September, 1993

Dear Colleague:

Attached is the Information Services Market Analysis Program's latest report on the *Telecommunications Sector.* It provides a current assessment of the events and issues driving this marketplace, and offers INPUT's forecast of the market size for information services for the period, 1993-1998.

This report should be filed with INPUT's other U.S. Information Services Market Analysis Program reports, behind the tab marked *Telecommunications.* Your INPUT program binders, together with the delivery modes reports, provide a total assessment of the United States market for information services.

Market Analysis Program industry and cross-industry sector reports are prepared annually and may be in one of two forms. The expanded report such as this *Telecommunications Sector* report, contains a detailed industry analysis and supporting forecast data. It is typically 40 to 50 pages in length. The forecast update is a short report, providing a new forecast and summary data to support forecast assumptions. It is generally be 15 to 20 pages in length. Normally, for each industry and cross-industry market segment, full reports are produced every other year, with summary reports prepared in the intervening years. The intent of this new format is to recognize the value of our client's time, and provide concise statements of industry activity, supported by rigorous business, technical, and competitive analysis, and a five-year industry forecast.

I am certain that you will find the *Telecommunications* report to be both informative and useful, and welcome any comments that you have on this document, or any of INPUT's publications.

Sincerely,

Bob Goodwin

Robert L. Goodwin
Manager
Information Services Market Analysis Program

Enc.

MVT

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Manager
Information Services
Market Analysis Program

VERTICAL MARKET ANALYSIS

# TELECOMMUNICATIONS
# 1993-1998

**U.S. Information Services**
**Market Analysis Program**

SEPTEMBER 1993

# TELECOMMUNICATIONS

# INFORMATION SERVICES OPPORTUNITIES & TRENDS

# 1993-1998

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**Information Services Market Analysis Program**
(MAP)

***Telecommunications***

***Information Services Opportunities & Trends, 1993-1998***

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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.

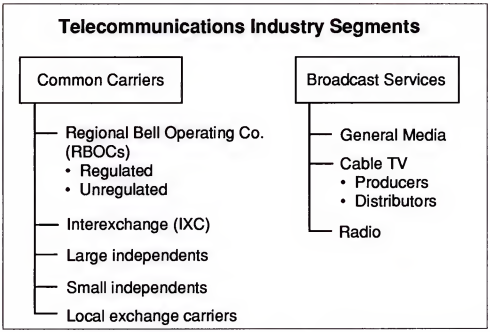
### 1. Purpose

The purpose of this report is to identify key changes in the market for information services in the telecommunications industry, and to provide the 1993 INPUT forecast for this market sector.

*Sector Definition* - 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).

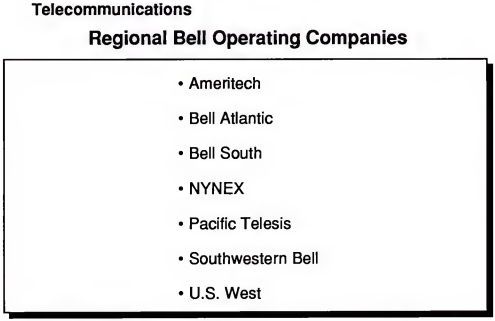
A composite industry structure is shown in Exhibit I-1.

EXHIBIT I-1




Regional Bell Operating Companies (RBOC) are shown in Exhibit I-2.

EXHIBIT I-2



Major Interexchange Carriers (IXC) are shown in Exhibit I-3.

EXHIBIT I-3

**Telecommunications**

**Interexchange Carriers**

- AT&T
- MCI
- Sprint

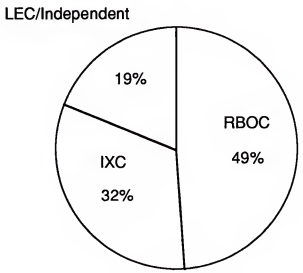
In addition to the providers in the RBOCs and IXCs, there are numerous independent service providers. Contel is the largest independent provider, as a result of a merger with GTE.

Considered in total, there are an estimated 2,000 providers of telephone and circuit services. However, the majority of the industry's revenues are realized by the top 10 to 12 companies. Exhibit I-4 offers an estimate of the division of basic service revenues among the common carriers.

EXHIBIT I-4

**Telecommunications**

**Common Carrier Revenue Share**



Providers of broadcast services fall into three basic groupings:

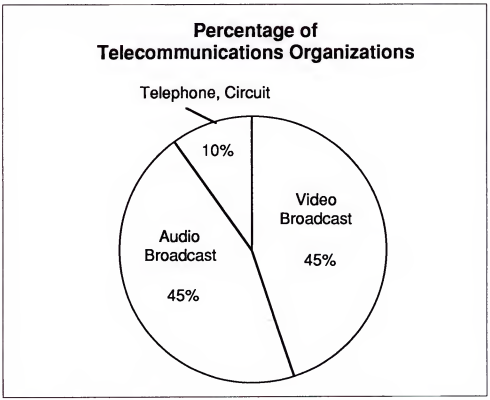
- General media broadcasters including the major networks (ABC, CBS, NBC and Fox), which are supported by over 650 affiliated and 400 independent stations
- Approximately 70 cable TV program networks provide programming to more than 9,500 cable systems throughout the country
- More than 10,000 licensed 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, including 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-5.

EXHIBIT I-5



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

*Key Issues* - Market issues influencing information services include:

- *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.

- *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 achieve penetration into foreign markets is improving. European monopolies (PTTs) are beginning to weaken.

- *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.

- *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 can impact the current and future use of information services.

- Chapter III, *Information Systems*, shows how the telecommunications sector organizes and uses information technology, and identifies both key technologies and the 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 delivery mode and submode, for the U.S. telecommunications market.

- 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 vendors.

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

- Appendix A, which contains the Forecast Data Base, presents a detailed forecast, by information services delivery mode and submode, for the telecommunications vertical market. A reconciliation to the previous forecast is also provided.

## 3. Methodology

Much of the data on which this report is based was gathered during 1992 and early 1993 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 3,000 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.

*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 noted in the Economic Assumptions section of the Department of Commerce's *1993 U.S. Industrial Outlook*, U.S. economic growth in 1992 was somewhat less than what was forecast in the prior year. The very slow recovery seen at the end of 1991 continued into 1992, with unemployment remaining at undesirably high levels—a condition fueled primarily by corporate restructuring and defense industry cutbacks. Even though retail sales were at an encouraging high during the 1992 Christmas season, business expenditures continued to remain low. This was due to both an ongoing desire to reduce costs and improve profits, and uncertainty as to the precise nature of any economic (primarily tax) reforms that would be proposed by the new Clinton administration.

In 1992, the major burden for implementing economic policy fell on the Federal Reserve, a strategy that caused the Fed to steadily reduce the federal funds rate from 8% in June of 1990 to 3% in September of 1992, forcing a general reduction in all interest rates to the lowest levels in years.

The outlook for 1993 is cautiously optimistic, with many of the uncertainties tied to the new administration's attempts to reduce the budget deficit while at the same time stimulating a still sluggish economy. At this time, messages remain mixed, with proposed corporate taxes favoring small businesses and those who make capital investments, and penalizing larger corporations, especially services firms, through a 2% increase in the top corporate tax rate from 34% in 1992 to 36% in 1993. Personal income will be reduced by a proposed increase in income taxes averaging 3% for middle income families, and 5% for those in the highest income categories. All taxpayers, business and individual, will also experience higher energy costs due to proposed new energy taxes. Many critics of the administration's proposals fear that the new taxes risk slowing the economy just when it has started to show some healthy growth; there is a general wait-and-see attitude to determine how successfully the proposals survive the conflicting agendas of the congressional process.

INPUT uses the Blue Chip Consensus (economic) report, and various other sources (Federal Reserve, IMF) to identify anticipated economic growth trends and incorporate GDP assumptions in industry and delivery mode financial forecasts. Economic growth in 1992 had a very slight movement upwards, but the 3% growth in GDP anticipated for that year is now forecast for 1993. This modest 3% growth resulted from the pressures placed upon the defense industry, tax uncertainties, a weak commercial real estate market, high federal debt, slow growth in the labor force, cautious financial institution lending policies, and the growing economic interdependence of the industrialized nations. Balancing these growth inhibitors are the healthy gains in corporate profits noted in 1992 and a pattern of increased consumer spending.

# Industry Trends, Events and Issues

## A
## Trends

This chapter discusses in detail general business and technology trends in both the common carrier and broadcast segments.

Major changes are occurring in the telecommunications industry and are having a significant impact on both the common carrier and broadcast entities. Both 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 both industries, 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. 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-1, and INPUT expects them to affect the common carrier segment of the industry for at least the next several years.

EXHIBIT II-1

**Telecommunications**

**Key Business Trends**
**Common Carrier Segment**

- Convergence of communication industries
- Basic service diversification
- Emerging competition
- Globalization of industries
- Changing regulatory environment

### a. Convergence of Communications Industries

Just as the process of deregulation in the early 1980s resulted in considerable confusion among service users and vendors, the convergence of communications industries that is now occurring is recreating a new round of disorientation.

A number of recent merger and alliance announcements have made a substantial and indelible impact on the way that consumers and businesses will receive communications services. These changes will begin to come into effect later this year and continue into the next decade.

For instance, several major common carriers and cable television organizations are in the process of either merging or forming new alliances. This represents a significant change from last year's attitudes 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 cable television industry.

The brass ring that everyone is now reaching for is broadband interactive television services, including voice, data, and multimedia. This is facilitated through a convergence of computing, communications, and entertainment. The focus now seems to favor consumer services over business services.

The mergers and alliances noted below are presented in four groupings to show how they interrelate:

- RBOC/Cable TV Alliances
  - Southwestern Bell (SWB)/Hauser Communications—SWB will pay $650 million for Hauser's cable systems located near Washington. (Under the Cable Act of 1984, phone companies are barred from owning cable companies within their service territories.)
  - US West/Time Warner (TW)—US West will pay $2.5 billion to acquire a 25.5% interest in Time Warner. This requires an exchange of cable territories between Time Warner and Telecommunications, Inc. (TCI).
  - Southwestern Bell/Cox Cable—A joint development is under way to create a British cable system.
  - TCI/Cox/Teleport—TCI and Cox also bought a 50% interest in Teleport Communications Group last year. Teleport is a competitive access provider (CAP) that provides local fiber access to business to circumvent RBOC local access fees.
  - Other RBOC/CATV Alliances—It is expected that all the other RBOCs will follow suit and attempt to align themselves with other CATV companies. Much of this activity depends on the durability and interpretation of the 1984 Cable Act restrictions.
  - Turner Broadcasting has indicated that it may break up this fall by divesting itself from the controlling interests of TCI and Time Warner.
- Interexchange Carrier (IXC)/Cable TV Alliances
  - AT&T/TCI—AT&T is negotiating with TCI.
  - MCI/?—MCI may be able to afford a financial alliance/merger with one or more of the other cable TV companies as a result of a $4.3 billion investment to be made by British Telecom.
  - Sprint/?—Sprint may also wish to pursue this avenue but its recent investment in Centel may prevent any near-future activity.
- IXC/International Carrier Alliance
  - MCI/British Telecom (BT)—BT plans to invest $4.3 billion in MCI, representing a 20% stake. This should accelerate the global rivalry between MCI and AT&T. Ironically, $3.8 billion of the investment will come from AT&T when it buys a 33% stake in McCaw Cellular Communications from British Telecom.

- CATV/International Alliances

  - TCI/Sumitomo—TCI has agreed to buy 18% of Sumitomo's Cable Soft Network in Japan. Sumitomo is Japan's largest cable operator.

  - Cox/Southwestern Bell—Cox will take a 25% stake in developing SWB's British cable system.

This merger and alliance activity will continue through 1994.

**b. Basic Service Diversification**

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

Local carriers and cable TV companies are distributing fiber optic technology almost out "to the curb" to support voice, data, and video in local networks. The cost is estimated to be up to $400 billion and conversion may not be completed until 2015. However, new technology breakthroughs and the new U.S. government administration may hasten its distribution. Considered below are two new capabilities—interactive TV and an electronic super highway—that are now receiving a lot of attention.

- Electronic Super Highway

A number of announcements have occurred in the industry that identify a new direction. The intent is 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 agreed to set system network standards to allow communications between CATV companies.

  - The current administration is promoting the advantages of this network as comparable to the economic benefits derived from the interstate highway system constructed in the 1950s.

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

  - A start-up company called Broadband Technologies is developing a 1500-channel CATV system for Bell Atlantic and other phone companies.

- 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 systems.

- Microsoft is also involved in the development of a new Prodigy cable connecting box for two-way CATV; other developers include General Instrument's Jerrold Communications and Intel.

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

- AT&T, US West 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.

### c. 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.

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 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 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 the 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 US West and Time Warner adds support to this observation.

Several key business trends, listed in Exhibit II-2, indicate that the cable TV industry will emerge as a competitive threat to the local telephone companies.

EXHIBIT II-2

**Telecommunications**

**Key Business Trends**
**Cable TV Industry**

- Convergence of communications industries
- Competition
- Regulation
- Untapped market potential
- Infrastructure investment

**d. 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.

Communications companies are positioning themselves to provide one-stop shopping for global services. Mergers such as that of MCI/BT are intending to provide seamless international communication services to their multinational corporate customers. AT&T is providing a global network called WorldSource.

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 super highway.

### e. Changing Regulatory Environment

Though the BOCs continue to be constrained by the effects of the Modified Final Judgment (MFJ), a significant shift in regulation now allows BOCs 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.

INPUT believes that as early as mid-1993 the BOCs will be competing in an open market in the intra-LATA toll arena. They will, however, continue to face strong opposition to manufacturing and to providing inter-LATA and long-distance services.

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

The BOCs are also allowed to offer "video dial tone"—the ability to transmit video signals for all program suppliers. As noted, other BOCs are gearing up to provide information and entertainment delivery. However, the FCC may place certain limitations on cellular and phone companies offering PCS (personal communications system) services.

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.

## 2. Cable TV Business Trends

### a. Convergence of Communications Industries

(See Common Carrier's Convergence of Communications Industries)

### b. Competition

Several business trends, listed in Exhibit II-2, suggest that the cable TV industry, interexchange carriers, and competitive access providers have been emerging as a competitive threat to local telephone companies. However, this trend is now being challenged, with the advent of US West's investment in Time Warner.

The lines between telephone and cable companies are beginning to blur and become refocused as communications companies.

### c. Regulation

Ongoing regulatory activity may provide further impetus to the cable TV 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 cable TV, stifling competition. Consequently, consumers believed they were being overcharged for cable TV 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.

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 cable TV rates, with an expected rollback of as much as 10%. It also gave back to local governments the right to regulate basic cable TV service. Some cable competitors, however, argue that this new regulation does not go far enough. In any case, this regulatory action has caused the FCC to petition Congress for $28 million to cover the costs of interpretation and litigation that will be brought against the FCC by the cable industry through 1993/1994.

### 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 the 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, INPUT expects CATV companies to become aggressively involved in the wireless personal communications services (PCS) microcellular industry.

### 3. 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, 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.

The FCC, in another ruling, allows each of the 1,500 TV stations, if they choose, 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 chooses not to pay (it has never paid before) it loses the right to carry the station after October 6, 1993. Cable companies that do pay cannot 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. The 57 million households with cable could be the losers in this upcoming battle.

### 4. Technology Trends

Technology trends contributing to industry growth are shown in Exhibit II-3. Though most are known technologies, their impact as growth enablers is only beginning to be felt.

EXHIBIT II-3

**Telecommunications**

## Key Technology Trends

a. Broadband transmission
b. Advanced intelligent network
c. ISDN services
d. Multimedia services
e. Mobile wireless communications
f. Network management
g. CATV technology advances

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

Bell Operating Companies 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 will allow the BOCs to compete with competitive access providers (bypass) to meet metropolitan data networking needs.

In the meantime, the BOCs 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 will include 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 of 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, when U.S. 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. ISDN Services

Based on the AIN approach, such terms as ISDN (Integrated Services Digital Network) will nearly disappear from the public lexicon within the next four years. Providers will begin to define "service sets" that require integrated digital technology. Essentially, services will be marketed, not ISDN.

### d. 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.

### e. 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, Bell South 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 to $40 billion in just a few years.

### f. Network Management

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

However, for the BOCs to become accepted as network managers, they must provide significantly enhanced network management tools. There are indications that some BOCs 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 software and diagnostic/management software that is integrated into a BOC's products.

### g. 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.

# B
# Issues and Events

## 1. Key Industry Issues

There are several significant issues facing 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.

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

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-4 and are discussed below.

EXHIBIT II-4

**Telecommunications**

**Key Industry Issues**

- Changing regulatory environment
- Competition
- Trade potential
- Service pricing
- Customer service

### a. Changing Regulatory Environment

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

The change in regulatory position allows the BOCs to 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 will now be able to leverage underutilized technology to deliver value-added services and reduce the cost of basic services.

The MFJ is a major threat to the BOCs' 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 bills in Congress that would further restrict the BOCs and have support from a coalition of long-distance companies, newspaper publishers, consumers, and communications labor groups.

With the granting of permission to provide gateways and information processing, questions regarding inter area services continue to arise. BOCs 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 various alternative access providers become more prevalent.

It had been thought that cable companies would become a significant threat to local carriers. However, with the recent merger of US West and Time Warner, this threat may become somewhat ameliorated. Other BOCs will try to copy this alliance wherever possible. However, regulations currently prohibit BOCs from owning and operating CATV companies in their own territory. This situation will cause BOCs 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, cable TV, competitive access providers, VSAT, VAN, cellular, PCS and long distance companies (IXCs) to be allowed to utilize 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-1993; inter-LATA might not occur until late 1994.

### 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 weaken.

IXC/international carrier alliances are building with the recently announced MCI/British Telecom merger. This alliance and AT&T's efforts in offering one-stop shopping to multinational corporations support major efforts to expand in the international market.

CATV/international carrier alliances are also building with the TCI/Sumitomo merger (Japan's largest cable operator). Also, the Cox/Southwestern Bell alliance allows Cox to take a 25% stake in developing SWB's British cable system. This 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 as winners. They will benefit from low prices, better service, more innovative service options and diversity of supply.

### f. Cellular/Health

The wireless industry is beginning to proliferate and a plethora of companies have entered or are about to enter this potentially lucrative market. But an emerging issue may be of concern to existing and future wireless phone users.

Studies have suggested that radio frequency energy poses a potential health hazard, in the form of cancer, which increases as the radio frequency increases. Exactly which signal levels are safe is still being debated. Six personal injury suits against cellular operators and equipment manufacturers are currently in the U.S. courts. Consumer concern about cancer could reduce cellular sales by 10% or more.

Portable "bag" phones or portable handheld devices with remote antennas will be favored over devices that are used next to a consumer's head. Major studies to assess detrimental impacts to the human body from RF energy are under way and should be completed by the end of 1994.

### 2. Major Events

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

Exhibit II-5 summarizes a number of events that INPUT believes were significant, not because they received a great deal of attention in trade publications, but because they indicate industry trends.

EXHIBIT II-5

**Telecommunications**

**Major Events**

- BOC information services
- CATV/LEC/wireless competition
- Personal communications services
- Mergers and acquisitions

*BOC Information Services*

The federal courts have lifted a stay that prohibited the Bell Operating Companies from providing content-based information services. The ban on phone companies developing their own information services had been in effect since 1984. The BOCs can now own, generate, edit, and manipulate information.

*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. It has 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.

*Personal Communications Services*

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

Cable network providers have filed a very large number of applications to begin to test PCS. This is the first step in the cable industry's entrance 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.

As indicated earlier, however, the health concern for handheld cellular telephones could have a deleterious effect on its growth.

*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" by 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.

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 typically reports to an operations executive.

The second organization is typically 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 is 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 sometime later.

This distinction is now starting to blur as at least one of the BOCs 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/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 budget reported by internal information systems organizations. Overall, they reflect continued growth, with external purchases showing a higher growth rate than internal expenses. Note that the purchased services category includes the information services discussed in Chapter IV.

EXHIBIT III-1

**Telecommunications**

## Information Systems Budget Distribution

| | 1992 Percent of IS Budget | 1992-1993 Percent of Expected Budget Growth |
|---|---|---|
| Personnel (Salary & Fringes) | 32 | 3 |
| Hardware | 28 | 13 |
| Purchased Services | 40 | 16 |

- *Personnel* - The modest growth rate for personnel includes 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 has been noted over the past several years.

  Major reductions in force are near an end; 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 is greater than in many industries. The growth is attributed to the need for bigger systems to accommodate more complex applications and larger data bases. 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 growth in professional and systems integration services.

Within the broadcast services segment, the expenditure breakdown is more in line with 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.

EXHIBIT III-2

**Telecommunications**

**New Technology Impact**
**Common Carriers**

- Decentralization
- Data/systems integration
- Greater customer control
- System flexibility
- Increased information flow
- Underutilized infrastructure

- *Decentralization* - As with many industries, information systems in common carriers are 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 many services such as software-defined networks, network management, and virtual digital networks.

  - Digital technology has created an 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 them quickly and easily. They want custom sets of features and custom-designed billing. They want to be able to have analysis 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 pass well into the low gigabit ranges by 2005.

- *Underutilized Infrastructure* - Due to a recent 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.

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 the majority of these impacts will be in the cable industry.

EXHIBIT III-3

**Telecommunications**

## New Technology Impact Broadcast Services

- Interactive television service growth
- Increased networking
- Increased business applications

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 BOCs 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 BOCs today.

- *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 Highway" is developed.

- *Increased Business Applications* - There will also be growing demand for business applications such as enhanced voice messaging, electronic directory, electronic mail, electronic data interchange, and electronic funds transfer.

Growth is under way. 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 Information Systems Group), 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

With the change in regulation now allowing common carriers to 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 BOCs had been concentrating on fixing antiquated systems, which precluded the rapid deployment of many new or planned services. Some of these carriers (BOCs) 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 interfaces.

The developing need to provide these new information service offerings, coupled with the strong probability of competition with cable TV 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 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 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 (BOCs), 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.
- 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 growing 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 believe that the environment is sufficiently unique that few standardized products are likely to become available.

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 these new, complex systems that will support the 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

**Telecommunications**

**Critical Future Applications**

- Service orders
- Flexible billing/EDI
- Facility management
- Electronic imaging
- Network management/outsourcing
- Software-defined networks

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

### b. 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 in the uniform definition of 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.

### c. 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.

### d. 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.

### e. Network Management/Outsourcing

Nearly all carriers are interested in providing 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 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.

### f. Software-Defined Networks (SDN)

Large corporate customers have a 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 this necessary software to permit customers to control their (carrier-provided) networks. Also, the Advanced Intelligent Network (AIN) should provide significant improvements to 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. Cable Television

In contrast, the cable industry 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 significant changes that come with competition—from two significantly different industries. For example, 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.

## 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

**Telecommunications**

**Key IS Issues—Common Carriers**

- Developing new services
- Allowable activities
- Decentralization
- New technologies
- Staff reductions

#### a. Developing New Services

With the recent change in 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?

- Can the new services leverage existing computing resources?

INPUT believes that many of these development issues will be solved through acquisition and 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.

  - BOCs are currently not permitted to provide service 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 BOCs 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.

### 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. The decentralization creates need for more sharing of data and flexible systems that are responsive to customer demands.

### d. New Technologies

Many carriers are ill-prepared to successfully apply new technologies. With a background in voice and data services, many have little knowledge about 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.

### e. Staff Reductions

Accompanying the current regulatory constraints and impact of new technologies is pressure on most providers to reduce personnel costs. Productivity-enhancing tools provide some assistance in meeting commitments with reduced staffing, but do little to provide a foundation for addressing new technologies.

The issues are more pronounced among medium-sized and smaller providers. While the BOCs and IXCs assess strategic direction and prioritize major new applications, LECs must determine how to provide enhanced basic services with limited resources.

## 2. Cable Television

While major broadcast networks struggle with reductions in funding and staff sizes, the cable TV 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

**Telecommunications**

**Key IS Issues**
**Cable Television**

- Developing new services
- Outsourced alternatives
- Rapid growth

### a. Developing New Services

With the recent changes in reregulation and the potential to compete in PCS and subsequent local telephone markets, information service 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 acquisition and alliance with various private 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 roll out 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 have begun to exceed their ability to effectively manage the systems.

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

**Telecommunications**

**Key IS Issues—Broadcast Services**

- Reduced operating margins
- Staff reductions
- Aging systems

*Reduced Margins* - The state of the economy and 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 organizations, 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.

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# 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 will begin to change within the next several years. 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.

- 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 to 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 US 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 organizations. Also, there will be an increasing need for new ATM network switching systems provided by CATV and CAP provider organizations.

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

## 2. Market Summary

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

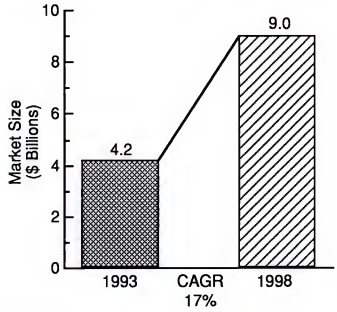
Though considerable investments have been made in new (nonregulated) activities, significant improvements have also been made in productivity and cost effectiveness. After a number of years of considerable struggle, the industry has achieved a momentary level of stability.

Overall, the market for information services in the telecommunications industry will grow at a compound annual growth rate of 17% over the next five years, from almost $4.2 billion in 1993 to nearly $9.0 billion in 1998, as shown in Exhibit IV-1.

EXHIBIT IV-1

**Telecommunications**

**Information Services Market, 1993-1998**

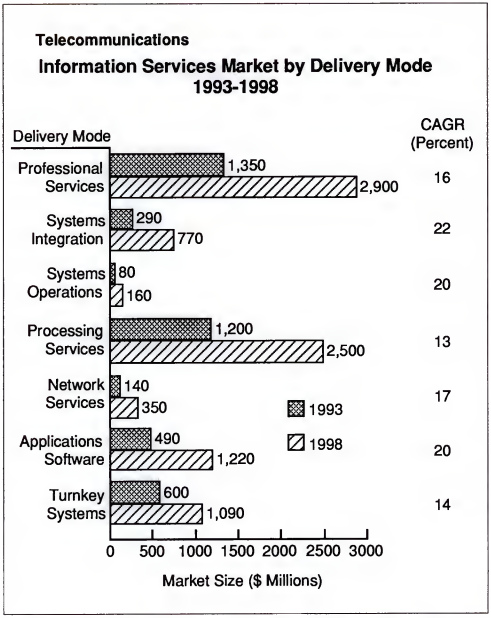



The market, broken down by delivery mode, is noted in Exhibit IV-2. Each delivery mode is discussed in the next section.

The overall telecommunications sector growth reflects a slight upward change beginning in 1994. In terms of revenue, two delivery modes clearly lead the telecommunications sector—processing and professional 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.

EXHIBIT IV-2




Systems operations 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 an anomaly, information systems are the primary business of common carriers.

## B
## Delivery Mode Analysis

### 1. Processing Services

The market for processing services (transaction processing) is expected to remain strong, growing at an annual rate of 14% for the next two years, then increasing to 16% for the balance of the five-year window. The market is expected to grow from more than $1.2 billion in 1993 to almost $2.5 billion by 1998.

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

- 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.

- 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, GEIS, and CBIS to meet their processing needs.

- As new technology is implemented, maintaining plant and equipment records becomes increasingly complex. Records that could be maintained manually ten to fifteen years ago 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.

- Likewise, as the cable, cellular and PCS industries expand, the need for complex customer and service support systems becomes more important. Many smaller providers are unable to make the necessary investments in large, complex systems.

### 2. Turnkey Systems

The turnkey systems market is expected to continue to grow at a somewhat faster rate in the telecommunications sector than in the information services industry as a whole.

As a result of a slight upturn in 1994, the market will grow at a compound annual rate of 13% for the next several years. Between 1993 and 1998, the market will grow from $600 million to almost $1.1 billion.

The growth of turnkey systems results from the need for an increasing number of application-driven services such as voice messaging, E-mail, and EDI, and the need for universal gateways that are operated as stand-alone systems.

The need for turnkey systems arises from several factors:

- There is reluctance on the part of carriers to incorporate information service-related functions directly into switching systems. Information service applications are frequently changed to make enhancements and corrections. Carriers do not want the changes made to applications to affect their basic delivery systems.

- In the common carrier segment, regulations prohibit the comingling 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.

- With the exception of the largest cable providers, developing large complex systems to maintain accounts exceeds the ability of many providers. Turnkey systems will become increasingly important as the cable industry begins to broaden its services and will be the only viable method of obtaining cost-effective systems.

### 3. Applications Software Products

The market for applications software will remain strong, growing from $490 million in 1993 to an estimated $1.22 billion by 1998, at a compound annual growth rate of 20%.

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 two critical areas will become more pronounced over the next several years. Specifically:

- Workstation/PC software is needed to support logistics and maintenance activities. Engineers need to be able to access central systems to obtain cable and circuit diagrams and obtain 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.

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

### 4. Systems Operations

The systems operations market is comprised of four elements: platform operations, applications operations, desktop services and network management. 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.

The market for systems operations in the telecommunications sector is expected to grow from more than $80 million in 1993 to an estimated $160 million in 1998, at a slightly increased compound annual growth rate of 14%.

Applications operations currently represents the largest portion of the systems operations market; noncarrier network management needs will cause this submode to grow from 11% of total systems operations expenditures in 1993 to almost 20% in 1998.

### 5. Systems Integration

Systems integration services annual growth will increase slightly to 22% in 1994 and maintain that CAGR through 1998. There are several reasons for this continued growth:

- Since deregulation, carriers have devoted extensive resources to enhancing their primary applications software. The billing and customer service systems that they inherited functioned poorly and were not able to meet changing needs. The majority of these systems have been either enhanced or replaced. However, the process of integrating 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 will be a growing need for integrated (network) service delivery systems to support the cable industry. The 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 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 $290 million in 1993, growing to nearly $770 million by 1998.

### 6. Professional Services

Professional services is the other leading delivery mode in the telecommunications sector. This is due to the fact that there is a continuing need for both consulting and software development services to meet changing needs in a competitive market.

The professional services market is expected to increase beyond its current growth rate of 16% to a 17% CAGR for the five-year period, 1993-1998. The market will grow from nearly $1.4 billion in 1993 to $2.9 billion by 1998. Software development represents approximately 60% of this total. Professional services use is driven by a number of factors:

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

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

- Use of professional services also reduces implementation time. As system criticality grows, due to the development of revenue-producing services, reducing development time will become more important.

### 7. Network Services

The market for network/electronic information services is expected to continue to grow, from more than $140 million in 1993 to an estimated $350 million by 1998. This represents a slight increase in CAGR—from 19% to 20%—beginning in 1995.

The telecommunications industry will continue to have a need for internal electronic information services and there will be a slight increase in the rate of growth, from 17% in 1993 to 19% for the five-year forecast period.

Although it represents the smaller segment of network services, network applications is 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

The primary driving forces in the telecommunications industry are now focusing 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.

EXHIBIT IV-3

**Telecommunications**

**Driving Forces**

- Deregulation
- Emerging competition
- Service/organization integration
- Flexible software
- Staff productivity
- Internal user needs

- *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 is changing. 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 have become a necessity. Decentralization has moved staff closer to the customer. With this move, there continues to be a need to integrate service and support systems. For instance, customers will not accept 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 data base systems.

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

- *Internal User Needs*—As in other industries, information systems executives in telecommunications are increasingly driven by internal user departments, as 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

In addition to the driving forces, there are a number of factors (summarized in Exhibit IV-4) inhibiting the growth of services in the telecommunications industry. Key factors are:

- *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.

- *Customer Need Uncertainties*—The needs stated by customers have generally not been qualified. 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. Some carriers are now making an investment in evaluating the real benefits of the Advanced Intelligent Network and the market potential of the services.

- *Unresolved Standards*—Many standards affecting open system architectures, EDI, and the radio spectrum for PCS are still unresolved. 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 appear to be excessive, as interpreted by advocacy groups. The groups generally have little interest in new services, or the benefits of delivering the services. They are single-minded, focusing solely on the provision of cheap, basic service.

EXHIBIT IV-4

**Telecommunications**

**Inhibiting Factors**

- Regulatory realities
- Customer need uncertainties
- Unresolved standards
- Continuing public pressure

Overall, the driving forces significantly outweigh the inhibiting factors. Expenditures for information services will grow at a rate twice that of the industry 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 processing and professional 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 Vendor Profiles

INPUT conducts extensive analyses of vendor revenues. In order to present useful and accurate information for the telecommunications market, U.S. revenues were subtracted from worldwide revenues.

## B
## Competitive Climate

With the change in regulation now allowing common carriers to 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 BOCs had been concentrating on fixing antiquated systems, which precluded the rapid deployment of many new or planned services. Some of these carriers (BOCs) 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 interfaces.

## C
## Competitive Positioning

The developing need to provide these new information service offerings, coupled with the strong probability of competition with cable TV 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 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 will be needed. For vendors, the need to focus on fixing problems will shift to applying new, creative technology.

INPUT believes that the local access carriers (BOCs), 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 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 offers many opportunities for vendors of information services.

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

- The leading vendors are providers of processing services and professional services.
- 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 small local and niche vendors.

## D
## Participating Vendors

A key characteristic of the telecommunications sector is that there are numerous providers of a wide range of information services. The majority of vendors provide service in only one, or at most two, delivery modes. With some 2,000 common carriers (LECs, IXCs, etc.) and 9,500 cable service providers located throughout the country, there are numerous local and regional information service providers to the telecommunications sector.

The following Exhibit V-1 shows a matrix of major vendors by delivery mode. Exhibit V-2 shows the same vendor matrix by application focus.

EXHIBIT V-1

**Telecommunications**

### Service (Delivery Mode) Offerings of Major Information Services Vendors

| Company | Processing Services | Software | Professional Services | Turnkey Systems | Systems Integration | Systems Operations |
|---|---|---|---|---|---|---|
| FDC | X | | | | | |
| AMS | X | X | X | X | | |
| CableData | X | | | X | | |
| CBIS | X | X | X | | X | X |
| EDS | X | | X | | X | X |

EXHIBIT V-2

**Telecommunications**

## Application Focus of Major Information Services Vendors

| Company | Processing Services | Software | Professional Services | Turnkey Systems | Systems Integration | Systems Operations |
|---|---|---|---|---|---|---|
| FDC | X | X | X | | | X |
| AMS | X | | X | X | | X |
| CableData | X | | | | X | |
| CBIS | X | | X | | | X |
| EDS | X | | X | | | X |

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 Bell Operating Companies (BOCs). 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.

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

Vendors such as AMS, CBIS, 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. Electronic Data Systems Corporation

7171 Forest Lane
Dallas, TX 75230
Phone: (214) 604-6000
Total Personnel: 70,500
Total 1992 Revenue: $8,218,900,000

### 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, communications, energy, government, health care, insurance, manufacturing, retail, and transportation.

- EDS' currently has 70,500 employees and more than 8,000 clients in all 50 states and 29 other countries.

- EDS' largest client is General Motors Corporation (GM) and its subsidiaries, which contributed approximately 41% ($3.35 billion) to EDS' 1992 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 systems operations market. EDS has expanded its penetration of current markets and is entering new markets. EDS' selection criteria for new markets include the size of companies in the 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 opportunity, at least in the longer term. In the short term there are opportunities to assist with billing services to 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's strength in providing network services results in EDS being perceived as a threat to many common carriers, particularly as the industry evolves to a broader base of integrated services.

However, as a noncommon 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 contributor to the delivery of integrated network services.

**c. Products and Services**

EDS's 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 include the following:

- EDS was awarded a systems management contract with publisher Meredith Corp. of Des Moines (IA).
- During 1991, EDS announced its first contract in the cable TV industry—a systems management agreement with the Lenfest Group of Pottstown (PA).
- During 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.

**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 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.

### 2. American Management Systems, Inc.

1777 North Kent Street
Arlington, VA 22209
Phone: (703) 841-6000
Total Personnel: 3,200
Total 1992 Revenue: $ 332,544,00

#### 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.

#### b. Strategy

AMS' overall strategy for the 1990s includes:

- Specializing by industry, business function, and client size
- Managing and building on longstanding 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.

### c. Products and Services

INPUT estimates that AMS's 1992 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. Service and application revenues from this market reached $61.2 million in 1992, an 89% increase over $32.4 million in 1991. It is estimated that 1993 revenue from the market will increase by 27% to over $75 million.

- Includes applications support order processing, message processing, billing, accounts receivable, and collections.

- About 75% of Mobile Communications' 1992 business was international.

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

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

- In June 1992, AMS announced that it had been selected as the application developer and integrator for new customer contact, billing, and message processing systems for Bell Atlantic, Sprint (Local Telecommunications Division), Stentor (formerly Telecom Canada), and SNET Cellular.

In October 1991, AMS and NYNEX Mobile Communications Company introduced Mobile 2000, a jointly developed customer management and billing system for the cellular telephone industry.

- AMS is implementing 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 DECsystem 2060s.

**d. Key Issues**

- AMS' fastest growing vertical market business is telecommunications, which increased 89% during 1992.

- International revenue increased 88% during 1992, representing a 107% increase in sales to the telecommunications sector.

**3. First Data Corporation**

American Express Tower
World Financial Center
New York, NY 10285-4560
Phone: (212) 640-4451
Total Personnel: 19,400
Total 1992 Revenue: $1,205,320,000

**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 an industry such as cellular 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 could fit well with FDC's strategy.

FDC has a sophisticated network and extensive networking capability. It 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.

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.

### 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

During 1992, CSG and IBM Information Network (now Advantis) announced a multiyear contract whereby IBM would link more than 8,000 terminals in cable television companies nationwide to CSG's mainframe computer. Cable operators can use the network to respond to subscriber service or billing requests.

### d. Key Issues

- There are indications that Cable Systems Group is interested in providing increased services (primarily processing services) to competitive access providers (CAPs) and CATV.

### 4. Cincinnati Bell Information Systems, Inc.

600 Vine Street
P.O. Box 1638
Cincinnati, OH 45201
Phone: (513) 784-5900
Total Personnel: 4,000
Total 1992 Revenue: $42,500,000

#### a. Company Description

CBIS provides a range of processing and systems operations services, software products, and professional services, primarily to telecommunications and cellular companies, financial services firms, and to federal and state and local government clients. CBIS also provides products and services to other operating units of its parent, Cincinnati Bell, Inc.

CBIS' business operations are organized into two primary groups and several support groups as follows:

- The Communications Systems Group provides processing and professional services and software products to telephone, cellular and paging companies worldwide.
- The Systems Integration Group serves two major CBIS markets outside the telecommunications industry: financial services and government.
- CBIS International Group markets and supports CBIS' products and services outside of North America and Europe and supports CBIS' long-term project with Nippon Telegraph and Telephone (NTT).
- CBIS Europe Group was formed in late 1990 to capture telecommunications and information services opportunities in European markets.

#### b. Strategy

CBIS considers the telecommunications industry (both domestic and international) to be a strong niche for the company. However, it is placing increased emphasis on diversifying into nontelecommunications industry-related activities.

CBIS' focus on diversification is underscored by decisions to outsource some processing service activities previously done in-house. CBIS' focus on new industries has, until recently, included billing processing services for the cable industry. However, CBIS now outsources processing activities to CableData, a major processing services company serving this industry.

### c. Products and Services

CBIS' mobile business operations provide processing services and applications software products for customer account management and customer billing to cellular telephone companies and radio-paging providers.

- CBIS provides software to support 70% of the mobile subscribers in North America, including four of the nine cellular regions in Mexico. During 1991, CBIS opened a data center in Monterey, Mexico to support these clients.

CBIS also provides network operating software and professional services to major telephone companies worldwide.

- CBIS is nearing completion of its customized version of a fully integrated telephone office support system for Nippon Telegraph and Telephone (NTT).

CBIS is developing CBIS Edge, its latest generation of telecommunication and mobile communications management software. It will incorporate open systems standards, client/server architecture, object-oriented and structured analysis design/development, layered application architecture, and an integrated application development environment.

### d. Key Issues

- New strategic alliances will challenge many of the current ways of doing business and may also include publishing and movie producing concerns.

## 5. CableData (U.S. Computer Services)

11020 Sun Center Drive
Rancho Cordova, CA 95670
Phone: (513) 784-5900
Total Personnel: 1,466
Total 1992 Revenue: $ 146,000,000

### 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.

### b. Strategy

CableData has recently reorganized and has expanded into new markets, including telephone and cellular information billing services in Europe. In the fourth quarter of 1992, CableData signed Mexico's largest cable operator, expanding its geographic scope to six countries.

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

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

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.

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 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 may soon be able to leverage its expertise in telephone billing, currently performed in Europe. New markets for jointly provided CATV/telephone services will soon be offered in the U.S.

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# Conclusions and Recommendations

## A
## Industry and IS Market Conclusions

The telecommunications industry is entering a period of significant re-adjustment as the telephone and cable industries converge. Telephone dial tone from a TV cable entity will be commonplace in the next five to seven years. This will work in conjunction with a host of 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 modifying their position on CATV ownership boundaries.

US 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 true market direction.

In addition, deregulation now allows BOCs 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.

The demand for services, coupled with the growth of competition, will place strains on the capabilities of (internal) information systems departments, forcing them to turn to information services vendors. In consequence, there will be greater opportunities for information services vendors, especially in processing and professional services.

Within the next three-year period, 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
## IS Vendor Issues and Recommendations

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

EXHIBIT VI-1

**Telecommunications**

**Vendor Recommendations**

- Focus on integration
- Emphasize carrier-to-customer linkages
- Provide flexible software
- Develop network management tools
- Understand the regulations
- Learn the cable/local carrier industries

- 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 processors, the integration of service systems is mandatory. These must also be integrated with management control systems. Internal integration is also necessary as carriers proceed with decentralization. Systems and services (LANs, E-mail, etc.) are necessary for effective communications between operating groups and functions that are decentralized.

- 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.

- 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.

- 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.

- Understanding the regulations is critical to marketing success. Such understanding is necessary to respond to objections and to structure products that acknowledge the environment that currently exists and the changes that are pending.

- 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 Data Base

This appendix contains the forecast data base for the period 1993-1998 and the 1993 MAP data base reconciliation.

## A

## Forecast Data Base

Exhibit A-1 presents the detailed 1992 actual and 1993-1998 forecast for the telecommunications sector.

EXHIBIT A-1

**Telecommunications**

## User Expenditure Forecast by Delivery Mode, 1992-1998 ($ Millions)

| Delivery Modes | 1992 ($M) | Growth 92-93 (%) | 1993 ($M) | 1994 ($M) | 1995 ($M) | 1996 ($M) | 1997 ($M) | 1998 ($M) | CAGR 93-98 (%) |
|---|---|---|---|---|---|---|---|---|---|
| Sector Total | 3,597 | 16 | 4,160 | 4,833 | 5,637 | 6,567 | 7,678 | 8,971 | 17 |
| *Professional Services* | 1,165 | 16 | 1,350 | 1,565 | 1,831 | 2,132 | 2,485 | 2,899 | 17 |
| - IS Consulting | 245 | 20 | 295 | 350 | 415 | 491 | 580 | 689 | 18 |
| - Education & Training | 155 | 26 | 195 | 235 | 280 | 336 | 405 | 485 | 20 |
| - Software Development | 765 | 12 | 860 | 980 | 1,136 | 1,305 | 1,500 | 1,725 | 15 |
| *Systems Integration* | 236 | 22 | 288 | 355 | 432 | 524 | 634 | 769 | 22 |
| - Equipment | 64 | 20 | 77 | 94 | 113 | 136 | 165 | 200 | 21 |
| - Software Products | 16 | 25 | 20 | 27 | 34 | 40 | 47 | 53 | 22 |
| · Applications Software | 8 | 25 | 10 | 13 | 16 | 18 | 21 | 24 | 19 |
| · Systems Software | 8 | 25 | 10 | 14 | 18 | 22 | 26 | 29 | 24 |
| - Professional Services | 154 | 22 | 188 | 230 | 280 | 342 | 415 | 508 | 22 |
| - Other | 2 | 50 | 3 | 4 | 5 | 6 | 7 | 8 | 22 |
| *Systems Operations* | 73 | 12 | 82 | 95 | 110 | 125 | 142 | 161 | 14 |
| - Platform Operations | 22 | 9 | 24 | 27 | 29 | 32 | 34 | 37 | 9 |
| - Applications Operations | 35 | 11 | 39 | 45 | 52 | 58 | 66 | 75 | 14 |
| - Desktop Services | 9 | 11 | 10 | 12 | 14 | 16 | 18 | 20 | 15 |
| - Network Management | 7 | 29 | 9 | 12 | 15 | 19 | 24 | 29 | 26 |
| *Processing Services* | 1,060 | 14 | 1,210 | 1,385 | 1,600 | 1,851 | 2,152 | 2,490 | 16 |
| - Transaction Processing | 1,060 | 14 | 1,210 | 1,385 | 1,600 | 1,851 | 2,152 | 2,490 | 16 |
| Network Services | 119 | 18 | 141 | 168 | 202 | 243 | 291 | 349 | 20 |
| - Electronic Info. Svcs. | 98 | 17 | 115 | 137 | 164 | 196 | 234 | 280 | 19 |
| - Network Applications | 21 | 24 | 26 | 31 | 38 | 47 | 57 | 69 | 22 |
| *Applications Software Products* | 411 | 19 | 490 | 586 | 701 | 842 | 1,010 | 1,217 | 20 |
| - Mainframe | 199 | 15 | 229 | 263 | 303 | 348 | 400 | 460 | 15 |
| - Minicomputer | 100 | 21 | 121 | 148 | 180 | 220 | 268 | 330 | 22 |
| - Workstation/PC | 112 | 25 | 140 | 175 | 218 | 274 | 342 | 427 | 25 |
| *Turnkey Systems* | 533 | 12 | 599 | 679 | 761 | 850 | 964 | 1,086 | 13 |
| - Equipment | 239 | 8 | 258 | 286 | 310 | 335 | 375 | 420 | 10 |
| - Software Products | 203 | 15 | 233 | 265 | 300 | 339 | 384 | 431 | 13 |
| · Applications Software | 177 | 16 | 205 | 234 | 266 | 302 | 344 | 388 | 14 |
| · Systems Software | 26 | 8 | 28 | 31 | 34 | 37 | 40 | 43 | 9 |
| - Professional Services | 91 | 19 | 108 | 128 | 151 | 176 | 205 | 235 | 17 |

## B
## Forecast Reconciliation

Exhibit A-2 offers a reconciliation of the 1992 and 1993 forecasts for the telecommunications sector.

EXHIBIT A-2

**Telecommunications**

### 1993 MAP Data Base Reconciliation ($ Millions)

| Delivery Modes | 1992 Market | | | | 1997 Market | | | | 92-97 CAGR per data '92 Rpt (%) | 92-97 CAGR per data '93 Rpt (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1992 Report (Fcst) ($M) | 1993 Report (Actual) ($M) | Variance from 1992 Report ($M) | Variance from 1992 Report (%) | 1992 Report (Fcst) ($M) | 1993 Report (Fcst) ($M) | Variance from 1992 Report ($M) | Variance from 1992 Report (%) | | |
| Total Sector | 3,582 | 3,597 | 15 | 0 | 7,425 | 7,678 | 253 | 3 | 16 | 16 |
| Professional Services | 1,159 | 1,165 | 6 | 1 | 2,331 | 2,485 | 154 | 7 | 15 | 16 |
| Systems Integration | 235 | 236 | 1 | 0 | 611 | 634 | 23 | 4 | 21 | 22 |
| Systems Operations | 73 | 73 | 0 | 0 | 135 | 142 | 7 | 5 | 13 | 14 |
| Processing Services | 1,058 | 1,060 | 2 | 0 | 2,129 | 2,152 | 23 | 1 | 15 | 15 |
| Network Services | 118 | 119 | 1 | 1 | 279 | 291 | 12 | 4 | 19 | 20 |
| Applications Software | 410 | 411 | 1 | 0 | 1,008 | 1,101 | 2 | 0 | 20 | 20 |
| Turnkey Systems | 529 | 533 | 4 | 1 | 932 | 964 | 32 | 3 | 12 | 13 |

There were only minor differences between the 1992 projection for 1992 expenditures and the actual amounts noted in the 1993 report. The maximum variance was a 1% 1992 understatement of 1992 turnkey systems, professional services and network services revenues.

Variances in the market projections for 1997 ran from 1% to 7% for six of the seven delivery modes, averaging a 3% overall increase in 1997 expenditures, and reflect minor adjustments in the 1997 forecasts for the indicated delivery modes.

The small variations in the 1992-1997 compound annual growth rates (CAGRs) include 1% increases in all delivery modes except processing services and applications software. These increases are the result of the improved outlook for information services expenditures in this market, but taken together, are not enough to increase the overall industry CAGR above the 16% forecast in 1992.

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- Acquisition targets

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