

**MAPS**

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**Strategies for New  
Telecommunications  
Opportunities**



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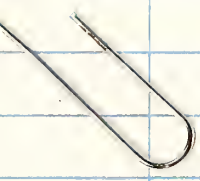
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STRATEGIES FOR  
NEW TELECOMMUNICATIONS OPPORTUNITIES

M-PTC  
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AUTHOR  
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TITLE  
munications Opportunities

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# STRATEGIES FOR NEW TELECOMMUNICATIONS OPPORTUNITIES

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# STRATEGIES FOR NEW TELECOMMUNICATIONS OPPORTUNITIES

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## I INTRODUCTION

- This report is prepared by INPUT as part of the Market Analysis and Planning Services (MAPS) and describes and analyzes changes in the telecommunications-related marketplace due to the breakup of AT&T. Impacts of these changes on users in 1984 and beyond are presented. Opportunities in voice, data, and combined networks are provided.
- This topic was selected because of high client interest. The indecision and confusion that was expected when a monolithic entity such as the "old" AT&T was broken into separate pieces has occurred. Some companies are coping with the new environment better than others.
- The purpose of this report is to summarize the events leading to the breakup of AT&T and to describe the impact of these changes on information services vendors and information systems users. This report can be used to assist with market planning, product delivery mode planning, and network structuring considerations.
- The information presented indicates that different organizations are dealing with the new environment as the basic needs of their business dictate. Each respondent to our questionnaire expressed different opinions related to:
  - Changes in the actual costs they are seeing.

- The importance of some of the key product and organizational announcements of the past year.
- Their plans for implementation of alternative services and systems.
- In addition to the ongoing research that INPUT handles throughout the year in covering a range of topics that directly or indirectly deal with telecommunications issues, an additional 15 companies were polled expressly for this report. These interviews primarily were with corporate managers responsible for communications in both vendor and user organizations.
  - The companies interviewed ranged in size from \$10 million information services vendors to multibillion-dollar user companies.
  - The questionnaire used for this report is included as Appendix A.
  - Appendix B contains definitions of telecommunications terminology.
  - Inquiries and comments on this report and the information it contains are welcome from clients.
- Interested vendors are referred to the following related INPUT reports:
  - Telecommunications Planning Methodologies defines and describes telecommunications planning techniques and processes, using the case example approach, and further identifies critical telecommunications issues.
  - Annual Information Systems Planning Report evaluates information system/telecommunications critical issues and trends, and graphically plots critical management issues.



- LAN/CBX Trends: Decision Processes for Users (October 1984) evaluates the various networking technologies and discusses divestiture, LAN/CBX vendor offerings and future trends, and identifies cost factors for planning purposes.
  
- Market Opportunities in Network Services (December 1982) examines the network services market, analyzes the possible applications, forecasts costs for network services, and contains a comparative analysis of two submarkets.
  
- Impact of Communications Developments on Information Services Vendors (December 1981) analyzes changing communications technology and services, identifies opportunities for information services organizations, addresses communications pricing issues, identifies future competition, and provides a specific list of action items.



## II EXECUTIVE SUMMARY

- This executive summary was designed to give the reader a synopsis of the salient points of the report. Readers are urged to study the entire report prior to arriving at strategic conclusions.
- In order to assist the reader in presenting this report to others, presentation material is provided on each text page of the executive summary and highlights the material on the facing exhibit. The presentation leader is encouraged to use other exhibits in the report to supplement this material.

## A. THE TIMES ARE CHANGING

- If there is one certainty that can be derived from the current state of people's attitudes towards the break up of AT&T and the subsequent activities that have evolved, it is that:
  - No one person or organization has really gotten a handle on all of the impacts to be felt from this major sociological event. The event is sociological because it affects all of us in ways that we had not expected (even though we may have anticipated them).
  - Multiple bills for service and equipment, previously derived from one vendor, now increase overall bookkeeping expenses and exacerbate the worry about the in-fighting between the BOCs and AT&T.
  - A myriad of choices in the marketplace now exist that make the decision process more difficult and tedious.
  - There is now confusion as to the permanence of our institutions; if Ma Bell can disappear, then what about other major institutions?
  
- A second certainty that can be derived from the attitudes of the users and vendors of communications-related services and equipment is that things will never be the same again. The monolithic, paternalistic Ma Bell will never return. This change can be positive if we all review our choices carefully with an eye not only on today but on tomorrow. But this can also be negative if we react in haste without really reviewing all of our alternatives.

# THE TIMES ARE CHANGING

- **Divestiture: Sociological Impact**
- **Multiple Choices in the Market**
- **Things Will Never Be the Same Again**

## **Positive**

**Review Choices**

**Long-Term View**

## **Negative**

**React in Haste**

**Repent in Leisure**

## B. COMMUNICATIONS COSTS HAVE BEGUN TO CHANGE

- Like virtually all aspects of the telecommunications situation, the question concerning whether or not users of communications have seen higher and lower costs is debatable.
- However, the continued rise in private communications line costs, with the imposition of new access charges, should fuel the rapid growth of bypass technology and various alternative information distribution technologies.
- In order to validly compare costs, it is essential that like configurations be compared with like configurations. Otherwise, business decisions will be made on false premises, with consequent damage to corporate budgets.
  - Benchmark configurations need to be obtained from all vendors that can provide data.
  - The burden for obtaining this information usually falls on the user.
  - Distinctions need to be made in costs per line versus price per line.
    - Price per line is often a higher figure than cost per line.
    - Training and documentation expenses need to be considered when weighing costs versus price.

# **COMMUNICATIONS COSTS HAVE BEGUN TO CHANGE**

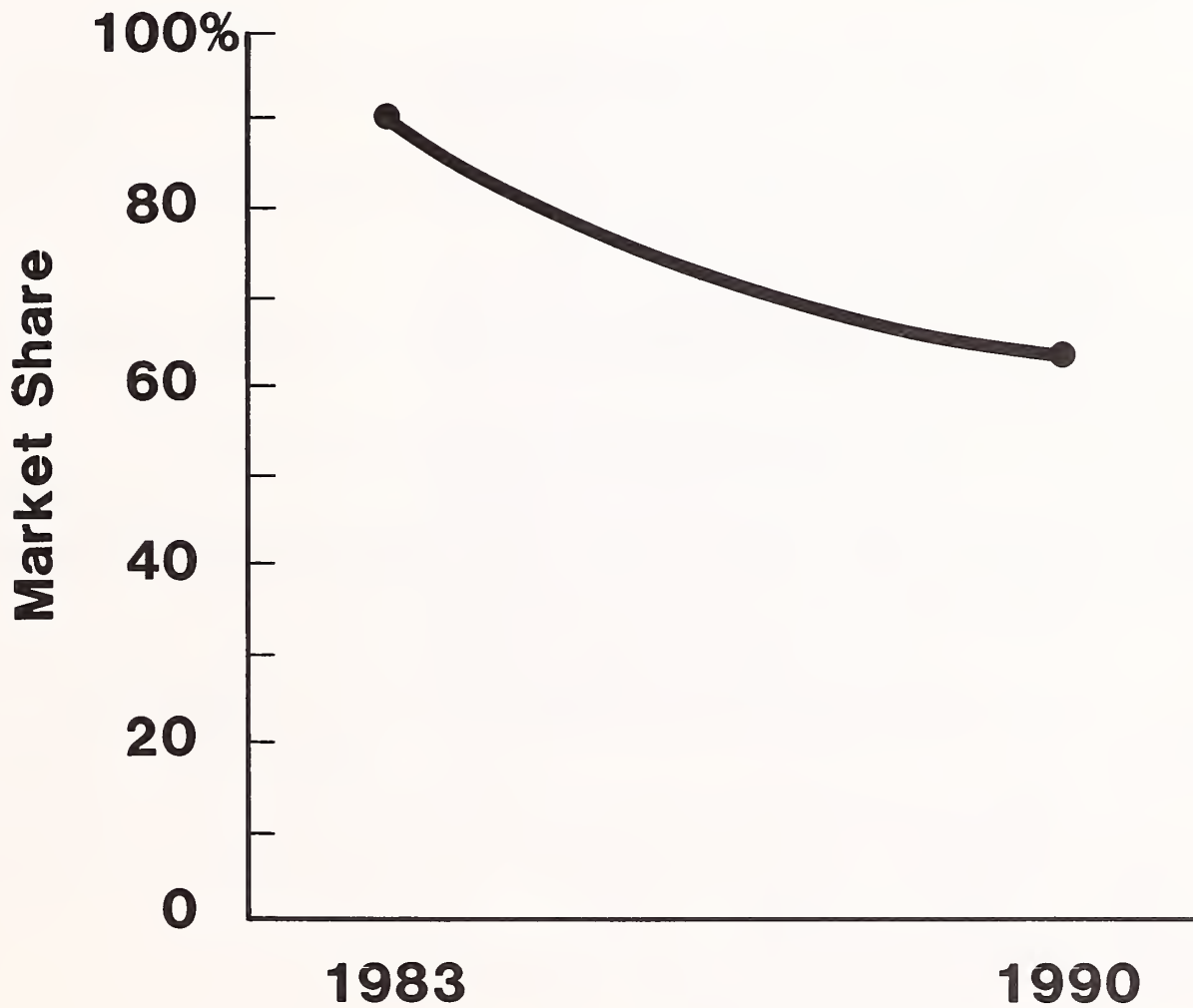
- **Users Unsure if Costs are Rising or Falling**
  
- **Many Alternatives**
  
- **Must Do Proper Cost Comparisons**
  - **Distinction between Cost and Price per Line**
  
  - **Include Documentation and Training Costs**

### C. THE BELL OPERATING COMPANIES/AT&T ARE LOSING MARKET SHARE

- As of the end of 1983, over 70% of the users of communications services and equipment spent over 90% of their budget in this area with Bell-related organizations. During this time, BOCs/AT&T comprised 90% of the telecommunications market (hardware services).
  - The immediate trends, measured from the first of the year until now, indicate that there is relatively little change to this overall status compared to last year. However, there are some organizations that have decreased their use of the BOCs and AT&T by small percentages. The next three to four years should see some fairly dramatic changes in this situation.
  - Only two organizations felt that there would be no changes to their usage of BOC/AT&T services. Five companies were unsure what the future would be, and over 50% said that they intended to decrease their dependence upon BOCs/AT&T. Half of those that were going to reduce their dependence said the reduction would be from 30% to 50% per year.
- INPUT projects that by 1988 BOCs/AT&T market share can be reduced to as little as 70%.
- The sample responses were indicative of the desire in the marketplace to find an alternative to BOCs and AT&T. However, there is also confusion as to what should be the alternative. Very large companies are developing their own networks while smaller companies are experimenting with alternative vendors. One fact is apparent: although price is important, service is just as important. Currently, BOCs/AT&T have a distinct advantage in service and reliability. The longer this advantage is maintained, the slower will be the decay in their market share.



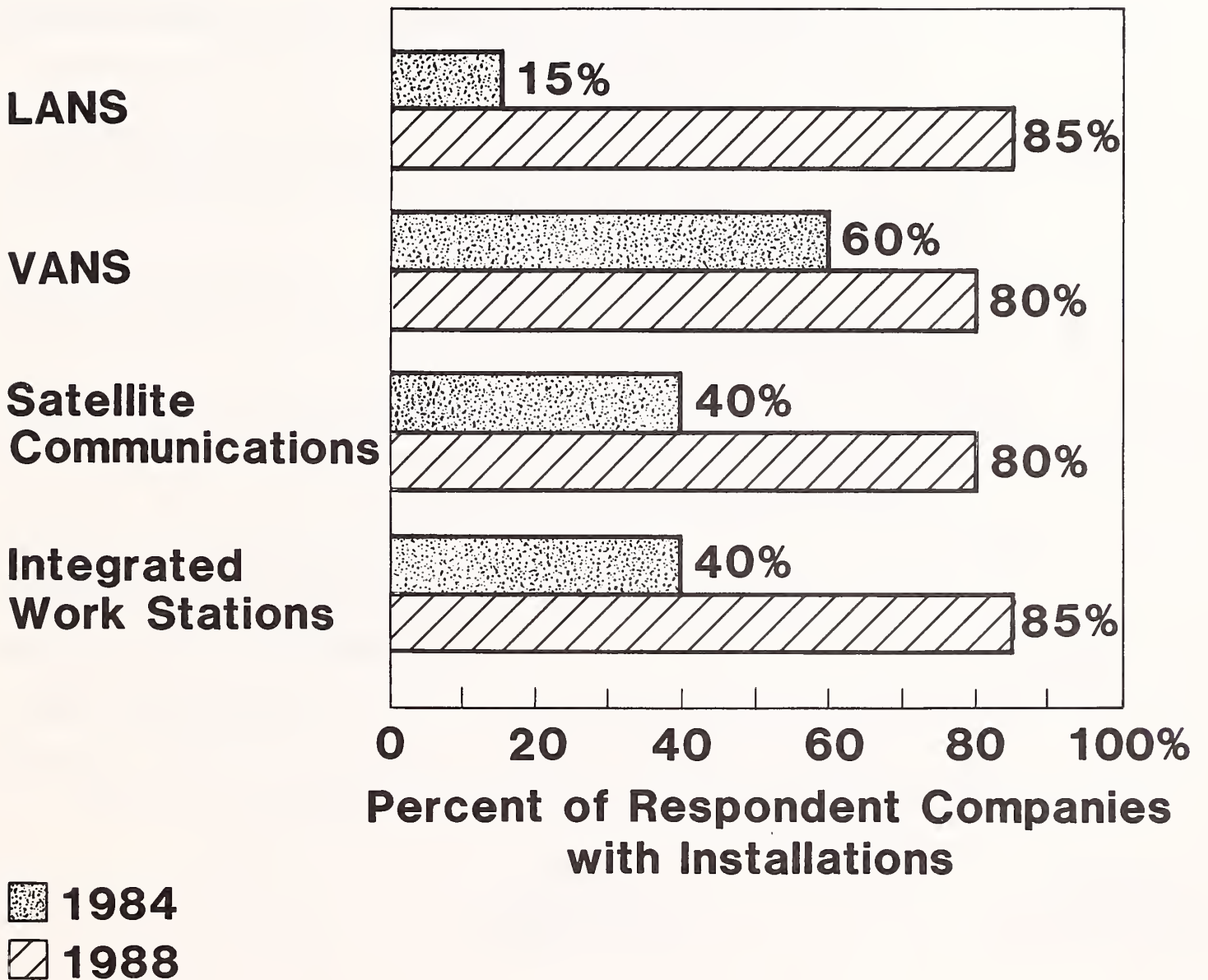
# THE BELL OPERATING COMPANIES/ AT&T ARE LOSING MARKET SHARE



D. WHAT ARE PEOPLE DOING ABOUT SOME OF THE NEW TECHNOLOGIES?

- Only 15% of the companies contacted had implemented LANs, indicating an uncertainty in which standards to follow and what vendors to use.
- Over 70% expected to have LANs in place within the next few years, indicating increased expectations for PC placement for pooling data and local communications.
  - Sixty percent planned on installations in the 1985 to 1986 time frame.
  - Value-added network (VAN) services are well accepted in the market and are expected to increase.
    - Sixty percent of the companies are currently using VANs.
    - Only 15% do not expect to be using VANs by 1988.
  - Satellite communications seem to be causing more confusion and price sensitivity. One-fifth of the organizations have no plans to use satellite links for any purpose and another 15% are holding back on their plans until they get a better feeling for the costs involved.
  - Companies have started to place integrated workstations (defined as telephones with either terminals or microcomputers in one housing) into their operations.

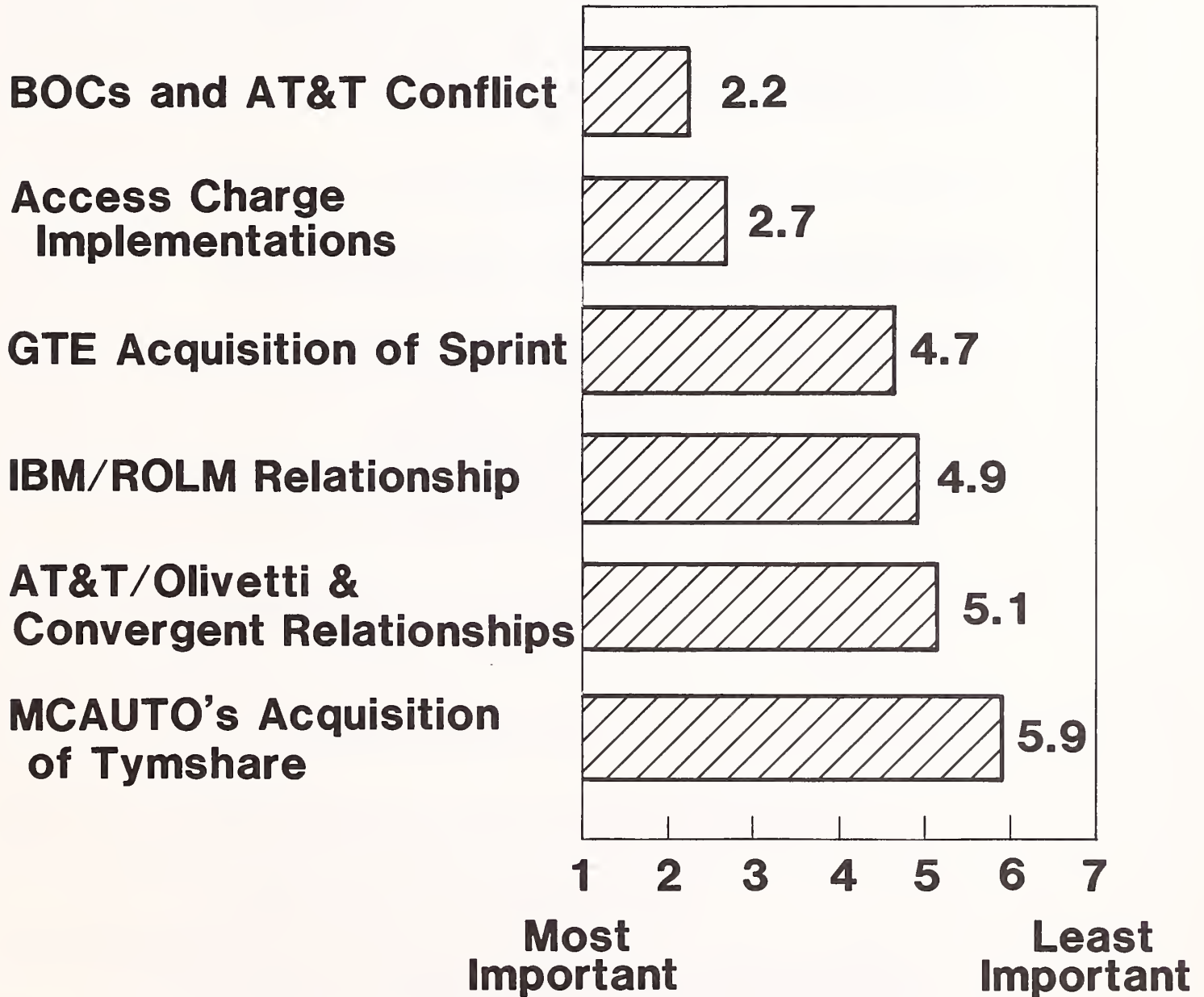
# WHAT PEOPLE ARE DOING ABOUT SOME OF THE NEW TECHNOLOGIES



## E. WHAT IS THE MARKETPLACE CONCERNED ABOUT?

- The biggest problem being faced by users of telephone equipment in today's marketplace is the increasing conflict between the BOCs and AT&T.
  - "I don't think that AT&T and the local operating company talk to each other at all," one user comments.
  - Thirteen percent of the other companies were having extraordinary trouble getting lines installed and orders for equipment implemented.
- The BOCs are becoming major distributors on non-AT&T products, particularly since the high-end, large-customer segment has been specifically targeted for market penetration by the BOCs.
- There is increased competition across the entire spectrum of telecommunications.
  - Interexchange carriers and equipment vendors are becoming very aggressive in their quest for new customers.
  - New entrants are multiplying, and large multinationals are becoming major providers of telecommunications equipment.
  - Several multinationals--especially financial service companies such as American Express, Citicorp, and Merrill-Lynch--are rapidly penetrating the market, particularly in videotex and satellite communications.

# WHAT IS THE MARKETPLACE CONCERNED ABOUT?



## F. WHAT TO DO?

- Keep close contact with the changes in technology in order to ensure that you do not get into dead-end equipment and/or services.
- Don't look at the present only--keep the long term in view, especially in regard to new services you may offer, new locations you may wish to open, and new equipment (not communications gear primarily) to be sure that they will work together beyond the short term.
- Negotiate with all vendors for the best deal.
- Expect to see the following affecting communications:
  - Access charge implementation.
  - Expansion of cellular radio in major cities.
  - Two-way satellite communications as real alternatives.
  - Competitive long distance pricing much like that seen in the airline industry.
- Attempt to leverage the competition to your advantage.
  - Consider joint ventures/acquisitions for VAN, LAN, and even voice product capabilities that integrate with other service offerings.
  - Watch industry leaders carefully to ensure that when standards are set your systems will be compatible.

# WHAT TO DO?

## EXTERNAL

- **Joint Venture for New Product**
- **Expect Access Charges**
- **Watch and Use Bypass Technology**
  - **Cellular Radio**
  - **Two-Way Satellite**
- **Expect Long Distance Price Wars**

## INTERNAL

- **Increase Planning**
- **Negotiate Price and Service**
- **Leverage Competition**
- **Keep Compatibility of Equipment**

## G. THE NEW EQUIPMENT RESULTS IN NEW OPPORTUNITIES

- The changing telecommunications environment requires that information services vendors increase the telecommunications management expertise.
- Maintaining a leading-edge telecommunications organization is a prerequisite to maintaining market share in most sectors of information systems markets.
  - The demand for consulting services in telecommunications will present a growing opportunity for vendors. The internal expertise developed by vendors can be easily translated to customers who are searching for guidance in managing corporate telecommunications activities.
  - Micro-mainframe applications will grow to comprise as much as 35% of all applications by 1988. This presents an opportunity to provide not only software products and communications interfaces, but also turnkey systems. Vendors can then provide products that solve the inherent interface problems embodied in micro-mainframe and office systems will have a competitive edge.
  - The on-line data base market will grow at an average annual growth rate of 23% over the next five years. The severe price competition in the VAN market will work to the advantage of on-line data base vendors and lower the barrier to entry of new vendors. Customers are demanding timely information that can be incorporated into their information networks. Vendors that can provide simple interfaces with customers' networks will develop a distinct advantage in this market.
- The changing telecommunications environment provides the potential for both peril and profit for information services vendors. Planning and management will be the key for turning opportunity into success.



# THE NEW ENVIRONMENT RESULTS IN NEW OPPORTUNITIES

- **Consulting**
- **Micro-Mainframe**
- **Turnkey Systems**
- **On-Line Data Base**



### III THE DEREGULATION OF AT&T's IMPACT ON INFORMATION SERVICES PROVIDERS

#### A. HOW IT CAME ABOUT

- AT&T had been embroiled in a deep legislative and judicial jungle since the antitrust decree of 1956, when it was allowed to retain control of Western Electric in exchange for a promise to operate only in regulated markets.
- This was reasonably acceptable until the CARTERPHONE decision of the late 1960s when the FCC allowed competitors to offer telephone hardware that AT&T was then required to connect to its telephone system.
- This inroad was capitalized on by strong, well-managed hardware competitors such as Rolm and Plantronics, who were beginning to provide equipment more sophisticated than that of AT&T but at a lower cost.
- The Bell organization tried unsuccessfully to get out from under the 1956 agreement until 1980 when the FCC agreed to let Bell set up an "arms-length" subsidiary, nicknamed Baby Bell, that could compete in deregulated markets without subsidizing that business with income derived for subsidiary Bell organizations.
- New competitors, such as MCI and Sprint, now arose to offer competition in the very important core of the Bell business--long-distance communications.

And at the same time, the new Bell organization, designed to compete in the unregulated market, was under increasing government restrictions which almost completely negated the perceived value of that organization. In other words, Bell was overregulated.

- The die was cast and AT&T decided to capitulate to the demands of government regulations.
- Exhibit III-1 defines the detailed events that took place from January 1982 through November 1983.
- On January 8, 1982, AT&T and the Justice department signed an accord that cancelled the 1956 consent decree and settled forever an antitrust suit dating from 1974.
- AT&T now had the right to engage in unregulated business and, in turn, agreed to spin off the 22 Bell Operating Companies (BOCs).
- A month later, Bell indicated that the 22 BOCs would be organized into seven regional companies. This was followed by a raft of congressional and business attempts to change the ruling, all of which proved to be unsuccessful.
- In August 1982 the agreement was formalized, with AT&T forced to give the exclusive rights to publish the Yellow Pages to BOCs. The BOCs were also allowed to sell telephone equipment, while AT&T was precluded from originating electronic information (e.g., data processing) carried on its facilities.
- From August 1982 through April, 1983, the financial rearrangements that were needed were negotiated and agreed to between AT&T and the BOCs.
- In July of 1983, AT&T lost the rights to use Bell in its name or in its product line.

## EXHIBIT III-1

### A CHRONOLOGY OF EVENTS SINCE AT&T AND THE U.S. REACHED ACCORD ON BREAKUP

- Jan. 8  
1982 Justice Department and AT&T sign 19-page accord to drop the 1974 antitrust charges and to scrap the 1956 consent decree forbidding AT&T to engage in unregulated business. AT&T agrees to spin off the 22 local Bell companies.
- Feb. 19  
1982 AT&T says the 22 local organizations will be grouped into seven regional companies.
- Mar. 25  
1982 House of Representatives Subcommittee passes a bill that will alter agreement. AT&T lobbies against changes.
- May to June  
1982 Over 600 groups file criticism of agreement.
- July 20  
1982 House of Representatives drops bill to alter agreement.
- Aug. 11  
1982 Judge Green changes agreement to let BOCs publish yellow pages and sell telephone equipment. AT&T banned from originating electronic information carried on its facilities.
- Aug. 24  
1982 Formal approval given to antitrust agreement. AT&T is given six months to file formal divestiture plan and one year beyond that to carry the plan out.
- Oct. 4  
1982 AT&T files maps to show local and long distance dialing areas.
- Dec. 16  
1982 AT&T files detailed divestiture plan.
- Feb. 28  
1983 Supreme Court upholds divestiture agreement.

EXHIBIT III-1 (Cont.)

A CHRONOLOGY OF EVENTS SINCE AT&T  
AND THE U.S. REACHED ACCORD ON BREAKUP

March 10 1983	Moody's cuts debt ratings for AT&T and most of the BOCs
March 24 1983	S&P cuts debt ratings on a few of the Bell units.
April 7 1983	AT&T and Pacific Bell settle a disagreement when AT&T agrees to increase financial assistance.
April 13 1983	First BOC new name chaser - US West, Inc.
April 20 1983	Judge Green approves the local and long distance boundaries offered by AT&T.
July 8 1983	BOCs gain almost exclusive rights to use the name Bell.
Oct. 7 1983	AT&T announces the stock distribution in new regional companies will be virtually tax free.
Oct. 19 1983	AT&T states it will cut earnings by \$5.2 billion to prepare for 1984 operations.
Nov. 16 1983	AT&T files for registration for trading of new securities.

- On January 1, 1984 the "new" AT&T and the new seven regional BOCs officially came into existence.

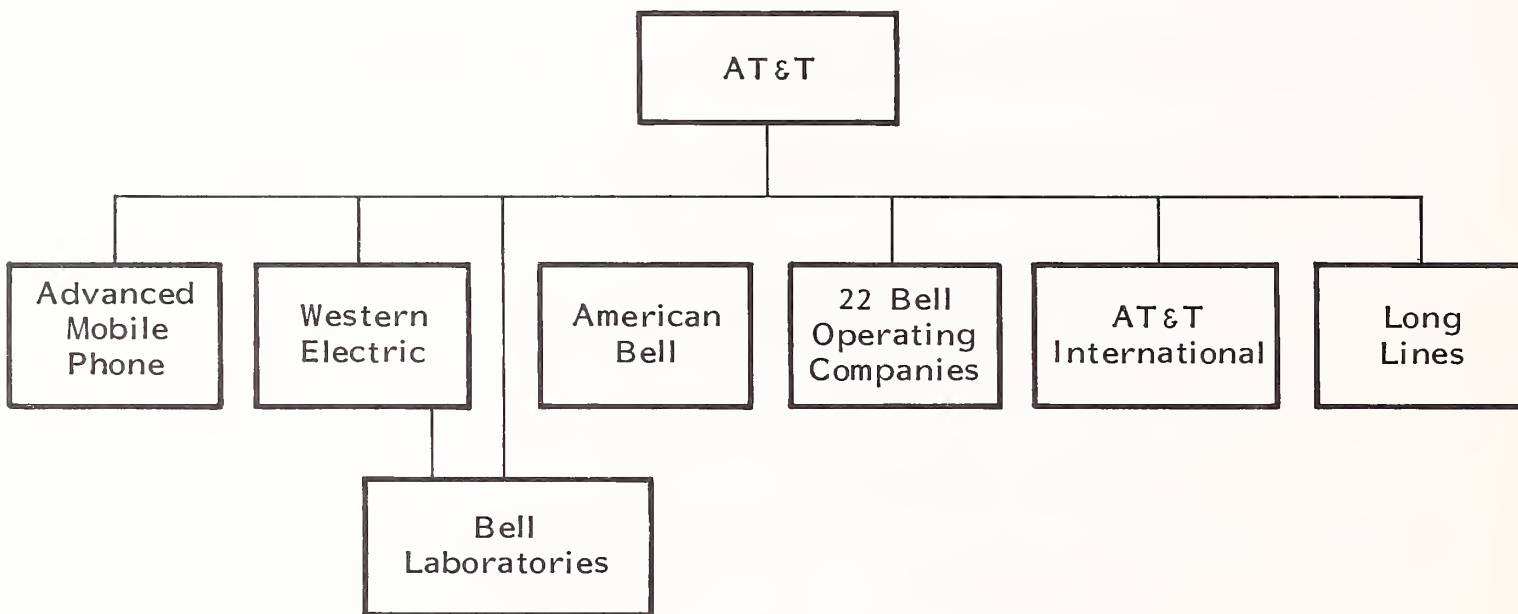
## B. CURRENT STATUS OF THE "OLD" ORGANIZATIONS

- The old AT&T has been reorganized along the following lines:
- Reporting into the corporate headquarters are:
  - Western Electric.
  - AT&T Communications.
  - AT&T Information Systems.
  - AT&T International.
  - Bell Laboratories (Note: this is the one entity within the organization that was allowed to retain the Bell designation.)
- Exhibit III-2 shows the current AT&T organization chart.
- In place of the 22 old operating companies are the seven new regional organizations:
  - Pacific Telesis, which covers California and Nevada.
  - U.S. West, which covers the Northwest, Southwest to Texas, and northern Midwest.
  - Southwestern Bell Corporation, which includes the central Southwest.

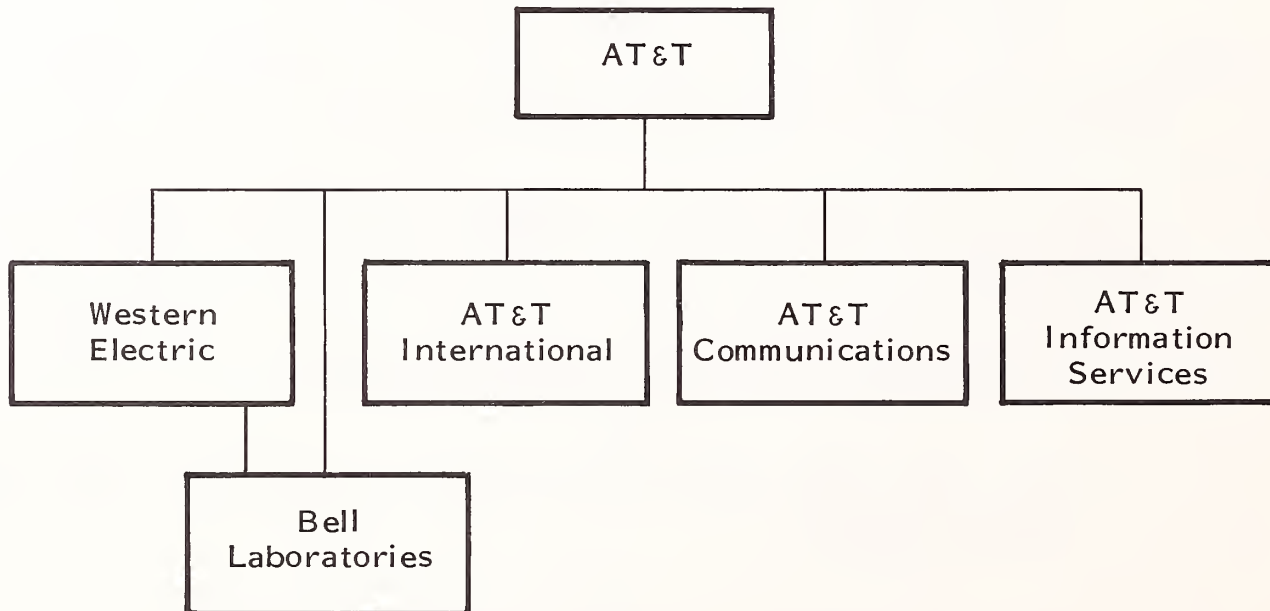
EXHIBIT III-2

AT&T ORGANIZATION

Pre-Divestiture



Post-Divestiture





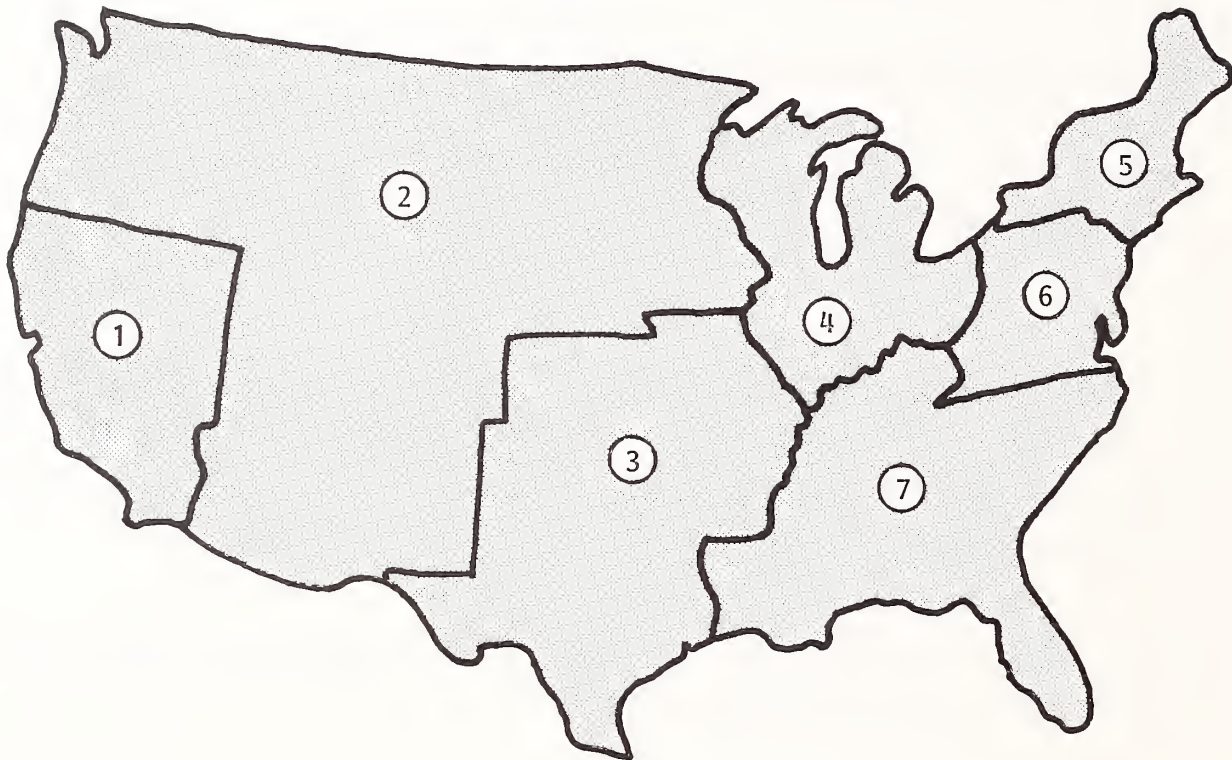
- Ameritech, which includes Michigan, Illinois, and Wisconsin.
  - Bell Atlantic, which serves the Atlantic corridor from the greater New York area to Washington, D.C.
  - NYNEX, which covers New York and New England.
  - BellSouth, which covers the Deep South.
- Exhibit III-3 shows the maps of each organization.

### C. COMPETITION

- With the new organizations in place, the level of competition and the number of competitors has increased dramatically. Exhibit III-4 shows that the market segment for Rolm and Northern Telecom are only slightly below AT&T in total market share for PBXs.
- By 1985, it is estimated that Rolm and NT will control up to 19% of the market with AT&T holding 20.4%.
- Even though AT&T holds over 20% of the market, the competition has the bigger piece of the pie--nearly 80%.
- The expectation is that PBXs will be in direct competition with local-area networks as the PBX becomes more intelligent in terms of:
  - Handling both voice and data transmission.
  - Switching and software capabilities.

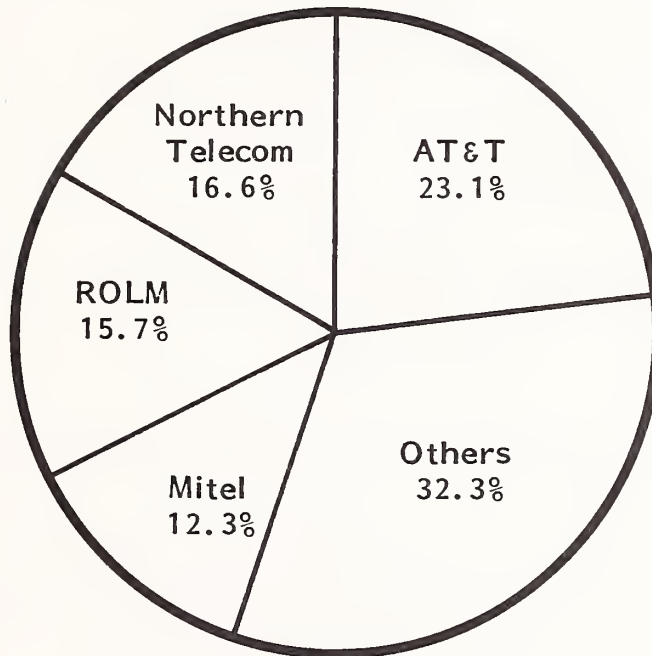
EXHIBIT III-3

A MAP OF THE BELL OPERATING COMPANIES

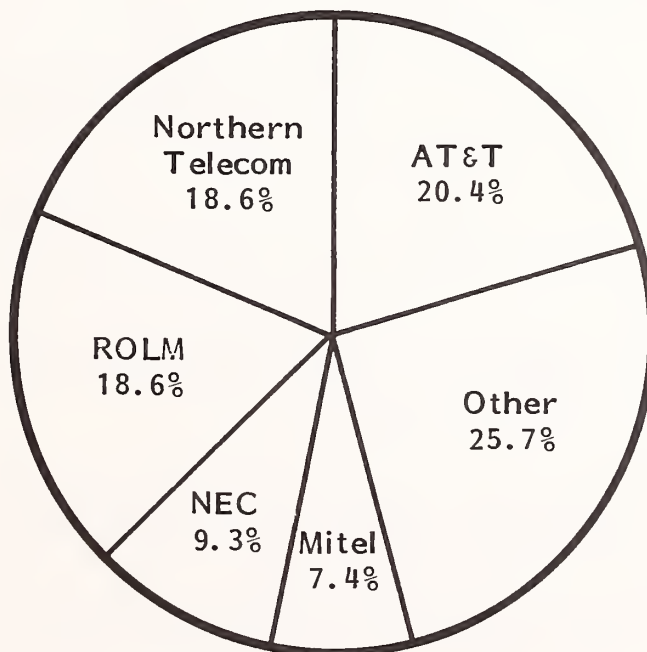


- |                           |                 |
|---------------------------|-----------------|
| ① Pacific Telesis         | ⑤ Nynex         |
| ② US West                 | ⑥ Bell Atlantic |
| ③ Southwestern Bell Corp. | ⑦ Bell South    |
| ④ Ameritech               |                 |

EXHIBIT III-4  
U.S. PBX MARKET (LINES SHIPPED)  
1983-1985



1983  
3.25 Million Lines



1985  
3.6 Million Lines

- Such items as "feature phones," voice-data workstations, terminals, electronic mail, voice messaging, and enhanced software relating to office automation and networking applications will eventually provide PBX suppliers with as much revenue as does their basic product--perhaps even more.
- Many feel that PBX sales will eventually represent just the "foot in the door" and that the real money will be generated by add-ons and extended capabilities to the basic PBX.
- One of the long awaited faceoffs is now beginning to take place with IBM in one corner and AT&T in the other.
  - With IBM's lead in the data processing arena and AT&T's strength in communications, it is apparent that each will move into the other's court in an attempt to dominate the markets of the late 1980s and 1990s, where an integrated processing and communicating environment will be prevalent. So far we have seen:
    - The introduction of the AT&T line of computers, enhanced as recently as June 1984, to include:
      - IBM 3270 and SNA, as well as compatibility with personal computer operating systems.
      - The availability of a LAN that is deliverable now.
      - A range of specific software offerings plus access to all MS and PC-DOS software.
    - IBM, in turn, has announced the availability of UNIX for a wide range of its systems, and has introduced its LAN concept by making available its wiring schematics and network distribution setup.

- Exhibit III-5 highlights key elements for the great IBM/AT&T faceoff.
- The advent of by-pass communications technology is creating a broad potential market for all vendors of voice and data services, including AT&T. This technology includes satellite transmission and cellular radio as its major components.
- Expansion in the number of vendors and an increase in the number of services offered indicate that Value-Added Networks (VANs) will play an important part in the communications environment of the late 1980s. The ability, for example, to lease Telenet nodes and present them to an end user as his own proprietary network will permit more service vendors to provide network service capabilities without incurring the expense of creating a total network.
- An increasing pressure on voice communications will occur as MCI and Sprint get out from under the problem of having their subscribers key in more digits than for AT&T service. As these vendors get more freedom to operate in an intrastate basis, this capability will assume even greater importance.
- The BOCs' attempt to enter distance markets and AT&T's ability to enter the local market via cellular radio are harbingers of price competition for all communications "dial tone" service.
- Other phenomena that will profoundly affect the competitive atmosphere are:
  - IBM's acquisition of Rolm, which gives IBM access to fully developed, state-of-the-art, communications technology.
  - The part ownership by AT&T in Olivetti, which gives AT&T a fully developed off-the-shelf portable computer.
  - AT&T's decision to OEM PCs from Convergent Technology.

EXHIBIT III-5

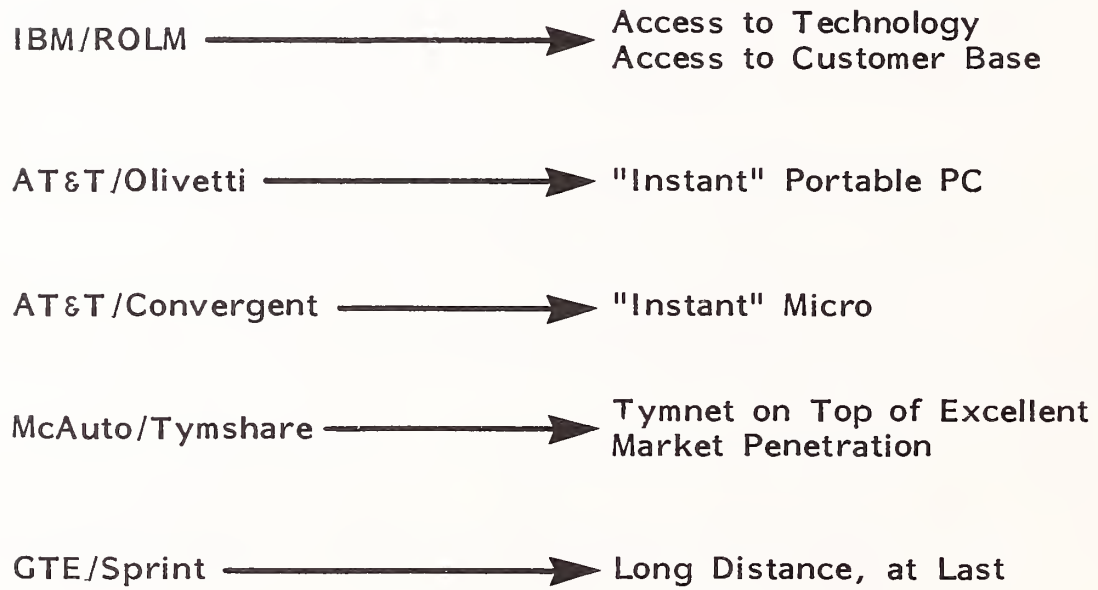
THE IBM/AT&T FACE OFF

IBM	AT&T
<p>Mainframe Dominance But Lots of Operating Systems</p> <p>PC Dominance MS PC &gt; DOS - Standards</p> <p>Communication Standard SNA</p> <p>Local Area Network 2 Years Away</p> <p>Limited Use of UNIX</p> <p>Excellent Marketing</p>	<p>New Midsize Systems - More Versus DEC Than IBM</p> <p>PC Introduction Using MS/PC DOS UNIX</p> <p>Communication Giant and Addressed SNA</p> <p>Local Area Network Now</p> <p>Creators of UNIX</p> <p>To Be Determined. Can They Sell In the Commercial Market?</p>

- The acquisition of Sprint by GTE.
- The purchase of Tymshare by McAuto.
- Exhibit III-6 shows the rationale for much of this merger and joint venture activity.
- The requirement that AT&T permit MCI and Sprint to access long lines without the need to input more than one additional digit (the so-called equal access arrangement).
- The requirement of the BOCs to offer the "optimum" routing of long distance calls regardless of which network is used.
- The establishment of subsidiaries by the BOCs which sell competitively against AT&T.
- The increased implementation of microcomputer-mainframe links that allow each machine (and its user) to communicate with the other both on an internal and an external basis.
- The increased installation of LANs, with the consequent large number of vendors jockeying for position, and in which IBM gets set to deliver its system in 1986. Meanwhile, AT&T will still be getting its sales act together.
- The rapid growth of electronic mail services, as the more intelligent PBXs and LANs are implemented and as more VAN and service providers add to their product offerings.
- The reality of voice mail through the efforts of AT&T, Rolm, and Northern Telecom.

EXHIBIT III-6

MERGERS, ACQUISITIONS, AND JOINT VENTURES

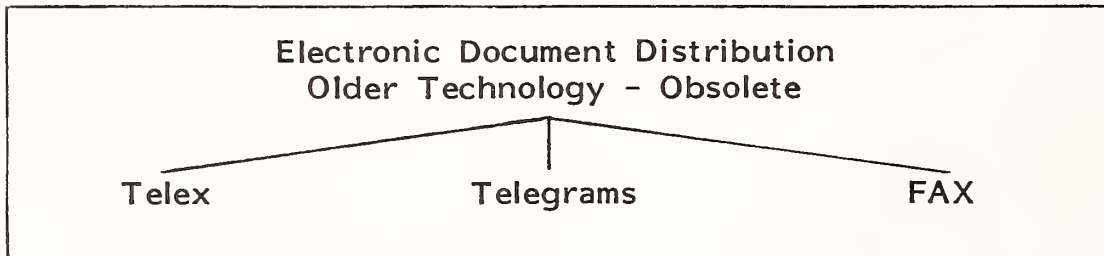
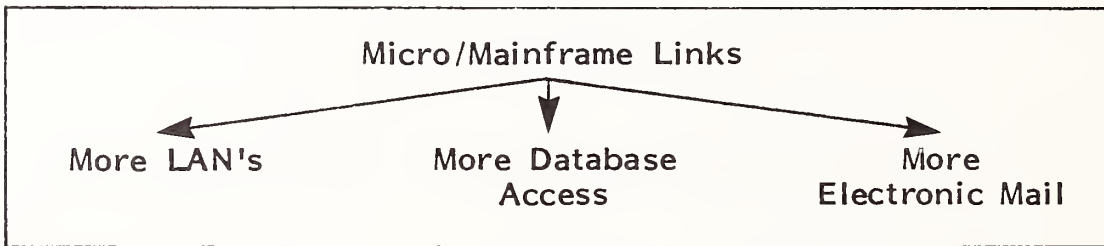
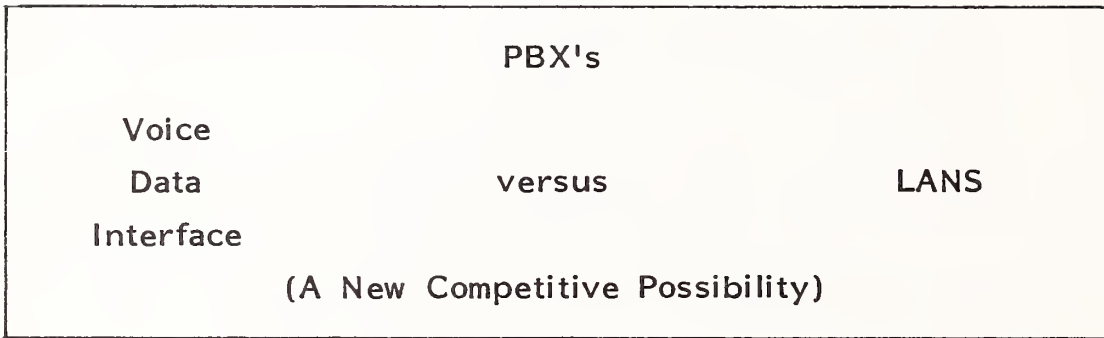




- The advent of electronic mail and electronic document distribution services, and their growing importance relative to telephone dialog.
  - The potential obsolescence of other communications services such as telex, telegrams, and FAX created by electronic messaging.
  - Exhibit III-7 highlights other events that users and vendors alike need to be aware of and watch closely.
- The breakup of AT&T from a monolithic entity into a series of new companies has, for the first time, created a wide-open opportunity for vendors that can satisfy the needs of the user.

EXHIBIT III-7

OTHER EVENTS TO WATCH CAREFULLY



## IV THERE ARE MANY OPPORTUNITIES

### A. LOCAL AREA NETWORKS (LANs)

- The local area network environment is extremely cloudy and diverse. Most LANs typically operate at 10 Mbps baseband frequency, with the trend being toward broadband networks in the 25-40 Mhz range, such as the VAN product expected from IBM.
- In office automation, using switching and data control, the issue is even more unclear.
- Recently, two of the major competitors for the office automation market have made major announcements regarding the implementation of local area networks.
  - IBM announced that its token ring LAN implementation would take place in 1986.
    - Wiring diagrams and schematics were made available in May 1984.
    - A wide-ranging distribution network was established for sales of the initial LAN capabilities, including a range of companies that are electrical products and electronics vendors. IBM seems to

want to pass the responsibility for implementation on to outsiders.

- AT&T announced that they had an immediate LAN implementation available in July, 1984.
  - Both fiber optic links and coaxial cable links were available.
  - Fiber optics can easily operate at 20 Mhz, due to low attenuation and their high-frequency response characteristics.
  - The costs per port were announced as being between \$400 and \$500 each.
  - Compatibility of the AT&T microcomputers with IBM's SNA was also announced.
- Other major competitors in the local area network market include DEC, Xerox, and Ungermann-Bass.
- Only a few LANs are public companies, compared to the computer and its Net/One telecommunications industries. Of the private companies, Ungermann-Bass seems to stand the best chance of capturing a large share of the general purpose LAN market.
- IBM, with its dual strategy of offering both broadband-based PCs and general purpose baseband star-radial network, appears to be much more willing to work with many LAN companies.
- IBM has a number of joint development and marketing agreements with several LAN companies.

- Exhibit IV-1 lists the major LAN competitors and some of the offerings each provides.
- Three major types of LANs are expected to dominate the next four years:
  - Fiber optic-based systems, which will be relatively slow-growing until 1986. They will then begin dramatic growth, bringing them to dominance in the marketplace by 1988.
  - Baseband systems, which are as available as broadband systems but which will only be slightly less important by 1988 than are fiber optic systems. Baseband transmission speeds are typically around 10 Mbps and use a form of coaxial cable.
  - Broadband systems, which are now at their peak point, with expectations that their growth will slow or cease altogether over the next four years. Broadband transmission rates are typically around 20 Mbps and use standard CATV coaxial cable.
  - INPUT reports, Local Area Networks: Directions and Opportunities, December 1983, and LAN/CBX Trends: Decision Process for Users, 1984, provides additional information on this subject.
- Exhibit IV-2 describes the expected growth in LANs, by each type.
- The potential competition between LAN capabilities and fourth-generation PBXs (the latter permit low-speed printers, terminals, and PCs to be hooked up using twisted pair wiring feeding into RS 232 ports for access to the high-speed computer hosts) will become increasingly important over the next several years.
- A major issue will be whether super PBXs supplant or replace LANs, since this technology is developing more rapidly than that of LANs. This could have a

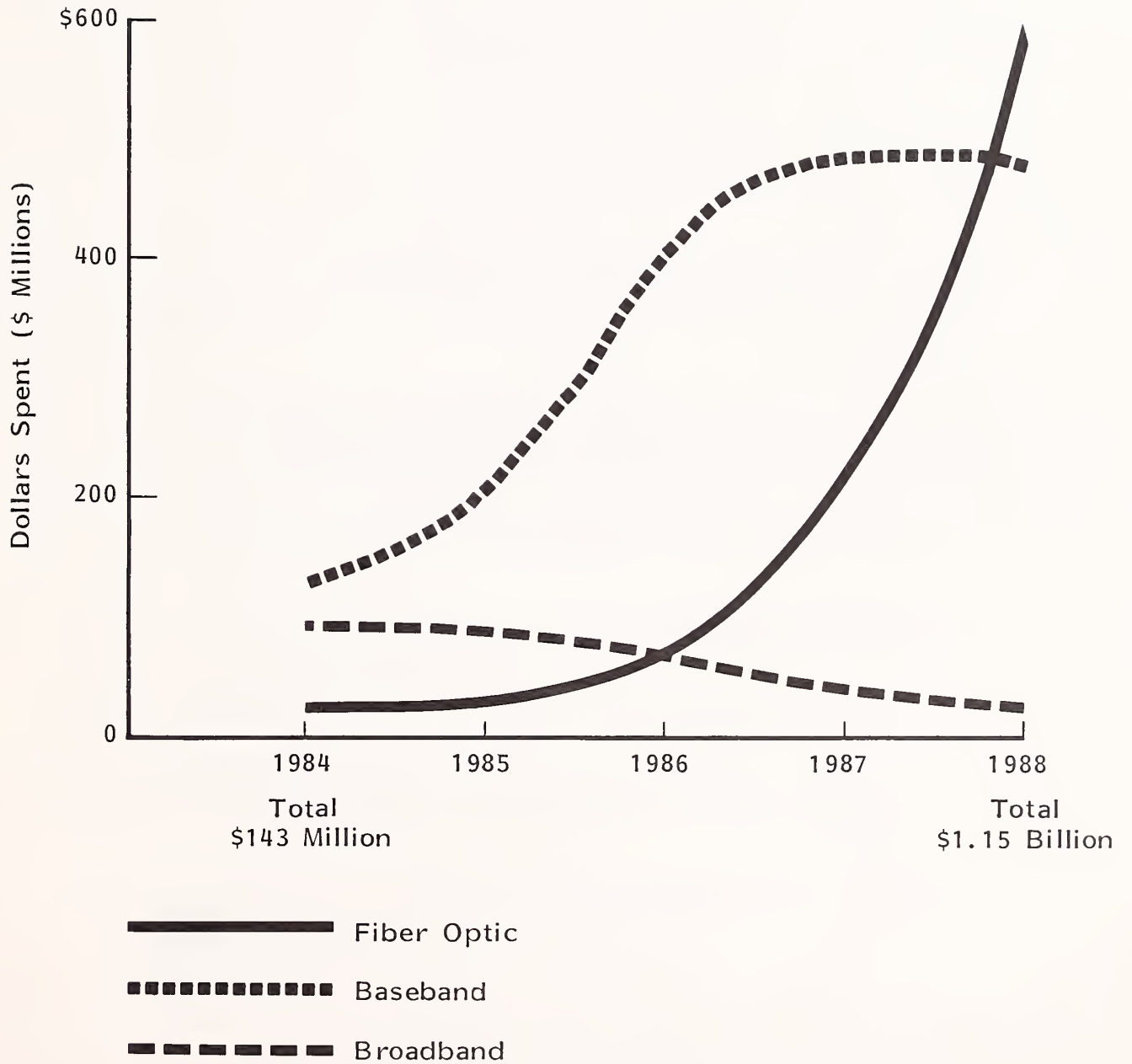
EXHIBIT IV-1

LOCAL AREA NETWORK MAJOR COMPETITORS

VENDOR	PRODUCT OFFERING
AT&T	Dimension - 85
Datapoint	ARC
DEC	DECNET
Exxon	Z-Net
Four-Phase	710
Gandalf Technologies	PACXNET (Private Automatic Computer Exchange)
General Electric	GE Information Service - Office Automation - Local Network Software
Hewlett-Packard	HP - MPN
IBM	SNA - 5520, 3730
ITT	System-12
Northern Telecom	Partnership with IBM Incorporate IBM's SX-2000 Technology into PABX for IBM to Market Open World/SL1
Sytek	IBM Partner Broadband Offering
Tandem	Non-Stop Network
Ungerman-Bass	Netone
Wang	Wise Mailway
Xerox	Ethernet

EXHIBIT IV-2

LOCAL AREA NETWORK FORECAST  
1984-1988



significant effect for on-line users and could change the way we think of these services.

- As PBXs become increasingly intelligent the need for LANs decreases accordingly. Many projections forecast a declining interest in LANs by the turn of the century.
- By 1988 PBX and related features and equipment should exceed \$10 billion. This is a substantial increase from \$3.3 billion in 1983.
- Service vendors need to be aware that software for PBXs may be more lucrative and less competitive than that for LANs.
- Delivery of electronic message services (EMS) and micro-mainframe interfaces should be viewed from the vantage points of software capabilities and LAN availability.
- Prime candidates for integration via LANs will include:
  - Conventional data communications.
  - Message switching.
  - Word processing, evolving to include facsimile and electronic mail.
  - Copying systems, enhanced and integrated into the "office of the future."



## B. VOICE COMMUNICATIONS

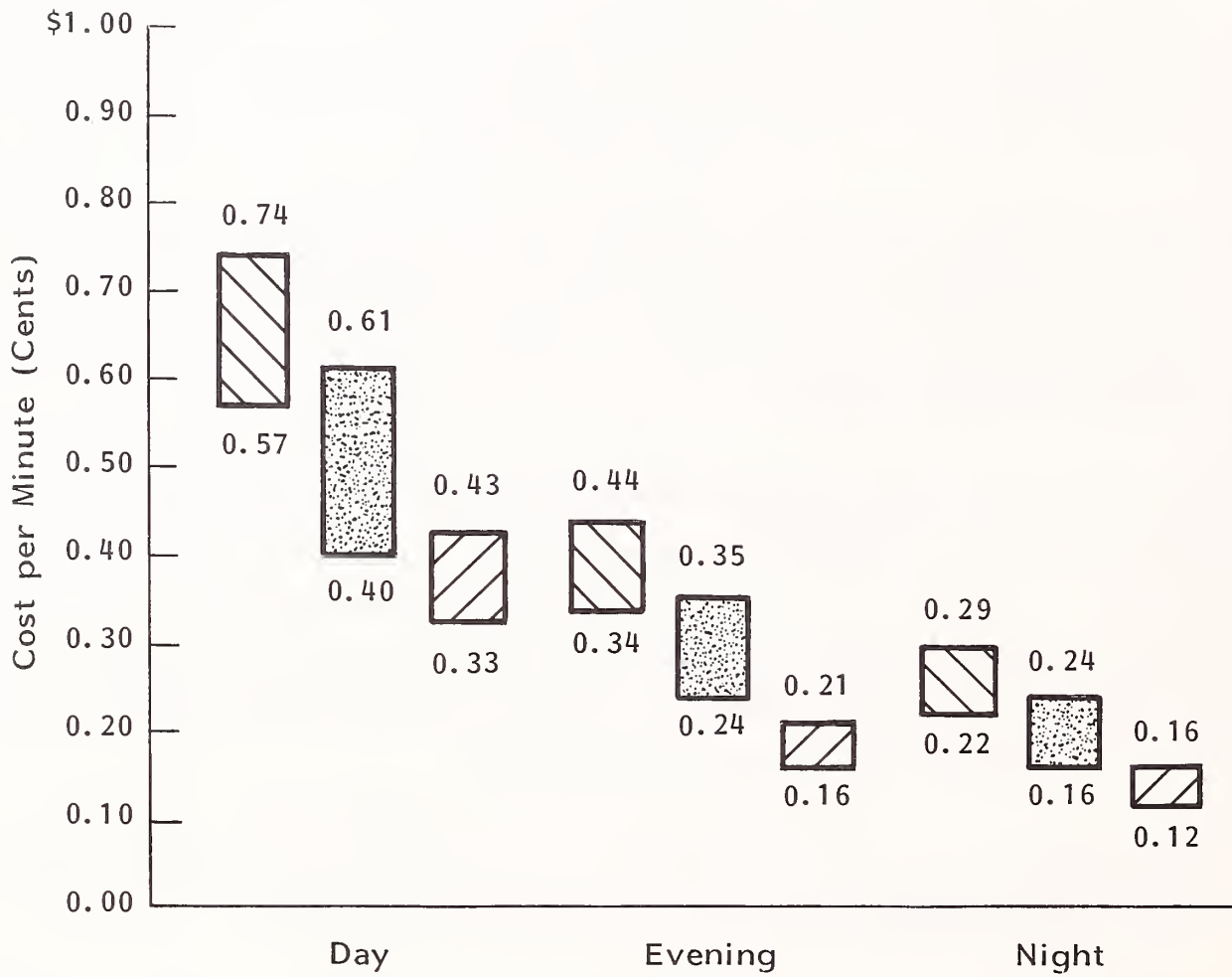
- When the combination of alternative service vendors--such as MCI and Sprint, and the vendors of PBXs, such as Rolm and a range of Japanese firms--are reviewed, it becomes obvious that voice communications is one of the most competitive in the entire telecommunications area.
  - Over 80% of the respondents to our questionnaire indicated that they were using one or more alternatives to AT&T or the BOCs.
  - When the question of satellite communications is added to the equation, even though there does not seem to be a major swing to this environment today, the future becomes very clouded and even more competitive.
  - Sixty-seven percent questioned were either using satellite communication capability or expected to add it within the next two years. This will increase even more if the overall costs for this service become more competitive.
- New vendors are appearing that are offering ASCII terminals with voice communications features as a standard.
- The split between voice-only lines and voice-data lines also needs to be considered.
  - A voice-only line might be priced at \$800, while a voice-data line may go for \$1,300.
  - Thus, a supplier providing systems with all voice lines would deliver 63% more lines than a supplier providing all voice-data lines.




- Liberty Electronics has developed a \$1,295 station for immediate availability.
- An increasing number of established vendors are making the competition for voice grade equipment even more difficult for AT&T.
  - Rolm's CBX II, introduced in November 1983, gave Rolm a continuing technological edge over the Western Electric arm of AT&T.
  - This, plus the new relationship between Rolm and IBM offers strong opportunities for cross-selling.
- Long-standing customers for AT&T equipment are going to competitors--the most galling to AT&T (they would have us believe) are the BOCs.
  - NYNEX announced that it was buying telephone equipment from GTE.
  - The Pacific Telesis Group announced as early as September 1983 (before the actual breakup was completed) that they were going to buy from other vendors as follows:
    - Large PBXs from Northern Telecom and T.I.E.
    - Small PBXs from American Telecom Inc.
    - Telephone handsets from Comdial Corporation.
- The increased service capabilities and the increasing number of locations that can be reached by Sprint and MCI have continued to make inroads into AT&T's long-lines business.
  - With the equal access requirements for the BOCs coming into effect, this competition should increase.

- The price advantages still favor the smaller competitors.
- Intrastate competition is now developing as well.
- Exhibit IV-3 shows comparative prices as of May 1984 for AT&T, MCI, and Sprint services.
- Where AT&T allowed the line or access charges to the specialized common carriers to increase significantly, their margin of profit was seriously eroded, and their ability to survive seriously challenged.
- Recent attempts by the BOCs to offer long distance service in direct competition with AT&T was thwarted in late July 1984 when a federal judge turned down their request until the regional companies had lost their monopoly in the local phone service market.
  - This period of time was estimated to be as high as 10 years by a Justice Department official.
  - The BOCs' competition with AT&T may decrease the performance of each, since both groups seem to be in conflict about everything even remotely related to mutual cooperation.
  - As one of our respondents said: "It is a troubled time for good cooperation between the two organizations."
- Bypass technology is becoming a reasonable alternative to land line telephone service for major metropolitan areas.
  - Bypass is defined as any arrangement that goes around the local telephone exchanges of the public switched network and includes:

EXHIBIT IV-3

COMPARATIVE PRICES - LONG-DISTANCE SERVICE/VOICE  
MAY 1984



-  AT&T
-  Sprint\*
-  MCI

\* Monthly Minimum Bill = \$5.00

- . Satellite communications.
  - . Cable television.
  - . Cellular telephone.
  - . Digital microwave radio.
- Bypass allows the user (or customer) to access the outside world without relying on the regional BOCs.
  - Exhibit IV-4 shows the growth in microwave radio technology, which is considered to be a major contender for the market for bypassing local telephone exchanges.
  - Exhibit IV-5 describes digital termination service (DTS) vendors, locations, and availabilities.
- Voice mail systems, an emerging form of corporate communications, are also beginning to show sales growth. These voice message storage and delivery systems (really sophisticated telephone answering systems) seem to be on the verge of becoming widely accepted by a reasonably large number of companies.
    - Voice mail offers the ability to dial a special telephone number connected to a computer and dictate short messages along with instructions of when and how the message should be conveyed to the other person. The person receiving the message dials his "mailbox" and the message is then relayed to him. This process is identical to message store-and-forward.
    - Growth estimates indicate that sales in 1985 may be as high as \$300 million compared to only \$50 million in 1983.

EXHIBIT IV-4

MICROWAVE GROWTH, 1980-1990

SEGMENT	MILLIONS OF CONSTANT 1980 DOLLARS			
	1980	1982	1985	1990
Bell System*	\$12.5	\$ 21	\$ 29	\$ 85
Independent Telcos	35.0	42	55	85
Private and Industrial	8.0	12	20	35
Satellite Common Carriers and Specialized Common Carriers	5.0	26**	47**	30**
<b>Total</b>	<b>\$60.5</b>	<b>\$101</b>	<b>\$151</b>	<b>\$235</b>

\* Includes AT&T and BOCs

\*\* Includes Digital Termination Services (10GHZ)

EXHIBIT IV-5

10 GHz DIGITAL TERMINATION SERVICES  
VENDORS AND CAPABILITIES

COMPANY	CITIES	LOCAL NODES (LN)	SUBSCRIBER RADIOS 4 PER QUAD 4x4xL.N.
1. ISA Communications Services, Inc.	40	240	3,840
2. SBS	32	192	3,072
3. Tymnet	50	300	4,800
4. GTE Telenet	41	246	3,936
5. Western Union	41	246	3,936
6. Graphic Scanning Corp.	167	1,002	16,032
7. MCI	46	276	4,416
8. RCA Network Services, Inc.	50	300	4,800
9. DTS Inc. (Austin, TX)	100	600	9,600
10. National Microwave Interconnect Co.	120	720	11,520
11. Data Sources, Inc. (Minneapolis, MN)	50	300	4,800
12. Contemporary Comm. Inc. (New Rochelle, NY)	50	300	4,800
Subtotal		4,722	75,552
13. *Six Regional Carriers in Each City	*30 Top = SMSA	6x6x30 1,080	17,280
Total		5,802	92,832
14. AT&T	Pending Regulatory Rules		

Assumptions

- Six Local Nodes Per City - Six Miles Each
- Four Customer Site Radios Per Quad - Growing From Zero to Four in a Period of Three Years. Conservative Estimate - 1983-1986.

- Optimistic estimates project sales of over a billion dollars a year by 1990.
- System costs are decreasing from a high of \$500,000 to around \$55,000.
- Joint ventures in this area are increasing the viability of the vendors involved.
  - VMX has joined forces with GTE.
  - Mitel is working with Octel Communications.
- The main advantages to voice mail is the saving of managers' and other professionals' time and the elimination of "telephone tag." Specific time slots may be assigned for placing telephone calls without the problems of no answer, busy, or party-not-there. The system also creates a convenient means of checking phone messages, regardless of location.
- Cellular radio service, approved for use in major cities, provides five frequencies per locale. This means increased capabilities for users, thus ensuring good growth potential for providers and companies whose communications requirements tie them to telephone service.
  - This service offers AT&T an opportunity to compete with the BOCs for local service because it bypasses the land line system.
  - The appeal of this type of service (as expressed by our interviewees) is mixed across the board but seems to be volatile.
    - One respondent indicated that on the exact day of our interview the chairman of his board called asking for a cellular phone installation in his limousine.



- "A week ago," he said, we would have indicated that we had no interest in this technology."
- The PBX market is perhaps one of the most volatile as the competition heats up.
  - The new generation of PBXs will have more functions. They will:
    - Handle voice and data.
    - Compete with LAN implementation.
    - Handle voice store and forward.
  - The Japanese can potentially capture up to 40% of the overall U.S. PBX market by 1988. Both NEC and Mitel, for example, will have dramatic market share increases by 1985, with 9.3 and 7.4% of the market, respectively.
  - The total PBX market place in 1988 is estimated at \$10.1 billion.
    - Estimated growth is from 21% to 29% annual average growth rate.
    - Estimates indicate that from \$8.4 million to \$12.5 million lines will be handled through PBXs in 1988.
- A number of major companies, historically not involved in the communications field, are becoming involved in the market.
  - IBM has acquired Rolm.

- Wang has acquired up to 30% of InteCom Inc. This lets Wang discontinue its in-house PBX development plans and they can redirect their efforts toward voice processing technology.
- In 1978 AT&T (through Western Electric) built over 50% of the \$1.8 billion of PBXs sold that year. By 1983 the market had grown to \$3 billion, with AT&T's share down to 23%.
- Satellite communications are also getting the attention of major vendors as evidenced by RCA's acquisition of Cylix.
  - Two-way satellite communications using baseband frequencies are becoming more price competitive.
    - Equatorial Communications has been running pilot programs with three major users for almost two years with excellent results.
    - Production facilities for two-way satellite communications are expected to be in place in 1985.

### C. NONVOICE COMMUNICATIONS

- Exhibit IV-6 lists some of the vendors who are now providing VANs throughout the U.S.
  - The major communications vendors are included in this group.
  - McAuto's acquisition of Tymshare was due, in great measure, to the availability of the Tymnet network and the growth potential foreseen in data base activities.

EXHIBIT IV-6

VALUE-ADDED/MESSAGE/PACKET CARRIERS

ADP

AT&T IS

Computer Sciences Corporation

CYLIX Comm. (RCA)

Graphic Scanning

Graphnet

GTE Telenet

ITT

McAuto (Tymshare)

Pacnet

RCA American

United Telecom

Western Union

- The growth in the use of data bases and in the implementation of micro-to-mainframe computer links presages a large growth in the use of packet switched networks. (See INPUT's report, On-Line Data Bases, June 1984.)
- By matching the market niches you have with the need for data base access, you can increase market growth.
- The increased use of micro-mainframe links offers software companies a reason and an opportunity to sell communication services as an adjunct to historical products.
  - The ability of smaller service providers to lease an entire network by piggy-backing onto the existing VAN Telenet nodes will permit a larger number of companies to compete in the data base market without having to incur the expense of developing and maintaining a private network. This strategy should be looked at by:
    - All VAN vendors.
    - Service providers who want to provide a "private network" capability without having to build that network.
- Satellite communications are also becoming important in nonvoice data communication. Exhibit IV-7 lists some of the primary vendors in this marketplace.
  - As the cost for two-way communication decreases and the availability of smaller satellite receivers (dishes) increases, more providers and receivers of data can utilize the kind of network system shown in Exhibit IV-8. This will offer two significant advantages:

EXHIBIT IV-7

MAJOR CARRIERS PROVIDING  
SATELLITE COMMUNICATION SERVICES TO END USERS

American Satellite

AT&T (American Bell)

GTE (Spec) and GTE Satellite

Hughes Communication  
(With International Interconnect)

RCA American Communication

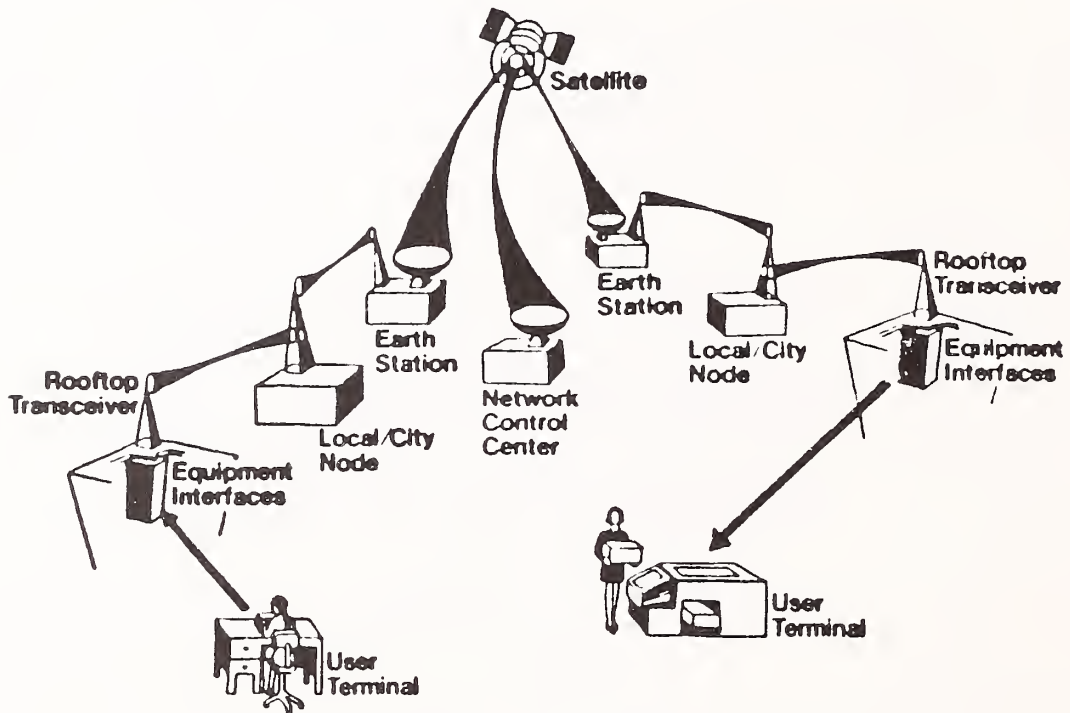
SBS (IBM - COMSAT)

UNINET

Western Union

EXHIBIT IV-8

SATELLITE-BASED DATA COMMUNICATIONS SYSTEM



- . It will provide additional opportunities to offer your customers technical support.
  - . It will also offer an ability to provide "hot line" services at lower cost (and/or price).
- Network television, historically tied to AT&T technology, is now able to cut the cord.
  - NBC, in conjunction with RCA, Comsat, and Harris Corporation, has become the first large-scale user of the super high frequency "ku" band of the radio spectrum. Ku frequencies lie between 12 and 14 billion hertz (cps) or 12-14 gigahertz.
  - NBC expects to get 99.99% reliability from the new network.
  - NBC expects an increase in annual operating cost, estimated at \$30 million, for the next few years. However, by the middle of the next decade, they expect this service to be a "real bargain."
- Cable television (CATV) will become increasingly important, not only for the consumer entertainment potential, but as a medium for enhancing business communications.
- The major impact being made in the area of data communications is coming from the proliferation of microcomputers and the subsequent need (or desire) to interface these with mainframe systems. (See INPUT's series of four reports on micro-mainframe opportunities--Micro-Mainframe: Processing Services and Turnkey Systems Market Opportunities, 1984, Micro-Mainframe: Personal Computer Market Opportunities, 1984, End-User Micro-Mainframe Needs, 1984, and Micro-Mainframe: Telecommunications, 1984.)

- Numerous vendors, such as Informatics General and MSA, are making software tools available to assist in the transfer of information from the micro to the mainframe.
- A number of other companies, such as Ungermann-Bass and Sytek, are involved with providing local area networks, while a number of other competitors, including the BOCs, are planning to enter the market.
- The recent announcements by AT&T offering a full range of computers, interfaces, and software has caused at least some of the buyers of systems to consider AT&T a reasonable alternative to IBM.
- One potentially important strategy is to latch on to AT&T's apron strings instead of waiting for IBM, anticipating that IBM will pragmatically accept the need to interface with AT&T.
- At least one of our respondents indicated that they felt that the ITT XTRA microcomputer was also evidence that IBM was vulnerable to professional organizations offering good equipment with good communications and software capabilities.

#### D. OTHER TRENDS TO KEEP IN MIND

- One of the key elements to watch for in the quickly changing telecommunications area is who is involved with whom and on what basis.
  - There seem to be an increasing number of companies that are either acquiring other companies especially in the communications area, or become part owners or joint ventures in order to gain technologies that are currently not in-house.



- Rolm and IBM strengthen each other: Rolm has access to IBM customers, and IBM has communications (and LAN) alternatives.
  - Wang and InteCom.
  - AT&T and Olivetti and Convergent Technology.
  - RCA and Cylix.
  - AT&T and Wang; and AT&T and Hewlett-Packard.
  - These relationships are working toward interfacing product lines; e.g., linking AT&T's Dimension 85 with HP and Wang hosts or, in some cases, joint certification of equipment.
  - For example, conversion of Wang personal computer OIS (word processor) and VS (operating systems) formats to AT&T Electronic Document format.
- The trend toward acquiring and/or joint venturing will continue giving the major vendors more clout, making it more difficult for the smaller vendor to compete, and helping to ensure that some form of "standardization" is available.
- Exhibits IV-9 and IV-10 describe, in detail, all the elements in the telecommunications equation: the overall size of the elements of this market, their growth over the past two years, and the projection for this year.

EXHIBIT IV-9

U.S. DATA COMMUNICATIONS MARKET SURVEY, 1984 - SERVICES

SERVICES	VALUE OF SERVICES SOLD				
	1982 (\$ Millions)	GROWTH (Percent)	1983 (\$ Millions)	GROWTH (Percent)	1984 (\$ Millions)
Telephone Carriers	\$ 6,300	11.1%	\$ 7,000	10.0%	\$ 7,700
Satellite Carriers	120	45.8	175	42.8	250
Specialized Carriers	190	21.0	230	21.7	280
Communications Expenditures for Database and Timeshare Services	325	15.4	375	20.0	450
Business Timesharing Costs	3,100	22.6	3,800	10.5	4,200
Repair & Maintenance	800	18.8	950	15.9	1,100
<b>Total Services</b>	<b>\$10,835</b>	<b>15.6%</b>	<b>\$12,530</b>	<b>11.5%</b>	<b>\$13,980</b>

## EXHIBIT IV-10

## U.S. DATA COMMUNICATIONS MARKET SURVEY, 1984 - PRODUCTS

PRODUCTS	VALUE OF PRODUCTS SOLD				
	1982 (\$ Millions)	GROWTH (Percent)	1983 (\$ Millions)	GROWTH (Percent)	1984 (\$ Millions)
Digital Switches	\$ 1,800	15.6%	\$ 2,080	10.6%	\$ 2,300
Microcomputers	3,400	50.0	5,100	27.5	6,500
Minicomputers	1,800	13.9	2,050	12.2	2,300
Programmable Terminals	1,150	21.7	1,400	17.9	1,650
Front-End Processors	580	8.6	630	11.1	700
Diagnostic and Test	180	25.0	225	20.0	270
Local Networks	50	20.0	60	33.3	80
Software (Unbundled)	710	12.7	800	12.5	900
Nonprogrammable Terminals	685	9.5	750	(-6.7)	700
Portable Terminals	225	13.8	256	1.6	260
Modems (1.2 Kbits & Under) and Acoustic Couplers	160	56.3	250	20.0	300
Modems - Over 1.2 Kbits	580	3.4	600	25.0	750
Earth Stations	480	14.6	550	9.1	600
Teleprinters	225	(-20.0)	180	(-5.6)	170
Facsimile Terminals	225	33.3	300	33.3	400
Concentrators	35	(-14.3)	30	0.0	30
Multiplexers - Time Division/Freq. Division	80	(-6.3)	75	(-8.9)	65
Multiplexers Statistical	175	48.6	260	53.8	400
Data Entry Terminals	55	(-9.1)	50	(-6.0)	47
Protocol Converters	20	15.0	23	0.0	23
Communicating Word	1,800	16.7	2,100	(-9.5)	1,900
<b>Total Products Market</b>	<b>\$14,415</b>	<b>23.3%</b>	<b>\$17,769</b>	<b>14.5%</b>	<b>\$20,345</b>



## V CONCLUSIONS AND RECOMMENDATIONS

### A. CONCLUSIONS

- 1985 will be a year of realignment, regrouping, and repricing for all of the major elements in the telecommunications equation. From 1986 and through the rest of the decade, the trends established in the next two years will mature with certain vendors such as Rolm, MCI, Sprint, IBM, GTE, McAuto and, of course, AT&T, becoming (or continuing as) leaders in all or part of the niches created by Judge Green's divestiture decision. Other vendors, those who fail to follow the lead of the major players, or those too small or with too little capital to compete properly, will either be absorbed by the others or will disappear.
  
- Specific items that will be affected over the next two years are:
  - Initiation of access charges, perhaps selectively, for business communication.
  
  - Cellular radio availability will expand at a rapid pace within major metropolitan areas.
  
  - Two-way satellite communication will move from the test phase into full implementation.

- More availability of point-to-point transmissions in a larger number of areas.
  - Lower cost per packet and larger packet sizes.
  - Ever narrowing band widths requiring smaller microwave dishes, which in turn will increase the market for this method of transmission and reduce the land line load.
- Microwave communications will grow in all areas.
- Deregulation of long-distance telephone charges "a la the airline industry."
  - The widely used "routes" will be less expensive to the users than will be others regardless of the actual distance of the call.
- Increasing competition in the PBX marketplace.
  - Watch out for the Japanese.
- Exhibit V-I highlights some of the events certain to occur in the rest of this decade.
- Teleconferencing, with and without video, will become more viable and more important to daily business activities.
- AT&T and IBM will move more aggressively into each other's backyard through mergers, acquisitions, and/or joint ventures.
  - Don't be surprised to see AT&T buy more of Olivetti or all of Convergent Technology.

EXHIBIT V-1

CERTAINTIES FOR THE 1980s

Access Charge Implementation  
will Increase Business Costs

Bypass Technology will Expand  
Cellular Radio  
Satellite  
Microwave

Deregulation will Come  
Slowly But Surely  
Pricing Like the Airlines

PBX Competition will be Extreme  
Japanese  
Non-AT&T

- The BOCs, especially U.S. West, Nynex, and Cincinnati Bell having subsidiaries that increasingly compete with AT&T. The BOCs will also enter the VAN market and become a well capitalized, competitive force in the next five years.
- Micro-mainframe, micro-micro, and micro-mini links via LANs or PBXs will increase in quantity and importance.
- Exhibit V-2 outlines some key events to watch closely.
- The years 1986 and beyond will go to the swift (the best marketers), the smart (the best product developers), and the strong (IBM, AT&T, GTE, Rolm, and the Japanese such as Nippon Electric).

## B. RECOMMENDATIONS

- The above events describe an environment that is fraught with both challenges and opportunities. The information services vendors have a unique opportunity to leverage the management of their internal telecommunication activities into new and enhanced products and services.

### I. INTERNAL CHALLENGES

- As a customer of telecommunications services and products, the information services vendors will be in an enviable position.
  - As large users of one or more of the major communications elements, information systems vendors will be wooed and pursued by all of the participants in the market.



EXHIBIT V-2

EVENTS TO WATCH CAREFULLY

Increased Merger/Joint Venture Activity

IBM

More of ROLM

Voice Capability

AT&T

More of Olivetti

Convergent Technology(?)

LANs versus PBXs

Which is Right for You

Increased Micro Placement Interfacing

BOCs Entry into Other Markets

- Exploit your strength as a major user of telecommunications services and do the following:
  - Negotiate for the best fee schedules for voice, data, and/or combined service. Fee schedules are more malleable than prior to deregulation.
  - Treat AT&T or a BOC just as you would any other vendor. Don't be intimidated by their size or financial muscle. With competition they will have to learn how to compromise.
  - Leverage one vendor against the other regardless of the service; e.g., Sprint versus AT&T for long-distance voice and/or data service.
  - Leverage one type of service against another; for example, cellular radio versus land line telephone service in major city locations.
  
- Make sure to keep compatibility the primary consideration for:
  - Local area networking.
  - PBX replacement or addition.
  
- For additional discussions of LANs and PBX alternatives, see INPUT report, LAN/CBX Trend: Decision Processes for Users, 1984.
  
- Make sure you keep long-term considerations in mind when planning to:
  - Change PBX--you don't want to add a system in 1985 that is too narrow in capability to handle the requirements of 1988.

- Set up a new or modified network to allow you to:
  - . Set data bases and access thereto.
  - . Interface with teletex or videotex applications and environments.
  - . Increase or initiate electronic mail services.
  - . Increase micro-mainframe and/or LAN interfaces.
- In addition, INPUT recommends that you:
  - Establish a properly staffed communication review group ready to put key information into the hands of decision makers.
  - Be constantly aware of new equipment, service offerings, pricing alternatives, etc.
  - The rate of technological change is so great and potentially so dramatic that it can have major impact on the corporation's balance sheet, income and expense reports, and actual cash flow.
  - Act on the recommendations made by the communications review group.
  - If you already have this capability, review its charter, ensure that it is properly staffed, and make sure that information is quickly disseminated to decision makers for action.
  - Add communications to your long range planning considerations as a primary item.

- As you increase product delivery mix and as the various elements of the communications arena change, you will need to have alternative marketing plans and marketing tactics variations.
- As the various elements become more (or less) attractive, you need to project when to switch from one source (or method) to another and recognize the impact on:
  - Personnel.
  - Brick and mortar. (If, for example, you intend to use small diameter dish satellite receivers, it probably is unnecessary to wire a new building with coaxial cable.)
  - Ways of doing business, either with customers/users or with vendors/suppliers.
- Exhibit V-3 is a reminder of things for you to do at once.
- Don't be a victim of inertia.
- It may be hard to break the Bell/AT&T habit but do it:
  - When it saves you money.
  - When it increases productivity.
  - When it gives you more flexibility.
  - When you are sure of the staying power of the vendor.

EXHIBIT V-3

THINGS TO DO TODAY  
(Don't Procrastinate)

Negotiate

Best Prices

Best Service

Leverage

Vendor Against Vendor

Service Against Service

Ensure Compatibility

Remember the Long Term

Review the Technology

Formally

Regularly

Plan → Plan ← Plan

## 2. EXTERNAL OPPORTUNITIES

- The RCS vendors beat the leading edge in telecommunications technology. The expertise that must be developed to run the communications segment of their market is also a marketable commodity for their customers.
  - The internal challenges described in the previous section must be conquered in order for RCS vendors to survive.
  - Noninformation service companies do not necessarily have a compelling need to be leading edge companies in telecommunications.
  - These companies, however, are looking for guidance and advice on how they should plan and control telecommunications activities. They will want individuals who have experience and can navigate through the labyrinth of vendors, products, services, and tariffs associated with the volatile telecommunications market. The RCS vendors are uniquely qualified to do this.
- INPUT projects that by 1988 as much as 35% of applications will be micro-mainframe. This growth is fueled by the increasing demand of end users accessing information on corporate mainframes. This demand presents the following opportunities:
  - Developing turnkey solutions that incorporate data and systems that reside on both the micro and the mainframe. Included in these systems would be the communication interface software.
  - Acting as mainframe receiver for a micro-mainframe customer application. Decentralized companies may choose to use VANs and electronic mail facilities to gather remote information, consolidate it at a RCS vendor's mainframe, and receive the consolidated results from the RCS electronically.

- The micro-mainframe market is growing and many companies are having problems coping internally with the demands on their data centers and systems personnel. RCS vendors can fill the gap between user demand and their internal systems capabilities. Customers are becoming both more computer literate and demanding solutions, not tools. The vendors who can provide solutions that eliminate the customers' concern for software, hardware, and communications will be winners.
- The on-line data base market will grow at an average annual growth rate of 23% over the next five years. The increased price competition in the VAN market will lower the barriers to the on-line data base market. Customers are thirsting for more and diverse information. Office systems are being established in many organizations that are communications oriented. They allow the systems' users to access departmental, corporate, and external data bases. The successful companies in this market will not only provide timely, topical information, but will also be the most flexible. They must:
  - Provide connections from various sources using different access speeds.
  - Provide videotex compatible interfaces.
  - Provide custom data bases for very large customers with their own telecommunications networks.
- The changing telecommunications environment presents the challenge of increased competition from heavily capitalized, deregulated competitors. But these changes also present opportunities for strengthening customer relations through consulting. Consulting can:
  - Develop new services by taking advantage of the VAN price competition.

- Open new markets by providing turnkey solutions.
- Deregulation has presented many risks that will flush out the undercapitalized and poorly managed vendors. But companies that can effectively manage their telecommunications function will have a potential competitive advantage by leveraging their experiences and participation in the growing market for communications-based services.



STRATEGIES FOR NEW TELECOMMUNICATIONS OPPORTUNITIES

Questionnaire

1. Have you noticed a change in your telecommunications costs since January 1?

Yes       No

If yes:

Data Transmission \_\_\_\_\_ % Higher/Lower  
 Voice \_\_\_\_\_ % Higher/Lower  
 Equipment \_\_\_\_\_ % Higher/Lower  
 Other \_\_\_\_\_ % Higher/Lower

2. What percentage of your telecommunications was handled by AT&T or the BOCs (Bell Operating Companies) prior to January 1, 1984?

\_\_\_\_\_

3. What percentage of your telecommunications is now handled by AT&T or the BOCs?

\_\_\_\_\_

4. What percentage of your telecommunications do you expect to have handled by AT&T and the BOCs in 1985 \_\_\_\_\_, 1986 \_\_\_\_\_, 1987 \_\_\_\_\_, 1988 \_\_\_\_\_.

5. What other vendors do you use:

<u>Vendor Name</u>	<u>Equipment/Service</u>

6. What vendors do you expect to use in the future?

<u>Vendor Name</u>	<u>Equipment/Service</u>

7. Do you use the following:

LAN	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
VAN	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Satellite Links	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Integrated Work Stations	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

8. Do you plan to implement the following and, if so, when?

	<u>YEAR</u>
LAN <input type="checkbox"/> Yes <input type="checkbox"/> No	
VAN <input type="checkbox"/> Yes <input type="checkbox"/> No	
Satellite Links <input type="checkbox"/> Yes <input type="checkbox"/> No	
Integrated Workstations <input type="checkbox"/> Yes <input type="checkbox"/> No	

9. On a scale of 1 to 7, with 7 being the least important, please rate the following:

- Access Charge Implementation \_\_\_\_\_
- IBM's Partnership with ROLM \_\_\_\_\_
- AT&T's Partnership with Olivetti & Involvement with Convergent Technology \_\_\_\_\_
- GTE's Acquisition of SPRINT \_\_\_\_\_
- The BOC's Competing with AT&T \_\_\_\_\_
- McAUTO's Acquisition of Tymshare \_\_\_\_\_
- AT&T's New LAN Announcement \_\_\_\_\_
- IBM's LAN Announcement \_\_\_\_\_
- Cellular Telephone Availability \_\_\_\_\_

10. In your opinion, what is the most important telecommunications issue you have to deal with over the next 4 years?

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## APPENDIX B: DEFINITIONS

- INFORMATION SERVICES--Computer-related services involving one or more of the following:
  - Processing of computer-based applications using vendor computers (called "processing services").
  - Services that assist users in performing functions on their own computers or vendor computers (called "software products" and/or "professional services").
  - Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

### A. USER EXPENDITURES

- All user expenditures reported are "available" (i.e., noncaptive, as defined below).
- NONCAPTIVE INFORMATION SERVICES USER EXPENDITURES - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

- CAPTIVE INFORMATION SERVICES USER EXPENDITURES - Expenditures received from users who are part of the same parent corporation as the vendor.

## B. DELIVERY MODES

- PROCESSING SERVICES - This category includes remote computing services, batch services, processing facilities management, and value-added networks (VANs).
  - REMOTE COMPUTING SERVICES (RCS) - Providing computer processing to a user by means of terminal(s) at the user's site(s) connected by a data communications network to the vendor's central computer. There are five submodes of RCS, including:
    - Interactive - Characterized by the interaction of the user with the system, for the purpose of problem-solving data entry and/or transaction processing. The user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.
    - Remote Batch - A service in which the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is usually measured in minutes or hours.
    - Data Base - Characterized by the retrieval and processing of information from a vendor-provided data base. The data base may be owned by the vendor or a third party.

- . User Site Hardware Services (USHS) - Offerings provided by RCS vendors that place programmable hardware on the user's site (rather than in the vendor's computer center). USHS offers access to a communications network, access through the network to the RCS vendor's larger computers, and significant software as part of the service.
  
- BATCH SERVICES - This includes computer processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunication media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.
  
- PROCESSING FACILITIES MANAGEMENT (PFM) (also referred to as "resource management" or "systems management") - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.
  
- VALUE-ADDED NETWORKS (VANs) - VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

- Processing services are further differentiated as follows:
  - Cross-industry services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).
  - Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party) are also included under this category. Examples of industry specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.
  - Utility services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.



- SOFTWARE PRODUCTS - This category includes users' purchases of applications and/or systems software that is sold by vendors as standard products intended for use by different organizations. Included as user expenditures are lease and purchase expenditures, as well as fees for work performed by the vendor to implement and maintain the package (when such fees are either bundled as part of the product price or offered on an annual subscription basis). Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, including:
  - APPLICATIONS SOFTWARE PRODUCTS - Software that performs a specific function directly related to solving a business or organizational need. Applications software provides information directly for use by the end user. Applications software products classifications are:
    - Cross-Industry Products - Used in multiple user industry sectors. Examples are payroll, inventory control, and financial planning.
    - Industry-Specific Products - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and materials resource planning.
  - SYSTEMS SOFTWARE PRODUCTS - Software that enables the computer/communications system to perform basic functions, which are interim steps to providing the end user with "answers" sought. Systems software product classifications are:
    - Systems Control Products - These products function during applications program execution to manage the computer system

resource. Examples include operating systems, communication monitors, and emulators.

- Data Center Management Products - These products are used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
- Application Development Products - These products are used to prepare applications for execution by assisting in design, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, and retrieval systems.
- PROFESSIONAL SERVICES - This category is made up of services in the following categories:
  - SOFTWARE DEVELOPMENT - This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.
  - EDUCATION AND TRAINING SERVICES - These services help people acquire new skills, techniques or knowledge related to computers. This definition does not include services to educational institutions. (This latter market is included in the education (industry-specific) segment.)
  - CONSULTING SERVICES - Consultants advise clients on computer-related issues that are usually management oriented. Feasibility studies and computer audits are examples of services provided.
  - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - This is the counterpart to processing facilities management, except that in

this case the computers are owned by the client, not the vendor; the vendor provides human resources to operate and manage the client facility.

- TURNKEY SYSTEMS (also known as Integrated Systems) - A turnkey system is an integration of systems and applications software with hardware, packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems. Nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.
  - Turnkey systems revenue is divided into two categories.
    - Industry-Specific systems--that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.
    - Cross-Industry systems--that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.
  - Revenue includes hardware, software, and support functions.

### C. OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

- The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.
- The specific industries (and their SIC codes) included under these generic industry sectors are detailed in Exhibit A-1.

EXHIBIT A-1

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
33	Primary Metals	

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services
Services	73	Business Services (excluding information services companies themselves)
	89	Miscellaneous Services
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	65	Real Estate
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	75	Automotive Repair, Services, and Garages
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	81	Legal Services
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations









