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- Executive Overview chapter from the report (usually chapter 2)
- TOC (from the report)
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- Program description
- About INPUT

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Information Services Opportunities and Trends, 1995-2000

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- Product/service opportunities
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- Competitive positioning
- Acquisition targets

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- Outsourcing options
- Systems plans
- Peer position

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U.S. Information Services Market Analysis Program

Telecommunications

Information Services Opportunities and Trends, 1995-2000

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MVT • 734 • 1995

Abstract

This report examines the trends, events and issues that will have an impact on the telecommunications industry and those vendors that supply information services to that market. The report also presents a forecast of the purchase of these services for the period 1995 to 2000.

The document offers forecasts of the telecommunications market for information services for the following product/service categories: professional services, systems integration, outsourcing, processing services, network services, applications software products and turnkey systems.

Issues, trends and other factors affecting the telecommunications industry are analyzed from the perspectives of common carriers, cable TV vendors and broadcast businesses. Key topics discussed include the increasing positioning activities of CATV, Broadcast, Telos and CONTENT providers, the changing regulatory environment, increased competition (including the CATV/LEC/Wireless vendors), personal communications services and increased merger and acquisition activities. The analysis of the technology trends and industry issues, together with other research, is used to project the growth in the telecommunications market for information services over the next five years—1995 to 2000.

The forecast update report contains 92 pages and 26 exhibits.

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Introduction

A
Purpose, Organization and Methodology

This section identifies the purpose and scope of this report, identifies key issues affecting information services expenditures in the telecommunications market sector, notes how the document is organized, and explains INPUT's research methodology and the techniques used in the preparation of forecast data.

1. Purpose

The purpose of this report is to identify key changes in the market for information services in the telecommunications industry, and to provide the 1995 INPUT forecast for this market sector.

The telecommunications sector, as defined by INPUT, is divided into two major segments. The first is comprised predominantly of traditional common carriers (telephone and circuit providers). The second is comprised of broadcast service providers, such as general media and cable TV service providers. The categories are derived from the Standard Industry Classification (SIC) code for Communications (SIC code 48).

A composite industry structure is shown in Exhibit I-1.

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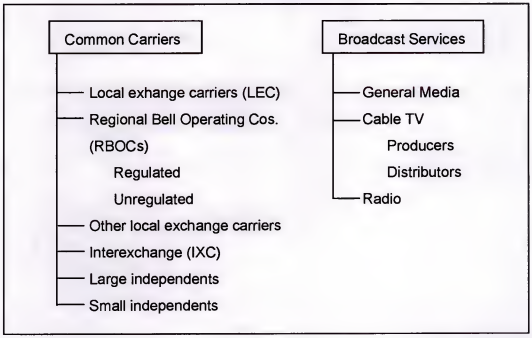
Exhibit I-1

Telecommunications Industry Segments



Source: INPUT

Regional Bell Operating Companies (RBOCs) are shown in Exhibit I-2, and interexchange carriers are shown in Exhibit I-3.

Exhibit I-2

Regional Bell Operating Companies

- Ameritech
- Bell Atlantic
- BellSouth
- NYNEX
- Pacific Telesis
- Southwestern Bell
- U S West

Source: INPUT

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Exhibit I-3

Interexchange Carriers

1st Tier	2nd Tier
• AT&T	• LDDC
• MCI	• ALC
• Sprint	• USLD

Source: INPUT

Providers of broadcast services fall into three basic groupings:

- General media broadcasters. These include the major networks (ABC, CBS, NBC and Fox), which are supported by over 650 affiliated and 400 independent stations.
- Approximately 70 cable TV program networks. These provide programming to more than 9,500 cable systems throughout the country.
- More than 10,000 licensed radio stations

The market for information services can be divided into three distinct groups:

- The RBOCs and IXCs, identified in Exhibits I-2 and I-3
- Local and independent providers
- Providers of broadcast services. These include public broadcast services such as ABC, CBS, and NBC; cable TV program networks and broadcasters; and radio stations.

In total, there are an estimated 22,000 organizations in the telecommunications sector that have requirements for information services. These can be divided into the three broad categories noted above and shown in Exhibit I-4.

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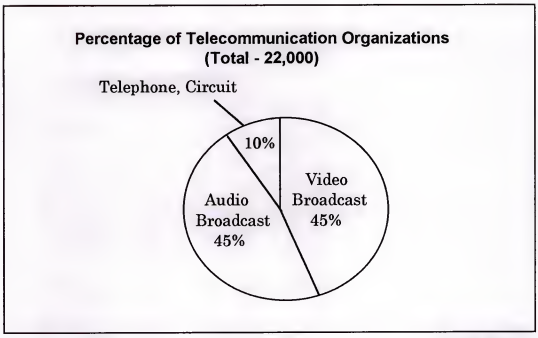
Exhibit I-4



Source: INPUT

A vendor must recognize that the 10% of the organizations providing telephone and circuit services account for the majority of information services expenditures. However, expenditures are significant in several other areas within the broadcast industry. These are discussed in Chapter IV.

Key Issues

- *Changing Regulatory Environment*

Regulations imposed by the Modified Final Judgment (MFJ) continue to be a significant consideration for telecommunications service providers.

- *Competition*

Compounding the difficulties of the carriers on one hand, and stimulating them to be more aggressive on the other, is the very likely emergence of direct competitors. The primary focus of regulatory activities will be to open up local exchanges to competition and to remove hidden local phone subsidies. There is also a global focus emerging so that major customers may obtain unified telecommunications services.

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- *Trade Potential*

An issue of concern for many telecommunications service providers has been the degree of competition from foreign providers. However, the abilities of U.S. providers to penetrate foreign markets is improving. European monopolies (PTTs) are beginning to weaken.

- *Service Pricing*

Efforts continue to encourage state and local governments to deregulate their local telephone exchanges in preparation for the competitive actions previously noted. These efforts will identify the intra- and inter-LATA telephone rate subsidies that are currently in place. The economic growth of enhanced services associated with these cost changes could be dramatic.

- *Customer Service*

Customers are still voicing their displeasure with unresponsive carriers. Carriers are focusing more attention on their customers' needs to integrate and manage complex network services.

2. Organization

In addition to this introductory chapter, the report contains analyses of the information services market and competitive environment as described below:

- Chapter II, *Industry Trends, Events and Issues,* discusses changes, market issues and activities, and competitive factors in the telecommunications sector that may affect current and future use of information services.

- Chapter III, *Information Systems,* shows how the telecommunications sector organizes and uses information technology, and identifies key technologies and major trends in the use of information systems. Key applications and the use of outside products and services are also considered.

- Chapter IV, *Information Services Market* presents an analysis of the expenditures for information services by product/service category for the U.S. telecommunications market.

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- Chapter V, *Competitive Environment*, discusses key industry issues and considers the competitive positioning of major vendors. It also identifies significant vendors by size and application area, and offers profiles of a selection of leading and emerging vendors.

- Chapter VI, *Conclusions and Recommendations*, offers suggestions and recommendations for participants in the telecommunications market.

- Appendix A, which contains the Forecast DataBase, presents a detailed forecast by information services product/service category for the telecommunications vertical market for the years 1995-2000. Because only one forecast was prepared in 1994 showing projections for the period 1994-1999, a copy of that forecast is also included in this appendix. Reconciliation for this year's forecast (1995-2000) is against the 1994-1999 projections.

3. Methodology

Much of the data on which this report is based was gathered during 1994 and early 1995 as part of INPUT's ongoing market analysis program. Trends, market sizes, and growth rates are based upon INPUT's research and in-depth interviews with users in the telecommunications industry and the IS vendors serving the industry. INPUT maintains ongoing relationships with, and a data base of, all users and vendors interviewed. Interviewees for the research portion of this report were selected from this data base of contacts.

INPUT Library - In addition, extensive use was made of INPUT's corporate library located in Mountain View, California. The resources in this library include on-line periodical data bases, subscriptions to a broad range of computer and general business periodicals, continually updated files on over 4,000 information services vendors, and the most up-to-date U.S. Department of Commerce publications on industry statistics.

Financial Data - It must be noted that vendors may be unwilling to provide detailed revenue information by delivery mode or industry. Also, vendors often use different categories of industries and industry segments, or view their services as falling into different delivery modes from those used by INPUT. Thus, INPUT must estimate revenues for these categories on a best-effort basis. For this reason, the delivery mode and individual segment forecasts should be viewed as indicators of general patterns and trends rather than specific, detailed estimates for individual years.

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Rounding - When displaying market forecast values in bar and column charts, INPUT rounds these amounts for ease of visual reference. Markets of $1 billion or more are rounded to the nearest $50 million; $100 million to $999 million to the nearest $10 million; and $50 to $99 million to the nearest $5 million. Actual values are shown in charts for markets of $49 million or less, in Appendix A tables, and in chapter text.

B
General Business Trends

As documented by the U.S. Department of Commerce, economists and business journals, the U.S. economy ended 1994 on a high note—perhaps too high from the Fed's viewpoint—with growth at approximately 4.6%. Because employment has also returned to an acceptable level, there is some concern that the strong growth increases the threat of inflation in 1995. However, January's gain in employment—134,000 people—was well below 1994's monthly average gain of 290,000. This decrease has generally been regarded by both economists and the financial markets as the first solid evidence of slower growth. Most economic observers now feel that growth should slow to around 2% by the third quarter of 1995, giving the American economy what some economists are calling a "soft landing." There is also general agreement that the economy seems to be in a mid-cycle slowdown, and that, long term, the risk of this slowdown becoming another recession in late 1995 is low.

From a financial market viewpoint, in 1994 bond yields rose nearly 200 basis points, and the Federal Funds rate was up 250 basis points. In 1995, most market analysts expect the Fed rate to top out at 6.5%, bond yields to move sideways in the range of 7.5% to 8.0% and S&P 500 earnings to increase approximately 7%—an amount smaller than in 1994. In general, most sectors of the U.S. economy should grow more slowly in 1995 than they did in 1994, the result of slight decreases in productivity and price/cost pressures. U.S. manufacturers are still restructuring, emphasizing cost cutting and downsizing, and, coupled with the early-1995 weakness of the dollar (especially against the yen), world markets should find U.S. goods attractively priced. Imponderables remain the short-term impact of supports for Mexico's peso and trade disputes with China. Both situations have the potential for significant short-term volatility, but in the long run should have little effect on the U.S. economy's return to modest, steady growth. Inflation in 1995, as measured by the *Blue Chip* consensus of approximately 50 private-sector economists, is expected to be at a conservative 2.9%, growing slightly

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through the year 2000 to a maximum of 3.3% (1996 and 1997) and then declining to 3.0% by the millennium.

The most encouraging sign of a healthy economy was seen recently in a statement by Federal Reserve vice chairman Alan Blinder, who noted, on March 9, that "the U.S. economy is downshifting to a more sustainable growth rate." He agreed with Fed chairman Alan Greenspan that the Consumer Price Index probably overstates the rate of inflation by 0.5 to 1.5 percentage points, but did not indicate whether the Fed rates, which have been raised seven times since February, 1994, would be increased again at the end of March. Most economists and analysts believe that no further increases will be seen in 1995, unless there is a major change in the economy.

Overall, the outlook for the U.S. economy in 1995 is for controlled, steady growth in the 5.7% range, with inflation at about 3% and corporate after-tax profits at approximately 7%, down slightly from 1994's 10%.

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II

Industry Trends, Events and Issues

A Trends

This chapter discusses in detail the overall telecommunications market and general business and technology trends that apply specifically to the common carrier, CATV, and broadcast segments.

Major changes are occurring in the telecommunications industry and are having a significant impact on the common carrier, CATV, and broadcast entities. These groups are positioning themselves to offer a number of new services, including multimedia, interactive television, and wireless services through broadband facilities and high-speed switching networks.

Because many of the key trends and issues are common to the segments, it is entirely possible that they will merge by the end of the decade.

A number of changes continue to show potential for affecting the way telecommunications services will be delivered in the future. They are considered in the sections that follow.

1. Industrywide Trends

A number of significant business trends are apparent across the telecommunications industry. These are summarized in Exhibit II-1, and INPUT expects them to affect the telecommunications industry for at least the next several years.

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Exhibit II-1

Significant Industry Trends

- Global Communication Convergence
- Content Receiving More Attention
- Internet Opportunities
- Video Dial Tone Opportunities

Source: INPUT

a. Global Communication Convergence

The global communications industries are undergoing a fundamental restructuring. They are converging through mergers, partnerships, joint ownership and other forms of alliances. Common carriers are investing in CATV companies. Foreign PTTs are aligning with U.S. common carriers. RBOCs and other local exchange carriers are seeking global long-distance affiliations.

A number of recent merger and alliance announcements have made substantial and permanent impact on the way that customers and businesses will receive communication services. This is at the root of the convergence movement that now appears unstoppable. These changes will begin to come into effect later this year and continue into the next decade.

For example, several major common carriers and CATV organizations are in the process of either merging or forming new alliances. This represents a significant change from last year's attitude of polarization between these two entities. While the RBOCs' local access and associated revenue continue to be an issue, telephone companies and RBOCs are now joining forces with the leaders of the CATV industry.

The goal that everyone now seems to be seeking is broadband interactive television services including voice, data and multimedia. This is facilitated by the convergence of computing, communications and entertainment. This focus now seems to favor consumer services over business services. But business services will probably ultimately provide the revenue to support these new services.

The mergers and other alliances noted below are segmented into four groups, depending upon how they interrelate.

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- RBOC/CATV alliances
  - Southwestern Bell/Hauser Communications
  - U S West/Time Warner—U S West invested $22.5 billion to acquire a 25.5% share in Time Warner.
  - Southwestern Bell/Cox Cable—joint development in the U.K. for a new cable system
  - Bell Canada invested in Jones Intercable.
  - NYNEX/Bell South invested in QVC.
  - NYNEX/Cablevision agreement to link U.S. networks for local phone service (1995)
  - TCI/Cox/Teleport—TCI and Cox bought a 50% interest in Teleport Communications in 1992. Teleport is a competitive access provider (CAPs) that provide local fiber access to businesses to circumvent RBOC local access fees.
- Interexchange Carrier/International Carrier alliances:
  - MCI/British Telecom (BT)—in the "deal of the century" BT invested $4.3 billion in MCI, a 20% stake. Also included was the formation of a new company to bid jointly on global communication service contracts. This should accelerate the global rivalry between MCI and AT&T.
  - AT&T/UNET (5 European telephone carriers)—during 1994 and early 1995, other customers have joined from Asia.
  - Sprint/UNETcom French and German telecom. When completed, UNETcom will have invested $2.5 billion and acquired 15% of Sprint.
- Other alliances:
  - Viacom bought Blockbuster in 1994.
  - TCI Sumitomo—TCI bought 18% of Sumitomo's CATV network in Japan. Sumitomo is Japan's largest cable operator.
  - Ameritech invested in GE's GEIS.
  - IBM/GTE agreed to offer data services over the cellular phone network.

This merger and alliance activity will continue through 2000.

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Technology, economies of scale, new service potential and specific user demand are the principle drivers of this convergance movement. For example, what industry was the first to recognize the value of computing to improve sales of its product? What industry was the first to recognize the value of telecommunication access to a central database to serve its customers better? What industry is the first to demand global focus from vendors to simplify the complex process of obtaining global communication services to support its computing network?

The answer to all three questions is the airline industry, specifically the reservations application. It isn't a surprise that the global marketing units formed by the communication alliances have targeted airlines, oil companies, and other industries with substantial remote global operations for their initial service targets.

b. Content Receiving More Attention

In the rush to lock up technical solutions for global communication services, content (or what will move over the new networks and information superhighway) is slowly beginning to get the attention it deserves. The Time Warner/U S West affiliation certainly is a major content play as well as a technology play. In addition, media giants, including newspaper chains and magazine publishers, have allied with on-line network companies for distribution agreements. A whole range of network information services—from database access services such as legal databases to transaction services such as on-line credit card account authorizations—have been part of a growing number of acquisitions and alliances in which content companies have moved into stronger hands. In some cases, (but not enough!), this has included telephone companies.

Electronic commerce—on-line purchasing and payment—has received enormous attention from telecommunication companies such as AT&T, MCI, and Sprint and even from a new competitor, Microsoft, which has caused concern among bankers and retailers about losing market share.

This attention to content is based on a simple factor. When four to six global communication alliances all appear to offer the same communication services and data transport, what will be the competitive differentiators? Content . . . .and the time to lock up the rights to data and information is now.

The increased attention paid to content will reveal still another issue, that of telephone companies potentially competing with their customers, using technology to obtain market share. This is what is behind the concern of bankers over Microsoft's announced intention to provide electronic commerce and related financial services. Where does it stop? This issue will become more important as we move into the 21st century.

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c. Internet Opportunities

The Internet is an information service already three to four times the size of the commercial on-line computer service market, closing out 1994 with an estimated 24 million users and adding upwards of 1 million users each month. Yet the Internet is owned by no one. It cannot be acquired. It is also difficult to manage and difficult to change.

As a result, many telecommunication companies together with information services vendors, are slowly beginning to embrace the Internet. This creates several areas of potential service revenues associated with the growth of the Internet. Providing local access to the Internet is one of these. Developing software that can search the Internet for user-desired information is another. Assisting manufacturers to set up storefronts and operating these storefronts on a service basis represents still another Internet opportunity. INPUT forecasts that many vendors, including telephone companies, will find rapidly growing and significant new revenue sources by serving those who wish to use the Internet.

d. Video Dial Tone Opportunities

Video dial tone refers to the availability of broadband access to homes via the local telephone network. Currently, all RBOCs and other independent LECs, such as GTE, are installing fiber optic or other high-capacity communication links and switching systems to reach homes and businesses in their territories. Outside their territories, they are seeking affiliation with CATV companies.

The costs involved in installing these kinds of services are in the two-digit billion-dollar range or more for all RBOCs, well over $130 billion for the total U.S.

A major issue emerging in 1994 is the debate over which services will be offered over these broadband networks and what will create the revenue base to pay for this capacity. INPUT suggests that this will be a major issue for the remainder of the 1990s and probably beyond. We suspect the answer lies with content and possibly with the development of new services for bringing the Internet into the broadband environment.

2. Common Carrier Business Trends

Within the common carrier group, more than 90% of revenues are derived from regulated services. Consequently, regulatory considerations will continue to be a strong influence on the direction and rate of growth.

A number of significant business trends are apparent. These are summarized in Exhibit II-2, and INPUT expects them to affect the

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common carrier segment of the industry for at least the next several years.

Exhibit II-2

Common Carrier Business Trends

- Basic Service Diversification
- Emerging Competition
- Globalization of Industries
- Changing Regulatory Environment
- Growing Markets for Second Lines

Source: INPUT

a. Basic Service Diversification

Technology advances will continue to provide more business opportunities to LECs to offer enhanced services to homes and businesses.

Local carriers and cable TV companies are distributing fiber optic technology almost "to the curb" to support voice, data, and "video-in" local networks. The cost is estimated to be as much as $400 billion and conversion may not be completed until 2015. However, new technology breakthroughs may hasten distribution. Considered below are two new capabilities—the electronic superhighway and interactive TV—that are now receiving significant attention.

• Electronic Superhighway

A number of announcements have occurred in the industry that identify a new direction—to build a nationwide broadband network. It would interconnect a minimum 500-channel cable TV network and may take as long as three to five years to complete. Some of the key activities include:

- TCI and Time Warner have set system network standards to allow communications between CATV companies.

- AT&T is providing ATM switching technology to Time Warner and Viacom.

- Broadband Technologies is developing a 1,500-channel CATV system for Bell Atlantic and other phone companies.

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• Interactive TV

Another new direction is being referred to as interactive TV. Again, a number of companies have been making major contributions to the development of this emerging industry:

- Microsoft is developing a new operating system for interactive video multimedia systems and is also involved in the development of a new Prodigy cable connecting box for two-way CATV.

- AT&T is developing a video server to store and send thousands of movies via CATV or telephone networks.

- AT&T, U S West, Bell Atlantic and TCI are conducting video-on-demand tests.

- Numerous ventures are under way to develop new interactive games and programs.

- TCI has purchased 15% of the Interactive Network.

b. Emerging Competition

With the regulatory environment becoming more flexible, LECs will find competition for voice and data-related services emerging from the cable TV, cellular, personal communications services (PCS) and competitive access providers (CAPs), and even interexchange carriers (IXCs). Several of these types of companies are discussing potential cooperative ventures, as noted above.

PCSs are aimed at relatively stationary close-in communication services, as in a home, a shopping center, an educational complex or an industrial park. Though the PCS user may be mobile within that environment, PCSs are not intended to serve traveling sales people and route delivery services (Fed Ex); these are cellular customers. As such, PCSs represent a substantial bit of competition for RBOCs and other local exchange carriers. No wonder they were notable among the bidders at the FCC auction for PCS licenses in major cities that took place in early 1995.

By the turn of the century, PCSs will have become major competitors at the local level.

The regulated LECs, having operated at a competitive disadvantage, have paved the way for a new industry to emerge—the competitive access providers (CAPs). CAPs are able to offer higher technology, lower prices and better service. Access charges are the IXCs' largest expense and make up one-third of LEC revenues. Therefore, in an attempt to reduce costs, IXCs (as well as cable operators and wireless companies) will favor

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CAPs. CAPs operate all-fiber optic local networks and offer a considerable discount to both IXCs and large end users. These attributes represent a significant threat to the LECs.

There is a natural synergy potential between CAPs and cable television (as well as IXCs). CAPs primarily serve business centers, while cable serves residential areas. CAPs are also in the process of linking major business/residential areas through their "local" trunking.

Even with the recent reregulation of the cable companies, INPUT expects that they will have a short-term advantage over rival phone companies. But in the long run, their advantage is less clear. Currently, cable's "edge" is its installed, wideband infrastructure, which carries the potential for hundreds of channels of video, voice, and data—all at the same time. The recent partnering between U S West and Time Warner adds support to this observation.

Several key business trends, listed in Exhibit II-3, indicate that the cable TV industry will emerge as a competitive threat to the local telephone companies. These will be discussed in greater detail in Section 3.

Major corporations that resell 800-number and other communication services represent a new and growing category of competitor. Because of their size, major corporations, even government agencies, can buy communication services at steep discounts. If they also can sell these services to others at a profit, telecommunication costs can be further reduced. However, most of these resellers do not possess the billing information systems needed to satisfy their customers. Therefore, there exists an opportunity for RBOCs, plus smaller independent telephone companies such as LDDS and US Long Distance, to provide billing services to support major resellers. These two companies already support small common carriers with powerful billing systems.

c. Globalization of Industries

Slowing domestic growth, coupled with international positioning, has resulted in many carriers expanding into new international markets. Also, American carriers are now significant participants in PTT privatization efforts going on throughout the world.

Communications companies are positioning themselves to provide one-stop shopping for global services. Alliances such as that of MCI/BT intend to provide seamless international communication services to their multinational corporate customers. AT&T is providing a global network called WorldSource. Sprint and IBM have announced similar services.

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To enable the globalization of industries, an infrastructure must exist. The undersea fiber optic cables linking the U.S., Europe, and Asia are an extension of the domestic electronic superhighway.

d. Changing Regulatory Environment

Though the RBOCs continue to be constrained by the effects of the Modified Final Judgment (MFJ), a significant shift in regulation now allows RBOCs the potential to provide a variety of information services. However, this "potential" is being reviewed in Congress and may result in certain limitations. INPUT expects that the limits of deregulation will continue to be tested over the next five years.

RBOCs have been barred from owning cable TV companies within their own operating areas. However, the FCC now allows the RBOCs to acquire CATV companies outside their telephone company's territory. For example, U S West now owns a 25% stake in Time Warner, with a majority of its CATV customers being located outside U S West's territory.

Newspaper publishers have also felt the effects of this deregulation. Telephone companies are now allowed to compete with publishers in providing information services such as electronic classified advertising and 900-service phone numbers providing information on stocks and sports.

e. Growing Markets for Second Lines

During 1994, several RBOCs, as well as independent LECs, identified a growing market among consumers and small businesses for second lines. Estimates were that between 5% and 10% of all lines are now second lines and this total is increasing rapidly every year. This is good news, not only because revenues come in at a lower operating cost to the telephone companies, but also because it confirms that more and more homes are finding it necessary to have a second line to support personal computers as more of these devices are going on-line.

3. Cable TV Business Trends

As summarized in Exhibit II-3, the following are the key business trends in the cable TV industry:

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Exhibit II-3

Cable TV Industry Business Trends

- High Valuation
- Competition
- Regulation
- Untapped Market Potential
- Infrastructure Investment

Source: INPUT

a. High Valuation

As stated above, CATV companies are increasingly being viewed as competition, but also as partners with other communication companies. As a consequence, the valuation of CATV companies is increasing steadily and dramatically.

A common measure used is the price paid in acquisitions and alliances per subscriber, obtained by dividing the acquisition price by the number of subscribers involved. Currently, prices paid are exceeding $2000 per subscriber. This is up from about half that value ($1000 - $1200) in the middle to late 1980s.

b. Competition

Several business trends, listed in Exhibit II-3, suggest that the CATV industry, interexchange carriers, and competitive access providers have been emerging as a competitive threat to LECs. However, with the advent of U S West's investment in Time Warner, the lines between telephone and cable companies are beginning to blur and, as a result, they are being refocused as communications companies.

c. Regulation

Ongoing regulatory activity may provide further impetus to the CATV industry to enter the telephone and PCS markets. Since deregulation in 1986, the cable industry has had the field virtually to itself. Many municipalities permit only one provider of CATV, stifling competition. Consequently, consumers believed they were being overcharged for CATV and mounted pressure to establish regulations that would control the rates. The government's cable TV price index rose above 60%, which is more than twice the 23% overall rise in consumer prices over the same five-year period, 1986-1991.

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Two events have led to the reregulation of the cable TV industry. Last October, Congress enacted the Cable TV Act of 1992, which gave the FCC power to make new rules for the cable industry. In early April of 1993, the FCC ordered a four-month freeze on CATV rates, with an expected rollback of as much as 10%. It also gave back to local governments the right to regulate basic CATV service. Some cable competitors, however, argue that this new regulation does not go far enough.

In 1994, CATV rates were again ordered reduced by the FCC.

d. Untapped Market Potential

Although the consumer market for CATV is approaching saturation, the business market is largely untapped. Few business services are provided by cable companies. The same facilities that serve homes in large metropolitan areas (New York, Chicago, San Francisco, etc.) can also serve businesses in those areas.

So far, with some exceptions, the telephone, cable and broadcast markets are contemplating associations that will ultimately benefit the consumer. Such considerations recognize that video, multimedia, interactive TV and other media are the profit centers of the future. Industry sources have predicted that TVs, telephones and computers may merge into one mega-industry that could hit $3.5 trillion in annual revenue in ten years.

e. Infrastructure Investment

The cable TV industry is continuing to invest aggressively in new (fiber optic) facilities. Use of fiber optic cables will result in increased ability to deliver quality broadband digital services within the next several years.

Recent industry activities also suggest that significant investments will be made in ATM (asynchronous transfer mode) high-speed switching technologies to work in conjunction with this fiber medium and SONET protocols.

Also, as the battle for frequency spectrum unfolds, CATV companies have become aggressively involved in the wireless personal communications services (PCS) microcellular industry.

4. Broadcast Business Trends

The FCC recently allowed television networks to own the rights to rerun TV shows, giving them access for the first time to a multibillion-dollar market. Networks were banned in 1970 from selling reruns—a move to prevent them from dominating the entertainment industry. Now, CBS,

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NBC and ABC may produce prime time shows and sell them later in the rerun market.

Lifting the ban allows Hollywood and the networks to merge. However, the FCC ruled that the networks could not participate in first-run syndication—the market in which shows are produced and shown on a wide range of TV stations for the first time.

In another ruling, the FCCs allowed each of the 1,500 TV stations, if it chose, to force local cable companies to carry its signal as part of a basic cable package and demand payment for the service. If the cable company chose not to pay (it has never paid before) it lost the right to carry the station after October 6, 1993. Cable companies that did pay could not pass the cost on to consumers until October 1994.

INPUT believes cable companies that are network affiliates and strong independent stations are not likely to pay. Not all stations want cash. Some are more interested in a better channel slot or in having ads placed in cable program guides.

On the information services front, two NIS vendors implemented reservation-like advertising space procurement systems and began offering services to radio and TV stations and advertising agencies globally in 1994. This can potentially increase revenues and profits at TV and radio stations as well as reduce unsold time. In addition, advertising programs can be carried out (and scheduled) with more certainty and less error.

5. Technology Trends

Technology trends contributing to industry growth are shown in Exhibit II-4. Though most are known technologies, their impact as growth enablers is only beginning to be felt.

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Exhibit II-4

Technology Trends

- Broadband Transmission
- Advanced Intelligent Network
- Multimedia Services
- Mobile Wireless Communications
- Network Management
- CATV Technology Advances

Source: INPUT

Of all the technological changes, broader bandwidth and fiber optics are continuing to have the greatest impact on how services are delivered. Significant technologies are discussed below.

a. Broadband Transmission

RBOCs are developing major fiber optic digital broadband systems that will enable them to support increasing demand for very high data throughputs. Anticipated data rates by the year 2000 will be 300 to 500 megabits, and into the low gigabit range by 2005. This resource will allow the RBOCs to compete with competitive access providers (bypass) to meet metropolitan data networking needs.

In the meantime, the RBOCs will offer medium- to high-quality full-motion video transmission over common phone lines due to a technology breakthrough by BellCore. However, this single path will not be able to accommodate the 500 to 650 full-motion interactive TV channels the CATV industry's fiber optics and coaxial cable will soon offer.

Key components of these high-capacity systems are fiber optics, SONET with the SS7 signaling system, asynchronous transfer mode (ATM), and the Advanced Intelligent Network (AIN). These components will become the building blocks for local carriers, enabling them to support all forms of networks, including broadband LANs, metropolitan-area networks, and broadband wide-area networks.

High-definition TV (HDTV) will also become an integral part of the very high-capacity applications. Three-dimensional TV (3DTV) will bring even greater demands for bandwidth as early as 1996-1997, when U.S.

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companies agree on a common standard. The INDEO personal computer protocol standard, which supports video on a PC, will also add to this need for additional bandwidth.

b. Advanced Intelligent Network (AIN)

The AIN software developed by BellCore allows carriers to rapidly reconfigure or create and deploy new network service offerings using equipment from a variety of vendors. AIN's intent is to allow users to gain greater control of their telephone company's network services.

c. Multimedia Services

Multimedia services will encompass all forms of media, including audio, image, graphics, data and full-motion video. Many of these interactive applications require the large broadband transmission facilities currently being developed.

d. Mobile Wireless Communications

As wireless services begin to compete in business and residential voice markets, LECs could lose traffic and revenues if CAPs and cable operators provide backbone transport. The strategic implications for LECs in the growth of wireless will be significant. To counter this situation, BellSouth is jointly developing products and services with Intel, Ericsson, GE, and RAM Mobile Data.

Factors driving the growth of mobile wireless communications include:

- The conversion to digital multiplexing technology will increase the capacity of the allotted radio spectrum by several hundred percent.
- Mobile (cellular) communication is becoming increasingly important in providing fax and data transmission services, primarily from laptop computers.
- As many as 63 million users may choose to subscribe to PCS within ten years. As a result, revenue for wireless services could reach between $30 billion and $40 billion in just a few years.

Those interested in an in-depth study of the wireless market should consider obtaining INPUT's September 1994 report, *Wireless Telecommunications Marketplace*. The report provides an analysis of this dynamic new market, and notes opportunities available to service providers.

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e. Network Management

With the implications of competition and the ever-increasing complexity of networks, the RBOCs will increase their participation in network management. The RBOCs will be more responsive to customer needs and offer more information about the cost effectiveness, design, and operation of their networks.

However, for theRBOCs to become accepted as network managers, they must provide significantly enhanced network management tools. There are indications that some RBOCs are beginning to broaden their skills in this area. Alliances are now being formed with other network management vendors who will provide the "help desk" and diagnostic/management software that is integrated into an RBOC's products.

f. CATV Technology Advances

Although the previous points are oriented toward the common carrier segment of the industry, technology changes will also have an impact on the broadcast segment, particularly the cable TV industry. The three most notable technological advances are the growth of fiber optics, the availability of greater bandwidth, and ATM switching.

- Fiber optics will provide a means of delivering a broader range of services than can be delivered today. With a fiber optic infrastructure, cable companies will be able to integrate one-way (broadcast) services with two-way (interactive) services to support major new market opportunities, including voice, data, and multimedia services.

- With greater bandwidth available, broadcasters will be able to provide a wider range of services directly to businesses and homes. Some of these services will support high-definition TV (HDTV), subsequent development of three-dimensional TV, and multimedia systems—all requiring exceptionally large bandwidths.

- Significant investments are being made in switching technology and software to support the operation, maintenance, and billing requirements of these devices. An example of this is Time Warner, which has invested in AT&T's ATM switch to support its fiber/cable networks.

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B
Issues and Events

1. Key Industry Issues

Several significant issues face users and providers of (common carrier) telecommunications services. For vendors of information services to this industry segment, knowledge of the issues is necessary to understand how the industry will evolve over the next several years.

Telecommunications users continue to be concerned about the availability and cost of services; they also continue to have concerns about the control and management of increasingly complex networks.

Such customer questions and concerns form the basis for significant issues that face the common carrier segment of the telecommunications industry. Key issues are shown in Exhibit II-5 and are discussed below.

Exhibit II-5

Key Industry Issues

- Changing Regulatory Environment
- Competition
- Trade Potential
- Service Pricing
- Customer Service

Source: INPUT

a. Changing Regulatory Environment

Regulations imposed by the Modified Final Judgment (MFJ) continue to be a significant consideration for telecommunications service providers.

The RBOCs may now offer information services. This action removes a primary restriction and allows them to use their installed base (imbedded circuits and switches) to provide information services. Telephone companies are now able to leverage underutilized technology to deliver value-added services and reduce the cost of basic services.

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Although restrictions have been removed, don't expect rapid action! RBOCs will ease into information services via alliances, licensing, etc. There will be few big acquisitions until after 1995.

The MFJ is a major threat to the RBOCs' ongoing efforts to deregulate. It continues to be one of the primary road blocks that prohibit manufacturing and long-distance services. In addition, there are pressures from a coalition of long-distance companies, newspaper publishers, consumers, and communications labor groups that would further restrict the RBOCs.

With the granting of permission to provide gateways and information processing, questions regarding inter-area services continue to arise. RBOCs have indicated that some business services, such as E-mail and EDI, will not be as cost effective if the service cannot be provided directly to a wide geographic (inter-LATA) area.

b. Competition

Compounding the difficulties of the carriers on one hand, and stimulating them to be more aggressive on the other, is the very likely emergence of direct competitors. The primary focus of regulatory activities will be to open up local exchanges to competition and to remove hidden local phone subsidies.

Much of the basis for this competition has been driven by the local access issue—the loop between IXCs and local phone companies. These costs represent up to one-third of local phone company revenues. This income could be in jeopardy as alternative access providers become more prevalent.

It had been thought that CATV companies would become a significant threat to local carriers. However, regulations currently prohibit RBOCs from owning and operating CATV companies in their own territory. This situation will cause RBOCs to compete amongst themselves through CATV in each others' "backyard." Some see this situation as the result of a move to placate public disapproval of expensive CATV rates by "reregulating" the industry with competition.

INPUT expects local telephone, CATV, competitive access providers, VSAT, VAN, cellular, PCS and long-distance companies (IXCs) to be allowed to use their excess capacity and technology to provide a broader base of services in direct competition with each other. New strategic alliances will challenge many of the current ways of doing business in this arena. Intra-LATA activity could occur as soon as late-1995; inter-LATA might not occur until 1996-1997.

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c. Trade Potential

An issue of concern for many telecommunications services providers has been the degree of competition from foreign providers. However, the abilities of U.S. providers to achieve penetration into foreign markets is improving, as European monopolies (PTTs) begin to expand their horizons, becoming more open minded at home in order to gain position globally.

IXC/international carrier alliances are building with the recently completed MCI/British Telecom alliance. This alliance and the efforts of AT&T, Sprint and others to offer one-stop shopping to multinational corporations represent major efforts to expand the international market.

CATV/international carrier alliances are also occurring, as with the TCI/Sumitomo (Japan's largest cable operator) merger. This activity is further supported by Cable Data's International Billing Services' focus on the cable/telephone market.

d. Service Pricing

Efforts are under way to encourage state and local governments to deregulate their local telephone exchanges in preparation for the competitive actions previously noted. These efforts will identify the intra- and inter-LATA telephone rate subsidies that are currently in place. The economic growth of enhanced services associated with these cost changes could be dramatic.

e. Customer Service

Customers are still voicing their displeasure with unresponsive carriers. As a result, carriers are focusing more attention on their customers' needs to integrate and manage complex network services.

Due to downsizing and increased demand for services, users have expressed requirements for network connectivity, protocol standardization, ubiquitous availability of information, spreadsheet capability and better PC training. There is also an increasing need for client/server configurations.

Because of LEC, IXC and cable competition, end users are likely to wind up the winners. They will benefit from low prices, better service, more innovative service options and diversity of supply.

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2. Major Events

In this rapidly changing industry, there have been numerous important events, such as rapid technology developments and mergers and acquisitions.

Exhibit II-6 summarizes a number of events that INPUT believes were most significant, not because they received a great deal of attention in trade publications, but because they indicate key industry trends.

Exhibit II-6

Major Events

- CATV/LEC/Wireless Competition
- Personal Communications Services
- Mergers and Acquisitions
- AT&T/Bell Atlantic Dispute

Source: INPUT

a. CATV/LEC/Wireless Competition

The FCC specified new rules that have now reregulated the cable TV industry. These rules allow local governments to control about 60% of the U.S.'s cable TV systems. They have opened the door to a competitive solution through cross-fertilized services between telephone and cable TV companies.

Generally, cable systems are deemed to have the advantage now. They already can carry large volumes of digitized video signals and have the ability to carry voice and data calls as well. However, cable companies need expertise, sophisticated switching equipment, and computers for the delivery, management and storage of the vast libraries of movies, data, games, and other services they expect to offer.

There is potential conflict between LECs and wireless service providers as users indicate a willingness to try wireless and, if successful, to spend less on wire-based services.

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b. Personal Communications Services

The next major growth concentration in the wireless industry is expected to be in the microcellular area called personal communications services (PCSs).

CATV providers, RBOCs, IXCs and others have filed a very large number of applications to begin to test PCSs. For the cable industry, this is a first step into the telephone services market. This entry will help to establish a base for the cable industry from which to compete with the established common carriers.

c. Mergers and Acquisitions

The convergence of telephone and cable industries (as described in the first section of this chapter) is of major import. Viewed individually, these events might not be considered particularly significant. Viewed collectively, they indicate several important points.

- Significant competition will result from reduced regulation and the cross-fertilization of CATV and local telephone companies.
- Progress is being made in high-speed broadband technology. Bringing fiber optics "to the curb" from competing nontraditional network service providers will facilitate the arrival of many new applications.

INPUT believes that these advances are strong indicators of significant growth in data networking services. Problems will exist, but a broad range of services will become available at more economical prices.

d. AT&T/Bell Atlantic Dispute

The MFJ breakup of AT&T still left the RBOCs largely reliant on AT&T for switching and transmission equipment. Foreign telco equipment manufacturers have made some inroads, but AT&T still prevails.

Bell Atlantic, therefore, hired AT&T not only to supply its new switching and broadband transmission equipment, but also to manage the installation, at a substantial fee.

In early 1995, Bell Atlantic removed AT&T as project manager, taking on the function itself. This is a blow to AT&T and a new RBOC show of independence that may lead to new opportunities for AT&T equipment rivals.

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III

Information Systems

A
Organization and Use of Technology

In larger carriers, there are frequently at least two information systems organizations. One is dedicated to developing and managing the carrier's switching systems. This organization normally reports to an operations executive.

The second organization is normally responsible for the company's internal and support systems. This organization may report to a Chief Information Officer or similar position, not unlike IS departments in other companies.

The distinction has been important to vendors, because the priorities of the organizations differ considerably. The operations organization is more interested in the technical detail. Switching systems must be extremely precise and change is difficult, with far-reaching implications. The internal organization is becoming more functionally oriented. Its interest is in receiving the best value, recognizing that systems may need to be changed at some later time.

This distinction is now starting to blur, however, as at least one of the RBOCs has put both organizations under one senior manager. This is attributable to growing similarities in goals and objectives that support the combining of digital technologies, the need for rapid development and change of products and services, and a concern for responsive customer assistance.

1. Budgets

Exhibit III-1 provides a summary of the distribution of the budgets reported by internal information systems organizations. Overall, they reflect continued growth, with external purchases showing a higher

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growth rate than internal expenses. Note that the purchased services category includes the information services discussed in Chapter IV.

Exhibit III-1

Information Systems Budget Distribution

I S Expense Category	1994 Percent of IS Budget	1994 - 1995 Percent of Expected Budget Growth
Personnel (Salary & Fringes)	31	5
Hardware	28	13
Purchased Services	41	19

Source: INPUT

Personnel - The modest growth rate for personnel is the result of two factors—salary increases and staff reductions. Information systems managers indicate that there will continue to be reductions in staff, but the reductions will be significantly fewer than in the past several years.

Major reductions in force have plateaued; what remains is fine tuning. Many of the remaining reductions will be accomplished through attrition. The growth of personnel expenses reflects a net result of salary increases and expense reductions due to the attrition.

Hardware - The overall increase in hardware expense continues to be greater than in many industries. The growth is attributed to the need for bigger systems to accommodate more complex applications and larger databases. Expansion in hardware also reflects a growing focus on workstations to carry out increasingly complex tasks.

Purchased Services - Growth in purchased services includes the software and services discussed in the following chapter. It also includes expenditures for voice and data communications services provided by other (non-value-added) carriers. The overall growth is heavily influenced by the strong and steady increase in the use of professional and systems integration services.

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Within the broadcast services segment, the expenditure breakdown is more in line with that of other industries. Expenditures for personnel and hardware are a higher percentage of the total and external purchases are lower.

2. Hot Technologies

Exhibit III-2 summarizes new technologies and their impact on nearly all common carriers. The carriers are driven to consider and adapt those technologies due to external customer demand and internal user requirements.

Exhibit III-2

New Technology Impact Common Carriers

- Decentralization
- Data/Systems Integration
- Greater Customer Control
- System Flexibility
- Increased Information Flow
- Underutilized Infrastructure

Source: INPUT

Decentralization - As with many industries, the information systems function in common carriers is being decentralized. Decentralization is most prominent in the marketing and customer service departments. Marketing and service are assuming greater responsibility for defining and managing development requirements and projects.

Data/Systems Integration - Organizational decentralization and the growing need for integration of data across functional areas are driving a need for the integration of systems. Data about customers and their service status must be available to operational and support departments.

Customer Control - Customers recognize the value of digital technology and the value of many of the services that carriers are beginning to offer. Many customers have demonstrated increased interest in the use of services such as software-defined networks, network management, and virtual digital networks.

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- Digital technology has created the ability for customers to directly control their networks and services. Customers look forward to the use of services, like the Advanced Intelligent Network (AIN), that will provide access to carrier systems to define networks and change features and functions.

- Customer demands create significant pressure on the carrier information systems organization to develop processes that permit greater customer control of their services. Greater customer access results in greater concern about system security.

- Meeting customer demands is fostering new technologies—such as expert systems and artificial intelligence—in which many carriers are gaining knowledge and expertise.

System Flexibility - Large and small customers are demanding greater flexibility in defining services that will best meet their needs. Prior to digital technology and deregulation, carriers defined categories of services. Older technology did not permit great flexibility and carriers were not inclined to develop many options. Customers either accepted or declined to accept the defined service.

Today, customers want to be able to select specific services to meet their needs and to be able to change such selections quickly and easily. They want custom sets of features and custom-designed billing. They want to be able to have analyses performed on both costs and service levels.

As customer demand continues to exceed the ability of carrier information systems groups to develop systems, carriers are seeking alliances with outside vendors to meet these needs. Carriers are also beginning to play a major part in developing new standards for network management and EDI telephone billing.

Increased Information Flow - There is a seemingly never-ending demand for greater bandwidth to pass greater amounts of data. Coupling these data demands with the new requirements for huge amounts of bandwidth to support HD and 3D television and multimedia applications will drive capacity requirements to exceptional heights. From the introduction of the first wideband (T1) services ten years ago, carriers will soon be able to provide local- and metropolitan-area switched network services at speeds of 300-500 Mbps. These speeds are expected to grow well into the low gigabit range by 2005.

Underutilized Infrastructure - Due to the breakthrough by BellCore, the RBOC technology development group, the carriers are now able to transmit medium- to high-quality TV signals, enabling them to obtain a temporary edge over the CATV industry.

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The broadcast services segment of the telecommunications industry has not, until now, been significantly impacted by many of the newer technologies. INPUT expects this to begin to change over the next few years. Exhibit III-3 highlights a number of impacts that new technologies will have on the broadcast segment of the telecommunications industry. Note that the majority of these impacts will be in the cable industry.

Exhibit III-3

New Technology Impact—Broadcast Services

- Interactive Television Service Growth
- Increased Networking
- Increased Business Applications

Source: INPUT

As noted earlier, the technologies that will have the greatest impact on the broadcast (primarily cable) industry will be fiber optics, digital switching technology, and microcellular PCS services. These will result in several secondary impacts.

Interactive Television Service Growth - With the availability of increased bandwidth from fiber and digital technology, many of the traditional limitations of coaxial cable will be overcome. The additional capacity of fiber, coupled with the enhanced capabilities of digital switching technology (Asynchronous Transfer Mode), will permit the introduction of new interactive services that have not been readily available in the past. For instance:

- Cable companies will compete directly with, and in some cases partner with, RBOCs and competitive access providers (CAPs) for the provision of local- and metropolitan-area telephone, PCS, and CATV services.
- Cable companies will be able to provide direct connections to electronic information service providers that are of higher quality than those provided by many RBOCs today, but the RBOCs will catch up.

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Increased Networking - With the introduction of PCS and telephone competition and a growing demand for CATV programming and multimedia interactive services, there will be a need for increased networking within the cable industry. Industrywide networking is limited today, but this will change as the 500-channel "information superhighway" is developed.

Increased Business Applications - There will also be a growing demand for business applications such as enhanced voice messaging, electronic commerce, electronic mail, electronic data interchange, electronic funds transfer, and derived marketing information systems, e.g., customer usage profiles.

Growth is occurring. Several CATV organizations are now preparing to support and promote the use of interactive TV networking applications. Organizations such as Tele-Communications, Inc., Time Warner, Cincinnati Bell Information Services, Cable Services Group (part of American Express's First Data Corp.), and CableData are in key positions to promote the growth of many of the network services offered by the cable industry.

B
Major Trends in the Use of Information Systems

1. General Assessment

Now that common carriers may offer content-based information services, many information services vendors are in the midst of presenting their latest technology to common carriers. Although it is still possible that Congress could create certain limitations on the type of services offered, carriers are establishing business units to evaluate, select, and negotiate with the most likely service-providing candidates.

Until the recent lifting of the regulatory restrictions, the RBOCs had been concentrating on fixing antiquated systems, which precluded the rapid deployment of many new or planned services. Some of these carriers still need to spend considerable time, effort, and money to fix or redo their billing and customer service systems. Many of these systems will also need to incorporate EDI and Internet interfaces.

The developing need to provide these new information service offerings, coupled with the strong probability of competition with CATV operators, should offer many excellent opportunities for vendors. They will need to provide many programs and systems that adequately support these applications. In addition to the new switching system requirements, carriers and CATV companies will need systems to support electronic publishing, electronic commerce (including directory assistance),

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enhanced voice mail/messaging, and service order and billing programs to support interactive CATV and PCS services.

Systems integration, transaction processing, and professional services to develop and support these new, complex systems will be needed. For vendors, the need to focus on fixing problems will now shift to applying new, creative technology.

INPUT believes that the local access carriers (RBOCs), bypass carriers, and cable TV companies are entering a new period of internal development and competition. These activities will require investment in new technologies and systems to support the new services.

The extent to which common carrier and cable companies will provide significant competition to each other is still open to question. But their potential emergence as providers of comprehensive, network-based services opens many opportunities for vendors of information services.

Research on providers of information services to the telecommunications sector leads to several conclusions:

- The leading vendors are providers of processing services and systems operations.
- Professional services are provided primarily to common carriers. Processing services are provided primarily to the broadcast (cable industry) segment of the sector.
- The largest vendors to the industry account for only an estimated 10-12% of the sector's spending. The majority of the spending is with numerous smaller local and niche vendors.

2. Common Carrier/CATV Implications

Common carrier applications traditionally have been developed internally. Systems development staff at RBOCs and major IXCs and independents indicate that as much as 90% of their applications result from internal development. There are several reasons cited for the traditional emphasis on internal development by the major carriers:

- Few vendors have been able to provide application products suitable for the telecommunications industry. On the whole, users believe that their environment is far too complex for packaged applications.
- Few vendors understand the requirements of switching systems. Industry managers have believed that the high degree of integration needed between switch systems and support application systems necessitated a dedicated staff.

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- Until deregulation, staff size of the carriers was of limited importance. Because prices were based on the company's cost structure, there was little incentive to reduce overhead costs.

Local exchange carriers and smaller independents that operate their own systems have generally been more receptive to packaged solutions than the large carriers. Because in many areas local exchanges serve primarily residential customers, they do not have as great a need for large, complex applications for businesses.

The large carriers indicate that this situation has changed since deregulation. And now, with the pressing need to provide content-based information services and potential cable TV opportunity/competition, they will look more to outside providers for assistance. Several reasons are cited for the changes:

- Most large carriers have had to make substantial reductions in staff. In an increasingly competitive environment, significant increases in staff productivity have been mandatory as staff size has been reduced.

- The nature of systems has been changing. Although switching systems remain complex, requiring specialized expertise, there has been growing emphasis on applications that support basic operational systems. The shift toward digital and ATM technology has fostered greater ease of integration between switching and control systems and support systems. The process of developing customer support and sophisticated billing systems requires less industry expertise and more design and development knowledge.

- Systems are becoming more complex, requiring greater knowledge of business applications. Electronic mail (E-mail) and electronic data interchange (EDI) require an understanding of business interaction, not just telecommunications expertise. Unique (industry) expertise is important, but is becoming less important relative to the need to understand how business operates.

- Though the systems staff of common carriers have extensive expertise in switch system requirements and technology, they are frequently no more knowledgeable about local-area networks and open systems architecture than companies in other business sectors.

Most IS managers indicate that they would acquire application products if they were available. However, they also believe that the environment is sufficiently unique that few standardized products are likely to become available.

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With the advent of new information service offerings and competition/partnering with cable TV operators, telephone companies will need to provide additional programs and systems that adequately support these applications. More specifically, they will need to support electronic publishing, electronic directory assistance, enhanced voice mail/messaging, and service order and billing programs to support interactive CATV.

However, given this significant change in direction, a major portion of the expenditures will be for systems integration and professional services to develop the new, complex systems that will support these new services.

C
Key Applications

1. Common Carriers

Exhibit III-4 provides a summary of the categories of applications that IS managers with common carriers believe will be most critical over the next several years.

Exhibit III-4

Critical Future Applications

- Network Management/Outsourcing
- Service Orders
- Flexible Billing/EDI
- Facility Management
- Electronic Imaging
- Software-Defined Networks

Source: INPUT

Although there is consensus on the applications that will be critical in the near term, the same managers note a number of issues that hinder their ability to successfully develop the applications.

a. Network Management/Outsourcing

Nearly all carriers are rushing to provide network management services. Several interexchange and international carriers have created alliances to support customers on an outsourcing basis. (VANs and systems integrators are also developing this market.) These alliances are using

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shared technical staffing teams and new, smart software-based network management systems that run the customer's networks on either a remote or local basis.

b. Service Orders

Service order complexity will continue to grow as many new applications are introduced—the result of deregulation and competition. At the time of deregulation, order and customer information systems were old and inadequate. Large and small carriers invested considerable time and money in developing systems that were at least accurate. Just prior to deregulation, many carriers still used manual files to assign telephone numbers.

Although minimum needs have generally been met, technology and users' demands have not stagnated. Customers using the Advanced Intelligent Network (AIN) will initiate services from a terminal or touch-tone phone. They will add service features, delete service features, and change service parameters (WATS, virtual network configuration, etc.) from remotely located devices. Though providing basic access to these services is not exceptionally difficult, integrating orders with operational systems and order tracking and billing systems is highly complex. In addition, security issues can be major impediments.

For software vendors and systems integrators, the problems are highly complex. In addition, specific customer requirements are generally not known. RBOCs are typically conservative in pursuing the development of highly integrated systems that provide dynamic changes to services, but all recognize the need for such change.

The need for caution is understandable. At the same time that customer demand is growing, the technology is changing rapidly. Major investments in specific applications could be outdated quickly. Some applications could even be outdated before development is complete. Carriers have placed their emphasis on developing applications that permit greater control of their environment. To better manage these unknowns, certain carriers have merged their senior IS and network (switching and control) managers under one vice president of systems technology. This move will help management retain focus on the key objective of developing highly flexible systems that are controllable and will not be outdated quickly.

Control problems can be observed in a number of major network failures that have recently occurred and were attributable to SS7 program modifications. Although the modifications to the program had been tested in a simulated environment, it caused massive and sustained outages when installed in the field. It has been suggested that the SS7 network

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controls are many years ahead of their time, but it is still very difficult to isolate, identify, and control problems within this new environment.

c. Flexible Billing/EDI

Customers are also demanding flexible billing. Statements that provide a summary followed by a listing of detailed calls are no longer adequate. This is evidenced by major carriers' use of tailored billing statements and development of electronic data interchange (EDI) 811 telephone billing standards.

As enhanced services such as the Advanced Intelligent Network, electronic mail, and enhanced voice messaging become more prevalent, customers will want analysis of service cost as part of their billing. But as with service order systems, the carriers do not have a firm understanding of exactly what features are needed or what charges, if any, should be applied. They are also concerned about the effect on their operations.

The EDI telephone billing standard 811 should help define the specifics to be exchanged between the telephone company and the customer. Though many questions have not yet been answered, several carriers are currently testing these complex applications. The EDI billing solution will primarily benefit the top 3% of a telephone company's customers, who have the largest telephone bills.

d. Facility Management

Facility management systems continue to be important, and enhanced systems are needed. Digital system facility maintenance is more difficult than that of old, manual systems because of the speed at which digital systems can change. Processes, and the accompanying information technology, are needed to quickly and easily control facility information.

e. Electronic Imaging

The need for electronic imaging/storage mediums is growing. The telecommunications industry is required to retain vast amounts of cost and facility information as well as copies of customer invoices.

f. Software-Defined Networks (SDN)

Large corporate customers need to modify their networks, sometimes frequently. Carriers providing virtual digital networks must be able to provide the means for customers to define and redefine the network structure through software. Carriers are developing the necessary

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software to permit customers to control their (carrier-provided) networks. Also, the Advanced Intelligent Network (AIN) should provide significant improvements to benefit the end user.

2. Broadcast Service

The applications requirements for network broadcasters and radio networks are predominantly internal. Federal requirements necessitate maintaining certain records of activities. Few requirements beyond maintaining legal records and developing programming schedules govern the activities of small operations such as local radio stations.

The FCC recently enlarged the number of radio stations that can be owned by a single entity. As a result, it is expected that the large networks and the evolving radio broadcast station conglomerates will have similar application requirements.

The activities of large (network) operations require extensive systems to maintain financial records, perform market analysis, develop and maintain "feed" schedules, and maintain legal records.

In all these cases, the systems are predominantly internal; there is little interface with the public. Although applications may be necessary for maintaining control, they provide limited competitive advantage.

3. CATV

In contrast, the CATV application requirements are more analogous to common carriers than to the broadcast industry. Today's systems are needed to perform traditional account control and billing, collection, and scheduling functions.

Applications are also needed to record requests and bill for pay-per-view programs. In addition, they are needed to schedule connection and maintenance activities.

The cable TV industry is preparing for the significant changes that come with competition—from two significantly different industries. Many of the applications previously noted in the common carrier and mobile telephone areas will soon apply to the cable TV industry.

For example, CableData is preparing for this eventuality by participating in the European telephone and CATV billing markets. It currently supports a substantial contract from Cincinnati Bell Information Systems to perform billing activities for some of the domestic cellular telephone companies. Also, many CATV companies have received licenses from the FCC to carry PCS signals between microcells.

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D
Use of Outside Products and Services

Issues facing the common carrier and cable television industries are becoming quite different now from those of the broadcast network industry. Because of the differences, each industry is addressed separately.

1. Common Carriers

There are a number of issues facing the information systems organizations of carriers and independent service providers. As shown in Exhibit III-5, a significant number of these issues relate to existing and pending changes caused by both new services and competition.

Exhibit III-5

Key IS Issues—Common Carriers

- Developing New Services
- Allowable Activities
- Decentralization
- New Technologies

Source: INPUT

a. Developing New Services

Because of recent changes—deregulation of content-based information services and the potential to compete in CATV markets—information service departments are confronted with many significant and complex issues. Some of the questions to be addressed are:

- Will the new services be acquired outside or developed internally?
- Organizationally, is it better to form new business units to perform these IS activities, or can the existing IS organization adequately develop and provide them?
- What staffing capabilities already reside within the IS organization?
- How fast should they move ahead in the development of new services in light of the potential for new regulatory constraints?

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- Can the new services leverage existing computing resources?

- Will guaranteed service levels (GSLs) be required by users? With penalties?

INPUT believes that many of these development issues will be solved through acquisition and/or alliance with various private businesses that have already developed these key technologies. The first challenge for the carriers will be to adopt the best version of a given technology/service and successfully integrate it into a newly created business unit. The second challenge will be to successfully roll out the new technology/service as a lean and flexible service-based entity, unencumbered by the large corporate parent.

b. Allowable Activities

- The extent to which carriers are allowed to perform certain functions has a major impact on development approaches and priorities, particularly when considering regulatory and technological changes that may or may not be forthcoming.

- RBOCs are currently not permitted to provide services outside their defined service area (LATA). They therefore have little direct control over the quality of data being received and transmitted through their networks. Systems development times are extended due to the need to coordinate with multiple organizations for the passing of information. Extensive coordination and technology compromise are necessary to implement new services. Coordination and compromise both add time and cost.

- As regulatory restrictions ease, many RBOCs plan on being able to deliver services outside their immediate service areas. Decisions must be made about whether to incorporate advanced capabilities internally—perhaps through partnering with CATV—or to build more basic systems that must be changed later. The latter will cause increased future costs for redesign requirements. The former causes higher short-term costs and risks exposure of future market strategies.

- Although regulated carriers are now permitted to utilize their existing asset base to deliver enhanced information services, caution must still be exercised when planning to leverage existing applications. Utilizing an existing application as a basis for a new service may still be considered a form of subsidization under certain circumstances. Information systems managers must exercise caution in systems development efforts where shared systems are involved.

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c. Decentralization

Prior to deregulation, carriers were highly centralized, with a primary focus on technology. Since deregulation, their focus has shifted to customer service and marketing. With this change, there is increasing decentralization, as responsibilities move closer to the customer. Decentralization creates the need for more sharing of data and flexible systems that are responsive to customer demands.

d. New Technologies

Many carriers are ill-prepared to apply new technologies successfully. With a background in voice and data services, many have little knowledge of local-area networking. Few have any background in electronic imaging. Although carriers have been enhancing their skills to include local-area networking, few have any greater knowledge than most other companies.

2. Cable Television

While major broadcast networks struggle with reductions in funding and staff sizes, the CATV industry is struggling to keep up with an expanding customer base and the potential of several new services. As shown in Exhibit III-6, many issues now relate to pending changes due to new services, competition, and organization.

Exhibit III-6

Key IS Issues—Cable Television

- Developing New Services
- Outsourced Alternatives
- Rapid Growth

Source: INPUT

a. Developing New Services

With the recent changes in reregulation and the potential to compete in PCS and subsequent local telephone markets, information systems departments are confronted with many significant and complex issues. Many of the issues confronting IS organizations in CATV companies are similar to those of their future competitors, the local telephone companies.

INPUT believes that a significant portion of these development issues will be solved through acquisitions and alliances with various private

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businesses that have already developed key technologies. To a lesser extent, alliances will also be formed with local telephone companies.

The first challenge to the CATV industry will be to adopt the best version of a given PCS and successfully integrate it into a newly created business unit. The second challenge will be to successfully deliver the new PCS as a lean and flexible service-based entity, shedding its image of a price-gouging, utility-like entity.

Multimedia services will probably be developed concurrently with the PCS networks. The direct-cabled telephone business will be developed later, subject to congressional influences.

b. Outsourced Alternatives

In light of many existing applications, it is anticipated that systems integrators and industry-based service bureaus will be able to provide most of the needed programs and expertise.

c. Rapid Growth

Cable TV operators, particularly the small ones, are in many cases struggling with small systems that frequently require extensive manual intervention. They are becoming unable to manage the systems effectively.

Larger operators are placing increasing reliance on providers of comprehensive turnkey systems.

3. Broadcast Services

Key issues in broadcast services are more closely aligned with issues faced by IS organizations in other industries than with those of cable TV and common carriers. Exhibit III-7 provides a summary of major issues.

Exhibit III-7

Key IS Issues—Broadcast Services

- Reduced Operating Margins
- Staff Reductions
- Aging Systems

Source: INPUT

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Reduced Operating Margins - The state of the economy and the shifting fortunes of programming ratings has had the effect of reducing operating margins. With the reduced margins and the need to invest in new program strategies, IS frequently is unable to make major investments in new applications.

Staff Reductions - Reduced revenue/expense ratios have also caused some reductions in staff, further decreasing the ability to begin new strategies.

Aging Systems - Coupled with reduced funding and organizational size, systems are beginning to reach the end of their life cycles and need to be upgraded. However, because of the reduced funding, IS managers are having to make do with small changes rather than major initiatives.

E

Major Pitfalls for Telecommunication Companies That Offer Information Services

Although RBOCs and all telecommunication companies now have the ability to enter information services businesses, the record to date has not been impressive for those that have tried, due to a major pitfall.

Simply stated, telcos have a monopoly background, and business strategies and operating practices developed over the years in a monopolistic environment do not match well with the requirements for providing information services.

Information services typically require high levels of coordinated customer service, hand-holding and relatively customized—sometimes even innovative—responses to customer needs.

However, telephone companies typically have their operations divided into very specific segments. When there is a sale it is turned over to the installing department. The installer turns it over to the billing department. When there is an operating problem, the maintenance department takes over. There is a premium on repetitive standardized responses to customer needs and inquiries.

Thus, when a telephone company acquires a software or information services company, it has attempted to manage it through historical experience rather than the needs of the market. In general, this experience-based response has led to suboptimial results. To be successful in the information services business, telephone companies should closely study the tactics, strategies and customer service philosophies of the dominant information services vendors in the markets in which the telephone companies wish to participate. Such analysis will

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allow the telephone companies to benefit from the hard-earned experience of successful information services vendors.

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IV

Information Services Market

A Overview

1. Market Overview

As noted in Chapter I, there are an estimated 22,000 providers of telecommunications services in the United States. However:

- Common carriers represent only 9% of the total providers, but two-thirds of the total expenditures for information services.
- Within the common carrier group, RBOCs and IXCs represent 80% of the industry's revenues and account for half of the industry's information services expenditures.
- Because approximately 90% of the industry's revenues are for the provision of regulated services, the majority of information services expenditures are to support regulated activities.

INPUT believes that the overall situation has started to change. Specifically:

- Cable companies are beginning to provide network-based trunking systems supporting voice and data systems through fiber optic, coaxial cable, and the new PCS microcellular networks. These trunking systems, coupled with interactive television and information services, will open new opportunities for consumers and businesses and will create pressure on the RBOCs and local exchange carriers. Within the next few years, cable TV and competitive access providers (CAPs) will provide local telephone services and will be in direct competition with most local access telephone companies.

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- The regulatory environment is changing for both telephone carriers and cable TV operators. Telephone companies have received another confirmation from the U.S. Court of Appeals that they may proceed in offering content-based information services. This confirms the potential for numerous application possibilities. The RBOCs continue to push the administration to allow them to enter the long-distance market. Cable TV companies have received a 10% rate rollback from Congress. However, it is not likely to be implemented soon, subject to the interpretation of numerous lawsuits still challenging its viability. Also, the CATV industry agreed to settle a monopolistic practices class action suit.

- The most likely "regulation" will be the inducing of cross-market competition between the cable operators and the telephone companies. Congress, the FCC, and the Clinton Administration could be convinced of the competitive benefits generated by the merger of U S West and Time Warner. Regulations could be modified to allow RBOCs to own and operate cable systems within their own territory.

- These actions will result in greater emphasis on the provision of the enhanced information services being provided by both the cable and telephone organizations. Also, there is an increasing need for new ATM network switching systems provided by CATV and CAP provider organizations.

- Because of these changes, the revenue mix is beginning to change, as will the mix of expenditures for information services.

2. Market Summary

Overall, the market for information services in the telecommunications industry will grow at a compound annual growth rate of 21% over the next five years, from almost $5.8 billion in 1995 to nearly $15.0 billion in 2000, as shown in Exhibit IV-1.

Until recently, information services expenditures have been directed primarily at gaining control of the communications environment and increasing productivity.

Though considerable investments have been made in new (nonregulated) activities, significant improvements have also been made in productivity and cost effectiveness. After a number of years of considerable struggle, the industry has achieved a momentary level of stability.

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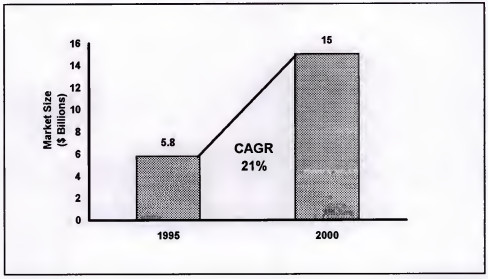
Exhibit IV-1

Telecommunications Information Services Market, 1995-2000



Source: INPUT

The market, broken down by delivery mode, is noted in Exhibit IV-2. Each product/service category is discussed in the next section.

INPUT's previous telecommunications sector report forecasted a 17% CAGR; as a result, the 1995 telecommunications sector growth forecast reflects a substantial upward change. In terms of expenditures, two categories clearly lead the telecommunications sector—professional services and processing services. Processing services are needed to support the numerous smaller carriers that are too large to be able to meet their internal needs with workstations and PCs and too small to have large information systems organizations. In addition, processing services are used extensively in the cable industry.

Professional services are also in great demand, to assist large organizations in identifying, planning, and developing major new systems. Vendors that have experience in developing large, complex, integrated systems will find a ready market as carriers and cable TV companies develop comprehensive new systems capabilities. Growth in systems integration will complement professional services, as larger carriers and CATV companies invest in new technologies to support new information services, electronic imaging systems, and network switching devices.

Systems integration services are being used to link critical operations, such as customer service/maintenance systems and billing/applications systems. The objective is to improve customer responses and services,

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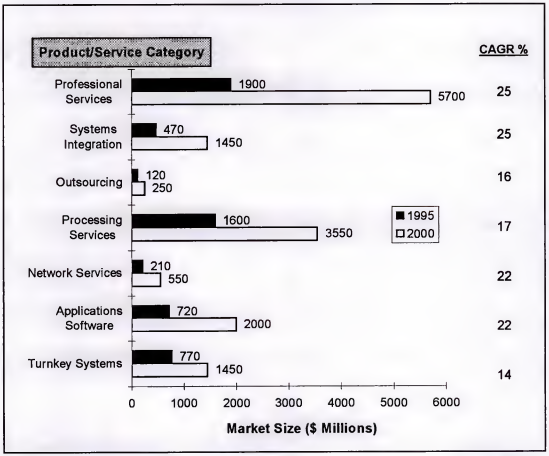
and to establish the basis for higher speed services and specialized applications, such as interactive services.

Exhibit IV-2

Information Services Market by Product/Service Category, 1995-2000



Source: INPUT

Outsourcing is expected to remain comparatively small, because large carriers will not permit outsiders to have total responsibility for their core business systems. Unlike other businesses, where information systems are used in support of core business activities, information systems are the primary business of common carriers.

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B
Product/Service Category Analysis

1. Processing Services

The market for processing services (transaction processing) is expected to remain strong, growing at an annual rate of 17% for the next five years. The market is expected to grow from more than $1.6 billion in 1995 to almost $3.6 billion by 2000.

Growth of processing services is expected to remain strong for several reasons:

- Smaller providers in both the common carrier and broadcast segments of the industry do not have the financial strength to make major investments in customer systems. They are reliant on service providers such as EDS, CableData, U.S. Long Distance, GEIS, and CBIS to meet their processing needs.

- Implementation of digital technology by smaller providers (LECs) has lagged behind that of the RBOCs and IXCs, but modern switching and control equipment is being implemented at an increasing rate. With the new technology, smaller providers continue to be interested in offering levels of service comparable to those in major metropolitan areas. The CATV, cellular, and PCS industries will also implement this digital technology.

- As new technology is implemented, maintaining plant and equipment records becomes increasingly complex. Records that could be maintained manually in the past must now be maintained by sophisticated systems. Although many of the smallest providers are making greater use of PCs and workstations to maintain records, many providers are outgrowing the capability of desktop systems.

- As the cable, cellular and PCS industries expand, the need for complex customer and service support systems is becoming more important. Many smaller providers are unable to make the necessary investments in large, complex systems, and the use of processing services is a cost-effective solution to their needs.

2. Turnkey Systems

As a result of a slight upturn in 1994, the turnkey systems market will grow at a compound annual rate of 14% for the next several years. Between 1995 and 2000, the market will grow from $770 million to almost $1.5 billion.

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The continued growth of turnkey systems results from the need for an increasing number of application-driven services, such as voice messaging, E-mail, EDI, and various transaction and other NIS services.

The use of turnkey systems to satisfy these needs arises from several factors:

- In the common carrier segment, regulations prohibit the commingling of funds or assets. Incorporating applications directly into the core infrastructure could be viewed as subsidization of information services by the basic systems. The risk of regulatory challenge is unwarranted.
- Carriers are reluctant to incorporate information service-related functions directly into switching systems. Such functions are frequently changed to make enhancements and corrections, and carriers do not want changes made to applications to affect their basic delivery systems.
- With the exception of the largest cable providers, developing large complex systems to maintain accounts exceeds the ability of many providers. Turnkey systems have become increasingly important as the cable industry begins to broaden its services and will be the most viable method of providing cost-effective systems.

3. Applications Software Products

The market for applications software remains strong, and will grow from $721 million in 1995 to an estimated $2.0 billion by 2000, at a compound annual growth rate of 22%.

The demand for applications software is being driven by the need for minicomputer and PC/workstation software, and the growing demand for mainframe software in at least three critical areas will become more pronounced over the next several years. Specifically:

- Consumer and business applications packages to support new information services offerings will be licensed by RBOCs and other telcos.
- Software for workstation/PCs is needed to support logistics and maintenance activities. Engineers need to be able to access central systems to obtain cable and circuit diagrams and retrieve information about numbering assignments. Customer service and maintenance representatives also need to obtain information about the status of a customer's services. Workstations and PCs are being used more often to reduce the volumes of paper previously associated with service and work orders.

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- Support requirements for imaging and mainframe-based artificial intelligence systems will continue to contribute to significant growth over the next several years. These applications are only beginning to emerge, as carriers implement increasingly sophisticated billing and customer support systems.

4. Outsourcing (Systems Operations)

The market for outsourcing in the telecommunications sector is expected to grow from more than $122 million in 1995 to an estimated $254 million in 2000, at a slightly increased compound annual growth rate of 16%. Applications operations currently represents the largest portion of the outsourcing market, although network management and business operations are growing more rapidly but from much smaller bases.

The outsourcing market is comprised of six elements: platform operations, applications operations, desktop services, network management, applications management and business operations. Platform operations refers to the management of an organization's computing hardware. Applications operations refers to the management of an organization's hardware and operational applications. In desktop services, the vendor assumes responsibility for the deployment, maintenance and connectivity among the PCs and workstations in the client organization. Network management services provide for the operation and management of a client's data communications systems.

Applications management is a relationship in which the vendor has full responsibility for developing and maintaining all of the application systems for a business operation or function. Business operations outsourcing (also known as business outsourcing or functional outsourcing) is a relationship in which one vendor is responsible for performing an entire business/operation function, including the information systems outsourcing that supports it. The IS outsourcing content of such a contract must be at least 30% of the total annual expenditure in order for INPUT to include it in the outsourcing market.

5. Systems Integration

Systems integration services annual growth will increase to 25% in 1995 and, as one of the two fastest growing product/service categories for the telecommunications industry, will maintain that CAGR through 2000. There are several reasons for this continued growth:

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- Since deregulation, carriers have devoted extensive resources to enhancing their primary applications software. The majority of legacy systems have been either enhanced or replaced. However, the process of integrating existing major systems and incorporating new areas, such as EDI, is just beginning.

- Customer service systems, containing profiles of a wide variety of features and services, must increasingly be linked to maintenance and network configuration systems. Charges for features must be integrated with charges for maintenance and troubleshooting.

- There is a growing need for integrated (network) service delivery systems to support the cable industry. More detailed requirements are expected to begin to appear near the end of the forecast period.

- As interactive TV and content-based information services come on-line and the broadband carrier and wireless areas develop, new customer service and billing systems will be required.

As noted in Exhibit IV-2, expenditures for systems integration services will be almost $470 million in 1995, growing to over $1.4 billion by 2000.

6. Professional Services

Professional services is the other leading product/service category in the telecommunications sector. This is due to the fact that there is a continuing strong need for both consulting and software development services to meet changing requirements in a competitive market.

Professional services expenditures will increase beyond current growth of 22% to a 25% CAGR for the five-year period, 1995-2000. The market will grow from nearly $1.9 billion in 1995 to $5.7 billion by 2000. Software development represents slightly more than 60% of this total. Professional services use is driven by a number of factors:

- As a result of continued staff reductions and the growing complexity of systems, carriers are turning increasingly to professional services firms to develop system specifications and perform system development, because such firms have a broad knowledge of application needs and requirements.

- Use of professional services can also reduce implementation time. As system criticality grows, due to the development of revenue-producing services, reducing development time becomes more important.

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- Although many carriers have upgraded staff skills, information systems managers indicate that additional training is still needed. Professional services firms provide an effective means of training information systems staff in processes and procedures.

7. Network Services

Network/electronic information services expenditures are expected to continue to grow, from more than $200 million in 1995 to an estimated $554 million by 2000. This represents a five-year compound annual growth rate (CAGR) of 22%, up from the 20% seen from 1994 to 1995.

The telecommunications industry will continue to have a need for electronic information services and there will be a slight increase in the rate of growth, from 20% in 1995 to 21% for the five-year forecast period.

Although it represents the smaller segment of network services, network applications are expected to continue to show strong growth during the five-year period. Year-to-year growth rates will be driven by needs for PCS trunking and the full spectrum of value-added network services.

C
Industry Sector Analysis

1. Driving Forces

Activity in the telecommunications industry continues to focus on broadband, interactive TV and content-based information services. In addition, need still exists to provide better internal support for changing organizations and to make better use of available resources. The major market forces are summarized in Exhibit IV-3 and considered below.

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Exhibit IV-3

Telecommunications Driving Forces

- Deregulation
- Competition
- Service/Organization Integration
- Flexible Software
- Productivity
- Internal User Needs

Source: INPUT

- *Deregulation*—Deregulation has intensified pressure for competitive performance. This has become a baseline driver behind much of the shift to outside services, primarily as a means of "catching up." Most managers realize that they could not have competed successfully with the systems and technology they started with immediately following deregulation.

- *Competition*—The competitive environment continues to change as traditional business boundaries dissolve. The entry of the cable industry is creating both confusion and new demand. Common carriers, which have tended to be somewhat insulated, are now faced with new competitive threats.

- *Service/Organization Integration*—With increased competition, customer-oriented services are now a necessity. One benefit of decentralization is that staff has moved closer to the customer. With this move, there continues to be a strong need to integrate service and support systems. For instance, many customers do not want multiple points of contact, and as a result, marketing and customer service representatives must have access to companywide data regarding service and support. Because of this need, there is growing demand for open systems and integrated internal networks.

- *Flexible Software*—There is an increasing demand for flexible software such as AIN, which will be needed to support customers who want to be able to change service features immediately. Delays are no longer acceptable. Business customers also want to be able to change service features directly from their own premises, which creates additional demand for open system architectures and database systems.

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- *Productivity*—A key to competitiveness is staff (both information systems and user department) productivity. CASE tools, for example, contribute to information systems productivity, and electronic imaging systems can offer significant productivity advances to user departments.

- *Internal User Needs*—As in other industries, information systems executives in the telecommunications industry are increasingly driven by the needs of internal user departments, as those users respond to growing customer demands. The complexity of carrier systems has slowed the move of information systems into user departments, compared to other industries. But the move has begun, creating demand for systems to be deployed more quickly and cost effectively.

2. Inhibiting Factors

There are a number of factors (summarized in Exhibit IV-4) inhibiting the growth of services in the telecommunications industry. Key factors are:

- *Customer Uncertainties*—The ability to make changes remotely to service features or network configuration is frequently cited by customers and information systems managers as a key market need, but in many other cases needs are not clearly defined or specified, and thus solution design and implementation can be delayed. Some carriers are now making an investment in evaluating the real benefits of the Advanced Intelligent Network and the market potential of the services.

- *Regulatory Realities*—There are a limited number of cable TV territories that would appeal to RBOCs under current regulations. Congress, the FCC, and the current administration must be convinced that regulatory change will benefit consumers and the business community.

- *Incomplete Standards*—Attempts to set standards affecting open system architectures, EDI, and the radio spectrum for PCS are still incomplete. As a result, many carriers and CATV companies are cautious about making major investments to provide these services until they are certain that standard changes will be minor.

- *Public Pressure*—Consumer advocacy groups are continuing to pressure carriers to provide cheaper services. With the change from profit to price ceilings, public pressure will almost certainly intensify if profit margins, as interpreted by advocacy groups, appear to be excessive. Such groups generally have little interest in new services, or the benefits of delivering the services. They tend to be single-minded, focusing solely on the provision of cheap, basic service.

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Exhibit IV-4

Telecommunications Inhibiting Factors

- Customer Uncertainties
- Regulatory Realities
- Unresolved Standards
- Public Pressure

Source: INPUT

Overall, the driving forces significantly outweigh the inhibiting factors. Telecommunications industry expenditures for information services will grow at a rate approaching twice that of the information services market as a whole. The emphasis is still on improving core systems, an area that will provide opportunities for most vendors of information services, particularly those that provide professional and systems integration services.

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Competitive Environment

A Introduction

This chapter describes information services vendors serving the telecommunications sector. The chapter is divided into the following sections:

- Competitive Climate
- Competitive Positioning
- Leading/Selected Vendor Profiles

B Competitive Climate

The biggest impact in the competitive climate is that telecommunications companies of all types are learning about each other, and from this interaction, ideas for affiliations of all types are being generated.

What is driving this thirst for knowledge about competitors is the convergence movement discussed in detail in Chapter II. Long-distance carriers, for example, need to serve customers with one point of contact. Therefore, the vendor has to respond to the service requirement of operating in many different countries in order to be competitive. This means affiliating with other telcos around the globe.

RBOCs and other LECs cannot provide national access outside their territories without building affiliations. Thus, competitors may be alliance partners in some geographic areas. In the variety of possible venues, a supplier may also be a competitor and an information service company may be both a competitor and a good customer. This multi-relationship environment will last for the next 10 years, until various telecommunication companies get sorted into major national and

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international teams that cooperate together—notwithstanding the fact that they may also compete in certain geographic or application areas.

Until the recent lifting of regulatory restrictions, the RBOCs had been concentrating on fixing antiquated systems, a challenge that precluded the rapid deployment of many new or planned services. Some of these carriers (RBOCs) still need to spend considerable time, effort, and money to fix or redo their billing and customer service systems. Many of these systems will also need to incorporate new EDI interfaces, creating an opportunity for more "diversions."

C
Competitive Positioning

The developing need to provide new information service offerings, coupled with the strong probability of competition with cable TV operators, should offer many excellent opportunities for vendors, but they will need to provide programs and systems that effectively support these applications. In addition to the new switching system requirements, carriers and CATV companies will also need systems to support electronic publishing, electronic directory assistance, enhanced voice mail/messaging, and service order and billing programs to support interactive CATV and PCS services.

Systems integration, transaction processing, and professional services to develop and support these new, complex systems are also required. For vendors, the traditional need to focus on fixing problems will shift to applying new, creative technology.

INPUT believes that the local access carriers (including RBOCs), competitive access providers (CAPs), and cable TV companies are entering a new period of internal development and competition. These activities will require investment in new technologies and systems to support new services.

The extent to which common carrier and cable companies will provide significant competition to each other is still open to question. But their potential emergence as providers of comprehensive, network-based services offers many opportunities for vendors of information services.

D
Selected Vendor Profiles

Five information services vendors have been selected that, in the opinion of INPUT, are either significant suppliers of information services to the telecommunication industry or offer the capabilities necessary to support

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the major trends and competitive activities now taking place in this market.

The companies are AMS, CableData, EDS, First Data Corp. and Microsoft.

A key characteristic of the telecommunications sector is that there are numerous providers of a wide range of information services. Historically, the majority of vendors provide service in only one, or at most two, delivery modes. But this is changing.

Exhibit V-1 shows a matrix of the primary delivery modes supported by the selected vendors.

Exhibit V-1

Service (Delivery Mode) Offerings of Major Information Services Vendors

Company	Processing Services	Software	Professional Services	Turnkey Systems	Systems Integration	Outsourcing
AMS	X	X	X	X		
CableData	X	X		X		
EDS	X		X		X	X
FDC	X	X				X
Microsoft	X	X				X

Source: INPUT

When considering the leading vendors, there are several points to note:

- INPUT's data excludes expenditures for switch system software. Switch system software is highly specialized, frequently delivered as part of a switching system, and is more analogous to embedded software than to true systems or applications software. Providers of switch systems and software are not included in the vendor analysis.

- BellCore is not included in INPUT's vendor analysis. Though BellCore is an independent company it is, effectively, owned by the regional bell operating companies (RBOCs). INPUT therefore considers its revenues to be captive revenues. Were it not for the captive nature of the revenues, BellCore would be the largest information services vendor to the telecommunications industry.

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- Revenues derived from the telecommunications sector are frequently only a small percentage of a company's revenues. With the exception of CableData, telecommunications industry-based revenues for the leading vendors generally represent no more than 8%-10% and seldom exceed 15% of the company's total (noncaptive) revenues.

Vendors such as AMS, First Data Corporation, EDS and GEIS continue to be leaders in applications and processing services to the common carrier segment of the industry.

CableData and First Data Corporation are the leaders in providing information services (primarily processing services) to the cable industry. Together, they hold an estimated 60%-70% of the market for information services to that marketplace.

E
Vendor Profiles

1. American Management Systems, Inc.

4050 Legato Rd.
Fairfax, VA 22033-4003
Phone: (703) 267-8000

Total Personnel: 4,600
Total 1994 Revenue: $460 million

a. Company Description

American Management Systems, Inc. (AMS), founded in 1970, provides systems integration, consulting professional services, applications software, and systems operations services to many of the country's largest corporations, hundreds of city and state governments, and the federal government.

Since 1982, AMS' marketing has focused primarily on larger financial services firms, federal government agencies, state and local governments, colleges and universities, energy industry clients, and telecommunications companies.

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b. Strategy

AMS' overall strategy for the 1990s includes:

- Specializing by industry, business function, and client size
- Managing and building on long-standing relationships with major clients in vertical markets
- Acting as a full-service business partner for clients in AMS' vertical markets
- Taking responsibility for results—not simply providing resources
- Forming alliances and partnerships with clients and other firms

Long-term U.S. growth targets for AMS' vertical markets include 25%-30% for telecommunications. (AMS actually achieved 89% in 1992 and 27% in 1993).

c. Products and Services

INPUT estimates that AMS's 1994 revenue was derived approximately as follows:

Systems Integration/ Application Solutions	70%
Systems Operations	15%
Professional Services	15%
	100%

With respect to telecommunications, AMS provides professional services and applications to large local telephone companies, interexchange carriers, international carriers, and cellular telephone companies. 1993 revenues from the market increased by 27% over 1992. It is estimated that 1994 revenue from the market will increase by 35-40% to over $100 million.

- Revenue includes that for applications support order processing, message processing, billing, accounts receivable, and collections.
- About 70% of Mobile Communications' 1994 business was international. A major contract, $20 million, was awarded in 1994 by Telia Mobitel, a leading Swedish cellular carrier.

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- The Telecommunications Industry Group has a North American focus, but still retains an international interest. Activities include joint development with Bell Atlantic and BellSouth, international opportunities with Telefonica (Spain), SIP (Italy), and Tokyo Digital (Japan), and moving to industry standard and advanced building-block architecture.

AMS has implemented versions of its TieLine applications for companies such as Bell Atlantic, BellSouth, Pacific Telecom, U.S. Sprint, Alltel, and Alberta Government Telephones.

AMS has implemented Info2000, a comprehensive customer management and billing system, at NYNEX Mobile. The system is the foundation for Mobile 2000.

AMS operates its own data communications network of high- and low-speed telephone lines, in addition to using the SprintNet service with DEC system 2060s.

d. Key Issues

AMS' fastest growing vertical market business is telecommunications, which is believed to be increasing at about 30% or better a year.

International revenue has increased at a pace higher than the U.S. growth rate, due to increases in sales to the telecommunications sector.

2. CableData (U.S. Computer Services)

11020 Sun Center Drive
Rancho Cordova, CA 95670
Phone: (916) 636-4500

Total Personnel: 1,750 (estimate)
Total 1994 Revenue: In excess of $250 million (private company)

a. Company Description

Founded in 1965 to provide data processing and billing services to cable television companies in the Sacramento, California area, CableData has become the leading provider of subscriber management information and billing services to the cable industry.

CableData is actually the operating name used by U.S. Computer Services, the parent company of CableData. U.S. Computer Services is a private company that includes a number of operating entities. Its two primary subsidiaries are CableData and Billing Services.

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b. Strategy

CableData reorganized in the early 1990s and has expanded into new markets, including telephone and cellular information billing services in Europe.

To become more competitive in this market, CableData switched from Tandem to IBM computer platforms and developed a new UNIX operating system. It plans to continue to focus on providing open standards-based products while leveraging the expertise and resources of its alliance partners, Tandem Computers, IBM, AT&T and Oracle. This activity suggests that CableData expects to be a leader in an industry that is in significant transition.

c. Products and Services

CableData provides a complete system for managing a cable operator's account management and billing requirements. Systems can be operated as standalone systems or through service facilities in several locations around the country.

In addition, CableLease provides lease financing for turnkey systems. CableData International provides services in Canada and other international locations.

Output from the systems can be sent or transmitted to CableData's International Billing Services (IBS) group, which will print and mail the statements. IBS also provides facilities for developing and mailing advertising.

d. Key Issues

In the early 1980s, the cable industry grew at rates that exceeded 25%-30% per year. Recent growth has been in the more modest range of 6%-8% per year. Re-evaluation of this industry data suggests, however, that saturation is *not* approaching, and there is now a strong possibility of increased sales due to expansion in existing and new markets.

CableData is leveraging its expertise in telephone billing, currently performed in Europe. New markets for jointly provided CATV/telephone services are being offered in the U.S.

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3. Electronic Data Systems (EDS)

7171 Forest Lane
Dallas, TX 75230
Phone: (214) 604-6000

Total Personnel: 72,000 (est.)
Total 1994 Revenue: $10.1 billion

a. Company Description

EDS, founded in 1962 , is a world leader in the application of information technology (IT), providing information processing, systems management, systems integration, systems development, consulting, software products, and process management services to customers worldwide. EDS serves public and private organizations in banking and finance, telecommunications, energy, government, health care, insurance, manufacturing, retail, and transportation.

- EDS currently has 72,000 employees and more than 8,000 clients in all 50 states and more than 30 other countries.

- EDS' largest client is General Motors Corporation (GM) and its subsidiaries, which contributed approximately 35% ($3.5 billion) to EDS' 1994 revenue. EDS, acquired by GM in October 1984, operates as an independent subsidiary of GM.

b. Strategy

EDS' business strategy shows exceptional foresight in its anticipation of changes in the outsourcing market. EDS has not only expanded its penetration of current markets but is also continuing to enter new markets. EDS' selection criteria for new markets include the size of companies in the market sector, changes taking place in the sector, and how the changes will influence the receptivity of prospects to systems operations.

The telecommunications industry offers EDS significant opportunities. In the short term, there are opportunities to assist with billing services for common carriers. In the longer term, EDS is in a key position to become a major provider of network-based services to both business and consumers. EDS is also a leading candidate to supply credit card and ATM card issuing, authorization and outsourcing services to telcos that choose to issue credit/phone cards.

EDS' strength in providing network services results in EDS being perceived as a threat to some common carriers, particularly as the industry evolves to a broader base of integrated services.

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However, since it is *not* a common carrier, EDS can add significant strength to LECs and independent carriers as an ally. Alliances can alleviate the perceived threat and establish EDS as a strong contributor to the delivery of integrated network services.

c. Products and Services

EDS' communications unit serves the telecommunications, cellular, cable, entertainment, and publishing industries. Products and services include industry-specific offerings such as billing, customer information, customer service, operator support services, cellular intercarrier services, and cellular management and information management system/billing services.

Contract examples of EDS' various activities include the following:

- In 1991, EDS announced its first contract in the cable TV industry—a systems management agreement with the Lenfest Group of Pottstown (PA).

- In late 1991, EDS was awarded a five-year general-services agreement with AT&T that covers a range of information technology services, from consulting to systems development and processing.

- EDS set up a similar agreement with France Telecom in 1992-1993.

d. Key Issues

With EDS' expertise in managing networks, it could also become a major catalyst in developing a wide variety of network-based services for the cable industry.

There are continuing indications that EDS' Communication Industry Division is interested in providing an increased number of services (primarily processing services) to competitive access providers (CAPs) and CATV.

Industry sources suggest that the communications division could become an acquisition target by some of the RBOCs or possibly larger CATV companies.

Will EDS do "a Microsoft"—that is, will EDS enter the global data network business in competition with telcos, especially for the provision of financial services and other information services?

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4. First Data Corporation

American Express Tower
World Financial Center
New York, NY 10285-4560
Phone: (402) 222-8545 (Omaha)

Total Personnel: 22,000
Total 1994 Revenue: $1.7 billion

a. Company Description

First Data Corporation (FDC) provides processing services, turnkey systems, and related services to the credit card, consumer funds transfer, telemarketing/teleservices, mutual fund, health care, and cable television industries.

FDC was originally formed in 1989 as American Express Information Services Corporation (ISC) from businesses previously organized as the Data Base Services Group of American Express Travel Related Services Company, Inc. During 1992, ISC's name was changed to FDC.

FDC/ISC operated as a wholly owned subsidiary of American Express until April 1992, when FDC and American Express made an initial public offering of 50.6 million shares of FDC common stock.

The Cable Services Group (CSG), formed in 1982, is based in Omaha with 600 employees. CSG provides processing services and turnkey systems to cable television operators.

As of December 1992, CSG serviced approximately 800 cable systems nationwide as well as on-line computer service providers, having an aggregate of approximately 15.3 million cable subscribers.

b. Strategy

FDC's strategy has been to acquire companies in which there is significant financial benefit in managing the flow of funds. Targeting the cellular industry suggests that FDC's approach is not going to change. It may also suggest a greater interest in providing more services to the telecommunications industry.

The telecommunications industry is highly capital intensive and has extensive cash management requirements. Managing the flow of funds and having ready access to an exceptionally large customer base fits well with FDC's strategy.

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FDC will be a leading candidate to provide credit card authorization and issuing services to telcos that choose to issue credit or phone cards.

FDC has a sophisticated network and extensive networking capability. It also has the ability to provide sophisticated billing and collection services. It has been successful in leveraging its knowledge about customers into comprehensive marketing for related—and unrelated—services.

c. Products and Services

Applications available through CSG include the following:

- Cable Control System, for on-line subscriber billing and information management
- CableMAX, a PC-based subscriber management system for smaller cable companies
- CompuLink, an advertising sales management tool
- Viewpoint, an on-line tool used to sort, analyze, combine, and organize information in an existing cable customer data base

d. Key Issues

The Cable Systems Group appears to have a continued interested in providing increased services (primarily processing services) to competitive access providers (CAPs) and CATV.

Either directly or through alliances, FDC could prove to be a strong competitor in the provision of transaction services to both common carriers and the cable industry. An added strength is that FDC would not be considered a competitive threat to common carriers.

5. Microsoft

One Microsoft Way
Redmond, WA 98052-6399
Phone: (206) 882-8080
Fax: (206) 936-7329

Total Personnel: 15,300 (6/94)
Total 1994 Revenue: $4.6 billion
FYE: 6/94

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a. Company Description

Microsoft Corporation was founded as a partnership in 1975 and was incorporated in 1981. The company develops, manufactures, markets and supports microcomputer systems and applications software products and related hardware and multimedia products.

In late 1994, Microsoft astounded the on-line computer services marketplace (together with leading banks and retailers) by announcing the formation of the Microsoft Network (MSN). The point of MSN is to thrust Microsoft into the transaction processing market for electronic commerce, including access and search software for consumer and business procurement, catalog listings by equipment, and software vendors and payment systems to complete the procurement process.

Microsoft also announced that MSN would be the home for the Intuit acquisition so that consumer payment services could be expanded to a full set of electronic financial services to be offered over MSN.

In early 1995, Microsoft announced agreements with 50 leading manufacturers of computer hardware and software to list their products on the MSN. Hewlett-Packard was identified as one of the larger participants.

As of early 1995, telcos, on-line computer services, bankers, and retailers are assessing the full implications of this new business thrust by Microsoft.

Total fiscal 1994 revenue reached $4.65 billion, a 24% increase over fiscal 1993 revenue of $3.75 billion. Net income rose 20% from $953 million in fiscal 1993 to $1.146 billion in fiscal 1994.

b. Strategy

Microsoft's business strategy emphasizes the development of a broad line of computer software products, including operating systems for personal computers, office machines, and personal home devices, languages, and application programs as well as computer books, hardware, and multimedia products.

Its marketing strategy calls for increasing its customer support services in order to attract major corporations and increase market share. Microsoft is also targeting the home market for new education and entertainment software via television advertising and technology demonstrations.

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The product strategy focuses on client/server development in an attempt to build client/server momentum from the ground up. Microsoft is using Windows to ease access to computer networks and provide more work group-enabled applications. This ease will be furthered by Microsoft's new "friendly" GUI, Bob.

In general, the announcement of MSN seems to take the above strategies and focus them on specific market sectors.

c. Products and Services

Microsoft's current product and service offerings are summarized by division, as follows:

Personal Operating Systems Division

The Personal Operating Systems Division develops desktop operating systems software, including MS-DOS, Windows for Work Groups, and Windows 95, a new general replacement for all of the above products.

Business Systems Division

This division is responsible for developing business solutions, such as Microsoft Windows NT Workstation for client/server computing, LAN Manager, file and device sharing and Microsoft Mail.

Desktop Applications Division

This division develops applications software products that include word-processing, spreadsheet, graphics, and project management applications. Included are the following: Microsoft Office for standard as well as professional office systems, Microsoft Word, Microsoft Excel (a spreadsheet program), Microsoft Power Point (a graphics program), and Microsoft Project (a critical path method for project scheduling and resource allocation).

Developer Division

The Developer Division provides software development tools and database products.

Consumer Division

This division develops and markets various products designed for homes, small businesses, and schools.

Other product areas include Microsoft University, Microsoft Press, and Microsoft Product Support Services.

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Microsoft Network Division

Currently in formation, the MSN Division will develop the Microsoft Network, including gateways to other networks, vendor service systems, user search software, and other financial services structured around the Intuit/Quicken acquisition.

d. Key Issues

Is Microsoft carrying out monopolistic marketing and sales practices? Over five years ago, Microsoft was charged with potential violations by the Justice Department—an event that set off a long investigation. The investigation resulted in a draft consent agreement between Microsoft and the Justice Department. However, the presiding judge (who needed to approve this agreement) declined to sign and said the Justice Department needed to examine additional issues, including the Intuit now-defunct acquisition.

Is Microsoft trying to become a major global retailer using electronic commerce as the vehicle? Is Microsoft planning to become the first global electronic bank? Consider that Microsoft could have announced a family of products that would assist retailers and banks in bringing lower costs and more responsive electronic products and services to the marketplace. Instead, it announced the Microsoft Network and said it would do the job itself. Microsoft executives protest that banks' fears regarding Microsoft's planning to become a bank are ridiculous and ludicrous; however, Microsoft appears to have assembled a set of tools that could accomplish just that.

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Conclusions and Recommendations

A
Industry and IS Market Conclusions

Globally, the telecommunications industry is entering a period of significant readjustment as the telephone, cable and content industries converge. Telephone dial tone from a cable TV entity will be commonplace in the next five to seven years. This will work in conjunction with a host of telecom and information services supported by interactive television and multimedia.

Some of the RBOCs are recognizing that it may be better to cut their losses now and create alliances with the cable TV industry. Essentially, there is greater potential for longer term return on investment in CATV than in local access revenues—even if those revenues come from outside a LEC's territory. A critical mass of alternative means to bypass the LECs is closing in quickly and regulatory agencies show no signs of narrowing their position on CATV ownership boundaries.

In addition, deregulation now allows RBOCs to offer content-based information services. As a result of this and other changes, this highly regulated market is undergoing some necessary and positive adjustments. In the past, regulations have stifled creativity and retarded the deployment of new technology and services. Now, carriers are developing better ways to operate in a competitive environment.

U S West's interest in Time Warner sends a very strong message throughout the common carrier and cable television industries that interactive TV and broadband technologies are setting the long-term market direction.

The demand for services, coupled with the growth of competition, will place strains on the capabilities of telco (internal) information systems

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departments, forcing them to turn to information services vendors. In consequence, there will be greater opportunities for those vendors, especially for systems integration and processing and professional services.

Over the next three to five years, even greater opportunities will emerge in competitive local network applications and systems and network integration. These will result from the efforts of Congress and federal, state, and local regulatory bodies to disentangle the remaining cross-subsidy issues between local and long-distance carriers.

B
Vendor Issues and Recommendations

Exhibit VI-1 provides a summary of the recommendations for vendors entering or considering expansion into the telecommunications market sector.

Exhibit VI-1

Telecommunications Vendor Recommendations

- Focus on Integration
- Emphasize Carrier-to-Customer Linkages
- Watch the Internet
- Provide Flexible Software
- Develop Network Management Tools
- Learn the Cable/Local Carrier Industries

Source: INPUT

- *Integration* - Integrated systems will be the key to success for carriers within the next several years. For all but the smallest local exchange carriers, who will turn increasingly to processing services, the integration of billing and service systems is mandatory. These must also be integrated with management control systems. Internal integration is also necessary as carriers proceed with decentralization. Internal systems and services (LANs, E-mail, etc.) are necessary for effective communications between operating groups and functions that are decentralized.

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- *Customer Linkages* - Linkages between carriers and their customers are becoming increasingly critical. Products and services based on accepted standards that permit users greater access to and control of networks are in increasing demand. Open systems and multiple-protocol support are among the leading needs, as evidenced by the success of value-added network carriers in marketing connectivity products and services.

- *The Internet* - During 1994, the importance of the Internet was clarified, yielding at least two opportunity areas. First, as telcos develop information services, they will increasingly use the Internet to take advantage of low-cost communications resources. Second, telcos of all types will take advantage of the new revenue opportunities provided by dramatic increases in the use of Internet services or access, search software, and customer support. Information services companies must take the Internet into account—as a vehicle for services and as a supported resource—in planning their future services to the telecommunications industry.

- *Software* - Software products that can be changed with moderate ease will replace complex, hard-coded systems. This will drive the demand for systems that permit flexibility in defining features and options. In addition, systems such as SQL will be in increasing demand to meet changing management requirements.

- *Tools* - Work must continue in building comprehensive network management tools that permit customers to have the visibility and control that are mandatory to the success of virtual network services.

- *Industry Knowledge* - Within the next year or two, cable companies and local exchange carriers will be providing local access carrier services, interactive television, and information services for consumers as well as businesses. There will be a need for integrated applications and networks, with the focus being on information (data and multimedia) services. Given the new technologies and the demand for significant broadband services, the cable companies and local exchange carriers will need to quickly learn each other's industry in order to successfully compete in providing network-based applications.

The telecommunications market continues to offer attractive opportunities, but vendors that market a wide variety of services may be at a disadvantage. Most successful vendors provide a product or service that addresses a specific need. The industry is highly specialized. Vendors need to be equally specialized.

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Forecast DataBase

This appendix contains the forecast database for the period 1995-2000 and the 1995 MAP database reconciliation.

A
Forecast DataBase

Exhibit A-1 presents the detailed 1994 actual and 1995-2000 forecast for the telecommunications sector.

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Exhibit A-1

Telecommunications Industry
Market Size by Product/Service Category, 1994-2000

PRODUCT/SERVICE CATEGORIES	1994 ($M)	Growth 94-95 (%)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	2000 ($M)	CAGR 95-00 (%)
INDUSTRY TOTAL	4864	19%	5789	6913	8331	10084	12259	14945	21%
Professional Services	1546	22%	1884	2319	2880	3600	4514	5680	25%
- IS Consulting	347	23%	428	531	663	833	1050	1330	25%
- Education & Training	233	24%	290	360	446	553	686	850	24%
- Software Development	966	21%	1166	1428	1771	2214	2778	3500	25%
Systems Integration	373	25%	466	586	734	919	1153	1443	25%
- Equipment	98	24%	122	151	187	232	287	356	24%
- Software Products	29	24%	36	44	54	66	82	100	23%
- Professional Services	242	25%	303	384	484	610	769	968	26%
- Other	4	25%	5	7	9	11	15	19	31%
Outsourcing	104	17%	122	139	162	188	217	254	16%
- Platform Operations	28	14%	32	34	38	41	45	49	9%
- Applications Operations	45	13%	51	58	66	77	88	102	15%
- Desktop Services	12	25%	15	18	21	24	28	32	16%
- Network Management	12	25%	15	18	23	28	35	44	24%
- Application Management	4	25%	5	6	7	9	10	13	21%
- Business Operations	3	33%	4	5	7	9	11	14	28%
Processing Services	1397	16%	1622	1880	2197	2574	3024	3555	17%
- Transaction Processing	1397	16%	1622	1880	2197	2574	3024	3555	17%
Network Services	173	20%	208	250	304	369	450	554	22%
- Electronic Info Svcs	141	20%	169	203	246	297	361	444	21%
- Network Applications	32	22%	39	47	58	72	89	110	23%
Applications Software	595	21%	721	874	1069	1309	1611	1988	22%
- Mainframe	267	18%	314	367	434	514	609	752	19%
- Minicomputer	151	23%	185	228	283	350	437	539	24%
- Workstation/PC	177	25%	222	279	352	445	565	697	26%
Turnkey Systems	676	13%	766	865	985	1125	1290	1471	14%
- Equipment	285	11%	317	352	394	443	499	569	12%
- Software Products	264	14%	300	340	389	445	512	584	14%
- Professional Services	127	17%	149	173	202	237	279	318	16%

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B
Forecast Reconciliation

Exhibit A-2 offers a reconciliation of the 1994 and 1995 forecasts for the telecommunications sector.

Exhibit A-2

Telecommunications
1995 MAP DataBase Reconciliation

PRODUCT/SERVICE CATEGORY	1994 Market				1999 Market				94-99 CAGR	94-99 CAGR
	1994 Market (Fcst) ($M)	1995 Report (Actual) ($M)	Variance From 1994 Forecast ($M)	(%)	1994 Market (Fcst) ($M)	1995 Report ($M)	Variance From 1994 Forecast ($M)	(%)	per data '94 Rpt (%)	per data '95 Rpt (%)
Total	4764	4864	100	2%	11224	12259	1035	9%	19%	20%
Professional Services	1519	1546	27	2%	4021	4514	493	12%	21%	24%
Systems Integration	364	373	9	2%	1086	1153	67	6%	24%	25%
Outsourcing	95	104	9	9%	174	217	43	25%	13%	16%
Processing Services	1370	1397	27	2%	2819	3024	205	7%	16%	17%
Network Services	169	173	4	2%	420	450	30	7%	20%	21%
Applications Software	584	595	11	2%	1502	1611	109	7%	21%	22%
Turnkey Systems	663	676	13	2%	1202	1290	88	7%	13%	14%

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Except for outsourcing, there were only minor differences between the 1994 projection for 1994 expenditures and the actual amounts noted in the 1995 report. The outsourcing variance was a 9% 1994 understatement of 1994 revenues. Expenditures were higher than anticipated due to strong growth in all subsectors and the addition of two new subsectors (applications management and business operations) to this spending category. The new subsectors, alone, accounted for $7 billion of the $9 billion variance.

The variances in 1999 market size range from a 6% to a 12% understatement in the 1994 forecast, except for outsourcing, where the expenditures will be 25% higher than previously estimated. This is a result of both the new submodes added to this spending category and a more aggressive growth estimate due to shifting telco programs.

C
1994-1999 Forecast

Although a full report on the telecommunications industry was not published in 1994, the industry forecast of information services expenditures for the appropriate period, 1994-1999, was completed. For continuity, and because it is the base against which this year's (1995-2000) forecast is reconciled, a copy of the 1994-1999 forecast is included in this Appendix as Exhibit A-3.

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Exhibit A-3

Telecommunications Industry
Market Size by Product/Service Category, 1993-1999

PRODUCT/SERVICE CATEGORIES	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
INDUSTRY TOTAL	4037	18%	4764	5642	6689	7936	9431	11224	19%
Professional Services	1250	22%	1519	1844	2241	2721	3308	4021	21%
- IS Consulting	277	23%	340	418	514	632	777	956	23%
- Education & Training	185	23%	228	283	352	436	542	673	24%
- Software Development	788	21%	951	1143	1375	1653	1989	2392	20%
Systems Integration	293	24%	364	453	564	702	872	1086	24%
- Equipment	78	23%	96	119	148	183	227	282	24%
- Software Products	20	40%	28	34	42	51	62	75	22%
- Professional Services	192	23%	237	296	369	461	575	718	25%
- Other	3	0%	3	4	5	7	8	11	30%
Outsourcing	82	16%	95	108	122	135	153	174	13%
- Platform Operations	24	13%	27	29	32	34	37	40	8%
- Applications Operations	38	16%	44	50	57	63	71	81	13%
- Desktop Services	10	20%	12	14	15	17	19	22	13%
- Network Management	10	20%	12	15	18	21	26	31	21%
Processing Services	1195	15%	1370	1583	1828	2112	2440	2819	16%
- Transaction Processing	1195	15%	1370	1583	1828	2112	2440	2819	16%
Network Services	142	19%	169	203	243	292	350	420	20%
- Electronic Info Svcs	116	19%	138	165	197	236	282	337	20%
- Network Applications	26	19%	31	38	46	56	68	83	22%
Applications Software	485	20%	584	704	850	1027	1241	1502	21%
- Mainframe	225	16%	262	306	357	417	487	568	17%
- Minicomputer	120	23%	148	181	222	272	332	407	22%
- Workstation/PC	140	24%	174	217	271	338	422	527	25%
Turnkey Systems	590	12%	663	747	841	947	1067	1202	13%
- Equipment	255	9%	279	309	342	379	420	465	11%
- Software Products	230	13%	259	293	331	374	422	477	13%
- Professional Services	105	19%	125	145	168	194	225	260	16%

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