, seven states provided us details of their monitoring activities. One state, Kansas, monitored the number of lines disconnected from the local telephone company and found that users did not appear to be discontinuing telephone company service. The remaining six states have instituted some form of reporting requirements to monitor bypass. Missouri, North Carolina, and Wisconsin require telephone companies to report to the commission when a major customer bypasses or is likely to bypass In Florida, the Florida Telephone Association requires telephone companies to report to the state commission on their plans to address bypass. In Maine, the telephone company has been requested to report what percentage of its customers provide the majority of revenues as an effort to monitor potential bypassers. In Utah, alternative providers of telecommunications services are to report to the commission on the locations, capacity, and sharing of their alternative services.

Bypass Policy Alternatives

We asked states about both bypass policies and policies adopted in response to competition, since bypass is often viewed as an outgrowth of competition. The policy alternatives that states have considered or approved generally fell under one of three broad categories (1) tariff

restructuring, (2) streamlining regulatory processes, and (3) deregulating services and/or altering regulations for shared or resold services.

Tariff restructuring involves changing the way local telephone companies recover costs for services they provide to customers. We found that states generally are restructuring tariffs or considering their restructure through the following rate structures. These include contract rates, capacity charges, subscriber line charges, rate bands/flexible rate tariffs, volume discounts, such as tapered rates or capped nontraffic-sensitive contributions, and rate deaveraging

Streamlining typically decreases the amount of time needed to process tariffs. States have also streamlined the regulatory process by reducing the amount of tariff cost-support information required, eliminating rate-of-return regulation, or relaxing quality of service standards.

Staff at state commissions also told us that they have deregulated specific telecommunications services or changed entry/exit regulations for telecommunications providers. For example, a few state commissions have determined that the provision of a certain service is no longer dominated by the regulated telephone company and have deregulated this service entirely, relying on the marketplace to determine its reasonable price. Oregon has deregulated data transmission services and eventually plans to deregulate all "competitive" services. Montana has deregulated private line offerings, and Iowa has deregulated Centrex services.

Furthermore, organizations such as shared tenant service providers have applied to resell services or provide shared services. These service providers can affect telephone company revenues because the services concentrate and route users' traffic within particular locales, thereby offering an alternative to the local public-switched network. State Telephone Regulation Report (11/7/85) provided the most recent information on state actions regarding shared tenant services. According to this report, 23 states have approved intrastate-shared tenant services, 15 states are currently considering it, 9 states and the District of Columbia have not yet considered it, and 3 states have rejected shared services or deemed them illegal.

Advance Comments From the Managing Director of the Federal Communications Commission

Note GAO comments supplementing those in the report text appear at the end of this appendix

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

APR 0 4 1986

OFFICE OF
MANAGING DIRECTOR

Mr. J. Dexter Peach
Director
Resources, Community and Economic
Development Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Peach:

Chairman Fowler asked that I respond to your letter of March 5, 1986 requesting our comments on draft report GAO/RCED 86-66, "Telecommunications: Bypass of Local Telephone Companies." Overall, we find that the report reflects the views of the Federal Communications Commission. Three areas, however, may need clarification.

See comment 1

1) The model referred to in Chapter 4 as "the FCC model" was contained in a staff report issued by the Commission's Office of Plans and Policy (OPP) and has never been endorsed or adopted by the Commission. The Commission issued an official report which concluded that "bypass is occurring now and will continue to grow" (FCC 84-635, January 18, 1985), but did not reach specific conclusions on the magnitude of present or future bypass. It would be more accurate to refer to the model as "the OPP model."

See comment 2

2) The title of Chapter 4, "Two Models Overestimate Shortrun Interstate Access Bypass Revenue Loss" may be misleading. The statement on Page 80 that "Both models assume that all subscribers respond immediately to changing access costs" is incorrect. The OPP model provided no estimates of shortrun bypass and made no assumptions about the rate at which subscribers would respond to changing access costs. It provided an estimate of the amount of long run bypass that would occur if all other industry conditions remained the same as they were in mid-1984. The report itself stated that "a significant amount" of time would be required for the bypass to occur (p. 46). The OPP model evaluated by the GAO was one step in the process of building a more sophisticated model that can combine bypass opportunities and changing industry conditions to forecast bypass quantities in both the short and the long run.

See comment 3

3) The OPP model and many of the other studies reviewed in the GAO report were developed in early to mid-1984 and reflect the conditions at that time. Because the industry is changing rapidly, the GAO report may not be an accurate representation of the current conditions in 1986.

I hope this information is helpful to you. Should you need any further information please call me.

Sincerely,

Edward J. Minkel
Managing Director

The following are GAO's comments on the Federal Communications Commission Managing Director's letter dated April 4, 1986.

GAO Comments

1. We note in the report (pp. 17 and 53) that the FCC model was not adopted by the Commission but is a staff paper issued by the Commission's Office of Plans and Policy. For ease of reference, we discuss the model throughout our report as the FCC model. As the Managing Director stated in his comments, the Commission issued an official report on bypass. The staff paper was included in full as an appendix in that report.

2. We agree that the model does not assume subscribers respond immediately to changing access costs; however, the model does assume customers respond to changing costs in the long run. The model provides an estimate of the amount of long-run bypass that would occur if all the industry conditions remained the same. In other words, the model assumes changing access costs provide incentives for customers to choose access options that minimize their costs. As a result, we concluded in chapter 4 that the model overestimates actual bypass in the short run and may underestimate long-run bypass. Where appropriate, we have changed language to emphasize that the models suggest greater bypass than would probably occur in the near future and that they were intended to estimate potential bypass in 1984 if customers could have fully adjusted to financial incentives to bypass. In addition, we have changed the title of chapter 4 to "Limitations of Two Models Used to Estimate Bypass Revenue Loss."

3. The FCC model and the other studies we reviewed were the latest available studies on bypass. We believe our report accurately reflects the current telephone industry. We have closely followed each regulatory change and updated this report, as necessary, to keep it current.

Advance Comments From the Director, Regulatory Analysis of Bell South Corporation

Note GAO comments supplementing those in the report text appear at the end of this appendix

BELLSOUTH

Robert T. Blau
Director Regulatory Policy Analysis

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April 5, 1986

Mr. J. Dexter Peach
Director
Resources, Community and Economic Development Division
United States Government Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

This letter is in response to your request for comment on those portions of Chapter 4 of the Government Accounting Office's (GAO) proposed report, Bypass of the Local Telephone Company, which critique a September 1984 study, The Impact of Access Charges on Bypass and Universal Service, that was prepared by Bell Communications Research (Bellcore) under my direction. As you know, your letter was addressed to me in my former capacity as Director, Government Affairs at Bellcore. While I am now with the BellSouth Corporation, your staff and I both felt it appropriate that I respond to your request with the understanding that the views expressed herein are my own.

In general, Chapter 4 of your proposed report presents a fair and well reasoned critique of Bellcore's bypass models. I also concur with the concluding section of the chapter and would hope that these points might be highlighted in an executive summary, along with a brief discussion of problems that public policy analysts have encountered in forecasting losses of local exchange carrier (LEC) revenue to bypass.

With regard to those sections of Chapter 4 that address specific limitations (i.e., simplifying assumptions) of the Bellcore study I would only offer the following few observations. First, and perhaps most important, the Bellcore study was not designed to predict how much bypass actually occurred in 1984 or at any other point in the immediate future. Instead, the study was intended to establish a general understanding of potential revenue losses that could result from bypass -- with and without the implementation of so called subscriber line or end user access charges. While it is true that the Bellcore study does not address when those potential revenue losses might actually occur, the omission of a time line does not mean that empirical estimates contained in the Bellcore study are so uncertain as to warrant dismissal by public policymakers.

As is true of any economic model, Bellcore's bypass models do contain a number of simplifying assumptions. This was

necessary because it is not possible to isolate and quantify all economic variables and behavioral considerations that might go into a telephone user's decision to bypass the public switched telephone network. It also is true that simplifying assumptions invariably reduce the accuracy (and, arguably, the usefulness) of empirical estimates that are derived from underlying models. The question, however, is not whether Bellcore's bypass and associated revenue vulnerability estimates are completely free of uncertainty. They clearly are not. Rather, the proper question is whether results contained in the Bellcore study are sufficiently reliable as to provide policymakers a reasonable basis for judging the public's interest in the implementation of end user charges. Notwithstanding several valid criticisms of Bellcore's study methods that are raised in Chapter 4 of your report, I would submit that the analysis does meet the latter test of reasonableness. This can perhaps best be illustrated by addressing major limitations (i.e., simplifying assumptions) of the Bellcore analysis that are cited in the proposed GAO report. Having reviewed the points discussed below I would hope that you and your staff might see fit to modify various statements contained in Chapter 4 which imply that Bellcore's empirical estimates of LEC revenue vulnerability are excessive and highly uncertain.

See comment 1

#1. Customers immediately and fully adjust to changing (exchange) access prices in order to minimize total access costs.

Now on p 61

On pages 79 and 80 of its report, the GAO correctly notes that the Bellcore model assumes that if users can reduce their telephone expenses by bypassing switched access services they will do so. The report further notes that this assumption is not always true because factors other than cost (e.g., reliability, convenience of acquiring service from local telephone companies, etc.) also influence -- and generally mitigate -- a customer's incentive to bypass. As such, the GAO report concludes that Bellcore's failure to account for non-cost factors has the practical effect of overstating the bypass problem.

While the draft report is correct in pointing out that incentives to bypass are not solely a function of cost, it does not follow that Bellcore's estimates of potential LEC revenue vulnerability are necessarily excessive. The reasons are twofold. First, there is no question that opportunities to reduce telecommunications costs by avoiding payment of per minute carrier common line charges (and, hence, contributions to LEC non-traffic sensitive costs) represent the single most important cause of bypass. It also is apparent that, over time, potential cost savings will represent an increasingly important motive to bypass.

Current customer attitudes notwithstanding telecommunications and related data processing services are now beginning and will continue to play an increasingly important role in shaping the competitive strengths and weaknesses of a wide variety of businesses that produce and market non-telecommunications products and services. Simply put, as individual firms find ways to increase their productivity by making more cost efficient use of telecommunications and information services, their competitors will have no choice but to respond in kind or suffer losses of market share. Thus, a business user's decision to bypass will turn not only on potential cost savings that can be achieved through the use of special access services or stand alone private networks, but also on that user's need to remain competitive with rival suppliers. The attached Harvard Business Review article, "How Information Gives You Competitive Advantage," by Michael E. Porter and Victor E. Millar amplifies on the latter point and may be of interest to you and your staff.

In this same vein, it is worth noting that exchange access charges represent over half of all costs that competing interexchange carriers incur in providing long distance service. Since the vast majority of these expenses stem from carrier common line charges, long distance carriers as well as end users obviously face incentives (and growing opportunities) to reduce their operating costs by substituting special access services or local private network capacity for switched access services which continue to make heavy contributions toward local telephone plant costs. Similarly, as competition between long distance carriers intensifies these incentives to reduce expenditures will become that much stronger. And the importance of cost in determining the degree of bypass that occurs over time will become that much more pronounced. As is recognized (albeit implicitly) on page 82 of the report, AT&T's new SDN and MEGACOM service offerings are illustrative of the latter phenomenon. Your staff might want to amplify on the effects that heightened competition in long distance markets may have on bypass and potential LEC revenue losses at this point in the text.

Second, it is not true that all non-cost factors that influence incentives to bypass necessarily mitigate potential losses of LEC revenues. Clearly, some factors have such an effect including, for example, managerial problems associated with designing, installing and maintaining private telecommunications networks. The same is true of preferences on the part of many customers to simply "stay" with a well known and reliable supplier, their local telephone company, for the sake of convenience. Others factors, however, have the opposite effect. These include the inability of some LECs to satisfy customer demand for integrating telecommunications and data processing services into all purpose, customized information systems. By terms of the AT&T consent decree, the Bell Operating Companies

(BOCs) are not permitted to offer information or interexchange long distance services or to manufacture telecommunications equipment. Since all three lines of business represent integral components of all purpose information systems, restricting the BOCs from these markets will prevent the Bell companies from satisfying customer needs, (especially those of large businesses) and generally result in higher levels of bypass -- irrespective of differences in the cost of alternative exchange access services.

In short, while customer decisions to bypass local switched access services are influenced by many factors, costs undoubtedly represent the single most important consideration. Similarly, since non-cost considerations have countervailing effects on incentives to bypass, their exclusion from Bellcore's models does not necessarily mean that our estimates of LEC revenue vulnerability are excessive.

See comment 2

#2. Access markets are fully competitive because equal access exists and AT&T is free to offer all LECs or facility bypass access services to its subscribers.

Now on p 62

On pages 80 and 81 of the proposed GAO report, it is noted that Bellcore's 1984 bypass study assumed that equal access services were available to all interexchange carriers which, at that time, was obviously not true. The report further notes that in those geographic markets (e.g., rural areas) which AT&T's competitors do not serve, AT&T would not be inclined to bypass LECs facilities because the lack of competition would provide no incentive to reduce the cost of providing long distance service. The report then asserts that by assuming universal availability of equal access and full competition in all long distance markets, Bellcore's study effectively overstates potential LEC revenue loss to bypass.

With regard to the equal access assumption, it is of course true that Feature Group D (equal access) exchange access service was not available through all LEC end offices. It does not follow, however, that Bellcore's failure to factor the transition to equal access into its bypass model necessarily resulted in flawed study results.

Again, the Bellcore study was not designed to estimate actual revenue losses to bypass in 1984. Rather, the study focused on total potential losses that might result over time under alternative exchange access charge plans. And since equal access will become widely available through the balance of this decade, the assumption in question is entirely reasonable and does not bias Bellcore's revenue vulnerability estimates in an upward direction.

As to the assumption of full competition, two points merit consideration. First, with or without OCC discounts, price competition in long distance service markets will increase carrier incentives to bypass LEC switched access services. If, for example, the OCCs were to maintain a discount on exchange access services, AT&T would undoubtedly respond by reducing its operating costs. It would do so by substituting special access or stand alone bypass capacity for switched access services, since service and facilities bypass represent the only practical means by which AT&T can accomplish significant and immediate reductions in its overall costs of providing long distance service.

If, on the other hand, all long distance carriers were required to pay the same charges for equal access services, the OCCs would be that much more inclined to bypass Feature Group D in an effort to maintain current cost advantages that they enjoy over AT&T by virtue of discounted rates that are now in effect for non-premium access services. In either case, as long as LEC non-traffic sensitive costs are recovered through per minute carrier common line charges to long distance carriers, heightened price competition between those carriers will increase incentives to bypass on the part of both AT&T and the OCCs, irrespective of whether the OCCs continue to pay discounted exchange access charges.

Second, it is true that AT&T's inclination to bypass will be substantially less pronounced in markets were AT&T faces no competition. Indeed, it is plausible that AT&T could attempt to raise rates in rural markets in an effort to offset losses in revenues that might result from more vigorous price competition in urban areas. Bellcore did not factor either possibility into its study since that would have resulted in excessive speculation on our part. Rather, it was simply assumed that all geographic segments of the long distance market are potentially competitive since any effort on AT&T's part to establish excessive rates in captive markets would invite competitors to enter those market segments.

That competitive entry could occur is evidenced by the fact that the BOCs marginal cost of providing competitive long distance service in rural areas would be relatively low. The reason is that, unlike the facilities based OCCs, the BOCs have plant in place that could be used to provide interexchange service. While the Bell Companies are now restricted from the interexchange market by terms of the AT&T consent decree, the Bellcore study implicitly assumed that these restraints would be transitional in nature -- on expectations that the Department of Justice and the consent decree court would eventually realize that rural communities should not be denied the benefits of long distance competition.

See comment 3

#3. Cost calculations which may make facility bypass appear unreasonably inexpensive because the costs do not take into account the limitations of some forms of facility bypass in the short run.

Now on p 63

Page 83 of the proposed GAO report implies that the cost of stand alone bypass systems that were used in the Bellcore study are too low, largely because the study assumes that the reliability of those systems need not be comparable to the public telephone network. Had Bellcore used comparable service reliability standards, the proposed GAO report submits that ensuing bypass cost estimates would have been significantly higher which, in turn, would have resulted in lower revenue vulnerability estimates. In addition, Table 4 of the proposed report suggests that facilities bypass cost estimates that are reflected in the Bellcore study are excessively low because those costs do not include any fixed costs associated with constructing stand alone systems.

As is discussed at length in Appendix A, "Bypass Technologies and Their Cost," the cost of stand alone bypass systems that were used in the Bellcore study do, in fact, include fixed capital costs and, as such, are not unreasonably low. Indeed, these estimates were derived from interviews with equipment manufacturers and were based on 1984 price lists. Capital expenses reflected in Bellcore's bypass model were expressed in terms of monthly carrying costs because such costs represent the proper basis from which a user would calculate savings that could be obtained from substituting private for public telephone network capacity. Monthly carrying costs do, of course, include fixed investment in stand alone systems in that those costs contain a depreciation component as well as an allowance for a return on up front investment.

Regarding the question of service reliability, it is true that stand alone or facilities bypass systems that are reflected in the Bellcore study would not necessarily afford the same degree of reliability (e.g., call blocking probability) that would be available through the public telephone network. Comparable reliability standards were not used for two reasons. First, and most important, end users typically would have no need to engineer facilities bypass systems to satisfy the same technical reliability standards under which LECs operate. This is because those users understand that they can turn to the public telephone network for service in the event that a private network fails. As such there is no need to incur the cost of adding redundant backup capacity. Nor is it necessary to design private networks to accommodate demand for capacity that might materialize at some point well into the future. Should unforseen channel requirements materialize, users always have the option of turning to special or even switched access capacity to

accommodate those needs until the capacity of that users's private network is upgraded. Given this situation, facilities bypass cost estimates that are reflected in the Bellcore study are entirely reasonable. It also is apparent that those costs tend to be relatively low because private systems are not encumbered with the obligation of serving as a carrier of last resort. Furthermore, as the draft GAO report quite correctly observes, there is every reason to believe that technological advancements will continue to reduce the cost of facilities bypass systems over time.

See comment 4

#4. Resellers can and will be able to directly access interexchange carriers and use the LEC for local access without paying usage charges to the LEC.

Now on p 65

On pages 92 and 93 of the proposed report, the point is correctly made that a significant portion of Bellcore's revenue vulnerability estimates are attributable to tariff shopping and resale. The report further states that losses due to resale may be marginally high because the Bellcore model assumes that resellers will be able to avoid payment of carrier common line charges by simply not informing LECs that local access lines are being used for long distance as opposed to local calls. This too is true since the FCC is proposing to impose carrier common line charges on certain types of resale operations. Because a business customer could use local business services in lieu of exchange access arrangements the potential for loss of access revenues will clearly exist.

As is explained in the Bellcore study and acknowledged in the GAO report, the latter assumption was made because LECs have no way of knowing whether a local call between an end user and a local reseller might be used in providing that user access to a long distance network. While such arrangements are not allowed under FCC rules there is no effective means of policing these requirements. As a consequence, it is reasonable to assume that such abuses will occur and should be reflected in any reasonable estimate of potential losses of LEC revenues to bypass.

See comment 5

In closing, I would like to offer two additional observations. First, your staff should be complemented for the high degree of professionalism and objectivity that they have displayed in preparing this report. While we have certainly not agreed on all points, my discussions with Cathy Slesinger, Mitch Rachlis, Rick Hale and other members of your organization have been cordial, informative and, at all times, thought provoking.

As I am sure you appreciate, evaluating the bypass problem is no easy task even for those of us who work in the industry.

That your staff has done such a thorough job in preparing those sections of the report that I was asked to review is both clear and, in my opinion, laudable. Hopefully, the GAO report will improve the quality and substance of the public policy debate over bypass and competition in the telecommunications industry.

Second, with regard to that debate, I would hope that at some point in your final report, consideration might be given to relationships between line-of-business restrictions that are now embodied in the AT&T consent decree and incentives to bypass. I raise this issue because too often public policy makers regard bypass exclusively as a byproduct of federal and state regulatory policies that provide for the recovery of non-traffic sensitive costs through per minute carrier common line charges to long distance companies and, ultimately to their customers. While these policies clearly represent a primary cause of bypass, they are by no means the only causal factor.

Fundamentally, bypass is a form of competition and should be recognized as such. That being the case, any regulatory policy--including the line-of-business restrictions in the AT&T consent decree -- which artificially constrain the ability of one industry group from competing with others -- will obviously encourage bypass. Such policies and restrictions also will do so at the expense of economic efficiency, widely affordable local telephone rates and universal consumer access to new telecommunication/information technology and services. Given growing Congressional interest in the practical effects of the AT&T consent decree and the public's interest in full and fair competition in telecommunications markets, I would think it entirely appropriate to reflect these issues and concerns in your final report.

If I can be of any further assistance in this matter, please do not hesitate to call.

Sincerely yours,

Robert T. Blau

Attachment

The following are GAO's comments on Bell South Corporation's letter dated April 5, 1986. The Director of Regulatory Policy Analysis at Bell South Corporation was previously Director of Governmental Affairs at Bell Communications Research and was responsible for the bypass model.

GAO Comments

1. We agree that the BCR model deals with "potential" bypass in 1984 if customers had been able to fully adjust to financial incentives to bypass Furthermore, we realize the model was not meant to be a forecast of actual bypass at any particular point in time. We also agree the model should not be dismissed by policymakers, as we noted in the conclusion to chapter 4, the models "provide policymakers significant insight into potential LTC revenue shortfalls" and "continued dependence on usage access charges for switched access may lead to irreversible revenue loss due to bypass." In the conclusion, we emphasize that BCR's estimates do not represent a forecast of actual bypass at any particular point in time. However, because the model does not address bypass levels in the immediate future, we believe that the revenue vulnerability estimates are excessive and uncertain for the near future, a time period of concern to policymakers.

2. We agree that cost is a major determinant of customers' bypass decision. However, our results in chapter 3 indicate it is only one of the factors that determine customers' access choices albeit an important one. Thus, in the near future, noncost factors may decrease the extent of bypass and the immediacy of revenue vulnerability However, in the long run, we realize cost can become an increasingly important determinant in customers' bypass decisions, as competition among telecommunications providers becomes more intense. In addition, we realize that the AT&T consent decree limits Bell operating companies' ability to provide information, interexchange long-distance services or manufacture equipment and that such limitations can restrict their ability to satisfy customer needs.

3. We agree that in the long run, equal access and increased competition create increased financial incentives to bypass as we note in the chapter's conclusion. However, the problem of revenue vulnerability is also a short-run policy concern. In the immediate future, bypass may be less than suggested by the model because the model's assumptions, including equivalent service and access charges from all common carriers, are not fully realized. Furthermore, the consent decree was meant to forestall monopoly abuses by BOCs, and we made no assumption that

it would be lifted and that BOCs would then be able to enter long-distance interexchange markets.

4. We agree that current BOC obligations permit facility bypassers to use BOC services in the event their own facilities fail or overload. Furthermore, we agree that the existence of these options permits bypassers to construct less expensive or less reliable systems. In addition, we agree that the BOCs' cost may be higher since they serve as carriers of last resort.

We also realize that BCR's facility bypass system costs include carrying charges for capital and operating expenses. Thus, our characterization of facility bypass system having no fixed costs was incorrect. Appropriate corrections to chapter 4 have been made. However, BCR's facility bypass costs are lower than FCC's facility bypass costs at low-volume locations. Thus, our conclusion that BCR's facility costs would lead to more bypass than FCC's facility costs remains valid.

5. As noted in chapter 4, BCR's model assumes resellers can avoid carrier common line charges and that such avoidance would lower their costs and would increase potential bypass. We also noted that such avoidance violates FCC rules and that policing such abuse could be difficult.

Glossary

Access Charges	A fee charged by the local telephone company to cover local exchange costs directly associated with the origination and termination of long-distance services.
Access Charge Decision	The Federal Communications Commission's decision on the computation and assessment of charges to cover local exchange costs associated with the origination and termination of interexchange services.
Access for Interstate Long-Distance Services	A service historically provided by local telephone companies to enable subscribers to place interstate long-distance calls. Access for interstate long-distance services may also be provided by bypass facilities or services.
Bell System	The pre-divestiture structural organization of American Telephone and Telegraph Company and its subsidiaries.
Bell Operating Companies	Twenty-two local telephone companies that provide local and intrastate long-distance service and were part of the former Bell system.
Bypass	The transmission of telecommunications messages that do not use the facilities or services of the local telephone company which are available to the general public, but that could use such facilities.
Cable Television	A telecommunications technology which sends signals along coaxial cables from a single source (the headend) to many locations. Cable television is primarily used to transmit television programming to subscribers but may also be adapted to provide two-way voice and data communications services.
Capacity Charge	A tariff structured to include a flat (nonusage) access charge levied on long-distance carriers based on their relative traffic capacity.
Capped Nontraffic-Sensitive Contributions	A tariff which limits or caps the amount of nontraffic-sensitive costs paid by a large subscriber.

Cellular Mobile Radio	A form of portable telephone service which allows mobile radio telephones both to initiate and to receive calls. Cellular mobile radios operate in geographical units called cells. Each cell is assigned its own set of radio channels or frequencies in the radio spectrum and is served by its own low-powered transmitter and receiver, preventing interference between neighboring cells and enabling cells sufficiently far apart to use the same radio frequencies.
Central Office (Switching Center)	A local telephone company facility which houses the switching system and related equipment that interconnect telephone calls for users in the immediate geographic area.
Centrex	A telecommunications service switched at the local telephone company which provides special features such as calling within an intracompany location by dialing only a few numbers. Like local exchange service, Centrex enables users to originate and receive calls within a defined calling area and to gain access to the long-distance network.
Circuit	A two-way communications path.
Coaxial Cable	A form of cable which increases the carrying capacity of ordinary communications cable. It is composed of an inner wire surrounded by a hollow cylindrical tube with layers of insulation between them. Signals travel between the inner wire and the outer tube and do not radiate outside the cable.
Common Carrier	A company, organization, or individual providing wire or electronic communications services for hire.
Contract Pricing	A tariff which allows telephone companies selectively to contract with large users for specialized services.
Customer Premises Equipment (Terminal Equipment)	Devices, ranging from simple telephones to computers, that are located on the customer's premises and are used to send or receive information over the telephone network.

Digital Termination System	A microwave system approved by FCC for operation as a common carrier service since 1981 which provides two-way transmission high-speed, computer-based messages in local areas using a central point which can transmit and receive information from multiple locations.
Divestiture	The compulsory transfer of title or disposal of interests (such as stock in a corporation) upon government order. The 1982 Modification of Final Judgment required American Telephone and Telegraph, among other things, to divest itself of the 22 Bell operating companies.
Docket	The record of a proceeding which is assigned a docket number for administrative control purposes.
Domestic Satellite Carrier	A carrier that provides intercity communications services within the United States via a domestic communications satellite.
Earth Station	An antenna, often saucer-shaped, electronically equipped either to receive signals from satellites, transmit signals back, or do both.
Economic Bypass	A form of bypass whose economic cost and price is lower than the economic cost of an equivalent telephone company service.
Economic Costs	The actual costs of providing a service.
End-To-End Bypass	Customer-owned or provided communications systems that transmit messages which pass through neither the local exchange nor interexchange carrier facilities.
Enhanced Carrier	A carrier that leases circuits from telecommunications common carriers and then adds special services, such as computer services, before selling the use of the circuits to a final user.

Facility Bypass	A form of communications which does not use local telephone company facilities. Facility bypass may be provided by the interexchange carrier, the customer, or a third party other than the local telephone company.
Flexible Pricing	A tariff permitting telephone companies to establish a range of rates for telephone service so that the company can set its prices to meet market conditions.
Fiber Optics	A cable-based communications technology which relays signals by tiny lasers through hair-thin strands of glass and is well-suited for carrying large quantities of information.
Fixed Costs	Costs that do not vary with usage. According to FCC, these costs are synonymous with nontraffic-sensitive plant costs.
Independent Telephone Company	A firm which is not affiliated with AT&T or the Bell operating companies but is the designated established carrier for the provision of telecommunications common carrier service in a specific geographic area.
Inside Wiring	Wiring that connects pieces of telecommunications equipment within a building or a complex of buildings.
Interexchange Carrier	A provider of telecommunications long-distance service.
Interstate Service	Telecommunications services offered between states. Such service currently falls under FCC's jurisdiction.
Intrastate Service	Telecommunications services offered within the boundaries of a state, including both local and long-distance services. Such service currently falls under the jurisdiction of state regulatory commissions.
Jurisdictional Separations Procedures	The procedures for dividing the cost of telephone company facilities and services between interstate and intrastate jurisdictions.

Lifeline Service	A specially priced local exchange service that has been specifically mandated by a state legislative or regulatory body for the purpose of providing telephone service to low-income households.
Local Area Network	A network designed to provide facilities for user communication within a defined building or plant and which does not necessarily use public network facilities.
Local Access and Transport Areas	Geographic regions which represent the post-divestiture service areas of the 22 Bell operating companies.
Local Exchange Service	A telephone service for single-line business and residential customers that provides customers with the ability to originate calls within a local calling area, receive incoming calls, and obtain access to the long-distance network.
Local Loop	The communications channel connecting a subscriber to a central office.
Long-Distance Service	Long-distance telecommunications service, as distinguished from local telephone service. It includes both intrastate and interstate long-distance service.
Long Run	The time period for production in which the producer can alter the quantity of all inputs to production. For example, in the long run, a company can hire new workers, adopt new technologies, or increase its plant size. This is in contrast to the short run, when one or more inputs to production are fixed.
Message Telecommunications Service	A long-distance communications service permitting subscribers to local exchange service in separate areas to establish two-way telecommunications on a message-by-message basis.

Measured Local Service	A method of pricing local telephone service based on the number, the duration, the time of day, and the distance of calls within the local exchange area instead of by a flat all-inclusive rate.
Microwave	A communications system which relays both voice and data signals through space by using dish-shaped antennas placed on towers or building rooftops.
Modification of Final Judgment	A judicial settlement ending the federal government's 1974 antitrust suit against AT&T, Bell Telephone Laboratories Inc., and Western Electric Company Inc.
Natural Monopoly	A market situation in which it is considered to be more efficient and economical for a product or service to be provided by a single firm under regulation, than by two or more competing firms.
Nontraffic-Sensitive Costs	According to FCC, these are costs which do not vary with usage. Such costs are concentrated in the local loop, inside wiring, and customer premises equipment.
Other Common Carrier	Any carrier authorized by FCC to provide interstate telecommunications services in competition with the established carriers.
Penetration Rate	The percent of the residential population with a household telephone.
Private Branch Exchange	A private switching system, usually located on the customer's premises, that directs telephone calls internally or to external networks such as the public telephone system.
Private Line Service	A communications link between two or more designated points set aside for a particular customer's exclusive use.

Public Switched Telephone Network	The public telephone system, including the telephones, local lines, local exchanges, trunk lines, and long-distance facilities, that interconnects users' calls over a communications network
Rate-of-Return Regulation	A method of regulation allowing a regulated firm to earn revenues equal to its cost of service, including a fair return to stockholders and bond holders. Such regulation attempts to prevent firms from receiving monopoly profits but still allows them to attract new capital.
Rate Averaging	Charging all calls of equal distance and duration at the same time of day at the same rate.
Rate Deaveraging	Charging two calls of equal distance, duration, and time of day at different rates.
Resale Carrier	A carrier which leases circuits from a telecommunications common carrier and resells them to individual users for a profit.
Resale	Lease of a telephone company service by an entity at a flat fee to resell sporadic use of that line to users normally too small to enjoy volume discounts.
Revenue Pool	A group of companies that aggregate all revenues earned by the companies and allocate these revenues among the members of the group. The revenues allocated to any particular company need not reflect either its own costs or the revenues it contributes to the group.
Revenue Requirement	As it relates to regulated telephone companies, the amount of money the company is authorized to collect for selling an estimated amount of services. Revenue requirement is by definition the total cost to the telephone company of providing the service, including operating expenses, depreciation, taxes, and authorized earnings on assets.

Satellite	An earth-orbiting communications system which receives radio signals from earth stations and retransmits these signals back to other earth stations.
Sensitivity Analysis	A method of analyzing key assumptions or parameters in a simulation model to determine how such variations change the results of the model.
Service Bypass	A form of bypass which connects customers to the long-distance facilities of interexchange carriers through the use of local telephone company private lines.
Shared Tenant Services	The sharing of a telephone company's services by tenants through the use of a private switch which concentrates and routes tenants' local and long-distance calls.
Short Run	The time period for production in which one or more inputs to production are fixed. For example, in the short run, a factory has a fixed size.
Special Access	A service that provides users nonswitched access to local telephone company facilities over dedicated private lines. Special access services incur a specified charge that is independent of usage and allow users to access long-distance carriers without paying a contribution to the switched portion of the local telephone company.
Specialized Common Carrier	A carrier which provides intercity private line service in competition with the established carriers.
Stranded Investment	Telephone company plant that is left unused because customers reduce their telephone company services. Stranded investment may result in higher prices to those customers who continue to purchase telephone company services, since the cost of the plant must be spread over fewer users.
Subscriber Line Charge	A monthly charge associated with a residential or business line paid by the subscriber in order to cover local exchange costs associated with the

	origination and termination of interexchange services. This charge has also been referred to as the customer access line charge or the end user charge.
Subscriber Plant Factor	The allocator that until recently was used to assign nontraffic-sensitive plant costs to the interstate jurisdiction.
Switched Access	Telecommunications services which provide users access to local and interexchange carrier facilities and usually incur charges based on level of use. Most switched access services provide a contribution to the local telephone company's rate base.
Tapered Rates	A form of volume discount which allows telephone companies to charge large users at a declining rate as users' purchased quantity increases.
Tariff	A tariff is a statement filed by a telecommunications common carrier with the appropriate public regulatory agency (state or federal) that describes the service it offers and lists a schedule of charges and conditions for using that regulated service.
Teleport	A telecommunications system that integrates multiple technologies to concentrate and route users' local and long-distance calls.
Tie Line	A dedicated service used to link on a continuous basis, two or more private branch exchanges.
Trunk	A high-capacity communications channel connecting switching centers or exchanges.
Traffic-Sensitive Costs	According to FCC, these costs vary according to usage. Such costs are concentrated in the switches and trunk lines of the local telephone company plant.

Uneconomic Bypass	A form of bypass whose economic cost is higher but whose price is lower than the economic cost of an equivalent telephone company service.
Universal Service	The public service goal to make telephone service available to all people in the United States at a reasonable price.
Volume Discount	A tariff which allows telephone companies to charge large users at a decreased rate for the purchase of specified levels of service.
Wide Area Telecommunications Service	A telephone service which allows a subscriber to make calls to specific geographic areas for a rate based on volume and time-of-day but generally less than that charged for message telecommunications service.

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