ECONOMICS OF TELECOMMUNICATIONS

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ECONOMICS OF TELECOMMUNICATIONS

THE ECONOMICS OF TELECOMMUNICATIONS

ABSTRACT

This report analyzes changing views of the network, methodologies for efficient operations, ways to measure the network's contribution to the corporation, and examples of how the network can be used as a profit center.

The report is intended to help IS and telecommunications managers identify appropriate ways of economically and productively using the network and recognize how other departments and the corporation as a whole can gain from such use.

This report contains 115 pages, including 20 exhibits.

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ECONOMICS OF TELECOMMUNICATIONS

CONTENTS

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ECONOMICS OF TELECOMMUNICATIONS

EXHIBITS

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I INTRODUCTION

I INTRODUCTION

A. PURPOSE

- This report, produced by INPUT's Telecommunications End User Program, examines telecommunications with an economics viewpoint.

- The growth in networking demands leads to increasing communications costs. The microcomputer and growth in micro-mainframe linkages represent only a portion of increasing network traffic. As communications costs increase, they become more visible, and reducing costs becomes a requirement.

- This report analyzes changing views of the network, methodologies for efficient operations, ways to measure the network's contribution to the corporation, and examples of how the network can be used as a profit center.

- The report is intended to help the IS manager identify appropriate ways of economically and productively using the network and recognize how other departments, and the corporation as a whole, can gain from such usage.

- Its central thesis is that the informed IS manager/telecom manager is in a better position to respond to requests for applications identified in this report and to initiate beneficial projects.

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B.   SCOPE

- This report focuses on new technologies which are being tried for both cost-effective design and operational functions. It often discusses trends with which the telecommunications manager may not yet be totally familiar, but it does review some familiar factors.

- The study addresses the following questions:

    - How is the corporate telecommunications network viewed by management?

    - What methods are available for efficient network design and operations?

    - How can telecommunications and other departments work together to implement network uses which contribute to the corporate bottom line?

- The report focuses on analyzing telecommunications technologies as they are developing and as they are likely to develop over the next 10 years, and it explores both philosophical and practical issues.

- The background for discussion is characterized by the changes caused by the divestiture of AT&T, industry deregulation, and technological innovation. The foreground is a crowded, heated, and competitive market environment.

C.   METHODOLOGY

- The research for this report consisted of:

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- Client interviews.

    . INPUT clients were sampled to determine areas of interest and to learn of their experiences, problems, and needs.

- Vendor interviews.

    . Interviews were conducted with marketing personnel from several companies to gather perspectives.

- Product and service analysis.

    . INPUT collected and analyzed information on products and services described here, attended product demonstrations, and reviewed secondary research sources.

- Proprietary studies.

    . INPUT has conducted a number of relevant custom studies. No confidential information is revealed in this report, but the experience obtained has been applied in formulating the analysis and recommendations contained herein.

- Other studies.

    . Research conducted for other INPUT published studies has been used as appropriate to further understanding of the issues and opportunities discussed.

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D.   RELATED INPUT REPORTS

- <u>Telecommunications Strategies Planning</u> describes methodologies based on modified case studies and telecommunications planning principles, analyzing technical trends and the impact of deregulation.

- <u>Network Management and Control Systems</u> describes approaches and problems relating to network management, identifying relevant techniques, defining troubleshooting requirements, and specifically discussing packet-switched network problems.

- <u>LAN/CBX Trends: Decision Processes For Users</u> describes LAN and CBX product trends and presents an extensive planning process for managers to ensure successful implementation of an integrated voice/data network strategy.

- <u>LAN/CBX: PLANNING FOR CHANGE</u> is designed to further understanding of the field by identifying the technololgy and reviewing the important issues which need to be considered in assessing the economic impact of these technologies.

- <u>Telecommunications Annual Planning Report</u> is designed for senior managers and executives to help assess the effects of change and the opportunities they present.

- <u>SNA Networks: Challenges and Opportunities</u> describes the nature of IBM's system network architecture, competing products, the Open System Interface model, and the future direction of the technology.

- <u>Micro-Mainframe Connectivity</u> focuses on planning for the impact of the technology on the corporate network, operational steps needed to manage resources, and methods for controlling costs. The report also reviews antici-

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pated market and technology trends important to micro-mainframe tele-
communications planning.

- <u>Integrated Voice/Data Communications</u> describes the current effort toward integration, examines the limits of present technology, and studies the role of the Integrated Services Digital Network.

- <u>Electronic Data Interchange</u> discusses the electronic transfer of business information between organizations in a structured application. This report describes EDI activities in several industries, profiles services and software vendors, and analyzes issues affecting acceptance of EDI. Market forecasts and recommendations to industry participants are included.

- <u>Telecommunications Security</u> describes the current state of security within data processing and telecommunications, examines and analyzes the breadth and limits of current technology, and describes efforts toward national data encryption standards. It concludes with recommendations for future planning.

- <u>Office Videotex</u> describes how this technology is being used by several companies, outlines typical applications, and presents criteria for considera-tion in evaluating the technology and its features for implementation.

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II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This Executive Summary is designed in presentation format to help the reader quickly review key research findings and recommendations. It will also provide an executive presentation, complete with script, to facilitate group communications.

- The key points of the entire report are summarized in Exhibits II-I through II-4. On the left-hand page facing each exhibit is a script explaining that exhibit's contents.

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A. TELENOMICS: THE ECONOMICS OF TELECOMMUNICATIONS

- Divestiture, deregulation, and technological advances in telecommunications have combined to create both chaos and opportunity for information systems (IS) and telecommunications (telecom) managers. These changes include:

    - New network offerings.

    - New network methodologies.

    - Constantly changing tariffs.

    - Competitive market factors influencing costs.

- Growth in networking, the impact of the microcomputer, and emerging network applications have led to increasing corporate communications costs.

    - As these often departmental costs become greater, they will become more visible.

    - Reducing network costs become more of a requirement.

- Managers have increasing responsibilities not only to monitor and reduce costs, but also to facilitate and initiate applications which will improve corporate income. The network manager should become a contributor to planning which will help the corporation meet its goals.

- Telenomics is a concept, a way to view the means and methods used by telecommunications professionals to influence the corporate bottom line.

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EXHIBIT II-1

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TELENOMICS: THE ECONOMICS OF TELECOMMUNICATIONS

Telenomics:

The Means and Methods Used

by Telecommunications Managers

to Influence Corporate Profitability.

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B. TELECOMMUNICATIONS COST CONTROL/AVOIDANCE

- One aspect of telenomics is reducing or avoiding costs in network design and utilization.

- Mechanizing these tasks can take advantage of existing software products and remote computing service (RCS) applications.

- Private tandem switched networks are an economical and flexible alternative to dial-up services.

- Existing and forthcoming virtual private network offerings provide "hybrid" solutions for specific corporate communications needs.

- Centrex services can provide advanced telephone features for firms wishing to avoid buying expensive PBX equipment.

- Call accounting helps control employee telephone abuse while providing statistics which can be used for network optimization.

- Alternative long distance interexchange carriers (IXCs) can offer savings for both voice and data linkages. In addition to volume discounts, some pricing schedules are more advantageous than others.

- Bypass techniques such as microwave, fiber optics, satellite links, FM radio subcarrier, and cable TV services can lower costs by avoiding local telephone company access charges.

- Network applications such as electronic mail and teleconferencing can reduce costs and enhance productivity throughout the corporation.

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EXHIBIT II-2

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TELECOMMUNICATIONS COST CONTROL/AVOIDANCE

Bypass

Inter Exchange Carriers

Alternative Private Networks

Mechanized Inventory and Design

Call Accounting

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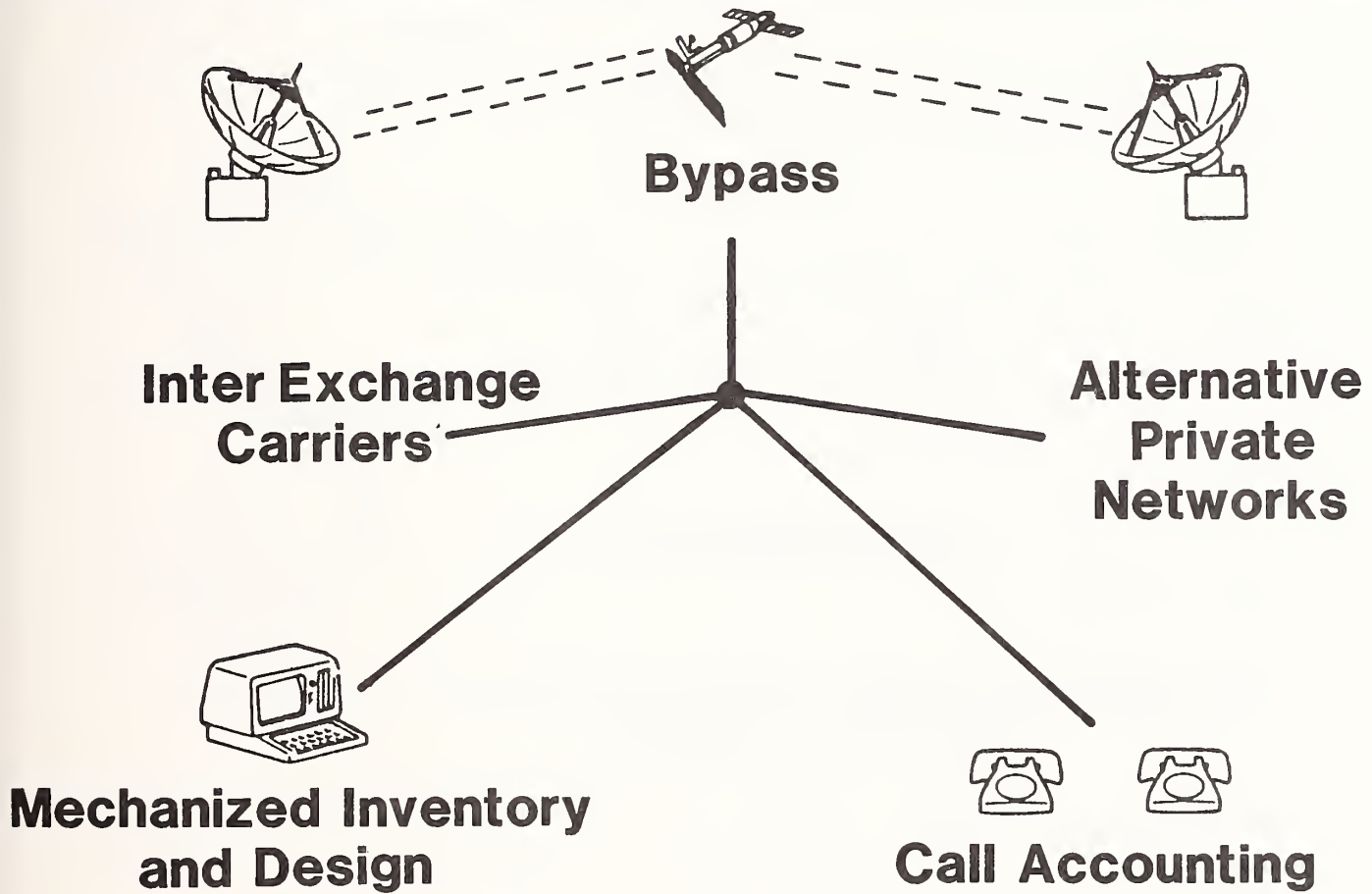
C.   NETWORK AS PROFIT CENTER

- In addition to reducing or avoiding costs, the network can be a potent contributor to corporate profitability.

- While financial and information service companies are clearly able to use networks for operations such as automatic teller machines (ATMs) or electronic information delivery, other companies can also benefit from network applications.

- On-line order entry systems and electronic data interchange (EDI) shift the customer service effort and expenses onto customers.

    - EDI is the exchange of electronic business documents between two companys' computers.

    - It reduces errors, improves turnaround, and costs less than manual methods.

    - EDI data can be integrated into other applications for added value.

- Telemarketing is another method of using the network for profit. Both incoming and outgoing applications have shown impressive returns on investment.

    - Systems which adapt data base management and on-line order entry enhance productivity.

    - Call distributors optimize personnel and network resources.

- Other ways of using the network for profit include resale of excess capacity, shared tenant services, and delivery of advertising to callers on hold.

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EXHIBIT II-3

- I3 -

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NETWORK AS PROFIT CENTER

- **Financial and Informational Services**

- **On-Line Order Entry/Inquiry, Electronic Data Interchange**

- **Telemarketing**

- **Excess Capacity Resale, Tenant Services**

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D.   INFORMED, PROACTIVE ACTION

● Cost control and avoidance measures are important, but the effort should be focused on large, rather than marginal, expenses. It makes little sense to direct $500 in effort to effect a $100 savings.

● The dynamic changes in the telecommunications environment make it difficult, but nevertheless more important, to stay informed of new tariff filings, new technologies, and new services which may be efficiently, productively, and/or profitably used by the corporation.

● IS and telecommunications managers need to rise above their previous roles as service providers to become more active participants in helping the company meet its strategic goals. This often requires improved skills in management and finance as well as staying technologically informed. It also requires a corporate telecommunications policy to avoid unnecessary expenses.

● Justification of new telecommunications applications can be based on either tangible findings, such as before-and-after piloting experiences, or intangibles, such as improved customer service, or a combination of both.

   - Progressive managers are willing to accept intangible cost justifications.

   - More conservative managers require new expenses to lead to a greater cost reduction than the investment.

● IS and telecom need to be sensitive to management styles in justifying network expenses.

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EXHIBIT II-4

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INFORMED, PROACTIVE ACTIONS

- Avoid Marginal Changes

- Stay Informed

- Improve Management Skills, Develop a Corporate Telecommunications Policy

- Use Both Tangible and Intangible Justifications

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III VIEWS OF THE NETWORK ARE CHANGING

III   VIEWS OF THE NETWORK ARE CHANGING

A.   OVERVIEW

- The costs of a corporate telecommunications network have been viewed by management as a necessary expense; however, this perception is rapidly changing. Increasingly, the corporate network is seen as a contributor to corporate profitability, and the telecommunications manager has taken a role among those responsible for finding new, innovative ways to show profits.

- This emerging view takes two forms:

  - The network aids the smooth functioning of the corporation by facilitating communications.

  - The network may serve as a contributor to the corporation's bottom line in its own right.

- This section highlights some of the findings relevant to telecommunications in INPUT's 1985 Information and Systems Planning report and in an earlier report, Telecommunications Strategic Planning. Additional comments have been included.

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1. MANAGEMENT PERCEPTIONS OF THE NETWORK

●   INPUT's research indicates that management believes IS and the network have some impact on the performance and competitive stance of the company, but that the greatest role of the information systems department continues to be the reduction of product and service costs.

2. WHO REPORTS TO WHOM?

●   Over the last two years, additional responsibilities have been given to IS due to data and voice communications complexity.

●   In over one-half of the cases reviewed, both the voice and data communications sides of the house report to information systems.

●   This means that in the balance of cases, voice communications reports somewhere else in the corporate hierarchy. INPUT believes this hinders the common development of the corporate network.

3. THE NETWORK CONTRIBUTES

●   Managers are coming to believe that the network can be a competitive tool. The most obvious example is automatic teller machine (ATM) networks in banking being used to leverage other services to expand the customer base.

●   Other corporate networks are being used to shift the customer service burden onto customers for applications such as order entry and order tracking. This application is discussed in Chapter V.

4. VOICE/DATA INTEGRATION

●   Voice/data integration has piqued the interest of all interviewed. The need to control communications costs is a high priority, and most respondents are skeptical about the technology's ability to merge voice and data economically.

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- Increasing demands on IS to provide communications support has relegated action on voice/data integration issues to the data gathering stage. Most respondents do not believe such integration will be a viable alternative until the 1990s.

- This finding is perhaps surprising given the availability and sales of advanced digital PBX equipment supporting integrated voice/data networks, the replacement rate of obsolete analog switches, and the logic of shared facilities (switches and wiring).

  - Digital switches should be fully in place by the early 1990s.

  - Perhaps then the digital PBX's capabilities as the corporate information switcher will become recognized for integrated applications.

5. LOCAL AREA NETWORKS (LANs)

- Those interviewed have few LAN installations. It appears that LANs are still viewed as experimental due to the lack of standards and unrealized need. Most interviewed feel they will eventually implement LANs, but only after IBM's intentions are fully known.

6. INVOLVING TELECOMMUNICATIONS IN PLANNING

- In poorly organized companies, telcommunications is not given its rightful place within the organization because executives either undervalue its importance or have difficulty communicating with technical personnel.

- In a 1984 survey, INPUT found that telecommunications is not included in the early planning processes.

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●   In the case of planning for a new physical plant, or in relocating an existing one, in over one-half the cases, telecommunications was not involved until after negotiations for the new facility had begun.

7.   LACK OF TELECOMMUNICATIONS POLICY

●   INPUT found that most companies lack a comprehensive telecommunications policy, attributable to the exclusion of communications personnel from executive decisionmaking.

-     This results in excessive expenditures for obsolete equipment, leased equipment with different expiration periods inhibiting attempts to upgrade or purchase new systems, substantial penalties for lease cancellations, and underutilization or overpayment of consultants due to the lack of a unifying policy.

-     In some cases (particularly with overseas operations), facilities may be located in areas where needed telecommunications services cannot be provided.

●   These findings are summarized in Exhibit III-1.

B.   TELENOMICS AND THE ROLE OF THE TELECOMMUNICATIONS MANAGER

●   Richard S. Kay, a senior staff administrator with GTE Service Corporation, has coined the term "telenomics" to describe the means and methods by which the telecommunications manager can help to influence the corporate bottom line.

●   Telenomics requires a proactive, rather than a reactive, role. Instead of only responding to service requests, the telecom manager needs to initiate discus-

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EXHIBIT III-1

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VIEWS OF THE NETWORK
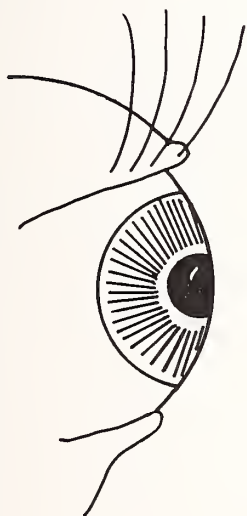
- The network impacts corporate performance, but mostly exists to control costs.

- Growing recognition of the network's potential to profitably contribute.

- Voice/Data integration not yet viable, LANs are still experimental.

- Telecommunications often excluded from planning, most lack corporate telecommunications policies.

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sion on how communications technology can be used both profitably and to reduce costs. Chapters IV and V discuss applications such as:

- Resale of excess private network capacity.

- On-line order entry systems.

- Electronic data interchange.

- Teleconferencing.

- Electronic mail.

- Bypassing the local telephone network.

- Telemarketing.

C.   THE CHALLENGES

- The dynamic telecommunications environment presents major challenges. The combined effects of divestiture, deregulation, and technological advances coupled with market competition mean more options for service and equipment, more need to stay current, and career risks for those making the wrong decisions.

- Wise decisions come from informed analysis, but with today's constant change and complexity, staying informed is a non-trivial task. Not only must the manager stay current on service offerings, pricing changes, new techniques, and technologies, he must be concerned with vendor viability, long-range planning, and the overall corporate strategic plan.

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- Investing in the corporate network requires more than a financial analysis to determine return on investment. It requires perspective on the company and the environment in which it competes. Unfortunately, the strategic view is sometimes lost in the press of daily matters.

- Information has a time value and is a corporate asset, one which is not usually reported in financial statements. The movement and management of information has become centrally important.

- While telecommunications has been largely excluded from strategic decision-making, indications are this is being corrected. Management is recognizing the value of telecommunications. Communications managers are becoming more skilled in technology and, more importantly, also in business matters.

- The next chapter discusses ways of reducing and avoiding costs in the design and use of the corporate network.

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IV NETWORK COST CONTROL/AVOIDANCE

IV   NETWORK COST CONTROL/AVOIDANCE

- This chapter discusses several ways of economizing in network operations and design, providing an overview of some familiar techniques while focusing on trends and emerging technologies which may be less familiar to the telecom manager. It also discusses network applications which can reduce costs in other corporate departments.

A.   FIRST STEPS IN COST CONTROL/AVOIDANCE

- The steps to controlling and avoiding network costs start with a review of the status quo. This first requires having an equipment inventory and baseline information on current expenses.

- The inventory should identify equipment purchase and leasing costs, amortization rates or lease terms, conditions, applications, physical location, and other relevant data.

- Baseline information on current network expenses requires analysis of local and long distance traffic, an inventory of all link types, and expense reports on applications such as facsimile, electronic mail, voice mail, VAN usage, and existing private line services.

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- While not directly related to the network, other useful information includes the expenses of business travel, courier services, sales expenses, and order processing.

  - These figures will be useful in determining the benefits of projects which will use the network either strategically or to reduce current costs.

  - Examples are teleconferencing, electronic mail, telemarketing, and electronic data interchange--subjects discussed later.

- Such information may not be easily extracted and the identification of this as a first step does not mean to imply that all information is required before proceeding on a cost reduction/control plan.

- Mechanizing at least a portion of this information collection is recommended, and there are a number of tools available specifically for telecommunications, such as:

  - Call accounting software, station message detail recording processors, or service bureaus.

  - Equipment inventory software.

  - Cable records software.

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B. EFFICIENCY IN NETWORK DESIGN

I. NETWORK DESIGN METHODS

- Designing a corporate network can be a time intensive undertaking if done manually and has been made increasingly difficult with the divestiture of AT&T which formerly could be called upon for network design services.

- While equipment and network services vendors can configure a customer's network, the telecom manager is wise to handle his own design, unbiased by a vendor's self-interest.

- Timesharing remote computing services (RCS) and micro-based software are available for network design, incorporating tariff information from a variety of carriers to aid network optimization.

- Examples of such offerings are:

    - Connections' Multipoint Network Design System.

    - System Engineering Tool's SET POINT.

    - Contel's MIND and GRINDER.

    - Telco Research's Network Architect.

- These packages generally permit "what if" analyses, providing cost options for various network configuration alternatives and assumptions on traffic growth.

- Voice and data circuits should be considered jointly for optimization, even though the circuits may not be interchangeable.

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-    They may be grouped for voice/data multiplexing or packetizing or for volume discounts, reducing the costs per channel.

-    Voice channels may also be used for data link backup.

•   The network optimization process needs to consider the efficiencies of multiplexing techniques and T-1 carrier availability from various vendors or through line-of-sight microwave links. In these cases, the costs of additional equipment need to be balanced against line cost savings.

•   Optimizing the network can be a complex undertaking due to the multivendor environment, but software tools can ease this process.

2.   METHODS OF MEASURING CAPACITY

•   Methods for measuring telecommunications capacity include:

-    Determination of load lines.

-    Use by channel, communications controller, multiplexer, etc.

-    Transactions per unit of time.

-    Response time by transaction and by transaction type.

-    Total number of transactions.

3.   LINE SPEED AND UTILIZATION COST CONTROLS

•   Communications costs, both in terms of line charges and holding times for data or micro-mainframe applications, can be reduced by using higher speed modems which are now available for use on dial-up lines at speeds up to 10 Kbps and even faster for certain types of private lines.

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- Cabling costs can be reduced by using coaxial multiplexers which allow multiple devices to communicate over a single cable. Several vendors offer such multiplexers supporting from 8 to 32 devices.

- Installation costs can be reduced by using fire resistant cable conforming with National Electric Code standards which can be used in suspended or dropped ceilings, eliminating the need for cable conduits.

- Settings requiring intra-building communications can control costs with various current bypass methods and by using planned local access transport area (LATA) packet services to be provided by the Bell Operating Companies. These proposed services are discussed later in this chapter.

- Synchronized links compress data into existing network capacity, and where increasing common carrier tariffs suggest, asynchronous communications should be analyzed to determine the payback period of new equipment supporting synchronous linkages.

- Some steps in cost control/avoidance are shown in Exhibit IV-1.

C.   PRIVATE NETWORK ALTERNATIVES

- A piovate network provides flexibility and cost control measures isolated from the dynamic telecommunications environment.

- Private networks help control costs because they are used to complete both on-net and off-net calls, using network nodes nearest the end location as the entry point to the public switched network.

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EXHIBIT IV-1

TELECOMMUNICATIONS COST CONTROL/AVOIDANCE STEPS

- Review Status Quo

  - Inventory

  - Expenses

  - Budgets

- Mechanize Information Collection, Network Design

  - Use Software or RCS Offerings

  - Become Self-Reliant: Vendors Are Self-Interested

- Plan Voice/Data Integration

- Use High-Speed, High-Capacity Links

- Reduce Cabling Installation Costs

- Consider Bypass and Private Network Options

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- It is beyond the scope of this report to fully describe all methods of implementing a private network.

    - The market is characterized by many network service vendors and new tariffs are filed virtually every day.

    - Keeping up with these offerings can be a full-time job, and reporting on them all here would require a rather lengthy document.

- This section describes several private networking methods, some familiar, others not so, in order to provide perspectives on cost-effective private network alternatives.

I.   THE TANDEM SWITCH NETWORK

- Private networks consist of PBXs at each company location and one or more centralized tandem switches which route voice and data among them through leased lines.

    - The primary difference between PBX and tandem switches is the amount of traffic expected on an incoming line.

    - On a PBX, the amount of traffic from an individual station is relatively small--perhaps 20 minutes per day.

    - On a trunk line from another switch, the traffic may be several times that volume.

- Intelligent switches provide flexibility by supporting least-cost routing in heavy traffic periods, thus avoiding blockage. This also means less expensive alternative interexchange carriers (IXCs) can be used in place of AT&T lines.

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- The decision to implement a private network is related to intra-company traffic volume, the increasing costs of public switched telephone network usage, local access charges billed for connection to telephone company central offices, and the ability of the corporation to design and manage a private network.

- Planning the private network involves determining the status quo, determining the number of trunk lines required now and in the future by using traffic engineering tables, and installing or updating needed equipment.

  - Analog trunks are low in cost and can be purchased individually.

  - Digital trunks, which carry both voice and data, provide economies in concentration and eliminate the costs of digital to analog conversion through modems.

- After determining the number of trunks needed, call routing needs to be established, based on the number and variety of PBX trunks and the hierarchy of trunk selection. Routing tables select the least expensive trunk; if that trunk is not available, the next available low-cost trunk is selected.

  - Private tie and foreign lines cost the least per minute, but are the most expensive to lease or purchase.

  - If the traffic study shows high usage during business hours, full-time circuits may be cost effective with the expense distributed over time to lower the cost per minute.

  - Alternative common carrier circuits should be evaluated for these links, with the costs at any particular installation compared to AT&T prices.

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- An intelligent networking switch as the central node or nodes is required. If existing nodes have not lived out their useful lives, it may still be desirable to replace them to accrue savings, offsetting losses associated with replacing not yet fully depreciated equipment.

- A newly emerging alternative to the fully private network is the virtual private network.

2. VIRTUAL PRIVATE NETWORK

- New network offerings will provide a combination of public switched and leased line services, enhanced with call processing features for the quick implementation of "virtual" private networks supporting both voice and data.

  - These services will be available in the 1987-1988 timeframe.

  - Such networks can be cost effective alternatives to fully private networks.

  - They will provide economies of scale since network services are shared.

  - Also, virtual private networks will reduce access line costs, the fees charged for dedicated lines to telephone company central offices, permitting easier economic justification than regular networks for smaller locations.

- Among vendors planning these services are:

  - AT&T Communications with the Software Defined Network (SDN).

  - MCI with V-Net, and recently with Satellite Busines System's Virtual Private Network.

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- U.S. Telecom and Isacomm also have services called Virtual Private Networks.

• Local access will be handled with leased private lines. A geographically dispersed corporation's local access points will connect through the public network but bypass the local telco for a virtual private network based on current requirements.

• As requirements change, the telecommunications manager can reconfigure the network from a microcomputer or a terminal.

    - Features will include selected routing, call handling instructions, and address translations allowing a four- to seven-digit calling plan for anywhere on the network.

    - Network configuration and features will be chosen from a menu.

    - Call detail reports will be available for network management, design, and departmental chargeback.

• Pricing for virtual private network services has not been finalized. However, AT&T's latest tariff filing calls for billing based on time of day and distance.

    - There is a monthly recurring charge of $5 per access line grouping and a non-recurring network implementation charge of $105,000.

    - Special optional features are charged separately.

• Virtual private networks will be most suitable for large companies with:

    - Dispersed nationwide locations. AT&T says the offering will be suitable for over 20 locations.

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- Regular, although sporadic, communications between those locations. AT&T says companies with over 100,000 minutes of monthly traffic will benefit from SDN.

- Needs for centralized management and network flexibility.

- The in-house ability to manage and reconfigure a network.

• The primary disadvantages are that users will be dependent on one vendor and will need to manage the complicated, continuing task of network optimization and redesign.

• Virtual private networks are a step toward the Integrated Digital Services Network (ISDN).

- When implemented, ISDN will support dynamic allocation of bandwidth (DAB) supporting a mix of voice, data, and image communications over the same facilities.

- ISDN will be directly competitive with local area networks, value added networks, and customer premises PBX switch equipment.

3. CENTREX SERVICES

• Centrex is a central office-based service providing many of the features associated with PBXs, but obviating the need for customer premises PBX equipment.

• The Bell Operating Companies, now free of AT&T which had promoted PBXs, are now promoting Centrex themselves, competing with PBX vendor sales.

• According to an industry association, the greatest Centrex growth is occurring in locations with under 125 stations. However, many larger users, including

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government installations, banks, and schools, still use Centrex for citywide, multiple locations.

- The BOCs are using special rate discounts and new services to maintain this larger installation class.

- This includes rate reductions guaranteed over long contract periods.

- New features being added include customer premises feature phones and new software offerings. Some of these are controversial as they may fit the category of "enhanced services" which, according to FCC rules, must be offered through separate subsidiaries.

    - However, the FCC has approved most currently-offered Centrex features and may approve others.

    - These features include call forwarding and customer-controlled moves and changes.

- Centrex services are most suitable for newly established companies which do not wish to invest in expensive PBX equipment, and in some cases, for newly established subsidiary corporations or smaller branch offices which are not linked through a private network to the corporate offices.

- These three private network alternatives are shown in Exhibit IV-2. Others are discussed below in Section E, "Bypass."

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EXHIBIT IV-2

THREE PRIVATE NETWORK ALTERNATIVES

VIRTUAL PRIVATE
NETWORK

Remote
Offices

Network
Services
Vendor

Vendor
Facilities

Vendor
Facilities

ABC
CORP.

TANDEM NETWORK

PBX

Remote
Offices

PBX

Leased
Lines

PBX

Intelligent
Tandem
Switch

CENTREX SERVICES

Telephone
Company
Central
Office

Public
Network

Nearby
Offices

INPUT
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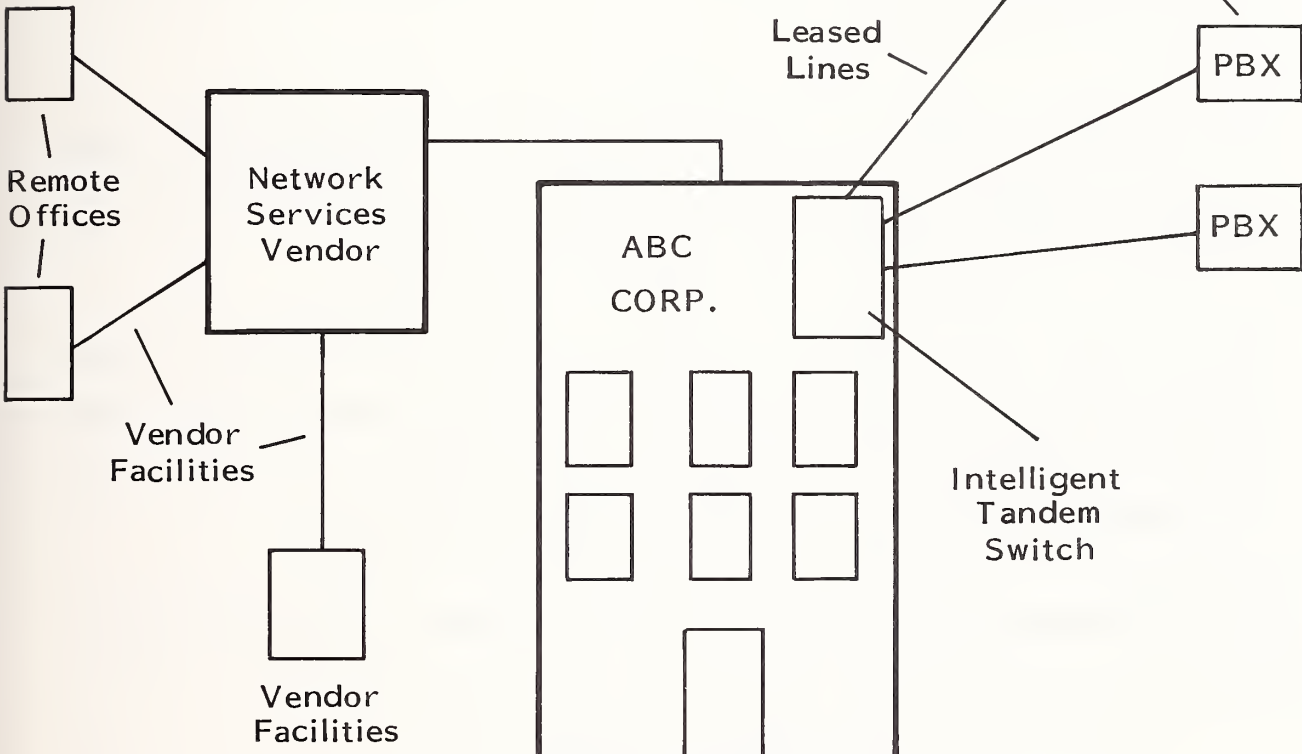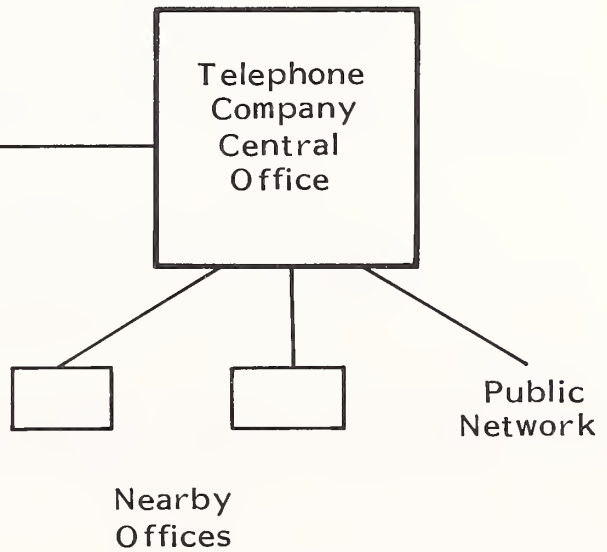
D. EFFICIENCY IN NETWORK USAGE

1. CONTROLLING TELEPHONE ABUSE WITH TELEPHONE CALL ACCOUNTING

- Employee telephone abuse can account for between 20-30% of all telephone usage in many businesses.

- Manual logging methods are difficult to manage, requiring that handwritten entries be compared with call records, followed by the costly, time-consuming task of calculating expense allocation and bill reconciliation.

- Most modern PBX equipment includes provisions for call detail recording (CDR). In its simplest form, the data is collected chronologically. With additional equipment/software features, or by using a third party remote computing service (RCS), more valuable reports can be detailed.

- Accurate telephone usage reports can help reduce communications costs by:

    - Identifying employee misuse of telephone service.

    - Permitting departmental chargebacks.

    - Supporting client billing in professional businesses which track calls made on behalf of customers.

    - Evaluating alternative telephone services such as WATS, foreign exchange lines, or alternative long distance interexchange carriers (IXCs) against current traffic patterns.

- The station message detail recording (SMDR) device is part of most telecommunications systems. When combined with call accounting, costs may be

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assigned, summary reports generated for each extension, trunk or account; and exceptions identified.

- For example, call accounting reports can identify which employees are not using available, low-cost services, who is making unauthorized long distance calls, or what extensions are responsible for calls to extra cost 976 exchange "dial-a" services.

- On-site processors, service bureaus, and software licensing are the usual arrangements for implementing a call accounting system.

    - On-site processors may be micro configurations, suitable for fewer than 200 lines.

    - Mini or mainframe systems are suitable for larger organizations.

    - Included in the software package are linked data bases with relevant tariffs, vertical and horizontal coordinates of all telephone company central offices for long distance call pricing, information on the organization's telecommunications system, as well as applications to process information and issue reports.

    - The advantages of an on-site processor are real-time billing, customized reports on demand, IS control, and relative low cost.

- Geographically distributed organizations may find RCS a better alternative.

- Remote computing services:

    - Maintain tariffs for all service areas.

    - Do not require the company's mainframe which may not have the spare capacity for processing.

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- Can accommodate data from various makes of PBXs in a multi-node network.

- Do not require IS support.

• An RCS will make the required monthly or quarterly tariff changes, update the client's network profile, and issue reports as needed.

• If opting for the RCS alternative, the chosen vendor should be able to accept move and changes information and permit data base review and editing from a micro front ending the RCS mainframe, preferably in a menu-driven format.

• The advantages of a service bureau include quality control by a specialized firm, no up-front capital investment, cost-effectiveness for less than 3,000 lines, and no company personnel needed for call accounting responsibilities.

• Pricng is generally based on volume, the size of the corporate network, the types of reports needed, and data base maintenance.

• In addition to assigning costs and controlling telephone abuse, a major advantage of call accounting is that the information generated can be used to help optimize the corporate network.

• Exhibit IV-3 summarizes the advantages of these various approaches to telephone call accounting.

• Call accounting software is available from several vendors, including Account-A-Call, Commercial Software, Communications Analysis Corporation, The Communications Group, CP National, Telco Research Corporation, Telecom Analysis, Inc., Telephone Budgeting Systems, and United Technologies.

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EXHIBIT IV-3

CONTROLLING TELEPHONE ABUSE

20% to 30% of Telephone Use is Abuse
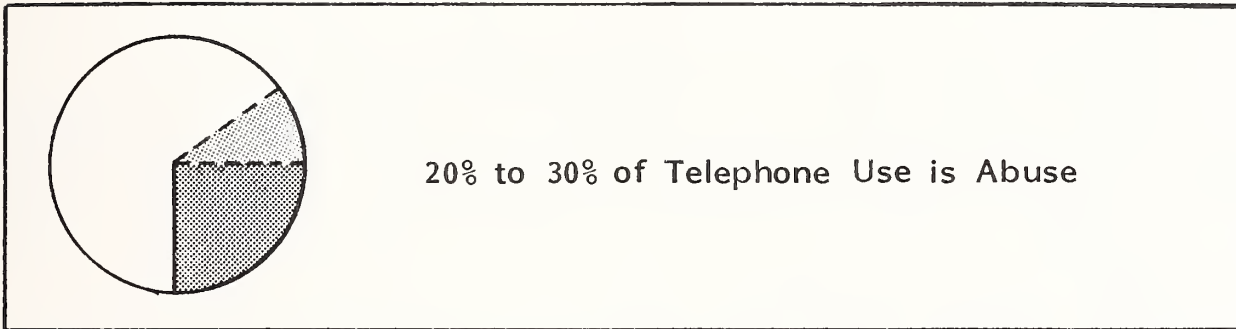
Call Accounting

- On-Site Processor

  - Real Time Billing

  - Customized, On-Demand Reports

  - IS Control

  - Low Cost

- Remote Computing Service

  - RCS Maintains Tariff Data Base

  - Doesn't Use Scarce Capacity

  - Accomodates Most PBX Types

  - No IS Support Required

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- Standalone call accounting processors are sold by Atlantic Technologies, Auto-Tel Equipment, Bitex, Control Key Corporation, Moscom (private labeled to AT&T, FirstTel Information Systems, BellSouth Advanced Systems, Executone, and Honeywell), Northern Telecom Cook Electric Division, Racom, Summa Four, Sykes, Telco Research, Telematic Products, Tie, and United Technologies.

- Remote computing services offering call accounting include Account-A-Call, Bitek, Commercial Analysis Corporation, Scientific Savannah, Telecom Analysis, Telecom Management, Telecommunications Service Bureau, Telecom MIS, Western Telematic, and X-Tend Communications.

2. ALTERNATIVE LONG DISTANCE INTEREXCHANGE CARRIERS (IXCs)

- There are risks in selecting a long distance carrier. If a carrier provides inexpensive service, but the service quality is inferior, this reflects poorly on the firm (and IS), can add expenses, and leads to lost business.

  - Interrupted calls, repeated attempts to get a better line, and lost data can be the negative results.

  - Equal access implementations only apply to the local connection. It is within the IXC's transmission facilities where these problems may occur.

- Exhibit IV-4 shows call quality ratings given by test callers to several long distance carriers, as surveyed by a consumers' group.

- Most IXC billing is based on the next highest minute, but several bill in increments of six seconds beyond the first minute.

  - This can result in an average savings of 30 seconds billing time per call compared to an IXC which rounds to the next minute.

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EXHIBIT IV-4

CALL QUALITY RATINGS

Percent of Calls Rated "Moderately" or "Severely" Defective
on Any Aspect of Quality by Test Callers or Called Parties

Company	SBS	AT&T	GTE Sprint	Allnet	Tele-Saver	MCI	ITT	Western Union
Percent	39%	45%	52%	62%	67%	68%	70%	74%
(Number of Test Calls)	(66)	(100)	(91)	(94)	(92)	(92)	(79)	(96)

Company

(Number of Test Calls)

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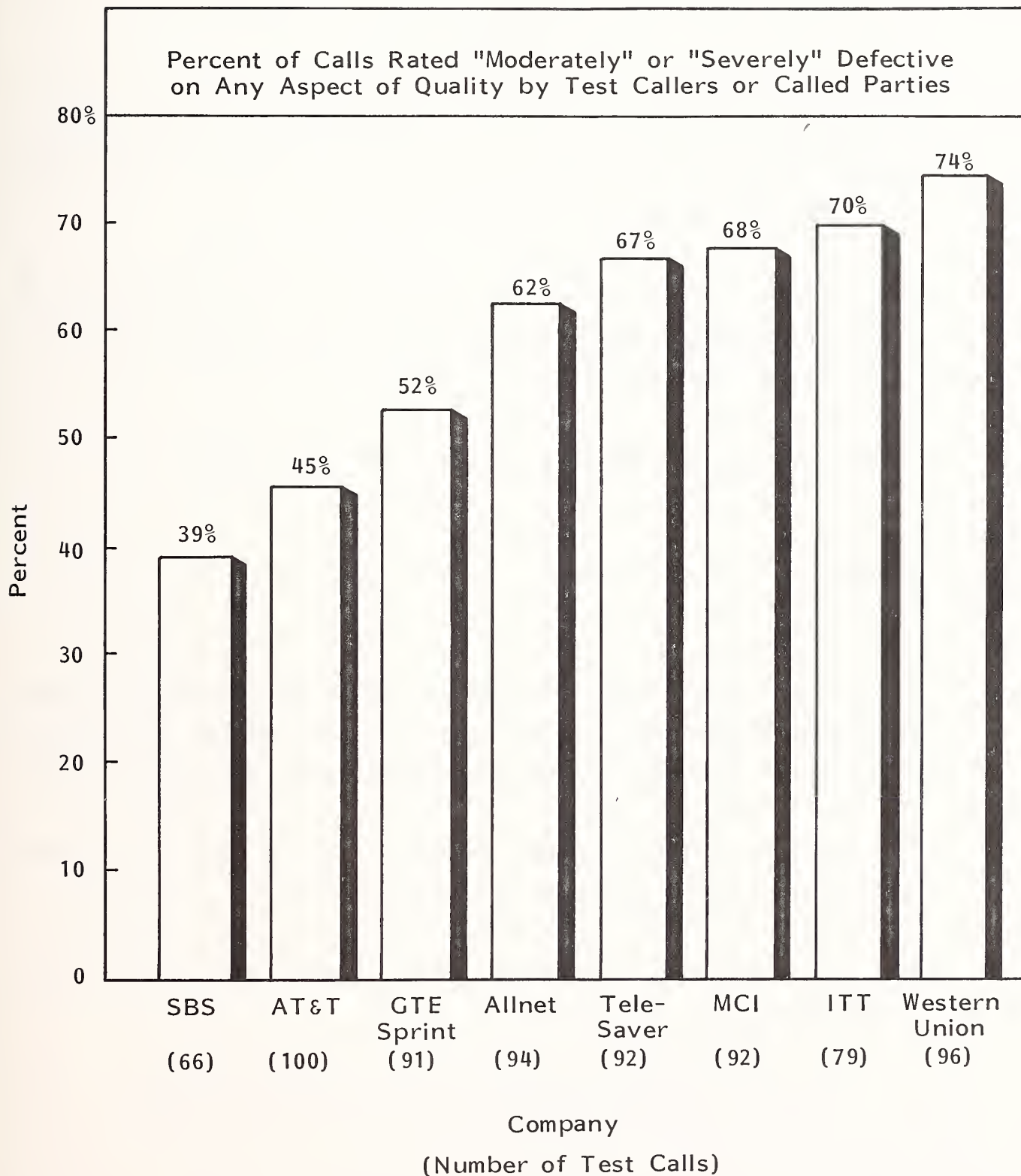
- The major IXCs using this practice are SBS Skyline and Allnet (note that SBS, formerly held in part by IBM, is now owned by MCI, which is now partially owned by IBM).

- Volume discounts are available from many of the IXCs.

● Some IXC services are available through long distance resellers. Resellers buy a mixture of network services on a wholesale basis, resell capacity at retail, and profit on the difference. The routing is determined based on the least-cost facility available at the time of the call.

● The risk with using a reseller is that some of the estimated 750 firms offering such services are not necessarily financially solvent. Vendor failure could interrupt service--an inconvenience at best.

● Considerations in evaluating IXC services are shown in Exhibit IV-5.

E.   BYPASS

● The term "bypass" is defined as replacing local telephone company facilities for communications between two user premises in the same city or between user premises and the serving office of a long distance interexchange carrier.

● The choice of several methods available for bypass requires a financial analysis based on the unique needs of the corporation.

● Bypass costs need to be allocated between equipment, media implementation, and administration.

- Equipment includes multiplexing and transceiving electronics.

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EXHIBIT IV-5

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IXC CONSIDERATIONS

- SERVICE QUALITY - Critical for Data

- BILLING BASED ON 1/10 SECOND - Saves Money

- RESELLER FAILURE RISK - Can Interrupt Service

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- Media includes cables or terminal costs such as satellite dishes.

- Implementation costs include planning effort, real estate property, right-of-way, engineering, construction, and installation costs.

- Administration includes maintenance, network management, and reconfiguration costs.

- Bypass recurring costs include line charges and the operational aspects of facility maintenance. Capital expenses include the costs of real estate and equipment.

I. T-I

- T-I designates the 1.544 megabits per second digital channels which are used between telephone company central offices.

- Because so much T-I equipment is used in telephony, it has become a de facto standard for many satellite, fiber optic, and digital radio transmission systems.

- T-I can support videoconferencing, high-speed digital facsimile, and high-speed, high volume data communications with integrated and aggregated voice channels. Twenty-four voice channels fit on a T-I carrier, although new multiplexing techniques can fit 44.

- AT&T initially offered T-I in 1983, calling it High Capacity Terrestrial Digital Service (HCTDS). Later, T-I was marketed as part of Accunet digital services. T-I services are now provided by the BOCs for local intra-LATA usage as well as by interexchange carriers.

- Since applications rarely operate at T-I sppeds, multiplexers aggregate lower speed traffic to use T-I facilities ecomomically. PBXs often integrate this capability.

- Add-on T-I equipment is sold by manufacturers such as Infotron, NEC, Tautron, Timplex, Amdahl, Avanti, Case, Coastcom, Ericcson, and GTE Lenkurt.

- T-I requires repeaters every mile, although with fiber optic links this distance can be between four and five miles.

- T-I services are intended for companies needing local voice and data transmission. The economics of T-I currently favor distances under 500 miles.

- T-I channels are priced at approximately $700 plus $300 per mile monthly for short distances. Mileage costs can drop to as low as $100. T-I multiplexing equipment can cost approximately $30,000 plus $1,000 per circuit.

- Multiplexer costs can be reduced by using the PBX or a front end processor (FEP).

2. DIGITAL TERMINATION SERVICES: 23 GIGAHERTZ MICROWAVE

- While there are other forms of microwave, the trend is toward digital systems.

- Short haul T-I links between a company's locations can be configured using 23 gigahertz microwave systems. These systems are suitable only for line-of-sight applications under five miles and are the least expensive microwave technique.

- Microwave systems require an FCC license and must be purchased in pairs.

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- The associated dishes have become smaller, easy to install, and less expensive.

- Atmospheric conditions (principally heavy rainfall) can affect transmission.

- Multiplexers may be needed unless connections are made directly between PBXs with T-1 compatibility.

- The cost of a 23 gigahertz system ranges between $20,000-25,000 for each end of the link, not including any needed multiplexers or voice grade signalling capabilities. Other costs may include needed land or towers, although small dish installations can be placed in a window or on the side of a building.

- Twenty-three gigahertz microwave systems are available from Digital Microwave (DCM 23), M/A Com (MAC 23 DR), and General Electric (Gemlink).

3. FIBER OPTICS

- Fiber optics offer certain advantages:

    - Large bandwidth--a .25-inch cable with two optical wave guides can carry the same amount of information as a 3-inch cable with 20,000 copper wires.

    - Thin, lightweight cable--this makes the media suitable in cases where weight or bulk may present an installation problem.

    - Low attenuation--this means fewer repeaters are needed to carry the signal to its destination.

    - Low noise--because it uses light waves, fiber optics are immune from induced electromagnetic or radio frequency interference. They can be used adjacent to high voltage equipment.

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- Security--related to their low noise characteristics, fiber optics are virtually immune from undetected intrusion.

- The costs of fiber optic links can vary widely depending on installation expenses such as the need to dig trenches and right of way purchase requirements. The length of the link influences the number of necessary repeaters.

- Fiber optic channels can also be leased from several transmission vendors.

4. SATELLITE LINKS

    a. Very Small Aperture Terminals (VSAT)

- VSAT techniques offer an alternative to leased-line, multi-node, dial-up, or private packet networks and to other forms of satellite communications for medium to large, wide area, "thin-route" networks.

    - Networks suitable for VSAT applications have many geographically distributed nodes with low data traffic patterns.

    - The network is designed for remote sites to communicate intermittently with central node processors, although communications between remote nodes is also possible.

    - VSAT terminals are under-two-meter transceiving earth stations.

    - The method obviates the need for last-mile connections between user sites and network services such as telephone company central offices.

    - Because traffic in VSAT locations is low volume and intermittent, the satellite link can be shared by many users, resulting in low recurring network costs.

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- Satellite transceiver dishes are also low power; however, the central station must be more powerful than remote sites. The size and expense of the central terminal requires the network to be over 100 stations in order for it to be cost-effective.

b.   Benefits of Ku-band Communications

- VSAT applications use Ku-band channels which are less congested than C-band and which use frequencies other than those used for terrestrial microwave.

    - This means no interference from this source.

    - Earth stations can be placed in congested urban areas where C-band earth stations or larger dishes would be impractical.

    - Since the band is only used for satellite communications, licensing, frequency, coordination, and site selection are simpler.

c.   Disadvantages of Ku-band Communications

- Local weather may affect the channel, requiring extra power to "punch through" heavy rainfall. However, some users do not see this as a problem; in fact, the NBC television network uses Ku-band exclusively (although with larger earth stations) and has been able to distribute programming to affiliates despite hurricanes.

- The up-front capital costs for hardware are relatively high because the technology is new. However, this is changing.

d.   Costs of VSAT Systems

- Because this is a new area, equipment prices are rather broad. For example:

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-       Remote earth stations cost between $7,000-15,000 each.

-       Monthly maintenance for each station is between $30-75.

-       The monthly space segment charges for the entire network are between $4,200-15,000.

-       A master earth station with redundant electronics can cost between $500,000-1,000,000.

● As can be seen, the most expensive element is the central node.

● To reduce this cost, the company may use a satellite network service which provides turnkey systems for VSAT applications, managing the network and providing the expensive central hub. These companies include Vitalink and Equatorial Communications.

● Also, AT&T Communications is working with Harris Corporation to develop such a service, scheduled to begin in June 1986.

-       Under the agreement, AT&T will market, maintain, and service the network while Harris provides equipment.

-       The service will be directed to companies with over 100 remote locations.

-       One-way broadcast data and video as well as two-way data communications services will be provided; however, the service reportedly will not be designed for voice-only communications. Details of the service have not been finalized.

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- Using such a service does reduce the user's control and removes some flexi-bility in network reconfigurations. Regardless, VSAT applications can be cost-effective solutions for some telecommunications needs.

F.   OTHER BYPASS METHODS

1.   FM RADIO SCA SERVICES

a.   Background of SCA

- Regulatory changes in the last few years have opened the FM radio station Subsidiary Communications Authority (SCA) spectrum for cost-effective data applications.

- Services are now operational, using the resources of literally thousands of FM radio stations to distribute data to places which could not economically be reached by private or dial-up lines.

- While some industry participants think direct broadcasting by satellite (DBS) will eventually replace SCA, there are valid reasons for using subcarrier networks in the interim, the most important being low cost and geographical reach.

- Several companies are offering SCA channels throughout the country for data, paging, audio, public displays, and local services. The number of cities served is growing steadily.

b.   Vendor Services

- Among those involved are:

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-   Bonneville Telecommunications (Salt Lake City, UT) which has marketing agreements with both GEISCO and Tymnet for SCA data services coupled to the value added networks for the return loop.

-   Indesys (Mountain View, CA), working with ABC Video Enterprises and Epson America, has introduced a service for distribution of price changes, sales information, and financial materials. Among those said to be using the services are Avon, BusinessLand, and Peat, Marwick, Mitchell and Company.

-   Mutual Broadcasing Systems' Multicom (Arlington, VA), which has been delivering data and private audio services (i.e., sales motivation messages) to distributors for Mutual's former parent company (Amway) and is beginning services for others, including newsletter distributors.

-   American Diversified Corporation (Costa Mesa, CA) also plans a similar, multichannel service and has launched nationwide paging and radio messaging services.

-   Lotus Development Corporation has purchased Dataspeed (San Mateo, CA), which uses SCA for stock market information transmittal to portable receivers. A new service called "Signal" linking financial data to spreadsheets has been introduced. The datastream operates at 9600 bps, but SCA speeds of up to 32 Kbps are eventually expected.

c.   Economics of SCA

●   A full-time 2400 or 4800 baud dedicated data circuit to the largest 250 cities would cost approximately $125,000 per month, depending on the supplier being used. Timesharing would further reduce costs. There may be monthly charges for leased receivers which may be purchased with optional printers for well under $500.

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- For less than full-time needs, national distribution would cost approximately $7.50 per 1,000 characters and a single city could be reached for as little as $0.75. Some of the services charge approximately $50 to deliver a 10,000 character electronic newsletter to 200 cities. Pricing is believed to be flexible in this new area.

    d.   Applications

- SCA applications include price and product list distribution, software updates, instant company news (audio or text), electronic mail (i.e., work assignments, product recalls), paging, and national fleet dispatching.

- Receivers are addressable so data can be sent to a single location, but SCA is more economical for multiple rather than single point distribution.

- Currently, only simplex transmissions are possible, but return communications can be handled through VANs. Information can be requested and/or verified through this means, while the economies of one-way SCA are used for information dissemination.

- Vendor viability is a factor. The principal players are longtime participants in the broadcasing business, but their technical proficiency may vary.

- Users considering SCA should determine the reach of the signals in each target area and evaluate if receiver equipment is suitable for the application. Those needing to receive information from the target sites need to factor the additional costs of the return loop via VANs.

- Subcarrier networks represent a promising technology offering an economical solution to many data distribution problems.

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2. CABLE TELEVISION (CATV) ALTERNATIVES

- CATV facilities can be used for voice and data services. Since 1983, MCI Communications has run an experimental program called Cablephone.

  - MCI leases space on the cable network and handles calls through its own switching and transmission systems connected to its long distance network.

  - While originally planned for service in approximately 25 markets, it is only available in eight, including New York, Dallas, and Washington, D.C.

  - Cablephone is targeted to businesses with 24 or more circuits.

- Due to recent deregulation, major CATV operators are evaluating new service options for their cable installations. Some are already offering institutional data services, typically for banks. Cox Cable and Warner-Amex are offering fiber optic loops for institutional data services.

- Only the major CATV companies have extensive experience with complicated telecommunications and computer equipment.

  - The CATV operator mindset is generally oriented to entertainment, not data or voice communications.

  - Recent deregulation has eliminated CATV "must carry" provisions requiring coverage of all local signals. This will reduce needs by smaller CATV operators to upgrade facilities to accommodate more local channels and remove impetus to apply surplus bandwidth to unproven ancillary businesses such as bypassing local telco facilities.

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- CATV operators also face investment challenges in wiring newly won franchises and upgrading older systems. Wiring industrial/business areas can be expensive and may not result in ongoing revenues from non-residential tenants. Data services may not be needed.

- Although INPUT believes that CATV voice and data services are largely technological demonstrations, such services, where offered, are alternatives for local telco bypass.

- The bypass methods discussed are shown in Exhibit IV-6.

G.   ELECTRONIC MAIL (E-MAIL)

I.   BACKGROUND OF E-MAIL

- Seen as a response to the sins of the U.S. Postal Service (called "Snail Mail" by its detractors), E-mail, available from a growing list of companies, is moving information faster and often more cheaply than other methods.

- Most corporate communications are within the same organization.

    - As companies become more decentralized, the efficiencies of E-mail become clearer.

    - Messages can be transmitted within the organization instantaneously without the delays inherent in physically preparing and moving a piece of paper around.

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EXHIBIT IV-6

BYPASS TECHNOLOGIES

TECHNIQUE	APPLICATIONS	BENEFITS	DISADVANTAGES
T-1	High-capacity links generally under 500 miles	Integrates voice, data and image on same link	Requires high volume to cost justify Not currently cost effective over 500 miles Requires repeaters every mile
23-Gigahertz Microwave	T-1 capability under five miles	Rapid payback Uncongested frequencies	Rainfall may affect transmission Requires line-of-sight
Fiber Optics	High-capacity "cabled" applications	Immune from electrical interference Lightweight	Installation costs similar to cable runs
Very Small Aperture Terminal (VSAT)	Wide area, low-volume, data-only networks	No microwave interference to Ku-band frequencies Flexible installation Low recurring costs	Weather may affect transmission Requires expensive hub terminal New market, electronics still expensive
FM SCA	Wide area data/audio/text distribution	Low cost Addressable receivers	Duplex applications require VAN for return loop
Cable TV (CATV)	Local cabled institutional networks	Uses existing broadband facilities for voice/data/image	Limited availability CATV operators not necessarily focused on data communications

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2. E-MAIL SOFTWARE AND SERVICES

• For internal E-mail, software is installed on a company processor. The major mainframe manufacturers offer E-mail as part of their office system packages.

• For external use, a service such as MCIMail or EasyLink is used.

• Public and internal systems can be integrated through gateways with little or no capital expenses and usually without installation fees.

• Mainframe based E-mail often links with automatic filing and retrieval systems. Files can be searched by date, author, addressee, or keyword.

3. EVALUATING E-MAIL ALTERNATIVES

• Over 40 companies now offer E-mail for use on corporate mainframe computers, and more than 10 companies provide subscription services on a timesharing basis.

    - This choice makes deciding between systems confusing.

    - The best course of action is to evaluate features compared to needs and analyze costs based on expected usage.

• If the company needs to communicate electronically outside the organization, there are a number of things to consider.

    - Cost—this should be approached on the bases of expected usage.

        . Many services require monthly minimums which do not make sense if external E-mail needs are infrequent. In this case, look for the lowest fixed costs.

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- Other services charge by complicated schedules, meaning some analysis is needed to estimate projected costs.

- Also, look for low-cost access to the network. Find out if the nearest network port is a long distance call--one of the hidden costs of using E-mail.

- If the company is now using one of the remote computing services or value added networks to access remote computers, evaluate the vendor's E-mail offerings. Otherwise, evaluate them all with an eye on unique needs.

- Is hard-copy printout needed to get mail to people who are not on the system? If so, make sure the service being considered can send electronic messages to E-mail serving offices where it will be printed for regular mail or courier delivery.

- Is there a need to communicate overseas? If so, make sure the E-mail system can at least send telexes or has some other overseas arrangements.

- Are primary customers or suppliers also on the system? If not, it may be desirable to find ways to make it more attractive to them, to closely bind other firms to your company.

- Evaluate providing gift accounts for business associates or opening the in-house E-mail system to customers.

- By using pre-designed electronic forms, on-line ordering can improve customer service and serve as an entry point to Electronic Data Interchange, discussed in Chapter V.

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- What is the desired image? Is it okay if hard-copy E-mail looks like a computer printout? Is it desirable to have company letterhead used on hard copies? Evaluate how important these things are to the company.

4. IMPLEMENTING E-MAIL

- Piloting and prototyping are ways of evaluating specific products in controlled tests. Personal accounts can be opened by those with micros who value the benefits of E-mail. These early users will often be in the marketing department.

- Find out what these early users think of the services. Settling on one system for all internal needs is important, but some departments may have legitimate reasons for using several external services.

- Once a decision is made to use E-mail, it is a good idea to implement "top down." Make sure the executives (or at least their secretaries), departmental managers, and line managers have accounts and ways to access E-mail.

5. "FLAMING" AND OTHER PROBLEMS

- For a company to gain E-mail productivity benefits, it must be used.

  - E-mail managers should arrange distribution of routine memorandum, company news, birthday greetings, and the like to user mailboxes to "seed" usage.

  - It is important to develop regular log-on habits--missed messages may be missed opportunities.

- E-mail has some social effects which need to be acknowledged.

- It is different than other communications.

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- Typically, an E-mail letter just ends without the customary "sincerely yours" closing. Letters are banged out on a keyboard, sometimes aggressively. The personal touch of a handwritten note is gone.

- According to researchers at Carnegie Mellon University, the dehumanization this represents may be behind the use of crude and abusive language ("flaming") in E-messages and quick, extreme decisionmaking based on E-mail dialogues.

- The particular E-mail feature which is its greatest benefit may be an occassional problem. Its instantaneousness allows a "flaming" message to be sent without forethought and with little or no chance of retrieval. An E-mail message is protected from intercept attempts.

6. COST SAVINGS

● The use of electronic mail is being fueled by increasing telephone costs and the labor of paper communications. New solutions are needed for time-sensitive business communications. E-mail is replacing long distance telephone calls and doing away with infuriating and costly telephone tag.

- E-mail savings of $10-20 per month per user terminal on telephone calls alone can be expected.

- Further direct savings in overnight courier usage can also be determined.

- Indirect savings, due to increased productivity, may be more difficult to quantify, however.

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7.   ANTICIPATED E-MAIL DEVELOPMENTS

- Electronic mail is somewhat limited because there are different systems and services with different command structures. They do not talk to each other. This may be less of a problem within a few years.

- In May 1984, the Electronic Mail Association endorsed the International Consultative Committee on Telephone and Telegraph (CCITT) recommendations on message handling systems (MHS), described in the X.400 standard.

- Many of the E-mail providers have started incorporating X.400 protocols which will provide guidelines for message exchange between computer-based message systems and related services such as telex, facilitating the creation of channels for global, compatible E-mail networks.

- The near term will also see further integration of services such as voice mail and textual electronic mail merging. For example, on Digital Equipment Corporation's All-in-One integrated office system, DecTalk reads electronic messages aloud over the telephone or through a workstation speaker.

- Voice-to-text will take longer to develop, although one E-mail vendor is claiming to be able to do this using two mainframe computers to translate between the media. IBM and Wang are also working on voice command typewriters with E-mail implications.

- Electronic mail will supplement many channels of business communications, opening its own unique structures and making its own stylistic statements. Cost savings and ease of use are the key factors.

- Exhibit IV-7 lists the reasons for using Electronic Mail. Exhibit IV-8 lists some vendors of E-mail services designed for external use.

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EXHIBIT 1V-7

WHY USE ELECTRONIC MAIL?

1. Speed.   Communication can be instantaneous.

2. Reduced keystroking, paper handling, filing, and storage expenses.

3. Reduced photocopying.

4. Reduced postage and mailing expense.

5. Less expensive than telephone calls.

6. Less susceptible to events which may prevent delivery or cause message loss.

7. Geographic independence.   Remote access is possible using portable terminals.

8. Time and time-zone transparency.

9. Eliminates "telephone-tag."

10. Fewer interruptions mean more productive time management.

11. Shortens decisionmaking, enhances group interaction.

12. Automatic recordkeeping.

13. Security through passwords.

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EXHIBIT IV-8

E-MAIL SERVICES

COMPANY	SERVICE
ADP Autonet	AutoMail is delivered via the ADP Autonet public data network.
AT&T Mail	Currently available only within AT&T, and sold as part of the computer system solutions, this product integrates text-to-voice voice, graphics, and forms generation, suitable for sales and marketing applications
Computer Sciences Corporation	Offers Notice on the Infonet Value Added Network
GTE Telenet Communications Corporation	Telemail operates on Telenet. Special interest E-mail subnetworks exist for financial and medical communities.
Graphic Scanning	Offers Graphnet FaxGram Service, which permits a user to call in and dictate a message for delivery via first-class mail, courier, telephone, Telex conversion, or international night letter.
General Electric Information Services (GEISCO)	Offers Quik-Comm and a bulletin board service for company communications.
International Electronic Mail Service	Resells OnTyme and offers Telex access. Charges $50 per year per user (two-user minimum), $5 per month per mailbox, $3 per connect hour, and $1 for every 4,000 characters sent or received. An average-sized message cost approximately 50 cents.
ITT Business Communications	Offering Dialcom, the company is active in international E-mail. Speedmail transmits computer mail to processing centers for printing and post office delivery.

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EXHIBIT IV-8 (Cont.)

E-MAIL SERVICES

COMPANY	SERVICE
MCI Digital Information Services Corp., MCIMail	Charges an $18 annual registration charge and fees based on messages. No connect-time charges. Electronic delivery of 7,500 characters costs $1.00. Short, 500-character messages are 45 cents. Hard copy is mailed first class for $2.00. Overnight and four-hour courier delivery available in many cities. Stationary and signature registration available for hard copies. Advanced users ($10 monthly) have increased on-line storage and other benefits.
Omnet	A reseller of GTE's Telemail, the company provides consulting and E-mail management services. Also offers BUSINESSnet and SCIENCEnet for the financial, research, and development communities.
RCA Global Communications	RCA Mail builds on RCA's Telex and other communications services. Pricing is based on access time, characters sent, and $500 monthly minimums per subscriber organization.
McDonnell Douglas Applied Communications	Offers the OnTyme Connection. Customization is available to simplify business communications, such as field office daily reports or order entry.
Western Union	Operates Telex and Telex II (TWX) networks, and EasyLink Service combining various forms of Computer Letter. Free registration, $25 per month minimum usage charge, based on connect time and services.

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H.   TELECONFERENCING

- The term "teleconferencing" covers several related electronic meeting techniques.

I.   VIDEOCONFERENCING

- The television transmission abilities of communications satellites are being used in private business to enhance productivity and cut down travel expenses.

- The video conference and its less glamorous related technologies (audio, audiographic, and computer conferencing) are also seen as improving the decisionmaking process, especially in decentralized organizations.

    - Research studies show that teleconferences encourage more effective preparation and better follow through in meeting objectives than face-to-face meetings.

    - Electronic meetings tend to be shorter, better organized, and more productive.

    - They also boost productivity by improving the quality of work life. Many executives are concerned about time spent away from their families and are therefore receptive to technologies which offer more flexibility in scheduling.

- Videoconferences can either take place between two points or use the broadcast capability of satellites to make presentations simultaneously in multiple locations.

- The production may resemble a television extravaganza, complete with entertainment, or an intimate business meeting between two people.

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- Interaction between originating and receiving sites is possible by return audio-only channels when the use of two-way video is not necessary or cost-effective. Document exchanges can be accomplished using a facsmile system integrated with the video channel.

- Ad hoc videoconferences are special events, set up as needed, as opposed to a dedicated system which is used on a regular basis.

- Slow to gain acceptance due to early limited functionality, high costs, and human factor problems, videoconferencing is growing in usage as equipment costs come down and less expensive transmission techniques and channels are introduced.

- Public rooms operated by AT&T and others are available; however, they have not been used much, primarily because participants still need to travel to the location. Ideally, a videoconference should minimize travel expenses and time—that is the point.

- Vendors providing videoconferencing services include Argo Communications (New Rochelle, NY), Bonneville Satellite Corporation (Salt Lake City, UT), Comsat General (Washington, D.C.), Netcom (San Francisco, CA), Private Satellite Network (New York, NY) and Videostar Connections (Atlanta, GA).

- If a company requires regular access to videoconferencing facilities, inexpensive portable equipment can be purchased or a dedicated room may be constructed.

  - Special rooms may be designed with the "corporate culture" in mind, incorporating several voice-activated cameras, large screen projection, and high-speed facsimile equipment, all installed in a leather, chrome, and mahogany executive board room.

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- Sensitivity is needed. The facility on the other end of the channel should be equally impressive to avoid intimidating effects which can color and hinder productive communications.

- Companies can use existing private network, high-capacity links for video-conferencing.

  - When used for a video conference, requiring more bandwidth than voice or data communications, other communications needs may need to be curtailed or routed through alternative pathways.

  - Video conferences may also be scheduled to minimize network disruption, such as on weekends or during early morning hours.

- Since most satellite communications and earth-bound microwave linkages use the same frequencies, service may be hampered in urban areas due to interference. Accordingly, a "last mile" wired connection between the satellite dish and the location may be necessary. However, Ku-band systems do not have this interference problem.

- In addition to studio production facilities, videoconferencing rooms, and satellite dishes, there is other equipment in the chain including codecs (COder/DECoder) which convert the video signal from analog to digital transmission and compress it to fit on a standard T-1 carrier or less.

  - Further compression using codecs is available, squeezing a conventional RF television signal to a 56 Kilobit channel—less than one-half the speed of a T-1 carrier. This cuts down transmission costs significantly, a major factor in videoconferencing expenses.

  - Codecs are offered by Compression Labs and Widcom, but those manufactured by different companies often cannot link.

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- Videoconferencing has been successfully used for sales meetings, training, annual report presentations, product demonstrations, project management, and contract negotiations.

2. ALTERNATIVES TO VIDEOCONFERENCING

- While videoconferencing has the appeal of "show business," communications managers investigating electronic meetings may find less expensive, more suitable methods.

    a. Audio Conferences

- A telephone call is technically an audio conference; however, a conference call is more similar. It is the most economical teleconference method.

- A significant number of people can participate, although listener fatigue may set in after an hour. Well-designed systems can enhance sound quality through audio equalization techniques.

- Audio conferences can be set up by telcos or by commercial operators of "bridging" services such as AT&T's Alliance Services or Darome (Harvard, IL), and turnkey systems can be purchased.

    b. Audiographic

- Audiographic conferences have specific applications as when engineers and architects work together over blueprints or specifications across great distances. Detroit automakers use these systems in developing new cars.

- Participants may be located across town or across the country. Impressive full color "drawing board" workstations are available which incorporate Computer Assisted Design (CAD) techniques, giving the designer great flexibility in manipulating the work.

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- Advertising layouts, color illustrations, and other materials can be worked on by a team and saved on computer memory or printed on plotters.

c. Freeze Frame/Slow Scan

- Freeze frame/slow scan video conferences offer most of the benefits of full motion conferences but at far less cost because they are more spectrum-efficient.

- The video system transmits one "frozen" TV image at a time. The screen "refreshes" with a new image every several seconds.

- The technique can be used in a "hybrid" form. The conference may open in full motion. After some of the social aspects of a business meeting are accomplished, the conference switches to a freeze frame format in which documents, photos, or graphs are shown and discussed at less expensive transmission rates.

- Freeze frame conferences can be handled over dial-up telephone lines.

d. Computer Conferencing

- Computer conferencing, as it is usually defined, is closer to electronic mail and computer bulletin boards. Basically, communities of interest conduct lengthy, text-based meetings (lasting months, even years) on a central topic.

  - The individuals may be located anywhere.

  - They access a timesharing computer from their own terminals.

  - The complete conference record is always available from the computer's memory for review, and participants take part whenever it is convenient.

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- An example of such a system is Network Technologies International's (Ann Arbor, MI) eForum Electronic Meeting Manager, which is operated as a remote computing service and also sold as a turnkey system.

- Another form of computer conference is similar to audiographic techniques, with conferees working in real time on individual microcomputers to share and manipulate computer data such as spreadsheets or working documents.

- The various forms of teleconferencing are compared in Exhibit IV-9.

3. HUMAN FACTORS RELATED TO THE BOTTOM LINE

- Communications goes beyond words. It includes culture (including corporate culture), body language, prejudices, and other human relations factors.

- We have been conditioned to react to other people in certain ways in our learning roles, defense mechanisms, and the like. These components of human relations are often unconscious inhibitors in communications.

- There is physical separation in electronic meetings. This means no object exchange, no touch sense, no socially lubricating meal breaks or business enhancing hallway meetings. Some of nonverbal cues are missing in electronic communications as the channels of communication are narrowed.

- These effects must be acknowledged by the videoconference planner. While a potential productivity enhancer, if improperly managed the system can lead to an expensive "failure to communicate."

4. BENEFITS OF TELECONFERENCING

- The benefits of teleconferencing include reduced travel costs, both in terms of real expenses and saved travel time, and better participation in decision-making, leading to better decisions and greater levels of productivity.

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EXHIBIT IV-9

TELECONFERENCING METHODS COMPARED

TECHNIQUE	CHARACTERISTICS	BENFITS	DISADVANTAGES
Audio	Audio Enhanced Conference Call	Least Expensive	Aural Fatigue
	May Integrate Facsimile	Can Be Quickly Established	No Visual Contact
Audiographic	Shared Documents	Flexibility in Group Design Projects	Best for Ongoing Project Teams
Slow Scan Video	Still Images Sent Every Few Seconds	Inexpensive: Can Use Dial-Up Lines	Participant's "Frozen" Images Are Unnatural, Can Be Distracting
Video	Broadcast, Two-Way or One-Way Full Motion Video	The "Next Best Thing" to Being There	High Transmission, Equipment Costs
Computer	Text-Based Conference Held Over Time	Conference Record Maintained for Review	User Acceptance, A Degree of Computer Literacy Is Required
		Conveniently Improves Employee Participation	

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I. PEOPLE FACTORS IN REDUCING/CONTROLLING NETWORK COSTS

- The human element can come into play in several, often unanticipated, ways. It is important for IS to examine the sociological and psychological impact new systems, methods, and procedures can have on employees.

- For example, electronic mail and video conferencing can lead to reduced expenses while improving productivity, but they do require adjustments in interpersonal communications and business practices.

- When implementing expensive systems designed to return the greatest value, it is necessary to do more than monitor technological developments. IS needs to consider how users of that technology must be managed and trained.

- Some aspects to be considered are:

  - Being sensitive when advising employees that their long distance abuses have been noticed. No one likes to be accused of theft of services. An improper approach can adversely affect morale and may lead to losing a valued employee.

  - Providing advanced training for participants in teleconferences to address concerns, especially in videoconferencing, with regards to appearance and presentation. One of the biggest fears of video-conferencing is the fear of appearing as a "telenerd."

  - Alerting electronic mail users to "flaming," the occassional tendency of users to use inflamatory, abusive, and obviously ill-advised language on the network. The motto may well be "think before you key."

- Another area where human factors come into play is telephone etiquette.

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- The telephone is the first level of contact for a company's customers.

- Rude or inefficient call handling by a company's operators can adversely affect a company's business.

- Training courses for receptionists and telephone operators are available covering how to present the best, most professional telephone image which reflects well on the corporation. Among elements of these training courses are:

  - Speed in call answering.

  - Tone of voice and the aural smile.

  - Prompt, efficient handling, especially during busy periods.

  - Efficient equipment handling and avoiding the unintended disconnect.

- It is important to involve users in decisionmaking with regards to new systems, even though this may slow up the process. Involved, contributing employees are more likely to accept the changes a new system may represent, and therefore make cost productivity benefits more likely.

- These people factors are summarized in Exhibit IV-10.

- This chapter has examined ways of reducing and controlling telecommunications costs. The next chapter describes ways the network can be used as a strategic tool which contributes to a company's profitability.

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EXHIBIT IV-10

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PEOPLE FACTORS

- E-Mail and Teleconferencing Require Adjustments/Training

- Use Sensitivity in Controlling Telephone Abuse

- Use Telephone Etiquette

- Involved Users Accept Change

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V THE NETWORK AS A PROFITABLE STRATEGIC TOOL

V   THE NETWORK AS A PROFITABLE STRATEGIC TOOL

- While cost control and avoidance are important economic functions of the telecommunications manager, increasingly corporations are looking at their networks to contribute to the bottom line. In the "Information Age," the network is the delivery mode for information.

- Uses of the network for information delivery are most clearly identified in the financial and publishing industries where information is the end product. However, information has value in other industries, as this chapter demonstrates.

A.   ELECTRONIC DATA INTERCHANGE

- INPUT analyzed EDI for a 1985 Market Analysis and Planning Service (MAPS) report and found it is currently unfamiliar to many telecommunications managers; it will have increasing importance in the future.

I.   EDI DEFINED

- EDI is the electronic exchange of business information between companies in a structured application.

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- It is used by companies to exchange electronic versions of standard business forms such as purchase orders, invoices, shipping bills of lading, and other such documents which may otherwise be prepared on computers, printed, and then mailed.

  - It is different from electronic messaging in that it is process-to-process communications and the content structure is known in advance.

  - Electronic mail is person-to-person communications and the content is unknown.

- With EDI, a company's computers exchange information with a trading partner's computers, even though they may be using incompatible systems and different document/data formats.

- EDI software translates the information to conform to agreed structures and routes it to the trading partner or places it in an electronic mailbox for later retrieval.

2. EDI BENEFITS

- EDI's benefits to a corporation include reduced costs in document preparation, faster turnaround, fewer errors since information is not rekeyed, time/space transparency, and the ability to integrate EDI data with existing applications such as inventory control, materials resource planning, and forecasting.

- EDI's benefits are shown in Exhibit V-I.

- While exchanges directly between two companies are being done now, the complexities of modern trading relationships often make managing such links difficult. For example, the auto industry buys components from approximately 35,000 small suppliers.

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EXHIBIT V-1

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WHY USE EDI?

- • Reduced Expenses

- • Fewer Errors

- • Improved Turnaround

- • Better Customer Service

- • Enhanced Management Control

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- Accordingly, third party EDI services are being offered by value added networks (VANs) with their processing affiliates and by several smaller remote computing services (RCS) which do not generally operate their own networks.

3. EDI GROWTH/COSTS

- INPUT projects the EDI market will grow by approximately 100% per year to become a $1.15 billion market in 1990.

- Transaction volume will grow by a larger amount, but as usage increases and the effects of competition come into play, per-transaction costs will drop.

- Transaction costs are currently under $1, and in some cases in the $0.15-0.50 range. This compares with paper document cost estimates of $35-50.

4. EDI SERVICE AND SOFTWARE VENDORS

- Vendors currently offering EDI services are McDonnell Douglas Electronic Data Interchange Company, General Electric Information Services Company (GEISCO), Control Data Corporation, AT&T Information Systems, IBM's Information Network, and Informatics General. RCS vendors providing EDI services are TranSettlements, RailInc., and SCM Kleinschmidt.

- These vendors and their principal users are shown in Exhibit V-2.

- EDI software is available from several vendors: EDI, Inc., Program Sciences Inc., Metro-Mark Integrated Systems, and the APL Group. Some of the VANs also sell software, either their own or developed by one of these firms.

- Software packages are available for all sizes of computers and are suitable for companies developing their own EDI systems as well as those using third party services.

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EXHIBIT V-2

VAN/RCS EDI SERVICES

	SERVICE	PRINCIPAL USERS
VANS		
McDonnell Douglas	EDI Net	Cross-Industry
GEISCO	EDI Express or MarkNet	Cross-Industry
Control Data	Redinet	Cross-Industry
AT&T	Interchange Services	Mortgage Bankers, Auto-makers (Supply Link), Distributors, Private Corporate Networks
IBM - Information Network	Product Information Exchange	Insurance (IVANS)
RCS		
Informatios General	Ordernet	Cross Industry
SCM Kleinschmidt		Rail Transportation
RailInc		Rail Transportation
TranSettlements		Motor Transportation
Transnet		Motor and Machinery, Canadian Auto Industry

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5.   ASSOCIATIONS TAKING A LEADING ROLE

- Industry associations are taking an important role in establishing and gaining acceptance of EDI standards.

    - The leading advocates for EDI is the Transportation Data Coordinating Committee which has been centrally involved in educating potential users and assisting in the development of EDI standards called X.12 by the American National Standards Institute.

    - However, EDI standards have not yet been finalized.

- Also involved are trade organizations representing the automotive, paper, office products, aluminum, steel, grocery, warehousing, and chemical industries.

6.   EDI EXAMPLES

    a.   The Paper Industry

- Several paper and pulp manufacturers have developed proprietary on-line systems which will evolve into fully developed EDI systems.

- Hammermill (Erie, PA) has HAL, the Hammermill Access Link, connecting 174 of their largest distributors.

    - The system is hosted by an IBM 3083 running in a VM environment, initially using remote 3270-type terminals.

    - Micro-based terminal emulation is also supported for an on-line, real time system.

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- Only particular files can be accessed.

- Only reports possible with terminal emulation can be generated.

- HAL links to the company's order processing application package called HILITE with modules for order entry, invoicing, shipping information, and other features.

- HAL uses X.12 EDI specifications.

- HAL replaces an older, inflexible, on-line system which fell into disuse and was subsequently abandoned.

- HAL will pilot and eventually be upgraded to full EDI capabilities pending an industrywide third party vendor endorsement. Hammermill is on an industry task force evaluating EDI proposals.

- HAL will evolve with additional features for management information services such as tracking, market studies, and analysis of distributor performance to help merchants better understand their performance.

- The purpose of HAL and future enhancements is to supply electronic information and increase productivity. Customer support is an important business service. The HAL manager reports fewer customer service calls from those using HAL, and those that do call are more informed in their queries. User satisfaction is high.

b.   The Medical Supply Industry

- American Hospital Supply, a manufacturer and distributor of medical equipment, offers the ASAP (Analytical Systems Automated Purchasing) system which allows customers to use terminals, touch-tone phones, portable terminals, bar code scanners, and processors of all sizes to enter orders.

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- Over 500,000 products are available to some 5,000 customers.

- Messages and special requests can be sent to customer sales represent-atives.

- The system can translate between a customer's stock numbers and AHS's order numbers and can provide documentation sorting and customized management reports.

- Optionally, the system can autmate ordering with the ASAP computer compiling a list of recommended purchases for electronic approval.

- ASAP is extended to American Hospital Supply's suppliers.

- ASAP saves the vendor an estimated $6 million annually and is credited with helping the company achieve market dominance.

7. EDI RECOMMENDATIONS

- It is advantageous for large companies to develop proprietary, on-line systems supporting business transactions.

 - Such systems work to maintain the customer base and provide a competitive edge.

 - There is a lower chance of security breaches. A company-controlled system is more confidential than one operated by a third party.

 - Such systems shift some of the internal customer service burden to customers.

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- The resulting savings defer development costs and help maintain competitive prices.

- However, unless developed with attention to future needs, proprietary EDI networks may later prove burdensome to enhance.

  - Often the pressures to meet internal needs prevent attention to standards which add another level of complexity to system implementation.

  - INPUT recommends that proprietary EDI systems use X.12 standards and that users/developers monitor refinements to these standards to maintain compatibility for future needs.

  - Most intercompany communications are not confined to a specific industry.

  - Keeping options open for extension to other industry groups offers the safeguard of system flexibility for future requirements.

- Developers should solicit feedback from system users, implementing changes recommended. Otherwise, an inflexible system will create frustration and will not be used.

- Consider the advantages of providing traditional suppliers and customers with micro-based EDI terminals and software on a no-cost or at-cost basis and the advantages of sharing personnel resources for developing EDI systems.

- Managing a proprietary EDI network requires a commitment in resources for both implementation and management. Carefully evaluate the company's ability to make that commitment before implementation and use a third party service if there is any question about company support.

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- Form an EDI task force with broad company representation to work across departmental lines and avoid internal jurisdictional problems.

- An EDI development strategy should be based on upgrading existing management information systems in stages to provide remote on-line ordering, order inquiries, and electronic messaging by principal customers, later adding functions such as electronic invoicing.

- Guidance in implementation, programming, transaction sets, definitions of data elements, and communications standards is available from TDCC and industry associations.

- Industry-dominant companies should consider requiring their suppliers to use an EDI system as a condition of doing business.

    - Partners not conforming to standards or using manual systems might be levied a surcharge to cover the additional costs involved.

    - While this may be difficult to do in some industries, such as those dependent on uncomputerized suppliers, with proper marketing, the benefits of EDI systems will be recognized.

- These recommendations are shown in Exhibit V-3.

- More information about EDI can be found in the INPUT report Electronic Data Interchange: Markets and Opportunities (1985).

B.   TELEMARKETING

- Telemarketing is broadly defined as using telecommunications technologies for sales.

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EXHIBIT V-3

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PRIVATE EDI NETWORK RECOMMENDATIONS

- Use EDI for a Competitive Advantage

- Plan for Future Needs

- Consider Supplying Terminals to Trading Partners

- Form an EDI Task Force

- Evaluate Ability to Manage the Network

- Upgrade Existing Systems in Stages

- Require Suppliers to Use EDI

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- It is one of the fastest growing elements of the marketing mix.

- IS and telecom need to be cognizant of this tool which can contribute to a company's bottom line and, if not managed properly, can waste telecommunications resources.

I. THE ECONOMICS OF TELEMARKETING

- The most important factor driving telemarketing is economics.

  - The cost of "cold calling" is estimated at between $240-280 per call.

  - A telephone conversation costs under $25, a tenfold savings.

  - A good telemarketing agent can make as many as 100 calls per day, while a good salesperson can make only four or five personal visits.

- According to a sales management survey, the average costs of keeping a sales representative on the road is estimated to have increased 5% in 1985 to $732 weekly based on per-diem rates, meals, hotels, and car rentals. This is nearly double the 2.2 rate increase reported for 1984.

- A second consideration in telemarketing is productivity.

  - Telemarketing programs help ensure that the personal selling effort is focused on qualified prospects.

  - As a side benefit, it makes the job of selling easier, meaning a happier sales staff, less turnover, lower training costs, and higher profits.

- Over 440 of the Fortune 500 are using telemarketing in one form or another. Businesses of all sizes are integrating telemarketing productivity into their

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organizations because of its flexibility, cost reduction, reporting capabilities, and ability to forecast results based on sample testing.

- The efficiencies of telemarketing need to be balanced against the "image" the technique generates. Telemarketers can be highly professional, but many view the technique as "nuisance calls." This section discusses large corporate telemarketing applications.

2. TELEMARKETING OPTIONS

- There are two primary telemarketing options: develop an in-house program or use an outside service for either inbound or outbound programs.

- Inbound programs can use toll-free 800 numbers, foreign exchange numbers, or numbers on the corporate network for collecting orders and for customer service. Systems can be designed to relay calls received in the East after regular business hours to offices in the West which remain open.

- Outside service bureaus can be used for experimental piloting before developing an in-house program. However, service bureaus are usually oriented to order taking rather than customer service and to outgoing solicitations. The company loses some control when using an outside bureau.

- Outbound telemarketing requires a commitment to planning and organization, control techniques, a good script, a selective list, and experienced managers who can recruit and train agents.

- Telemarketing agents are better trained and better paid as companies upgrade "boiler room" operations characterized by inexperienced staff and high personnel turnover. Investments are also being made in electronic systems.

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3.   TELEMARKETING EQUIPMENT AND SYSTEMS

   a.   Black Boxes

● Telemarketing has evolved to an advanced state using black box devices such as automatic call distributors (ACDs) to distribute incoming calls equitably while providing statistics on trunk usage, agent time per call, idle time between calls, and other facility/personnel information used to assess center and agent effectiveness.

   -   Other boxes are called uniform call distributors and call sequencers.

   -   Their differences and applications are shown in Exhibit V-4.

● Approximately 50% of an incoming telemarketing center's costs are telephone lines. About 45% are personnel costs. The costs of equipment are the remaining 5%.

   b.   Agent Station Equipment

● Telemarketing agents benefit from lightweight headsets which obviate the need for a handset and which also free the hands for order entry.

   c.   Computerized Systems

● Many telemarketing settings still rely on paper files, but as the function becomes more complex, an Information System (IS) solution is indicated.

   -   If the company has a small telemarketing department and a limited product and client list, PC software can manage the paperwork.

   -   With departments of 10 or more agents, a more sophisticated approach is needed—one which may need to access the mainframe.

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EXHIBIT V-4

TELEMARKETING CALL DISTRIBUTION EQUIPMENT

EQUIPMENT	CHARACTERISTICS	BENEFITS	DISADVANTAGES
Key System (Call Director)	Every Line Appears on Agent Station	Visual Monitoring Low Cost for Small Centers Easy Usage	No Call Distribution: Uneven Work Flow No Call Queueing Lacks Automated Performance Reports
Call Sequencer	Every Line Appears on Agent Station First-In Calls Signalled by Rapidly Flashing Light	Queues Calls Can Have Recording for Overflow Extends Key System Value Low Cost Provides Some Statistics	Limited Measurements No Call Distribution
Uniform Call Distributor (UCD)	PBX/Centrex Option Distributes Calls to First Available Agent	Queues Calls Recording for Overflow Oldest Calls Routed to Agent First More Equal Call Distribution Than Sequencer	Can Affect PBX Capacity Limited Reporting Agents Can Avoid Calls by Engaging Line

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EXHIBIT V-4 (Cont.)

TELEMARKETING CALL DISTRIBUTION EQUIPMENT

EQUIPMENT	CHARACTERISTICS	BENEFITS	DISADVANTAGES
Automatic Call Distributor (ACD)	Uses VDT for Real Time Reports	Automatic, Equitable Call Distribution: Smoothes Call Flow Complete, Real Time Reports Flexible Programming Can Forecast Staffing Needs Based on Projections Reduces Number of Lines Needed Threshold Alarms Signal Need to Reconfigure Signal	More Costly: Unsuitable for Small Centers Requires Training Requires Management Supervision of Reports

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- However, there is a problem with mainframe telemarketing software.

    - Fast response times are required.

    - Agents need customer records instantaneously. Other applications running on the mainframe can slow response, leading to lost sales and low productivity.

- The answer may be a standalone, mini-based system dedicated to telemarketing but able to upload orders and management records to the mainframe when time and processing requirements are less pressured.

- The telemarketing agent using a computerized system ideally works with a customized series of screens providing callback reminders, sales message prompts, competitive product comparisons, contact reports, account histories, literature fulfillment dates, and technical data.

    - It also supports "fill in the blanks" ordering with automatic price, discount, and tax calculations.

    - Automatic dialing is possible and directories of sales and service outlets support referrals.

    - Multiple, inexpensive terminals are supported simultaneously and remote field offices can dial into the ideal system.

- These applications include familiar data base management (DBMS) and automated order entry systems. However, computerized telemarketing should be specifically designed for the function, being responsive to agent needs while providing required analysis reports in standard formats.

INPUT

- While software can be written in-house, the applications backlog may preclude IS from developing, debugging, and implementing a home-brewed solution on a timely basis. Off-the-shelf packages are available and many allow customization.

- Examples of such systems include Telemarketing+ from Multi-Systems Inc. (MSI) of Phoenix which is jointly marketed with Prime Computers and AT&T. Systems can be leased starting at approximately $2,000 per month—less than a good telemarketing agent's salary.

  d.   Automatic Dialing and Announcing Devices (ADADs)

- ADADs are micro-based systems which call entered phone numbers and delivery a recorded message. Telephone answering machines are recognized and the message is not played.

- Most ADADs also record responses to questions asked on the tape. The information is later tabulated for followup. This obviously requires limited personnel compared to live operator applications.

- Many states have prohibitive regulations regarding ADAD usage.

  - Typically, the restrictions require a live operator to announce the recorded message and obtain permission before it is played.

  - This reduces the efficiencies of ADADs, but there are exceptions. People who agree beforehand to receive messages may be called without an operator assist, and ADADs may be used internally on a company's network.

- In cases where ADADs are used in violation of public utility commission rules, the telephone company may disconnect service.

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- ADADs have certain cost-effective applications for a corporation.

    - Sales or field status report collection.

    - To delivery product sales/promotion announcements. These announcements may be recorded by a celebrity or the company's president.

    - Automated delivery of timely information such as financial news to subscribers or "broadcast" work assignments.

    - Automated lead qualification.

    - Interactive market research polling.

- The benefits of ADADs (when permitted) are that time is saved in lead generation or in applications requiring repetitive message delivery or voice information collection.

4. THE BENEFITS OF TELEMARKETING

- Direct selling costs are increasingly impacting profits. If done correctly, telemarketers can make far more sales calls, achieving better results.

- Not all selling should be done by telephone--personal contact is often still required. However, telemarketing has proven itself as one element in the marketing mix, with rather impressive returns on investment documented.

- It would bring credit to IS/telecom and greater profits to the company for the IS manager to be receptive to assistance requests for a solution to what otherwise can become an unwieldy paper-based system and to assist the marketing department in optimizing the network for telemarketing applications.

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C.   RESALE OF EXCESS CAPACITY

1.   A TRUCKING COMPANY BECOMES A LONG DISTANCE CARRIER

- Schneider National is a Wisconsin common carrier trucking company.

- When the FCC lifted long distance resale restrictions, rather than sign with an alternative long distance carrier, the company decided to start a subsidiary communications company to resell its excess private network capacity. It subsequently purchased two large central office-type telephone switches for both its own use and to support resale operations.

- The company provides call accounting services, compares its bills against AT&T's, and guarantees a lower rate. Its services are sold by telephone equipment vendors in the state.

- The communications subsidiary is expanding into cellular telephone resale, voice store and forward, high-speed data switching, teleconferencing, multi-tenant services, and telephone billing and is evaluating paging and telecommunications consulting.

2.   RESALE TO EMPLOYEES

- A number of corporations have established programs to make their network available to employees after hours and on weekends for discount calling. Employees are billed for their calls based on a keyed identification number.

- Other companies sell long distance services to their business affiliates.

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3. SHARED TENANT SERVICES

- Companies which lease space in their facilities to other firms may consider the benefits of offering telecommunications and perhaps other business services to those firms. This requires some method of tracking costs and generating bills.

- Major tenants of a building or an office park can consider similar services. This requires the company to have the personnel and equipment to manage such offerings effectively.

D. ANOTHER PROFITABLE NETWORK USE: ADVERTISING ON HOLD

- Many PBXs provide music on hold. At least one company provides equipment and other services which present callers placed on hold with customized, "soft-sell" sales messages.

- The goal is to encourage callers to ask questions about a company's products and services and to keep customers from hanging up.

- One company (Invitational Promotions, Inc. of Canoga Park, CA) charges $1,500 annually for service which includes set up assistance, monthly custom messages, and backup tapes. The equipment may be rented for $250 annually.

- AT&T Communications also markets a "promotions on hold" system manufactured by Audiocom (Miami, FL).

- The next chapter presents methods of economically analyzing and justifying network expenses.

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VI THE ECONOMICS OF TIMING, JUSTIFYING, AND ANALYZING

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A.   TIMING

- IS should resist the tendency to become immobilized because future developments may offer better solutions. Productivity gained with today's tools while waiting for the ideal network solution can be substantial, but marginal changes should be avoided.

- Timing implementation often becomes a matter of finding the window of opportunity for methods which solve more problems than they create.

- IS runs a risk of implementing too soon or with methods which are currently inadequate for the job, or of networking overkill--developing surplus capacity which will not be needed for some time.

  - IS and telecom must become as skilled at prognosticating as they are at understanding technical issues by forecasting new technologies as well as anticipating corporate needs.

  - They must meet their professional responsibilities to management by making productive linkages available.

  - They also need to use people skills in balancing demands for network services with the technologically and economically possible. They need

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to make management and users aware of the potential risks, thus sharing those risks.

B.   JUSTIFICATION

I.   TANGIBLE VERSUS INTANGIBLE JUSTIFICATION

- Justifying network expense is one of the most critical issues facing telecommunications managers, especially as network traffic increases beyond their control.

- There are several justification options available, some based on "real" costs, others based more on intuitive or "soft" costs.

- In earlier surveys, INPUT found interpersonal communications is the largest corporate time/cost factor with analysis and decisionmaking second. Intuitively, network systems which enhance these functions lead to increased productivity, but managers often have difficulty in quantifying these increases.

- The manager should conduct his own survey to determine the unique time/cost factors within the company.

- The IS manager may then attempt to demonstrate network productivity improvements by prototyping systems and evaluating the change "before and after." However, such analyses may be time consuming and difficult.

- Increasingly, intangible benefits (increased effectiveness, quality of work, productivity, heightened competitive position) are used to justify system implementation.

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- However, conservative managers sometimes require "bottom line" tangible justification (cost displacement, reduced personnel costs, reduced backlog).

- They require new system expenses more than displace old system costs.

- INPUT recommends an awareness of management types to ensure that justification is consistent with differing requirements. While conservative managers require hard figures, more progressive managers are interested in business opportunities, "soft" dollars, and intangible projections.

2. COMPETITIVE JUSTIFICATION

- Managers can also look to the company's competitors for project justification.

    - If a company's competition has enhanced its network, this may be a potent tool in selling proposed systems internally.

3. COSTING STATEMENTS

- Network implementation cost should be stated in terms of individual user costs, rather than as the total package price. Not only is this lower price easier to comprehend, it allows evaluation based on the value of each worker's effort and will sometimes provide a basis for charging costs to end-user departments.

C. COST BENEFIT ANALYSIS

- Cost benefits analysis efforts should be related to the size of the anticipated investment.

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- Cost benefit analysis is usually organized early in planning and revised to reflect new information gathered at various stages.

- The steps in conduting a cost benefit analysis are:

    - Review organizational goals and priorities. Review available funding and determine management attitudes toward network systems.

    - Gather information for analysis including relevant department budgets, reports and revenue forecasts, organizational charts, and job descriptions.

    - Examine how the network enhancement can benefit the company. Look for specific problem areas which can be improved by network characteristics and applications.

    - Examine corporate and departmental cultures. Will departmental structures support successful implementation? How can changes be handled with minimal disruption? What training is needed? It is critically important to resolve major problems before proceeding.

    - Estimate costs. This means sizing the network, including any equipment purchased or leased, recurring costs, maintenance expenses, control center enhancements, etc. Include in the estimate internal costs for planning and implementation management.

    - Make the commitment to proceed with or abandon the effort based on the above review and a financial analysis. The effort should be postponed if needed organizational changes cannot presently be accommodated. The project should continue if financial analysis indicates an estimated payback period of three years.

        . Estimating productivity improvements is often difficult.

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- Benefits can be weighted against estimated implementation expenses and ongoing operating costs.

- One way of putting a dollar value on unquantified benefits is to determine how much the company would be willing to pay for them. Another is to attribute estimated revenue increases resulting from, for example, sales improvement directly to network projects.

- Finally, organize the information. Documenting the process supports management presentations. The planning file should be maintained for future projects should implementation be delayed.

- Exhibit VI-1 summarizes the steps required to conduct a cost/benefit analysis.

D.   COST FACTOR ANALYSIS

I.   CAPITAL EQUIPMENT "HIDDEN" EXPENSES

- Financial analysis of telecommunications capital equipment acquisition and operations should consider the following aspects in addition to actual cash costs.

  - Current telecom expenses: usage, maintenance, equipment replacement.

  - Value of current equipment inventory stated as a percent of corporate assets.

  - Telecom expenses stated as percent of corporate operating costs.

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EXHIBIT VI-1

NETWORK COST BENEFIT ANALYSIS STEPS

Organize
Findings

Go/No-Go
Decision

Estimate
Costs

Examine
Departmental/
Corporate
Culture Factors

Identify
Problems to
Solve

Analyze
Department
Structure and
Budget

Review Goals
and Priorities

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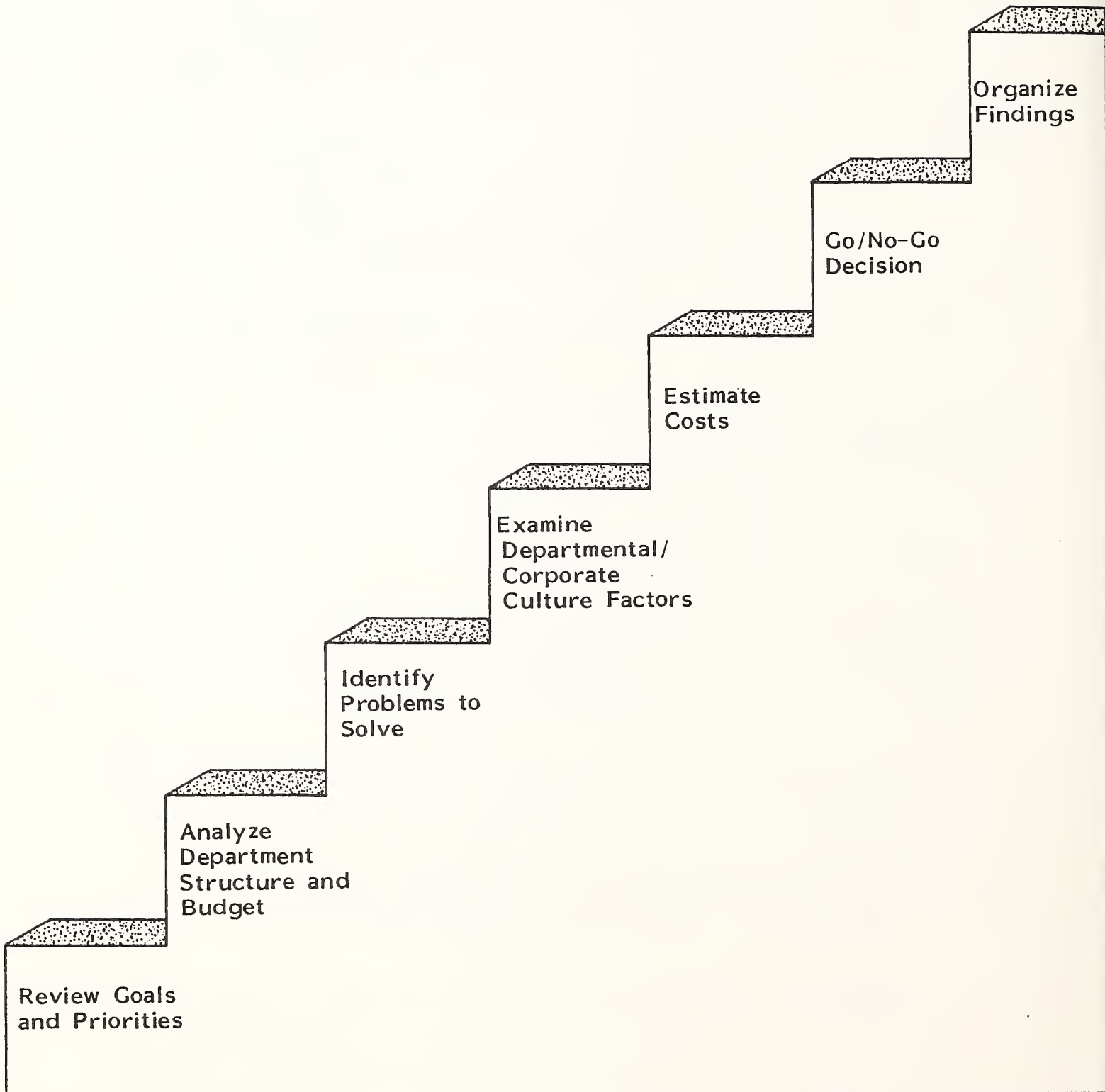
-   Interest expense on capital expenditure purchase/leasing.

-   Availability and impact of Investment Tax Credit.

-   Evaluation of future prices for upgrades and expansion.

2.   OPERATIONAL COST REVIEW

●   Maintenance can be 1.5-3% network costs on an annual basis.

●   Telcom needs to determine the impact new systems will have on operational costs--additional staff, skill level/salary rates, training expenses, outside services, software upgrades.

●   Other determinations need to be made including:

-   Sales, property, and use tax liability.

-   Investment Tax Credit benefits.

-   Depreciation rate.

-   Residual value of equipment at end of lease term.

3.   FUTURE REQUIREMENTS REVIEW

●   Plans to expand the network need to be described in a five-year telecommunications plan. Any new system will participate in the continued growth of the corporate. For example, the company may add locations or extend the network capability to major customers.

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- Future needs should also be anticipated. These needs may be from a "wish list" which was not fully implemented originally and may include advanced network features, greater capacity, or new services.

- The next chapter summarizes INPUT's findings and provides general recommendations regarding the economics of telecommunications.

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VII CONCLUSIONS AND SUMMARY

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A. CHALLENGES IN A RAPIDLY CHANGING ENVIRONMENT

- The challenges facing telecommunications managers are twofold:

    - Maintain the balance between network quality and cost control.

    - Facilitate or implement profitable uses of the corporate network.

- Poor network quality will lead to increasing costs due to downtime, repeated attempts to establish voice or data connections, and lost sales opportunities.

- While it is desirable to optimize the network and reduce recurring costs, rapid, third-party network services price changes mean today's decision to change may be made economically moot by tomorrow's new tariff.

B. RECOMMENDATIONS

- INPUT recommends IS balance the effort required to change with an evaluation of anticipated savings.

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- Focus on the highest cost network elements and avoid commiting resources toward marginal differences. It makes little sense to spend $500 in effort to save $100 in costs, especially when that effort could have been directed at larger expenses.

- Check your current vendor before signing with another. Desired offerings and prices may be negotiable.

- Recognize the influence skilled vendor sales staff can have on important decisions.

- Plan for future needs. Project how the network fits the five-year plan, time the steps needed to get there, and modify the plan as needed.

C.   THE CONSTANT TASK: EVALUATE OPTIONS

- The best network does not depend on one method or one vendor. It takes the best mix of private and public offerings which fit specific corporate requirements.

- This requires telecom managers to constantly track and evaluate new technologies which may represent new options for optimizing the network and reducing costs. Change for the sake of change is usually not justified, but there are benefits in experimenting with alternative approaches.

D.   A CORPORATE TELECOM POLICY IS NEEDED

- The IS/telecommunications manager's previous role was service, performing tasks as directed and minimizing costs where possible. The manager's

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emerging role as a more active contributor to the corporation is being recognized.

- The underlying requirement for telecom's new role is a comprehensive telecommunications policy, endorsed and accepted by upper management.

  - A telecom policy requires managers to take a more aggressive role, improve their management and financial analysis skills, and better understand the corporation's strategic goals as described in the corporate plan.

  - The telecommunications manager should be a contributor to the corporate plan.

- INPUT's research indicates the telecommunications manager is becoming a more important participant, as is the network, in helping to direct the corporate destiny.

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APPENDIX A: DEFINITIONS

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- <u>ACCESS CHARGE</u> - The FCC-mandated fee charged users of a telephone company's services, designed to offset non-traffic sensitive costs incurred by local telephone companies. Also called CALC for Customer Access line Charge.

- <u>ACD</u> - Automatic Call Distributor. A programmable system usually integrated into a PBX. It equitably distributes incoming calls to telephone agents in telemarketing applications and issues management reports.

- <u>ADAD</u> - Automatic Dialing and Announcing Device. A micro system which calls entered numbers, delivering a recorded message and optionally recording responses.

- <u>BOC</u> - Bell Operating Company.

- <u>BYPASS</u> - Refers to the use of one of several technologies (such as microwave) to avoid using local telephone company facilities.

- <u>CALC</u> - See Access Charge.

- <u>CALL ACCOUNTING</u> - An application which processes call detail records, issuing management reports on line and trunk usage.

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- <u>CALL SEQUENCER</u> - An add-on device that signals which caller entered the system first with a rapidly flashing key set light. Used in telemarketing. Also see ACD and UCD.

- <u>CATV</u> - Originally Community Antenna Television, now refers more broadly to Cable Television, including satellite-delivered and local programming in addition to retransmission of off-air signals. May use plant facilities to provide other services such as data transmission or voice.

- <u>CDR</u> - Call Detail Recording, a feature present on many private branch exchanges located within a business' premises.

- <u>CENTREX</u> - Special telephone features such as conferencing and call forwarding provided by the telephone company's central office equipment.

- <u>CODEC</u> - For coder/decoder, a device which converts between digital and analog video channels and compresses bandwidth for transmission. Typically used in videoconferencing.

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

- <u>DIGITAL TERMINATION SERVICES</u> - DTS, usually refers to a digital microwave system for line-of-sight applications.

- <u>DIVESTITURE</u> - The action, stemming from anti-trust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

- <u>EDI</u> - Electronic Data Interchange. The computer-to-computer exchange, usually through a third party network/processing service, of electronic business documents. The computers may have different protocols and the documents may be in different formats.

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- **EQUAL ACCESS** - The requirement that the same quality of lines must be offered, at the same price, to the interexchange carriers as are offered AT&T for long distance connections.

- **FM SCA** - A transmission medium which uses the Subsidiary Communications Authority "sidebands" of FM radio broadcast stations, usually in conjunction with satellite delivery to the radio station.

- **FIBER OPTICS** - A transmission medium which uses lightwaves.

- **FLAMING** - The use of crude and abusive language in electronic mail.

- **IXC** - Interexchange Carrier. A long-distance provider, sometimes called Other Common Carrier (OCC).

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

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

- **LCR** - Least Cost Routing. A feature on advanced PBXs and tandem networks which routes a call via the lowest-priced facility available at the time of the call.

- **MHS** - Message Handling System, an electronic mail standard.

- **976 EXCHANGE** - An exchange reserved for use by businesses for the delivery of "dial-a" services such as sports scores. The caller is billed a premium for accessing the service.

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- <u>OCC</u> - Other Common Carrier. A long distance telephone service provider other than AT&T. An alternative description of an interexchange carrier (IXC).

- <u>PBX</u> - Private Branch Exchange. A customer premises telephone switch.

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

- <u>RCS</u> - Remote Computing Service.

- <u>RESALE</u> - The practice of selling excess network capacity.

- <u>RESELLER</u> - A marketing organization which buys long distance capacity from others at wholesale rates, sells services at retail but discounted prices, and profits on the difference.

- <u>SMDR</u> - Station Message Detail Recording. Organized information processed from CDR data.

- <u>SHARED TENANT SERVICES</u> - A bundling of business and telecommunications services provided to tenants in a building or campus operated by a real estate enterprise or its agents.

- <u>SOFTWARE DEFINED NETWORK</u> - A private network which uses public network facilities and which is configurable on an as-needed basis by the user. Also see virtual private network.

- <u>T-1</u> - 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.

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- TANDEM SWITCH - A central customer premises telephone switch which works jointly (in tandem) with PBXs at company locations.

- TELCO - Telephone company.

- TELECONFERENCING - An electronic meeting method. May be audio, audiographic, video, freeze-frame video, or computer conferencing.

- TELEMARKETING - The use of any electronic means (usually telephones) in sales and customer service.

- TELENOMICS - The means and methods by which the telecommunications manager can help to influence corporate finances.

- UCD - Uniform Call Distributor. A PBX or Centrex option which distributes an incoming call to the first available agent.

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

- VIRTUAL PRIVATE NETWORK - A portion of a public network dedicated to a single user.

- WATS - Wide Area Telephone Service, also called outbound 800 service. A bulk rate, discounted, long distance service.

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

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About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs.

Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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