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Letter
Original

February 20, 1987

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Dear
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:

Enclosed please find the report U.S. Information Services Cross-Industry Markets, 1986-1991--Value-Added Networks Sector.

The information and analysis contained in this study is based on data available through early January 1987. The report and the enclosed tab are to be inserted alphabetically in the second Market Analysis and Planning Services (MAPS) binder, as part of Chapter IV, titled Cross-Industry Markets.

Please feel free to call us if you have any questions.

Sincerely yours,

Victor S. Wheatman
Senior Consultant

VSW:ml

Enclosure

U.S. INFORMATION SERVICES
CROSS-INDUSTRY MARKETS, 1986-1991
VALUE-ADDED NETWORKS SECTOR

DECEMBER 1986

U.S. INFORMATION SERVICES
CROSS-INDUSTRY MARKETS, 1986-1991
VALUE-ADDED NETWORKS SECTOR

CONTENTS

U.S. INFORMATION SERVICES
CROSS-INDUSTRY MARKETS, 1986-1991
VALUE-ADDED NETWORKS SECTOR

EXHIBITS

I MARKET SIZE AND GROWTH

- Value-added networks (VANs) are publicly available data carriers which augment basic network transmission with computerized (usually packet) switching and other features. These features include:

  - Protocol and speed conversion, permitting dissimilar devices to exchange data.

  - Error detection/correction.

  - Store and forwarding.

  - Host computer interfacing.

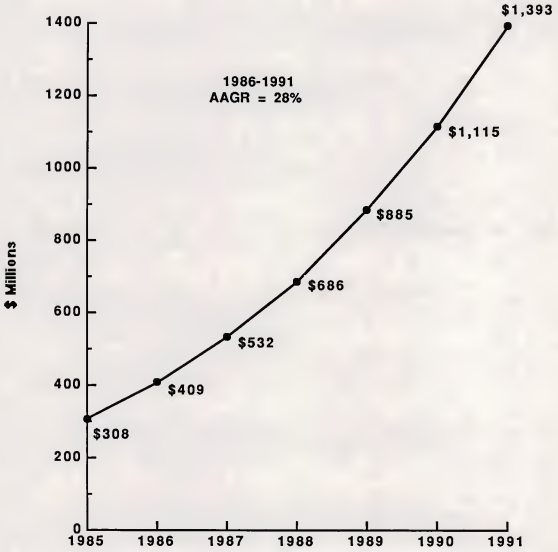
- VANs are available on a dial-up basis, or a customer may be directly connected through a leased line to a network node.

- In 1986, the market for value-added network services grew 33% over 1985, with user expenditures for VAN services reaching $409 million. From this level growth will continue based on an average annual growth rate (AAGR) of 28% through the forecast period to 1991, as shown in Exhibit I-1.

- Due to continuing price competition for these commodity services, traffic volumes are growing at a higher rate than revenue and, for some vendors, profitability has remained elusive.

EXHIBIT I-1

VALUE-ADDED NETWORKS MARKET GROWTH
(Noncaptive - Services Only)



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- Transaction applications such as electronic data interchange (EDI), point of sale (POS), and check verification/authorization networks are driving VAN growth, with electronic mail (E-mail) and on-line data base (OLDB) access close behind.

  - EDI usage is embryonic, creating an estimated $48 million 1986 market for communications, processing, software, and professional services, doubling 1985's market.

  - E-mail use will increase as standards acceptance (principally X.400) leads to system interconnectivity and more utility.

  - OLDB will grow throughout the forecast period; however, long-term (and beyond the forecast period), OLDB-related VAN activities will see some erosion due to emerging CD ROM data bases.

  - VAN vendor activities in support of private networks for automatic teller machine (ATM), point of sale (POS) networks, and other applications will contribute to VAN growth.

- In several ways, competition is both increasing and decreasing.

  - Existing VANs continue to be attacked from the high end by hardware vendors selling packet switching equipment for private networks, leading to substantial cost savings for high-volume users.

  - While VANs provide facilities and often equipment for private and virtual private networks, such sales essentially result in revenue losses as they are sacrificial in nature.

- Competition and cooperation are increasing as a result of local exchange carrier (LEC) activities and the nature of value-added communications.

- Local packet networks are being implemented, and Southern New England Telephone's ConnNet interconnects with both Tymnet and ITT's World Communications.

- When and where available, LEC-provided local area data transport (LADT) packet services will be less expensive than existing VAN services.

  . LADTs offer asynchronous to X.25 protocol conversion services.

  . LADTs are targetting the approximately 5% of VAN traffic which stays within the local area.

  . However, with long-haul connections, LADT services will participate in traditional VAN markets and provide additional access points for existing vendors which interconnect to them.

- Cooperation is found in the industry with VANs interconnected to a degree, allowing users of one network to access customers and applications on another.

• Competition is decreasing as industry consolidation continues:

  - Telenet and Uninet have joined as part of the new U.S. Sprint, jointly owned by GTE and United Telecom, forming Telenet Communications Corporation.

  - AT&T's Net 1000 has been cancelled.

  - CompuServe has made known its desire to acquire companies which can contribute to its current directions.

• More industry consolidation is likely to come in the form of mergers or joint ventures.

II ISSUES, TRENDS, AND EVENTS

- As noted, 1986 saw the merger of Telenet and Uninet, thus solidifying Telenet's market lead.

- In early 1987, General Electric announced it was selling the Cylix value-added network which it acquired in the merger with RCA.

  - The VAN originated in 1969 as part of Data Communications Corporation (Memphis, TN).

  - Cylix was purchased by RCA for over $30 million in 1982. It has never been profitable.

  - The new buyers are members of Cylix management. Terms were not disclosed.

- AT&T's Net 1000 was withdrawn, but pieces of the organization and the experience gained form the basis for possible reintroduction.

  - Net 1000 technology is the basis of initiatives overseas, principally in Japan.

  - AT&T's Accunet Packet Services provide multiprotocol support through a joint offering (called RediAccess) with Control Data Corporation (CDC) which provides conversions and packet assembly/disassembly services. Accunet is used for CDC's Redinet EDI service.

- 1986 included a demoralizing, and unfounded, rumor that McDonnell Douglas' Tymnet was for sale, with British Telecom the alleged suitor.

- British Telecom did buy ITT's Dialcom, creating uncertainty about that unit's continued ability to participate in U.S. government markets given its new foreign ownership.

- There have been examples of creative pricing and new services designed to increase network traffic:

  - Telenet's PC Pursuit offers hobbyists unlimited off-peak usage for a flat $25 monthly fee.

  - GEISCO's GEnie provides access to a variety of bulletin boards for $5 per hour off-peak, competing with existing hobbyist services such as the Source, CompuServe, and Delphi.

  - IBM's pricing has been restructured to become more competitive, with reductions in charges for connect time.

  - GEISCO has signed agreements with vertical market specialists in the automotive and apparel industries to sell EDI services along with turnkey systems and software.

- But 1986 did not bode well for videotex services. All three public systems (in Chicago, Florida, and Southern California) abandoned operations. The only interesting videotex development is the availability of the French Minitel service in New York and Los Angeles through Computer Sciences Corporation's Infonet.

- The international communications segment is heating up with:

- IBM announcing intercontinental data processing services through links between its U.S.-based Information Network, the IBM World Trade Europe/Mid East/Africa Corporation, and IBM Japan.

- GEISCO announcing Trade*Express, an international Electronic Data Interchange service. IBM's and GEISCO's actions may put pressure on Computer Sciences Corporation's Infonet which is positioned as a network for multinational corporations but which does not (yet) offer EDI services.

- McDonnell Douglas and British Telecom forming EDINet Ltd. for services in the United Kingdom, with planning underway for services in the Far East.

- AT&T's Packet Service planning expansion to 20 international countries.

- In this highly competitive environment, it is difficult to see any opportunities made possible by unbundling remote computing services (RCS) networks, where most VANs (except Telenet) had their beginnings.

  - However, Wang has opened and expanded its internal packet network, called WangPac, and formed a subsidiary now offering network services. It will likely operate as a remote computing service in the future.

  - Also, troubled Western Union has entered the packet switching market fray through the network originally developed as EasyLink's backbone for electronic mail.

- Technologically, more protocols are being supported and dial up access to 2,400 bps ports has become widely available, with CSC providing 4,800 bps ports.

- In 1986, most VANs enhanced their communications capabilities with SNA support, permitting users to link their terminals, micros, and mainframes via SDLC and 3270 protocols.

- New modems using error correction techniques are capable of speeds exceeding 9.6 Kbps on dial-up lines. VAN support for these higher speeds is expected, requiring capital expenditures.

- At year's end, several VANs joined with user organizations in lobbying efforts to prevent regulation of enhanced packet switched and protocol conversion services, as proposed by the Federal Communications Commission.

  - One alternative being considered would put VANs under regulatory restraints while allowing AT&T and the Bell Operating Companies to offer value-added services as part of basic services.

  - The proposal would redefine packet network services with protocol conversion as basic services, subjecting them to common carrier regulation by federal and, more troubling, state public utility commissions.

  - The protesting vendors and organizations fear such action would reduce competition, create regulatory burdens, and increase dial-up line access charges, an entirely unacceptable and business-threatening scenario.

- INPUT feels the FCC's proposals will be modified to permit continuing competition in the network services market while protecting the interests of current participants.

- Overall, the VAN market shows bright spots despite commodity pricing creating thin margins and low or no profitability.

- In many cases, a vendor's VAN has been the delivery mode for other services and as such may have been viewed as a loss leader. VANs may have brought in business as part of the total vendor solution with profits generated by providing other services and/or information.

- However, INPUT observes the market's direction toward a focus on corporate links rather than providing access to traditional timeshared remote computing services which are being brought in-house by users. VANs are now providing specialized vertical market applications and transaction services.

- Industry consolidation will help the now stronger players, but uncertainty over the impact and opportunities of LADT services (clearly a long-term local telephone company strategy), coupled with increasing traffic volume, new applications, advancing technologies, and potential regulatory restrictions, means the industry will be anything but dull for its participants.

- Key VAN trends are summarized in Exhibit II-1.

EXHIBIT II-1

VAN TRENDS

- Market Consolidation
- International Activities Increase
- Technological Improvements: Speeds, Protocols
- Corporate Links Emphasized
- Regulatory Threats

III COMPETITIVE DEVELOPMENTS - VENDOR PROFILES

A. TELENET

1. BACKGROUND

- Telenet Communications Corporation (Reston, VA) is now part of U.S. Sprint, formed jointly by GTE and United Telecom. It consists of two formerly separate, and competing, VAN and long-distance networks.

- The first to use packet switching technology for public communications, Telenet was originally established in 1972 by Bolt, Beranek and Newman, Inc. (Cambridge, MA) and the original Telenet Communications Corporation, which was acquired by GTE in 1979.

- Publicly offered services began in 1975 as a "pure" communications service, unlike most VANs which were formed by unbundling communications from remote computing services.

- Telenet is the largest VAN by revenues, with access in approximately 370 U.S. cities and overseas connections in 55 nations through its own nodes and other facilities. By merging with United Telecom's Uninet, the resulting VAN strengthens Telenet's market dominance.

- The company has offered former Uninet customers to continue the Uninet billing formats until July 1987 due to customer dissatisfaction with Telenet billing structures.

2. SERVICES

- Telenet provides access to Telemail E-mail services, with hard copy options and direct connections to Telecom Canada's Envoy, the first link between public electronic mail systems.

- Telenet also supports the Medical Information Network in association with the American Medical Association and the Phycom pharmaceutical products data base developed by Fisher-Stevens, Inc.

- Other applications are the Financial Information Network, Micro-Fone II credit transaction services for which GTE provides terminals, and PC SUNet for downloading software to IBM PCs and compatibles.

- In 1986, Telenet and Contemporary Group announced plans to provide a national paging service called Megamessage, with Telenet serving as the backbone transmission carrier.

- INPUT anticipates that Telenet will offer EDI services in 1987, and it has been promoting its electronic mail service for EDI-like applications.

- In addition to VAN services, the company provides dedicated private networks for government agencies, multinational corporations, and foreign governments and has transaction pricing available for credit card and other burst mode applications.

3. FINANCIALS

- Telenet has been profitable since 1983, although revenues are not separately reported by U.S. Sprint or earlier by GTE.

- Estimated 1986 revenues are in the $180-200 million range, reflecting the merger of Uninet into Telenet.

B. TYMNET

1. BACKGROUND

- The McDonnell Douglas Information Systems Group (ISG) was created in April 1984 consolidating three McDonnell Douglas divisions and the newly acquired Tymshare, Inc. subsidiary (with the Tymnet VAN). McDonnell Douglas' acquisition of Tymshare was completed in March 1984 for approximately $312.7 million.

- Tymnet was originally formed due to demand for network services from Tymshare's remote computing service clients. It is the second largest VAN.

- The major portion of Tymnet is now called McDonnell Douglas Network Systems Company, although EDI and vertical industry services form their own companies within the group, sharing facilities and services as appropriate.

- Tymnet serves approximately 50 countries and over 500 U.S. cities. International access is supported via International Record Carriers (IRCs); however, the company's majority ownership of FTCC (an IRC) was recently sold to a unit of Pacific Telecom.

2. SERVICES

- The group provides services to vertical and horizontal businesses through focused operating groups and also sells products and services to other ISG companies.

- Among services Tymnet provides are:

  - Check verification services.

  - Credit card authorizations.

  - Electronic data interchange.

  - VAN services for a variety of applications and customers.

- Tymnet also supports the OnTyme family of E-mail services, asynch, bisynch, and SDLC (3270) protocol access, and the X.PC error correcting protocol, with protocol conversions offered as part of the value-added service.

- Tymnet has an agreement with the Southern New England Telephone (SNET) company to provide access to its long-haul network from SNET's intraLATA packet network called ConnNet.

- Tymnet DTS, Inc., a subsidiary of the Network Systems Company, provides microwave digital termination services in several cities. This unit is believed to be for sale.

- Introduced in 1986, Tymnet's Tymstar Ku-band satellite network uses four-foot diameter earth stations, with transmission speeds up to 96 Kbps and receiving capabilities at T-1 carrier rates.

- Each earth station communicates with a shared master hub earth station, operated by Tymnet, or with one purchased by the user.

- Tymstar service uses Tymnet's existing packet switching technology and earth stations manufactured by Satellite Technology Management, Inc. (Torrance, CA).

3. FINANCIALS

- Prior to its acquisition and the 1985 blending of Tymshare's operations into various ISG operating group companies, Tymshare had revenue of nearly $300 million and 1983 net losses of $1.6 million.

- In fiscal year 1985, ISG reported nearly $110 million in losses on revenues of $1.1 billion (an increase of 13%) due to industry sluggishness and adjustments for corporate reorganizations. In response, plans for new services were delayed and the group closed a manufacturing operation, named new executives, and laid off workers.

  - Irrespective of group losses, Tymnet's business grew nearly 30% in 1985.

  - However, for the first three quarters of 1986, ISG reported continuing losses of over $75 million.

- INPUT estimates Tymnet's 1986 revenues in the $115-125 million range.

C. GENERAL ELECTRIC INFORMATION SERVICES COMPANY (GEISCO)

1. BACKGROUND

- GEISCO (Rockville, MD), established in 1984, is a division of General Electric. It provides the Mark*Net VAN, available in over 750 cities

worldwide with 600 access points in the U.S., representing the world's largest commercial teleprocessing network.

2. SERVICES

- GEISCO offers a broadly based service, with applications supporting international commodities, securities and currency markets, and international banking. Other industries served include manufacturing, shipping, retail, health care, and computer hobbyists.

- GEISCO's network provides access to a variety of processing services including its national clearinghouse for health care insurance claims, financial institution automated clearinghouse services, payment systems, and computer conferencing.

- The electronic mail service, called Quik-Comm, includes WPXchange, a storage and retrieval capability linked to the E-mail service, featuring word processing and document translations between incompatible computer hardware.

- The Mark 3000 remote computing service is IBM mainframe-based, but offerings in the Mark III service are more broadly based.

- GEISCO's strategic plan is to leverage the worldwide network presence and to focus on cross-industry applications, including EDI, business logistics, and international trade.

- It is also targetting vertical markets including banks, transportation, health care, and discrete manufacturers.

  - EDI services are provided through EDI*Express and Trade*Express, which supports international trading. The company has signed with several banks (including First Chicago) for international trade payment services.

- With its EDI service, the company is intent on signing with agents to sell its services along with industry-specific software and hardware.

  . For example, Apparel Computer Company, American Business Computer (selling primarily to the auto industry), and MSA have agreements with GEISCO.

  . MSA is integrating EDI software purchased from Transettlements (Atlanta, GA) into its mainframe accounting and inventory management packages.

- GEISCO has invested an estimated $15 million and the skills of approximately 150 professionals in EDI, focusing individuals on specific industry segments.

- EDI services are sold in a "ramp up" process which sells to the largest members of a trading group, then uses telemarketing to sign smaller accounts in the group.

- GEISCO abandoned a plan to offer national automated clearinghouse services (ACH) primarily due to lagging ACH volumes and competition from the Federal Reserve Bank. However, GEISCO does support a regional ACH in California.

- In 1985, the company announced the GEnie consumer information service for microcomputer users, with low cost hourly rates, access to electronic bulletin boards, software libraries, electronic newsletters, and games.

- In 1986, the company added support for 3270 SNA/SDLC protocols, in addition to existing synchronous and bisynchronous service, through Mark*Net, to the company's IBM-oriented Mark 3000 RCS services.

- GEISCO's philosophy is that the company will not enter any business where it cannot achieve a dominant or near dominant position. Rather than solely providing basic network services, such as electronic mail, GEISCO is positioning to leverage its data transmission, remote processing, and industry-specific applications in targetted markets.

3. FINANCIALS

- In 1984, the company spent $20 million upgrading equipment, spending another $8 million in 1985.

- As did many information service companies, GEISCO experienced difficulties during 1985, resulting in staff cutbacks.

  - The company announced the cutbacks were part of a restructuring leading to a tighter business focus.

  - Company officials acknowledge that network-based services contributed only 10% to the business. However, company officials established a 1986 goal of increasing the contribution of network services to 20%.

- INPUT estimates 1986 revenues in the $40-50 million range.

D. COMPUTER SCIENCES CORPORATION (CSC)

1. BACKGROUND

- CSC (El Segundo, CA), founded in 1959, is the largest independent professional services company in the industry, providing systems engineering and development, communications engineering, facilities management, and processing/network services.

- CSC was one of the first remote computing service vendors and now provides a range of services in domestic, international, and governmental markets. The vendor's value-added network (Infonet) is oriented toward multinational corporations.

- CSC entered the VAN network services market in August 1983 through its Infonet subsidiary, which is part of the company's Information Network Services Group.

  - Infonet currently serves approximately 400 international cities, with links in 19 nations through dedicated lines and in 51 additional countries served via IRC connections.

  - CSC's positioning as an international VAN is strengthed by a stated commitment to local support by CSC employees (rather than agents) in major industrialized nations.

- The group has been repositioned into three major areas:

  - Value-added communications, with the network uncoupled from the company's host processors, allowing VAN services to be sold separately, with enhanced electronic mail (NOTICE) capabilities.

  - Professional services for AT&T and others.

  - Remote and distributed data processing using the company's IBM-based service.

- Company officials indicate there have been informal acquisition discussions. Possible suitors include automakers (excluding GM), DEC, and AT&T. While acquisition is not inconceivable, there is apparently little present interest in being acquired. An unfriendly takeover would likely be unsuccessful because

much of the company's assets are its people. Any unfriendly takeover candidate must be careful to protect that asset base.

- Rather than be acquired, CSC officials indicate interest in buying firms with expertise in systems integration, health care, and/or financial services. In 1986, the company bought:

  - Computer Partners, Inc. (Waltham, MA), a small professional services firm with approximately $20 million in revenues which custom designs computing systems.

  - Comtec, Inc. (Farmington Hills, MI), an information systems supplier to health maintenance organizations with annual revenues of approximately $10 million.

2. SERVICES

- The company targets large multinational and multilocation organizations, including Fortune 1000 companies and communications, distribution, and manufacturing industries as well as federal and state agencies.

- CSC has relied heavily on government business and is working to expand its activities into more profitable commercial activities.

- Infonet's international profile serves well to differentiate its services, enhanced by CSC representatives versed in local languages, customs, and procedures in many landed countries.

- In 1986, CSC made several software and service announcements:

  - An agreement with Simware (Ontario, Canada) for software to allow micros to access mainframes through 327X protocols via Infonet.

- A micro package called PC/Notice allowing ASCII or binary file transfers through the network's NOTICE electronic mail service.

- An agreement with Orion Software (Lexington, MA) for OrionNet service, permitting customers to link IBM System/34, 36, and 38 minicomputers through Infonet.

- The addition of SNA/SDLC and 3270 protocol support.

- The linking with the French Minitel videotex network to New York and Los Angeles.

- The company has been focusing its host computer services toward the federal government and growth markets in certain industries for remote processing and nationally available industry-specific applications. Examples include:

  - On-line inventory control.

  - Administrative information and software distribution between a software vendor's domestic headquarters and international offices.

  - Support of the U.S. Army's worldwide recruitment activities.

- Further, CSC's professional services in facilities management, system development, and integration are being leveraged in both domestic and international markets.

- The NOTICE E-mail service can link messages to a data base and provide form processing, information file transfer, and microcomputer-based electronic mail as well as telex access. CSC is believed to be investigating an adaptation of NOTICE for EDI applications.

3. FINANCIALS

- CSC is rebounding from a multiyear slump. It has announced a goal of more profitable commercial activities accounting for one-half of its activities (rather than the current one-fourth) by the 1990s. This represents a shift in priorities from governmental contracts which are increasingly fixed-price and low profit.

- Fiscal year 1986 revenue for the company was $838.6 million, a 16% increase over the previous year. Pre-tax income was reported at $42.8 million, an increase of 36% (excluding one-time gains).

- In 1986, the Information Network Services Group accounted for 12% of the company's overall revenues or $100.3 million, with 48% from federal, state, and local governments; 39% from commercial activities; and 13% from international business. INPUT estimates VAN revenues in the $14-18 million range.

- The company expects as much as two-thirds of the group's revenue for fiscal 1987 will come from new communications and professional services introduced over the past several years.

- The company reported 1985 revenue for the Information Network Services Group of $92 million (down from 1984's figure on continuing operations of $95.2 million) but with a return to profitability.

- Historically, profit margins on Infonet were very high through 1981 but dropped as demands for timesharing eroded, leading to a loss in fiscal 1984, but rising in 1985 with an estimated profit margin of 3%.

- Earlier, the company established a 10-12% profit margin goal for the group, with growth on the order of 15%. The plan is to accomplish this through cost containment measures, successful marketing of new products and services, consolidation of equipment and facilities, and group function restructuring.

E. IBM'S INFORMATION NETWORK (IN)

1. BACKGROUND

- The Information Network (IN) was formed in 1982 as an independent business unit (IBU) within IBM offering SNA networking and remote processing services.

- IN was upgraded in 1985 with new computer center facilities and other measures designed to improve large users' abilities to connect their SNA networks, use network-based applications, and link with other customers.

- Earlier, IN was available in a few U.S. cities representing a majority of its large mainframe customer installations, but now dial-up access is possible in over 100 cities.

- IN also connects to Telenet for additional access.

2. SERVICES

- Two services are supported on IN:

  - Network Services, for linking a customer's mainframes and terminals in a managed network environment.

  - Information Exchange, which provides "store and forward" and other value-added services.

- The target markets for IBM's Information Network are best described as "dedicated IBM shops" with users in electronics (mostly IBM and suppliers), textiles, insurance, and telecommunications.

- In 1986, IBM announced Intercontinental Information Services to link transnational offices in the U.S., Asia, Europe, Africa, and the Middle East with data processing, office system, and file transfer services.

- IBM appears to be placing more attention on EDI services.

  - In late 1986, IN began distributing EDI software from Metro Mark, Inc. (Roslyn Heights, NY) and American Business Computer, Inc. (Farmington Hills, MI).

  - IN hosts Ad/TRACs (Advanced Transaction Rearrange and Conversion System) from Advanced Technology Systems (Norcross, GA) for EDI translations.

- INPUT believes the company's largest EDI users continue to be units of the parent firm and its suppliers.

- IN's Insurance Communications Service, selected by the Insurance Research Institute (IRI) to perform protocol conversions for up to 70 types of terminals and processors of independent insurance agents and corporate underwriters, also provides message switching and processing at volume discounts.

  - The Insurance Value Added Network Service (IVANS), operated by a separate company established by IRI, uses IBM's service supplemented with customized facilities and supervisory and support services.

  - Independent insurance agents can directly access a carrier's computers.

  - Approximately 40 insurance company host computers are connected to IVANS, serving over 3,000 independent agents.

  - IVANS is not believed profitable.

3. FINANCIALS

- Company representatives indicate that the network business doubled in 1985, and access charge price cuts were implemented in August 1986 to further encourage use.

- INPUT estimates 1985 total revenue for the Information Network in the $60-$100 million range. Estimates for 1986 total revenue are in the $80-120 million range, with noncaptive VAN services accounting for approximately $10-20 million in user expenditures.

F. COMPUSERVE INCORPORATED

1. BACKGROUND

- CompuServe (Columbus, OH), formed in 1969, was acquired by H&R Block, Inc. in 1980.

- Services are oriented to both consumer and commercial accounts. Its target markets are hobbyists, the financial community, and POS credit card processing firms (VISA and seven others). Transaction processing in 1985 is said to have increased 25 times over 1984 volume (to 4.2 million transactions monthly), becoming one of the fastest growing company activities.

- CompuServe's Network Services is a VAN available to corporations, government agencies, and financial institutions with access in over 200 U.S. cities and in 196 countries via IRC gateways. Additional access is possible through other VANs.

2. SERVICES

- Offered services include electronic mail, on-line data bases, shopping services, airline ticket reservations (via TWA's PARS system), and financial services including economic analysis, discount securities trading, home banking, and international funds transfer for overseas credit union members.

- CompuServe entered the point-of-sale (POS) information market in an agreement with VISA to provide computerized support for retail credit authorization and verification of charge card sales. Similiar agreements were signed with other private credit issuers.

- The EasyPlex (consumer) and Infoplex (business) electronic mail services and MCIMail were linked in early 1986 in the first U.S. connection between E-mail systems. Infoplex is used by approximately 150 Fortune 1000 companies.

- CompuServe has an exclusive agreement with two Japanese firms (Fujitsu and Nissho Iwai) to provide international services between Japan and the U.S., such as financial market information exchanges, positioning the company for further overseas activities.

- In 1986, the company announced its intention to buy SC-30M computer systems from Systems Concepts to meet anticipating mainframe processing and capacity demands resulting from business growth. These systems will be compatible with its current DEC processors.

- CompuServe has made known its desire to acquire companies offering new skills and technologies which will strengthen existing businesses.

  - Candidates may be service businesses providing on-line communications (E-mail and/or private, customized information services), data bases, shopping services, POS communication services, health care eligibility verification services, or facilities management companies.

- It is also interested in OEM relationships fostering sales to Fortune 1000 and major financial institutions.

- Targetted markets include: investment banking, pharmaceuticals/chemicals, retail, restaurants, and high technology firms.

- The company has established a goal of increasing the current subscriber base of approximately 300,000 to 1 million within three years by adding additional services, using new marketing strategies, entering joint ventures with other companies, and adding business subscribers.

- CompuServe is moving away from computing services by forming private networks to provide business customers with access to specialized data bases.

- Several additional products are being considered by CompuServe to fill niches. Examples include weather forecasts which are currently offered to private pilots, graphic videotex services, and EDI services.

3. FINANCIALS

- Fiscal 1986 revenue totaled nearly $85 million, an increase of 23.4% from the previous year, with $10 million in pretax earnings, an increase of nearly 40%.

  - Approximately one-half of its revenues are from remote computing services.

  - Communications services accounted for an estimated $8 million in annual revenue.

  - The balance of the company's revenues are derived from data base access and other services.

- Revenues for the third quarter ending January 31, 1986 were $21.5 million, an increase of nearly 22% from the same period one year earlier. Revenues for the nine-month period increased 26% to $62.4 million.

- Fiscal 1985 revenue totaled nearly $69 million, an increase of 33% from the previous year with nearly $8 million in profits.

- Parent company H&R Block reported 1986 fiscal year revenue of $606.7 million and net earnings of $60.1 million. Owner H&R Block earlier rejected an offer by a former company official to buy CompuServe. While the parent company has experienced losses in several quarters, its subsidiary is returning a respectable, and needed, profit.

- CompuServe has approximately 750 employees and claims more than 200 large corporate users in addition to individual service subscribers.

G. AT&T

1. ACCUNET PACKET SERVICE/REDIACCESS

- AT&T's Accunet Packet Service was orignally the backbone for AT&T's Information System's Net 1000, which was discontinued in June 1986. It was formerly known as the Basic Packet Switching Service and required customers to install dedicated trunks to shared network switches. Now, several access options are offered.

- Accunet Packet Service is available in 99 U.S. cities. By itself, the network does not fit the definition of value-added network, principally because of current regulatory restrictions on protocol conversion.

- The offering is billed as a basic service, supporting X.25 traffic from the customer into the network.

- Data Termination Equipment (DTE), data circuit terminating equipment (DCE), and packet assembly/disassembly equipment (PAD) are the customer's responsibility, as are links to the service.

- However, through a joint offering with Control Data Corporation (CDC), RediAccess service increases access points to 150 locations and adds multi-protocol (asynch/bisynch/synchronous) support through CDC which provides PAD equipment. Accunet facilities are used by CDC for the Redinet EDI service.

- Further, access is possible through five local exchange carrier (LEC) local access data transport (LADT) networks which provide asynchronous to X.25 conversion as part of the offering. In addition, access may be gained through other value-added networks.

- There is no holding time charge for domestic use. Customers are billed only for actual data kilopackets sent and received. International service does carry a holding time charge. There is also a fixed monthly charge for a customer's dedicated ports.

- Plans for Accunet Packet Service call for expansion from the 13 international interconnections to a total of 20 such links and connections with five local area public data networks (LADTs) operated by LECs. In the future, per call billing, customer network management, and additional access will be supported as needs arise.

2. THE CANCELLATION OF AT&T's NET 1000

- In January 1986, AT&T Communications announced it would withdraw its value-added packet switched/remote computing service called Net 1000

effective June 1986. The network was not meeting profit objectives, with 1984 estimated revenues under $3 million and 1985 not showing any improvement as customers left the service.

- There were difficulties in developing NET 1000. It was originally introduced as Advanced Communications Systems in 1978 and was reintroduced in 1983. The original design was modified to rely on existing IBM and DEC computers rather than use Western Electric processors which were delayed in development.

- Primary services available on Net 1000 were mortgage information, an electronic data interchange (EDI) service, and an automotive supply inventory service.

- AT&T had asked for FCC approval to offer the EDI Information Interchange services in conjunction with ATT Information Systems, saying discontinuation was possible. However company officials denied the closing was due to unfavorable FCC reaction to this and other proposals.

- Net 1000 was directed at a different market than traditional VANS and had broader capabilities. The idea was to provide a comprehensive, compatible network of networks connecting various corporate private networks and supporting any combination of computers.

  - Customers could load data bases and Cobol-like applications written in the "C" language on network node computers using store and forward services and tying their own processors to the network.

  - Net 1000 was a dual mode intelligent network which overlayed an on-line application-oriented processing service on a foundation of a transparent network.

- The original perceived need for the combined network and RCS service was not cost-effective for many users and not needed for others.

  - Customers preferred to install applications on their own processors. Much of the processing AT&T intended to provide can now be done on microcomputers.

  - The cost of using NET 1000 for communications alone versus private or other packet networks was not justifiable.

- In addition to these factors, AT&T had marketing problems. Rival firms told INPUT that the company failed to follow through in competitive bidding situations.

- Further, IBM mainframe users perceived that IBM's Information Network, with its SNA backbone, was more trustworthy than Net 1000 which supported any combination of computers. IBM was seen as having more SNA expertise.

- AT&T will remain active in the VAN market.

  - Barring unforeseen events, it will maintain EDI presence through a relationship with Control Data's Redinet which uses Accunet facilities.

  - With CDC, multiprotocol support is provided on Accunet in the RediAccess service.

3. AT&T's T-SERVICES

- In April 1986, AT&T Information Systems announced it was opening its private packet switched network to others in support of a new point-of-sale network called AT&T Transaction Services or T-Services.

- T-Services provides customer network control, protocol conversion, and preprocessing for POS network vendors, offloading the customer's host computers.

- Access was originally available in 90 locations throughout the U.S.

- CoreStates Financial Corportion, the holding company of the Philadelphia National Bank, is using T-Services for a POS system being constructed for the Sun Refining Company.

- T-Service charges are based on start-up fees, monthly charges, and usage fees.

- When permitted, AT&T may offer processing services similiar to those provided earlier through NET 1000 directly via its other network offerings.

H. GRAPHIC SCANNING CORPORATION/GRAPHNET

1. BACKGROUND

- Formed in 1968, Graphic Scanning Corporation (Teaneck, NJ) is involved in several communications services.

  - Prior to recent divestitures, it had cellular radio, paging, mobile telephone, telephone answering services, cable television, and direct broadcasting by satellite (DBS) interests as well as manufacturing operations.

  - Until late 1986, the company held a substantial interest in FundsNet, Inc. which provides electronic funds processing, funds transfer, credit card processing, and other services for the transportation and general

business market. FundsNet was sold to National Business Systems, Inc. (Minneapolis, MN).

- Subsidiary Graphnet Inc. provides data communications and messaging services via a value-added network. Graphnet, begun in 1975, was optimized for switched, store and forward facsimile services which have since been expanded with a variety of services.

2. SERVICES

- Graphnet services include:

  - The Freedom Network, a global packet switching service for messaging, supporting communications among a variety of equipment domestically, and telexing devices internationally.

  - Freedom Express, which provides electronic, courier, and telephone voice delivery as well as electronic mailboxing.

  - Freedom Forward, a store and forward service supporting the Freedom Express E-mail service.

  - Support for a telegram service and the telephoning of messages by subscribers to a service operator using a Freedom Network Gold Card for account billing.

  - Legal Net, connecting major law firms with the Securities and Exchange Commission and state securities commissions for sending and receiving messages and legal documents.

- Graphnet also provides specialized data and message processing for banks and their correspondents, industrial corporations, and government agencies. The Securities Services division provides communications and data base services to

the legal, investment banking, and brokerage communities in connection with security underwriting and distribution.

- In 1986, Graphnet and British Telecom International announced a planned U.S./Great Britain telex service. Graphnet holds common carrier operating agreements in Argentina, Austria, Canada, Costa Rica, Hong Kong, Italy, Mexico, the Phillippines, and Portugal.

- Graphnet claims to transmit in excess of 500 million messages and data transactions annually for over 400,000 customers.

- The company's recent history has been controversial, involving shareholder relationships, certain FCC applications for paging services, and the potential sale of assets to company officials who would then leave the company. Complaints by a shareholder group and a planned proxy battle led to a new president being named.

- Subsequently, Graphic has entered negotiations with several firms, including SouthWestern Bell Telephone, to sell its interests in cellular radio licenses and generate needed capital to bring the company back to profitability.

3. FINANCIALS

- The company has had increasing revenues but also losses for the past three fiscal years.

  - As of September 30, 1985, it had a retained earnings deficit of $50 million.

  - The company recorded a loss of $11.9 million in the year ended June 30, 1985, despite the divestiture of its cellular radio operations which resulted in income of $22.6 million.

- It had a net loss of $11.6 million for the six months ended December 31, 1985, compared with a net loss of $14.3 million the previous year.

- Selected financial information is shown below ($ thousands):

	1983	1984	1985
Total Revenue	107,400.4	124,483.9	155,573.1
Total Expenses	127,846.3	148,631.4	168,388.6
Net Income	-20,325.4	-25,285.5	-11,907.5

- Revenue from Graphnet's specialized data processing and record and data communications (which includes VAN services) in 1985 totalled approximately $30 million, an increase of nearly 11% from the previous year. However, the company had a 1985 loss from these services of over $8 million, continuing a pattern.

- Graphic Scanning has approximately 950 employees.

I. WESTERN UNION CORPORATION (WU)

1. BACKGROUND

- The pioneering Upper Saddle River (NJ) company is facing significant challenges including administrative and organizational problems which have developed over its long history.

- As a result of these problems, the company has reduced its work force by one-fifth, renegotiated new union contracts, reorganized its corporate structure,

and sold certain assets (and will continue to do so), while focusing its efforts on its core business as a record carrier, electronic mail service vendor, and provider of private data networks.

- Western Union Corporation, a holding company formed in 1969 to allow WU to diversify into unregulated areas, is being merged with the primary subsidiary, Western Union Telegraph Company.

- In September 1986, Western Union announced approval by its Board to enter into a letter of intent for acqusition by an investor group consisting of Pacific Asset Holdings, a private financial services organization, and MDC Holdings, Inc., a publicly traded national homebuilder and financial services company.

- The company has seen erosion in its customer base for private data networks due to increasing charges by the local telephone companies for leased lines. WU is trying to move this traffic to its packet switched data network and is seeking to upgrade its current telex customers to electronic mail services.

2. SERVICES

- WU, through subsidiary corporations, offers a wide range of networking services including:

  - Telex, TWX, and Worldwide Telex.

  - EasyLink Electronic Mail Service, Mailgram, Telegram, and Cablegram services. Electronic mail services include volume mailing of computer-originated messages.

  - Long-distance services, formerly called Metrophone.

  - A voice mail resale business using Voice Mail International (Santa Clara, CA) services.

- Special systems and services for voice, data, graphics, and broadcasting, as well as money transfer service.

- Intracompany private messaging via Infocom services.

- In late 1986, WU opened its internal Packet Transport Network or PTN-1 (which supports Easylink) to provide packet switching services for business customers. The network can also access EasyLink and data base services.

  - Additional access points are planned by mid-1987, bringing the total to 180 cities.

  - Both domestic and international services are planned with POS network services viewed as a primary opportunity.

  - Pricing will be a reported 10-15% lower than other VANs, partially due to local connections through the company's long-distance services and, eventually, through 800 IN-WATS service.

- The company also announced plans to introduce EDI services in 1987.

3. FINANCIALS

- Western Union sold its Government Systems unit to Continental Telecom's American Satellite Company for $155 million.

  - The unit provides federal agencies with data communications.

  - WU will provide maintenance and administrative services after the sale is finalized.

- The Government Systems Division provides Safelink, a packet switched network for interactive timesharing and transactions with encryption features for government agencies.

- In 1984, WU posted a $58.4 million loss on revenue of $1.1 billion, and in 1984, reported a $370 million loss primarily due to a write-down on certain transmission and switching equipment. The write-down was part of a financial restructuring and a renegotiation process with its lending institutions.

  - The company's estimated debt is nearly $1 billion.

  - Its external auditors had qualified the 1984 and 1985 financial reports due to uncertainty over the availability of financing to meet debt obligations.

J. WANG INFORMATION SERVICES COMPANY (WISC)

1. BACKGROUND

- In June 1985, Wang Laboratories formed this subsidiary to leverage the company's technology and create an additional revenue source. The company's proprietary and internal WangPac packet switching network has been opened as a value-added network.

  - WangPac was developed with help from Bolt, Beranek and Newman, Inc. (Cambridge, MA).

  - WangPac plans call for 60 packet switching processors, many located in Wang district offices and international locations.

- The network will offer services such as access to data bases and messaging services, gateways to other public data networks, and eventually RCS services with accounting and scientific applications running on Wang and IBM systems.

- WISC's initial offerings are nationally available voice mailbox services based on the DVX Digital Voice Exchange product and an electronic mail service with new portable terminals provided to subscribers.

- Incorporated into WISC, through acquisition, is Walsh Greenwood Company's assets in a subsidiary providing financial market data and analysis information to brokers and traders via telephone lines. The service is called "Shark."

- Wang also owns a subsidiary called Wang Communications, Inc. (Arlington, VA), which is a specialized common carrier.

  - In late 1985, Wang Communications was given permission by the California PUC to provide IntraLATA services in Los Angeles and San Francisco.

  - Wang Communications also has networks in the Boston, Philadelphia, and Chicago areas which extend across state lines.

- The company provides T-1 and higher capacity facilities using a combination of microwave, fiber optics, lightwave, and coaxial cables.

2. FINANCIALS

- After disappointing earnings leading to layoffs and a short manufacturing suspension, Wang Laboratories has been showing signs of recovery.

  - Wang's 1986 corporate revenue was $2.64 billion, an increase of 12%, with net earnings of $51 million, an increase of 228%.

- These results were achieved through streamlining operations, controlling costs, and reducing expenses.

- In January 1987, Wang, saying it would report an operating loss of over $35 million for the second quarter ending December 31 due to weak sales, announced it would fire 1,000 workers and cut pay 6% for U.S. employees, replacing the lost salaries with stock of equal value.

- Aggressive revenue targets for WISC were established; however, INPUT believes revenues for WangPac are still low due to its relatively recent introduction.

K. MCI COMMUNICATIONS CORPORATION (MCI)

1. BACKGROUND

- MCI began as Microwave Communications, Inc. to provide short-haul communications links. These links became longer, and, overcoming AT&T's monopoly along the way, the company became the most successful interexchange carrier (IXC), operating its own microwave, fiber optic, and satellite network.

- The company, through its subsidiaries, provides various domestic and international services including voice, data, record, personal communications, and E-mail services.

- Services are provided to match, or better, similiar offerings from AT&T such as WATS-type bulk services.

2. SERVICES

- MCI's DataTransport is a public packet network offering designed to compete with AT&T's Accunet. The service is directed to users spending $100,000 or more per month for data communications or who operate private networks of approximately 200 devices.

  - Service contracts are customized for each account, and points of presence are established in response to customer needs.

  - Connections with BOC packet networks are planned in order to save access charges for wide area networking.

  - The company is considering a strategic alliance with an equipment vendor to focus on selling private packet networks in a change of emphasis.

3. FINANCIALS

- In December 1986, MCI announced expected fourth-quarter charges of between $500 and $550 million, resulting in a sizable net loss for the year.

  - For the first three quarters in fiscal year 1986, MCI reported $2.67 billion in revenue and $54.1 million in net income.

  - In 1985, MCI reported revenue of $2.54 billion and net income of $113.3 million.

- The company's equipment write-downs are primarily related to the early 1986 acquisition of Satellite Business Systems from IBM in a complicated arrangement in which IBM purchased a portion of the company.

- Another portion of the write-down is due to reorganization and severance pay for over 2,000 dismissed employees.

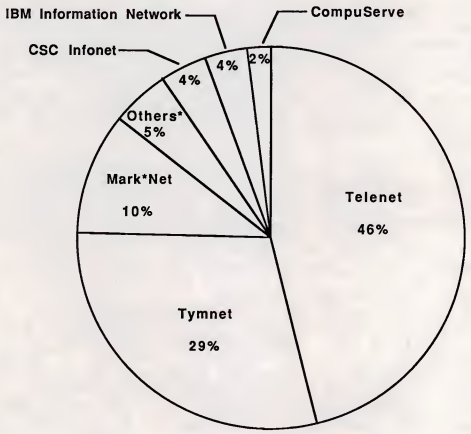
- Data Transport is reported to have only six large users. In January 1987 the company planned a new approach to improve sales by focusing on private network services, possibly in conjunction with a packet switch equipment vendor.

L. 1986 VAN VENDOR MARKET SHARES

- Estimated VAN 1986 market shares, based on user expenditures, are shown in Exhibit III-1.

EXHIBIT III-1

VALUE-ADDED NETWORKS ESTIMATED MARKET SHARES, 1986
(Noncaptive User Expenditures)



*Includes: ADP's Autonet, AT&T's Accunet/RediAccess, Boeing Computer Services, Electronic Data Systems EDS-Net, and Graphic Scanning's Graphnet.

IV CONCLUSIONS AND RECOMMENDATIONS

- VAN services are largely viewed by users as commodities. Available applications are often the only options leading users to choose one VAN over another. Geographical coverage has become less of an issue as networks have expanded.

- Pricing competition requires the general service VANs to find new ways of increasing their share of this growing market. As more players enter the field, maintaining market share will become more difficult, and the ability of new services to develop the critical mass needed for profitability will create significant challenges. The window of opportunity for new VAN services appears to be closing, although industry-specific services may find success.

- The "agent" approach used by GEISCO for EDI services is worth emulating by other carriers in EDI and other application areas, particularly those with a vertical industry focus.

  - By linking its communications services to the expertise of qualified processing, messaging, turnkey, or software vendors, a VAN can efficiently expand its market presence.

  - Of course, it is important to verify that the relationship with chosen agents is within the company's mission and will help meet its goals.

- While VAN interconnections are occurring, there are different pricing approaches. Some vendors charge full price for internetwork links, treating the handoff as another network node and resulting in double charges for the user. Others share communications costs for internetwork communications.

- Critical interconnection issues need to be resolved, particularly for E-mail and EDI services. The X.400 E-mail and X12 EDI standards are directed toward internetwork compatibility which will result in increased network traffic due to improved utility.

- There is inherently little reason for a VAN not to offer EDI services. INPUT is projecting high growth rates for EDI. A vendor failing to provide EDI is missing an opportunity to participate in an area which addresses fundamental business needs. EDI will eventually become a utility/commodity service in its own right, and a firm without an offering may lose some of its current customers. Companies are now locking up industry-specific services; however, opportunities will increase as usage grows.

- Both competition and opportunity for VANs is coming as the local exchange carriers (LECs) implement local area data transport packet (LADT) network services. The LEC strategy is clearly a long-term one since only about 5% of VAN traffic terminates in the same LATA. However, through interconnections with wide area VANs, additional traffic results and new presence points are added with little capital outlay by the participating VAN.

- A long-term threat to VANs is the Integrated Services Digital Network (ISDN).

  - Although a number of technical and market issues remain to be resolved, ISDNs will eventually come into play, offering a full range of communications services, some of which will compete with VAN services. Examples include electronic messaging, on-line data base access, and transaction processing, with ISDN services overcoming equipment and protocol incompatibilities.

- Existing VANs should monitor ISDN development and plan their responses. It may be desirable to initiate or demonstrate services which offer what ISDNs now only promise, including integrated voice, data, and image communications.

- Although growth rates are high, some VANs continue to operate unprofitably. This condition may be acceptable assuming the applications and data bases delivered through the VANs are profitable and if the VAN plays a strategic role in supporting the other services provided by the company.

- The high growth VAN areas are transaction related--EDI, POS, check verification/authorization. Other high growth areas are messaging and on-line data bases.

  - EDI use is embryonic but rapidly growing.

  - E-mail will grow as standards are set and accepted and as system interconnectivity increases.

  - OLDB will grow although the most used data bases are available through multiple outlets and are thus perceived as commodity services.

    . However, industry-specific data bases offer opportunities for differentiation.

    . Additionally, using EDI network traffic to create a unique data base is an opportunity worth investigating. Only one example can now be found, in Sterling Software's Ordernet Division's EDI services to the pharmaceutical industry.

- Vendors active in VAN services would be well served to secure control over the source data that is transmitted over the networks. The financial and

marketing leverage is greatest for the data owner--the network owner will evenutally be squeezed by alternate delivery methods (such as CD-ROM) and other network service vendors.

- Despite the forecast five-year period of strong growth, this recommendation for 1987 may appear premature. However, it is advisable for VAN vendors to allocate some of their profits to securing future control over network data, which represents higher margins, rather than expecting the projected growth rate to continue indefinitely.

- Private networks will increasingly be demanded, and although they compete with public VAN services, VANs can participate through selling packet network switches and providing facilities and professional services supporting private networks.

  - Vendors should therefore enhance their professional services activities not only domestically but also internationally, particularly in countries which are developing communications infrastructures and value-added networks.

  - International activities will extend the life cycles of existing technologies and position vendors for improving the international capabilities, and use, of their networks, applications, and data bases.

- Industry consolidation will likely continue. VANs should continue to evaluate firms which will add to their company's business or which can open large new markets meeting corporate goals and objectives.

- Technological improvements are one way to maintain a competitive edge. There may be opportunities to merge voice and data communications as packetized voice developments continue. Higher speed links accommodating new high-speed modems and cost-effective VSAT services are ways a VAN can expand its traditional services.

- Consumer applications may be the riskiest area, as the U.S. videotex experience has demonstrated.

  - In the long term, when the BOCs and AT&T are free to offer information services, electronic consumer information and services may yet become a substantial opportunity.

  - VANs will have a role to play in interLATA transport of videotex information, but must plan their participation through new relationships with the LECs and continuing relationships with information providers.

- New applications delivered by VANs will continue to develop. Although the market opportunities represented remain to be proven, adaptations of work-at-home ("telecommuting") applications may be of interest in some industry segments.

- Proposed regulatory actions which threaten the heart of VAN services will likely fail, but the directions appear clear--more competition is coming, and innovative approaches, coupled with services which meet user needs in a cost-effective and timely manner, are the avenues to survivability and market success.

- Exhibit IV-1 summarizes INPUT's recommendations to value-added network vendors.

EXHIBIT IV-1

VAN RECOMMENDATIONS

- Look for Strategic Partners
- Resolve Internetwork Pricing Issues
- Offer EDI
- Link with LEC LADTS
- Demonstrate ISDN-Type Services
- High-Growth Areas: Transactions, Messaging, Data Bases
- Offer Professional Services Supporting Private Networks and International Activities

APPENDIX VA-A: FORECAST RECONCILIATION

- Exhibit VA-A-1 shows the reconciliation between INPUT's 1985 forecast and the current forecast for end-user expenditures for value-added network services.
  - The size of the 1985 market has been reduced by $60 million, or 19%.
  - The forecast for the 1990 market has been reduced by $155 million, or 14%.
- These changes were required for three reasons:
  - INPUT defines VANs solely as communications services. To fit this definition, any "processing" must be solely related to communications--switching, store-and-forward, protocol, and code and speed conversions. These user expenditures are in addition to dial-up and leased line costs to a network node.
    - In some cases, applications-related processing fees and fees paid for data base access were improperly categorized in the earlier market sizing.
    - Since communications costs are often bundled into these expenses, INPUT has estimated the portion of application and data base fees paid by users which can be properly associated with transport/communications services.

EXHIBIT VA-A-1

DATA BASE RECONCILIATION OF VALUE-ADDED NETWORK USER EXPENDITURE FORECAST

1985 Market			1990 Market			1985-1990 AAGR Forecast in 1985 Report (Percent)	1986-1991 AAGR Forecast in 1986 Report (Percent)
1985 Forecast ($ Millions)	1986 Report ($ Millions)	Variance as Percent of 1986 Report	1985 Forecast ($ Millions)	1986 Forecast ($ Millions)	Variance as Percent of 1986 Report		
$368	$308	19%	$1,270	$1,115	14%	28%	28%

- An adjustment was necessary due to the double counting error which occurs when, for example, an information provider pays a VAN for providing access to data bases and the end user pays the information provider one fee for both communications and data base access. In this case, the information provider is the user.

- VANs often charge fees associated with providing services to end users and for internal use to other corporate units. In the latter case, this revenue is captive, and in the former case, end users pay fees which include the VAN service. Accounting for this situation necessitates a further adjustment to the forecast and market estimate sizes.

- The AAGR forecasts for 1985-1990 and 1986-1991 remain constant at 28%.

APPENDIX VA-B: DEFINITIONS OF TERMS

- BOC - Bell Operating Company (also see LEC).

- CD ROM - An optically-encoded "read only memory" disk with high capacity, similiar to compact disks holding music, but generally containing data.

- CCITT - The International Consultative Committee on Telephone and Telegraph, a U.N.-chartered standards setting agency, part of the International Telecommunications Union.

- DCE - Data Circuit Terminating Equipment. Communications equipment such as modems and multiplexers which connects DTE to the network. In a value-added network, usually describes equipment at the packet switching node or access point.

- DTE - Data Termination Equipment. User devices such as computers or terminals which receive or transmit data located at either end of a data network but connected to the network by DCE.

- Electronic Mail ("E-mail") - The use of telecommunications to distribute messages between individuals. May be a computer-based message system (CBMS), facsimile (FAX), or voice store and forward (voice mail).

- EDI - Electronic Data Interchange. The computer-to-computer exchange, often through a third-party network processing service, of data representing

electronic business documents. The computers may have different protocols and the documents may be in different formats. Sometimes called Electronic Business Data Interchange (EBDI).

- EFT - Electronic Funds Transfer. The transmission of data representing monetary value between entities.

- InterLATA - Communications between designated areas called LATAs (see definition below).

- IntraLATA - Communications within LATAs.

- IRC - International Record Carrier, providing "records" such as telex messages and leased line service both domestically and internationally.

- ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted pair wiring.

- IVANS - The Insurance Value Added Network, provided on IBM's Information Network.

- IXC - Inter-Exchange Carrier, a long-distance provider. Sometimes called Other Common Carrier (OCC).

- LADT - Local Area Data Transport. Packetized data communications provided by the BOCs within local access transport areas (LATA).

- LATA - Local Access and Transport Area, where communications are generally handled by the local telco.

- LEC - Local Exchange Carrier. A Bell Operating Company (BOC) or an independent telephone company which provides intraLATA services.

- NACHA - National Automated Clearinghouse Association, a banking services industry group.

- On-Line Data Base (OLDB) - Data bases available for interactive access through vendor or common carrier networks.

- Packet Switching - A shared channel data transmission technique which formats information within data "envelopes" called packets, each containing control information for routing, sequencing, and error correction (also see VANs).

- PAD - Packet Assembly/Disassembly equipment. Network equipment which allows multiple asynch and/or synch or host computers to link to a packet network by converting user protocols to X.25 standards for network transmission.

- POS - Point of Sale. A system which issues credit/debit card and/or checking account verification/authorization for retail transactions using magnetic card readers (often integrated with electronic cash registers) which accesses a service provider via a network.

- RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

- RCS - Remote Computing Services.

- SNA - Systems Network Architecture. An IBM standard for mainframe computer communications.

- T-1 - Refers to a standard 1.544 megabit per second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

- Telco - Telephone Company.

- Value Added Network (VAN) - A carrier which augments network transmission with computerized (usually packet) switching and other features such as store and forward, multiple terminal access, error detection and correction, and host computer interfacing.

- Videotex - An information distribution system characterized by displayed graphics and an easy user interface.

- VSAT - Very Small Aperature Terminal. A small satellite dish system, usually using Ku-band frequencies.

- X12 - Electronic data interchange standards administered by the American National Standards Institute (ANSI).

- X.25 - The CCITT interface standard for packet switched networks.

- X.75 - The CCITT interface standard for connection between packet switched networks.

- X.400 - The electronic mail standards established by the CCITT.