MARKET OPPORTUNITIES IN NETWORK SERVICES

INPUT

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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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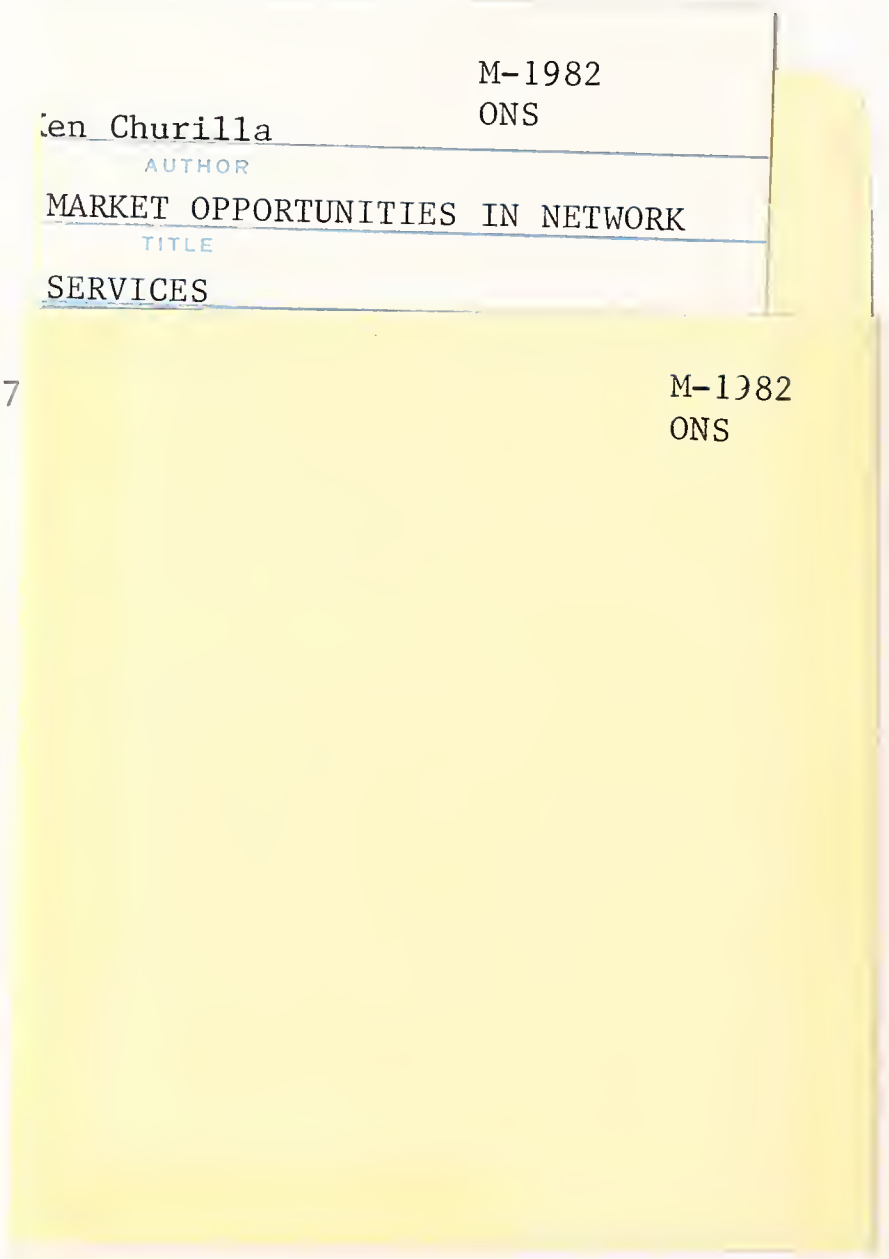

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INPUT Planning Services for Management

MARKET OPPORTUNITIES IN NETWORK SERVICES

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EXHIBITS

1 INTRODUCTION

I INTRODUCTION

A. PURPOSE AND SCOPE

- This study is produced by INPUT as a part of the Information Services Industry Program or ISIP.

- The primary purpose of the study is to provide subscription clients with analyses and recommendations for strategic and tactical application. The report provides an examination, quantification, and analysis of the use of public network services generically known as "VANs" or Value Added Networks. Included are:

  - An examination of the present status of major participants in the network services market.

  - An analysis of the probable status of future participants in the market.

  - A forecast of expenditures for network services.

  - An analysis of present applications.

  - A comparative analysis of two discrete submarkets.

  - An analysis of future user requirements.

- An examination of user attitudes and perceptions.

- An assessment of the impact of selected alternative technologies from the user perspective.

- Planning recommendations for participants and those desiring to participate in the market.

- The scope of this report is limited to the services of publicly available networks owned by U.S. companies engaged in a mix of data communications and message traffic. All user interviews were conducted with U.S. based companies. The international utilization of these networks is examined from a U.S. perspective.

B. METHODOLOGY

1. PRIMARY RESEARCH

- The primary research for this study consisted of interviews conducted with 50 large-scale users of public network services during August and September of 1982. The interview cycle yielded 48 usable interviews.

- Respondents were randomly selected from INPUT lists of Remote Computing Service firms (N=18) and from lists of Industrial, Financial and Service firms whose revenues exceeded $1 billion in 1981 (N=30).

- The total annualized value of expenditures by respondents exceeds 10% of the estimated market size. This is believed sufficient to support the study's primary conclusions.

- Additional unstructured, fact-finding interviews were conducted with knowledgeable individuals at five firms presently participating in or intending to participate in the network services market.

- Supplementing and corroborating the primary study data was additional data derived from the responses of communications managers at 154 large firms with interviews concluding in June 1982. This data was gathered as a part of a custom INPUT study and was used with the permission of the client.

- The questionaire utilized in the primary research is included as Appendix C.

2. ADDITIONAL SOURCES

- In addition to interview data, a wide variety of other sources were employed in the preparation of this report, including:

  - Publications of the United States Government.
  - Other INPUT studies.
  - Trade and industry publications.
  - Vendor-descriptive literature, price lists, tariffs, and press releases.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. OVERVIEW

- The market for Value Added Network services is currently of moderate size but is growing rapidly. The VAN market was originally defined by regulatory action to include "enhanced" communications, i.e., those communications which involved some operation other than pure "wireline" data transmission but not involving data processing. The services involved were to be regulated at the federal level. Historically, entry into this market and subsequent operations were overseen by the Federal Communications Commission.

- With the release of the FCC's Computer Inquiry II decision, the VAN services were effectively deregulated, and free entry was permitted. Present dominant suppliers began as regulated entities but are now functionally "deregulated." More recent entries - which include several companies with positions in RCS services - have not been subjected to signficant regulatory oversight.

- INPUT believes that the regulated nature of these services previously had a chilling effect on market participation in that potential participants avoided market entry due to the perceived risk in subjecting their businesses to regulatory scrutiny.

- In effect, regulation became a functional entry barrier to firms which were otherwise capable of market participation. Within this barrier a few firms

willing to assume the "risk" of regulation were able to carve out dominant market share positions.

- The regulatory legacy also influenced the nature of the services provided. Effectively, these services were restricted to protocol conversion, error detection and correction, host/terminal interconnections, and message services. Despite the lifting of the regulatory hand, these services still constitute the overwhelming majority of VAN utilization at present.

- The key strategic questions at the present time revolve around the following:

  - Is there a market of sufficient size to support both the dominant VANs and the new entrants with reasonable returns on investment?

  - Does the strategic window for entry into this market remain open and, if so, for what type of firm?

  - What are the optimum entry points under current conditions?

  - What is the probable future course of market development?

- This INPUT report on network services will assist clients with development of answers to these questions. In general, the results of this study indicate that:

  - While the market for low-speed basic VAN services has grown rapidly and will continue to grow at a pace only slightly reduced from historical levels, there is reason to believe that it will not profitably support many new entrants. Essentially, this is a commodity market with users exhibiting high price sensitivity.

  - Evidence indicates that the strategic window for entry is closing with respect to basic services. Windows remain open for services of other types such as Electronic Mail.

- Specific opportunities exist in areas such as "community of interest" networks at the present time. Intermediate-term opportunities may exist in the interconnection of Local Area Networks, personal computers, and office automation equipment.

- The future course of the market will bring it closer to applications and capabilities traditionally in the domain of Remote Computing Service (RCS) firms as VAN suppliers offer data bases and more processing-intensive applications in such areas as order entry.

- Ultimately, this market will cease to exist as a discriminable entity (although its functions will remain) as the final vestiges of its regulatory origins are swept away by free market forces and technological change.

B. FINDINGS

- INPUT's research among users indicates that there is little differentiation among the current dominant suppliers of low-speed Value Added Network services.

- Network Services as they as presently employed are essentially a commodity business with the users of such services acutely sensitive to the cost of the services.

- In terms of market penetration among large firms (those employing more than 1,000 persons), approximately 12% of the firms currently use VANs. This is expected to grow to 26% in five years.

- The underlying growth rate in packet-switched lines is estimated to be 24% per year by respondents over the five year forecast horizon.

- The rate of growth in VAN packet-switched lines is substantially greater than for DDS, MTS, or Private Line data communications.

- Increases in charges for connect, data transmission, and other associated network charges are a very substantial component in Network Services revenue growth, as shown in Exhibit II-1.

  - Over a five-year period price increases averaged 17% per year compounded in basic rates.

  - These increases do not occur at constant annual rates but are in discrete steps at irregular intervals.

  - They represent vendors' moves to recapture rate increases in the underlying interstate and local tariffs and, to a lesser extent, other factors.

- INPUT expects that price increases for these services will constitute a significant portion of future market revenue growth. This will be caused by continuing increases in the cost of underlying services and by vendor attempts to improve profitability.

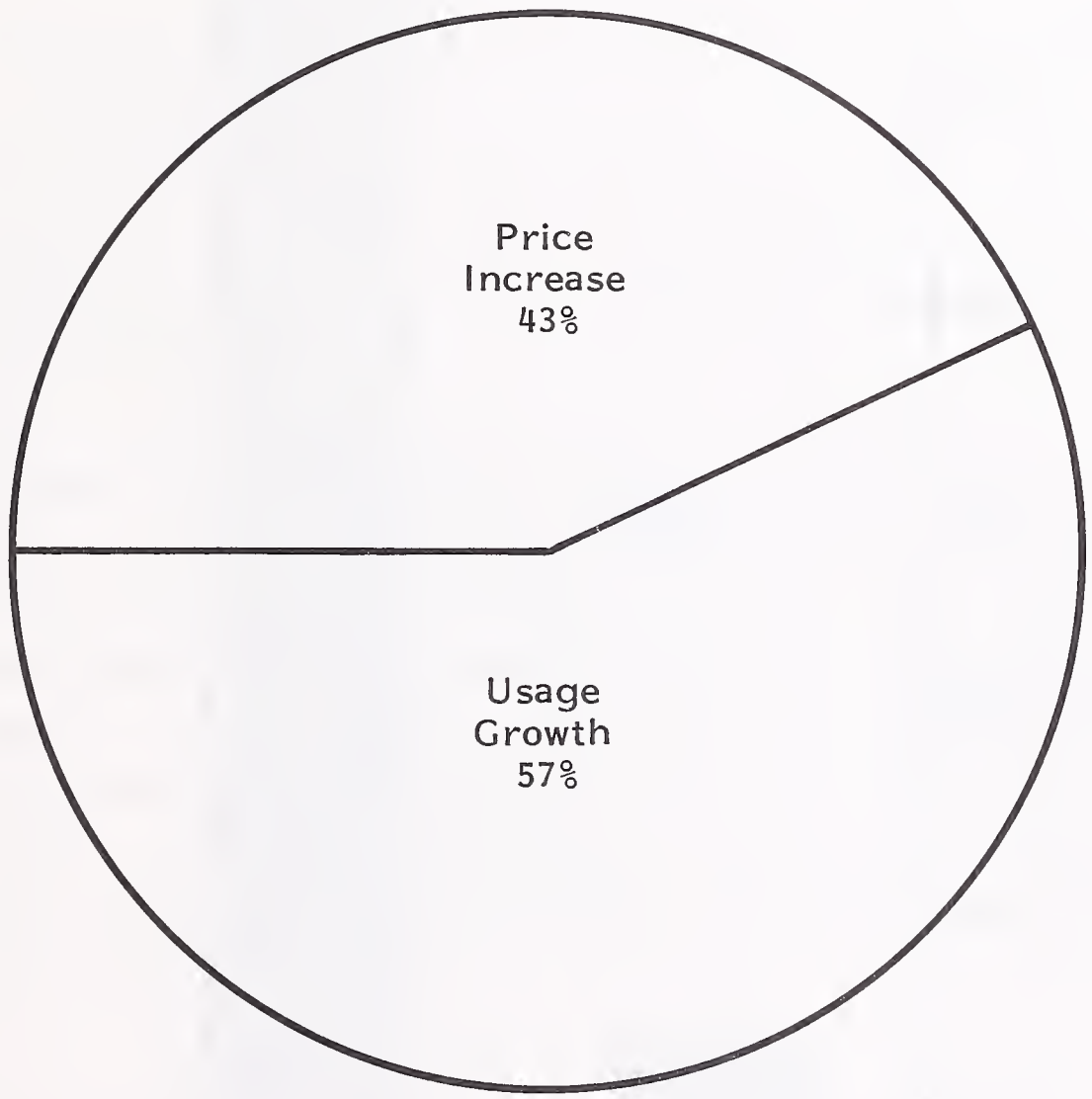
C. MARKET SIZE

- The market size at the end of 1981 was estimated to be $135 million. Over five years this will grow to $690 million for an average annual growth rate of 39%, as shown in Exhibit II-2.

- It is expected that a very significant portion of this growth will be the result of price increases in the future as it has been in the past. INPUT expects that

EXHIBIT II-1

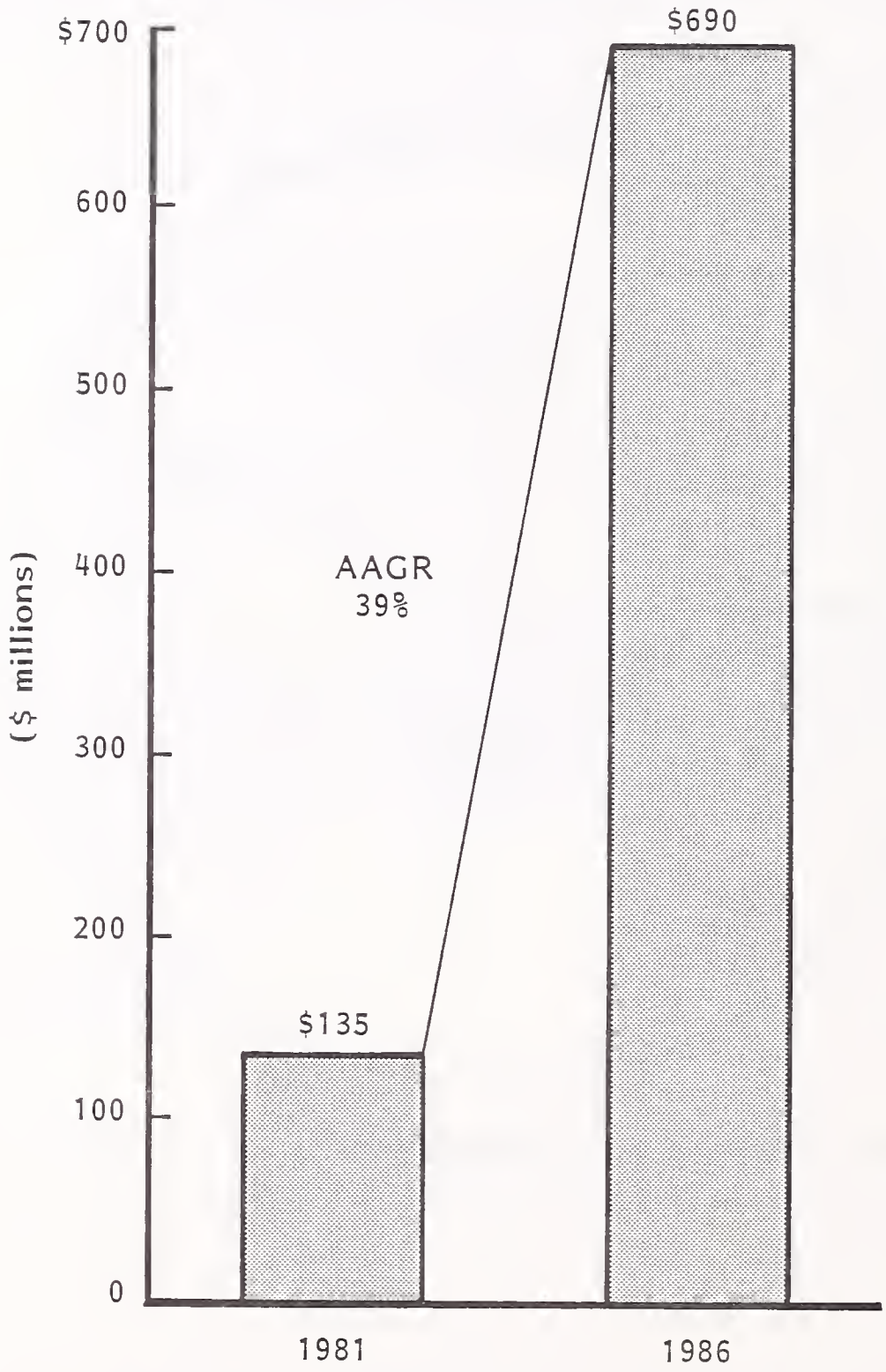
PRICE AND USAGE COMPONENTS IN
EXPECTED MARKET REVENUE GROWTH DURING FORECAST PERIOD



Growth Source

EXHIBIT II-2

COMBINED USAGE AND PRICE INCREASES
VAN REVENUE GROWTH,
1981-1986



over 40% of the revenue growth is likely to result from price increases if historical rates of increase persist.

- Tymnet and Telenet dominate the market with an aggregate share estimated at 60% in 1981. The revenues of RCS company networking activities competitive with the two dominant vendors are not derivable from survey data but are estimated to be less than $10 million or approximately 12% of the combined revenues of the dominant vendors.

- While the future entry of American Bell carries great psychological weight, it is not expected that the entry will have a major effect on this market during the forecast period. This is because this entry will take a different direction, targeting connections to 3270 devices, RJE devices, and a market for the collection and formatting of data for applications currently operating in the batch mode.

- Because of very substantial uncertainties regarding timing and a significantly different probable strategy, potential American Bell revenues are not included in the forecast. The company has stated that it expects to invest approximately $500 million in its services and expects a sales dollar return on that investment equal to the investment in five years. Current staffing levels for the subsidiary imply revenues of about $36 million per year if the unit achieves typical levels of efficiency in the near term and obtains customers very quickly. INPUT believes the announced American Bell objectives to be extraordinarily ambitious.

D. USER CHARACTERISTICS

- Users of network services are segmentable into two discrete submarkets. These are:

- RCS vendors which "distribute" their services on VANs either exclusively or as a supplement to an existing in-house network.

- Industrial, Financial and other (I&F) users who employ the VANs to distribute company applications or for message traffic.

- These groups have discrete needs and sharply different growth rates.

  - The year-to-year growth rate in expenditures was 14% for RCS companies.

  - The comparable growth rate for I&F users was 46%.

- In part these different growth rates can be explained by saturation in the RCS sector where virtually 100% of the firms in the universe employ VANs. A substantial portion of the growth in the I&F sector results from the addition of new subscriber firms. Among existing users in the I&F sector expenditures grew by 19%.

- Among I&F users it was found that expenditures for VAN services constituted about 6% of the total data communications budget.

- Among I&F firms the dominant application was order entry, accounting for almost half the expenditures by these respondents.

- Users of network services indicated a moderate degree of satisfaction with the dominant vendors, rating them on a one-to-five scale (five high) of 3.25. Unusual was the absence of polar responses of one (very dissatisfied) and five (very satisfied).

- A very significant finding was that 87.5% of respondents to INPUT's survey indicated that they were currently evaluating alternatives to their present VAN supplier(s).

- Cost was the primary factor cited by users in any decision to switch vendors or communications methods.

- RCS and I&F users have different needs profiles. In general, I&F users place greater emphasis on support and the quality of billing and appear to be less independent than RCS users. RCS users place a heavier emphasis on widespread geographic coverage.

- Network error rates and the variety of protocols offered were not very important to either group.

E. RESPONDENTS' VIEWS OF THE FUTURE

- Respondents overwhelmingly - by a factor of four to one - expect their communications costs to increase in the future.

- Over the forecast period the mean percentage rise expected is about 45%.

- Among those forecasting continuing rising costs the consensus as to cause was deregulation. Respondents seem to reject the conventional economic wisdom that increased competition will bring costs down, at least during the study timeframe.

- Fifty percent of respondents indicated that the response to their price forecasts would involve moving to or increasing the use of in-house networks.

- Twenty-four percent did not plan any change in action as a result of their forecast.

- Fourteen percent indicated that they would continue to monitor events before deciding on a course of action, if any.

- The remaining 12% provided miscellaneous responses.

- INPUT concludes that respondents view in-house networks as a "final" solution to cost concerns. This parallels the RCS market where many users view in-house systems as the "final" solution.

- Regarding plans for applications, respondents provided the data, as shown in Exhibit II-3. The relatively low percentage planning new applications during the study timeframe may be the result of general economic conditions.

F. USER ASSESSMENT OF FUTURE DEVELOPMENTS

- As in most areas of this study, users vary in their views dependent on whether they are an RCS or an I&F user of network services.

- In general, there was agreement between both groups on the future significance of Electronic Mail.

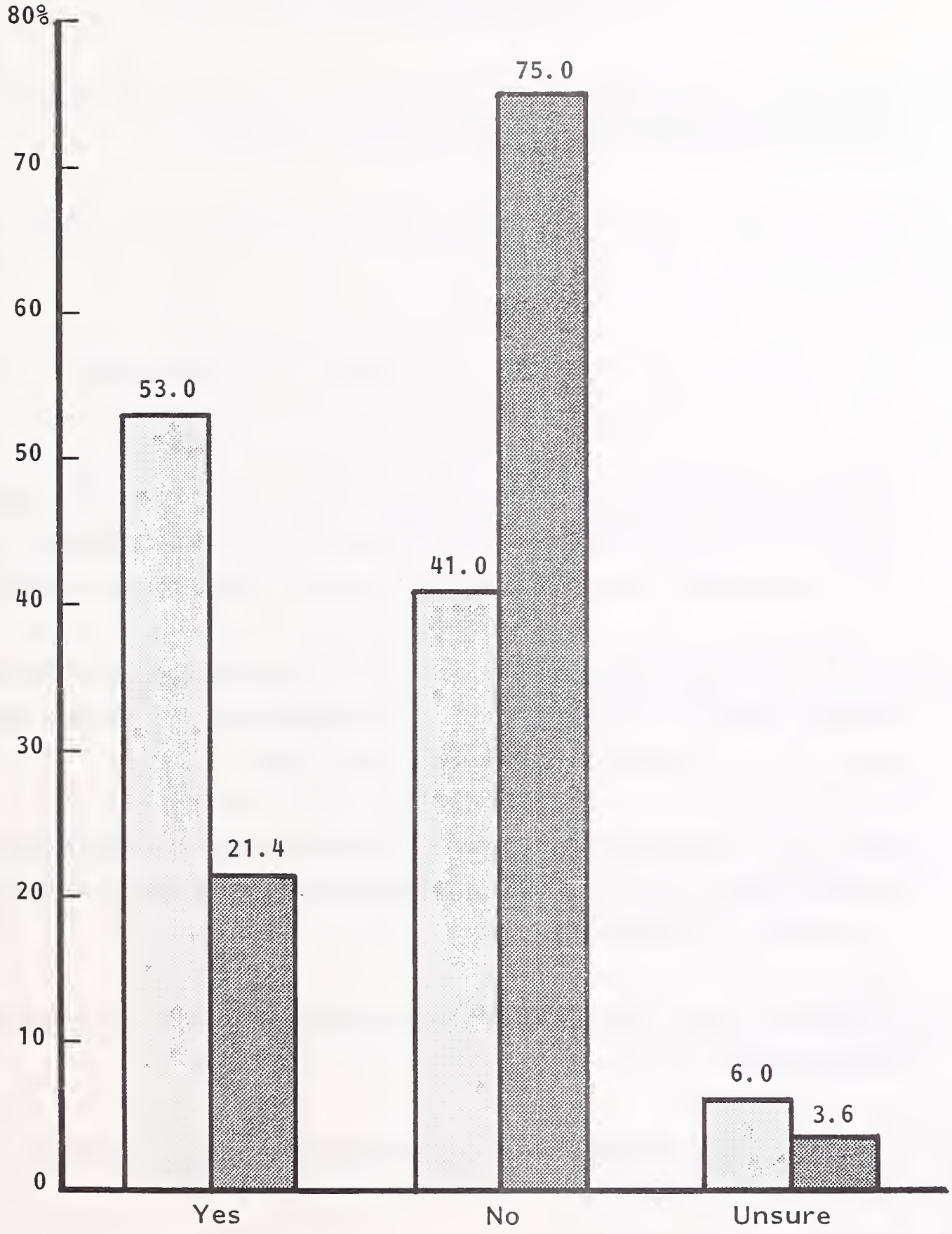
- Local Area Networks, office automation, and personal computers were thought to be factors of significance in future use by I&F respondents.

- Decision Support Systems were felt to be important by RCS users, ranking well ahead of the factors cited by I&F respondents.

- Alternative transmission technologies such as CATV data transmission were found to have little significance regarding use of existing services.

EXHIBIT II-3

PERCENT ANTICIPATING NEW APPLICATIONS
EMPLOYING VAN SERVICES



G. CONCLUSIONS AND RECOMMENDATIONS

- Clients are cautioned that the present marketplace for network services is characterized by unusual turbulence and uncertainty.

- The market has been and will continue to grow rapidly. A significant portion of the revenue growth has been due to price increases.

- Users of basic network services are acutely sensitive to the cost of these services.

- Basic services are not significantly differentiated among suppliers; accordingly, purchasing decisions are heavily influenced by cost factors.

- A differential of up to 30% in basic rates has developed between dominant vendors and certain challengers. New entrants should be prepared to offer what is essentially a commodity service which will be compared on price.

- Certain scenarios are possible in which high turnover may develop as subscribers move from vendor to vendor. The effects of such turnover would be extremely damaging to profit margins of participants.

- From their established base in basic services the dominant vendors are moving to "add value" through the provision of data bases, personal computers, and "community of interest networks."

- Should a strategic imperative for market participation exist, the following is recommended:

  - Plan for lowest cost possible in the provision of basic services.

- Emphasize the industrial and financial sector as contrasted to the RCS sector.

- Accommodate the specific needs of subscribers in this sector for support and improved billing.

- Package as a part of the network offering incremental processing capabilities in order entry and possibly in financial reporting.

- An Electronic Mail capability appears to be an imperative in the current market. Transaction pricing (as contrasted to connect time and/or character transmission pricing) should prove valuable in this cost sensitive market.

- Seek out opportunities in "community of interest" networks among trade associations, geographically spread but interrelated groups of manufacturers, distributors and suppliers, and also with professional groups.

- Leverage existing positions in proprietary databases and software among existing clients with geographically dispersed operations.

- Acknowledge in all phases of planning, operations and sales that basic low-speed terminal to host services have a strong commodity component and fully assess whether or not the existing organization is skilled in techniques for commodity market success.

- Consider alternative pricing schemes of an unconventional nature, e.g., "flat rate" instead of measured connect and data transmission.

- Develop strategies to take advantage of the relatively strong tendency for subscribers to seek alternative suppliers; i.e., subscribers' low intrinsic loyalty.

III CURRENT VENDORS AND SERVICES

III CURRENT VENDORS AND SERVICES

A. OVERVIEW

- In general, there is little to differentiate the existing vendors of Value Added Network services. The tendency among large users and users with critical applications to obtain services from two vendors - with one backing up the other - emphasizes this point.

- INPUT believes that, as presently utilized, network services are essentially a commodity business. A key characteristic of such businesses is the users' sensitivity to the price of the service. Very high sensitivity to price was found among respondents to this survey.

- There is a tendency among major vendors to search for "applications" which move beyond the provision of straightforward terminal communications services. This trend can be seen in such areas as Electronic Mail offerings, provision of more complete information services and the addition of "computing" capability.

- Over the long term, vendors of Value Added Network services will continue to provide increasingly large numbers of functions on the networks. In the process they will take on more and more of the characteristics of RCS companies.

- This trend will be accelerated by the recent entries of RCS companies into the network marketplace.

- In considering the future of both network and RCS services, it is important to remember that the boundary between these markets has been an artificial one created by government regulation, not a natural boundary based on technology or its application. Since most of the regulatory constraints have been removed, the former artificial boundary will be eradicated by competitive forces as new applications are developed.

- This trend can already be seen in a number of current developments:

  - American Bell's Net 1000 contains applications processing power in its nodes. While applications software is presently lacking in the proposed offering, the ability to provide such software is certainly present.

  - Novel combinations of capabilities are beginning to appear in the market such as those offered by I.P. Sharp. Sharp provides its APL development software and installs it on the client's processor. This software can then be accessed remotely through the Sharp Network. The company claims more than three dozen such installations.

  - Telenet has launched a Medical Information Network aimed at hospitals, group practices, and physicians. Offered in conjunction with the American Medical Association, the service combines electronic mail with database inquiry services.

  - IBM Information Network was selected to provide a "dedicated" network for insurance agents. Among the network's capabilities are interactive processing, store and forward message switching, and protocol conversion for dissimilar devices. About 60,000 insurance agents constitute the potential market.

- INPUT believes that the Telenet and IBM I/N systems cited above - both involving associations - constitute a significant step toward the construction of many "community of interest" networks which will include various segments of an industry, whole industries or users with specific needs. These networks are significant because they extend communications beyond the much more common intracompany systems.

- While community of interest networks are important developments, it should be remembered that there is little operational experience with such networks at present. It remains to be seen if:

  - The offered services will prove sufficiently attractive to encourage initial use.

  - The services will prove to have sufficient value to users that they will continue to use them.

  - Service pricing will be within an acceptable range.

- In general, Value Added Networks offer the following features:

  - Network management is assumed by the vendor, freeing clients from substantial administrative responsibilities and staffing requirements.

  - Error rates lower than the basic line error rates due to the use of error detection and retransmission schemes.

  - A higher degree of reliability resulting from the use of alternate routing capabilities.

  - Adaptability to a large number of otherwise incompatible terminal devices through automatic code conversion, protocol matching, and speed matching.

- The ability to interface with a variety of computer systems.

- Integration with other carriers for international record traffic and connection to offshore national networks.

- A combination of message and data traffic capabilities.

- Reduced capital investment requirements on the part of customers typical of service offerings.

- All vendors share these characteristic capabilities but vary in the degree of effectiveness with which they are implemented.

B. GTE TELENET

- Founded in 1972 and operational by 1975, Telenet is the oldest of the operating Value Added Networks. Local dial-up is available in at least one city in all 50 states and in approximately 40 nations.

- A wide variety of terminal interface devices are offered. Processors are available for asynchronous, bisynchronous, HDLC (High Level Data Link Control) and X.25 protocols. The largest of the processors can handle 112 asynchronous terminals, 16 binary synchronous terminals, 32 HDLC devices or a combination thereof. These large processors include a packet switch.

- Dedicated access facilities are available in the U.S. at published rates up to 9600 BPS. 56 KB ports may be arranged on request. Installation charges - $1,000 typically - are associated with these services.

- A number of special services are also available. These include:
  - A Hotline Data Service which allows communications between two specific network stations at a fixed monthly traffic charge.
  - A Nightline service which offers greatly reduced connect charges for off-peak hours.
  - A Host Port Exchange Service which provides a fixed number of connections at a flat monthly rate in place of connect and traffic charges.
  - A Private Packet Exchange Service which establishes exclusive use of a group of ports at a network node.
- Volume discounts are offered when billing exceeds $15,000 per month. The schedule begins with a 1.5% discount and reaches 13% at the $250,000 per month level.

- Telenet's "Telemail" electronic mail offering has been highly successful since its mid-1980 introduction. INPUT's examination of these services indicates a wide variation of billing methods and very significant differences in rates per message among competing vendors.

- The billing method elected by Telemail is connect time-biased with the basic daytime rate being $14/hour. Lower rates apply evenings and weekends.

- As with most E-mail service, there are monthly minimums ($500), an add-on account charge, and extra charges for detailed user reports.

- Telenet has also made efforts to sell not only VAN services but also its technology through the design of private networks. During 1981 public packet nets were installed for the governments in the United Kingdom, Mexico, and Chile.

- As has its competitor Tymnet, the Telenet group has chosen to participate in the market for specialized terminals. A credit authorization terminal for retail stores known as "Micro-fone" has been introduced. Claimed sales of this POS (Point of Sale) terminal were 15,000 units in 1981.

- INPUT believes that Telenet will continue in a leadership position in developing new applications beyond the provision of "commodity" communications services. Telemail and AMA Net ar bellwether applications of this type.

C. TYMNET

- First officially offered as a tariffed service in April 1977, Tymnet was informally connected with foreign hosts as early as 1972. Despite a slightly later start, TYMNET has achieved approximate parity with TELENET in the number of U.S. cities covered while TELENET maintains a modest lead in offshore coverage.

- Tymnet offers public access ports divided into three classes known as high, medium, and low density cities. Additionally, a sliding scale volume discount in three steps is applied to connect hours. As a consequence, connect time can range in price from $9.25 per hour to $2.00 during the ordinary business day, dependent upon city and volume.

- Private dial-up is available only in medium and high density cities.

- Transmission charges are also subject to a sliding scale rate with discounts after the first 100 million characters.

- A wide variety of synchronous and asynchronous hosts connections at speeds up to 9.6 KB can be utilized. This includes synchronous polled terminals.

- Special Services include:

  - The Tymcom 3270 service which provides public network access for these common devices. Tymnet indicates that with this service there is no need for software changes at the host or terminal. At present, this is not an emphasis service.

  - A Tymegram Electronic Mail service appears to essentially duplicate a similar Western Union service aimed at large users.

  - OnTyme Electronic Mail - available in its present form since 1980 - is available in either the conventional form or as a turnkey installation for intracompany communications. The service is charged on the following components:

    . Connect time.

    . Characters transmitted.

    . Per message charge.

    . Daily storage charge.

- In addition there is a minimum connect time charge per message, a charge for detailed invoices, and a modest monthly minimum. Messages are charged in and out of the network.

- In early 1982 Tymshare made available a French-built Matra terminal with automatic dial and log-on capabilities for less than $600 in single quantities. This small - less than one foot at the base - CRT device is one of the first in a new generation of small, low-cost terminals with high functionality. It is a general purpose terminal intended for desk-top use. More recently, a similar terminal with a built-in telephone has been announced.

- In late 1982 Tymnet announced an augmentation of its 3270 service for communications between 3270 terminals and terminal to host. A new Display System Protocol (DSP) has been agreed upon between Tymnet, Telenet, and Canadian Datapac to send and receive data across X.25 links and X.75 gateways.

- At the time of this writing Tymshare indicated that it will be making a mid-1983 introduction of undisclosed services involving Tymnet access to data bases through personal computers. A $3 million order with Digital Equipment Corporation for personal computers was also announced.

- As a part of its Ontyme E-mail service, Tymnet is experimenting with the electronic delivery of newsletters to subscribers of the newsletters.

- With positions in microwave through the 1981 acquisition of Multipoint Distribution System (MDS) carrier Microband, an approved filing for a DTS (Digital Termination Service) system, and a strong position in "basic" services (40 billion characters moved on the network in one month in early 1982), Tymshare and Tymnet are well-positioned for future growth.

D. UNITED TELECOMMUNICATIONS UNINET

- Announced in early 1981, Uninet is a spin-off of the teleprocessing network of United Information Systems. United acquired a potentially related company in 1982 known as ISA. ISA, which markets insurance industry software, also owns a controlling interest in ISACOMM. ISACOMM is a resale satellite services common carrier and also holds DTS licenses.

- A key differentiator with the Uninet service is the company's emphasis on remote batch traffic. The remote batch orientation of United's CDC-based scientific processing is the principal reason for this unusual feature.

- The network is configured around a "backbone" consisting of switching centers connected by 56 KB Digital Data Service (DDS) links.

- Interactive service is currently offered in 160 cities in the U.S. which are designated as high, medium and low density locations and priced accordingly.

- From backbone cities high speed 19.2 KB service is offered. The high speed service supports HASP, 2780, 3780 and CDC protocols.

- Uninet, as a relatively new network, has very low market penetration. This penetration proved to be unmeasurable in INPUT's survey, but informal remarks of Uninet users indicate that the network is currently operating satisfactorily.

E. ADP AUTONET

- Announced in early 1982, Autonet is a spin-off of an existing RCS network. Prior to the spin-off, ADP had spent at least two years making the necessary changes to the network to prepare it for standalone usage and in the creation of billing software, a non-trivial task for any network.

- The network is essentially conventional in terms of its user-provided functions. These include:

  - Public dial-in ports currently in excess of 5,000.

  - Private dial-in ports.

  - Dedicated access facilities with direct connect through private lines.

- Terminal concentrators on the customer's site for up to 80 terminals.

- Host access, either asynchronous or X.25.

- A unique "dial-backup" capability for use in case of network problems.

- The service is currently available from about 120 cities at terminal speeds of 110 to 1200 BPS. 1200 BPS service is not available at all locations.

- Autonet prices for basic services are moderate in comparison to those of the leading vendors at $3.00/hour for 110/300 connect and $4.00/hour for 1200. Transmission charges are also moderate at $.03 per thousand. Flat rate and prepaid transmission options are also available.

- Autonet claims over 5000 ports on the network and the connection of over 110 hosts. INPUT believes that most of these host connections are currently ADP mainframe or Onsite systems with fewer than 20 foreign hosts currently connected.

- INPUT further believes that the Autonet service is not presently being marketed aggressively on a large scale and is not likely to be in the near future. A small dedicated sales force is present in three cities.

F. COMPUSERVE NETWORK SERVICES

- Made available in 1982, Compuserve's network is another of the increasingly common RCS networks which have been spun off. Currently service is available in about 160 cities but an aggressive expansion plan calls for local service in 300 cities.

- Late in 1982 Compuserve reorganized its network function to combine the Infoplex Electronic Mail activity and the VAN function under a single management. The MicroNet personal computer network with its array of data bases including an on-line encyclopedia, stock prices and news services remains under separate management while sharing network facilities.

- As of mid-1982 the MicroNet service claimed 26,000 subscribers. INPUT belives that while the number of subscribers is high, the revenue per subscriber is modest, perhaps in the range of $10 per month.

- At the present time the VAN service is sold through a 105-person field organization which also sells RCS products. There is also a small dedicated sales force. There are about 30 sales offices in total.

- The VAN offerings are conventional in their configuration:

  - Dial up low-speed is available at 110-1200 BPS.

  - MicroNodes on the customer's site provide connections for up to 80 low-speed devices.

  - 3270 protocol converters are offered in conjunction with the MicroNodes to accommodate up to 11 simultaneous users.

  - X.25 is supported through a synchronous network link.

- Pricing of the service is moderate with base dial-up rates of:

  - $3.75 per hour connect for all cities at up to 1200 BPS.

  - $0.04 per 1,000 characters transmitted, all speeds.

  - Private access ports are available, also at moderate cost.

- Compuserve has long been active in the market for E-mail. Their service is uniquely characterized by transaction charges for such functions as message composition, forwarding, etc., as contrasted to the more common connect time-based schemes. This is a powerful benefit to the user as it removes much of the ambiguity in charges for these services.

- Compuserve very recently added an interface to the United States Postal Service's Electronic Computer Originated Mail (USPS ECOM). The service is targeted to small volume users in contrast to the prior ECOM emphasis.

  - List handling facilities are provided, and the service is transaction-priced with single letter rates beginning at $.85 per addressee.

  - ECOM guarantees delivery within two days anywhere in the country.

- Compuserve's penetration of the VAN market is currently very low, but the attractive pricing schemes of important VAN services such as E-mail and innovative offerings such as ECOM may serve to rapidly boost acceptance of the service.

G. GRAPHIC SCANNING GRAPHNET

- Graphnet began a digitized facsimile service in 1975. This service is technically a Value Added Network. Basically, the network accepts facsimile transmissions, digitizes, stores, and forwards the images to address locations. The network has dial-out and broadcast capability for FAX images.

- Since 1977 Graphnet has also had a digital transmission capability for data. The primary use of this capability is the transmission of record communications in competition with Western Union's Telex. This service and Telex are

to some extent competitive with the E-mail capabilities of RCS and other VAN vendors.

H. CYCLIX COMMUNICATIONS NETWORK

- Recently purchased by RCA, the Cylix network is a high-speed packet-switched network employing satellite and leased line channels. The network is not "switched" but is the equivalent of a private line network oriented toward long holding times. Service is targeted to heavy-usage, transaction-oriented systems using IBM and Burroughs terminals.

  - 4800 and 9600 BPS channels are available.

  - The network supports Burroughs polled, IBM 3270 and X.25 protocols.

I. AMERICAN BELL NET 1000

- Announced in mid-June 1982 as Net 1 (with a name change after a vendor of local area networks protested the usurpation of its trademark), this network was originally projected to be operational in late 1983. Subsequent events in the regulatory arena make forecasting a scheduled start date risky.

- As announced, the network has the following characteristics with terminal interfaces for:

  - Asynchronous contention terminals, IBM 2741 or Teletype Model 33.

  - Asynchronous polled, IBM 2740-II.

- Synchronous contention, IBM 2780/3780 and 3275.
- Synchronous polled, IBM 3271.
- SDLC terminal interface.

- Host interfaces are available for:
  - ASCII asynchronous host.
  - IBM 2780/3780 synchronous host.
  - IBM 3271 bisynchronous host.
  - SDLC host interface.

- It is claimed that over 80% of the installed terminal population is compatible with the network. It is worth noting that virtually all devices found in use in the survey of VAN users were ASCII devices operating at or below 120 CPS. While operating VANs claim the ability to handle bisynchronous devices, there is very little of this traffic at present.

- This implies that the Net 1000 effort is targeted at current private corporate networks for message switching and data communication to a significant degree. If true, then the Bell offering - when it becomes available - may have less impact on current value-added suppliers than many assume.

- Time is an extremely important variable in this market. The original Bell offering contemplates service in only 17 cities. This compares to the hundreds of cities in which service is available from current VANs.

- The current VAN market is fundamentally one of low-speed, low-density communications. Accordingly, it will be several years before Net 1000 achieves the ubiquity of current VANs, if ever.

- The competitive intersection is not with current VAN applications but in areas of large potential such as proprietary networks for trade associations and very large companies, and in the area of message networks or "Electronic Mail."

- Consequently, INPUT believes that the principal effect of Net 1000 will be psychological for the near term, minimal in its impact upon existing VAN applications and potentially foreclosing of expansion opportunities in the long term, i.e., in the late 1980s. In any case, ample time is available to current and future market participants to plan in an orderly fashion.

- Beyond basic terminal and host interconnection capabilities, Net 1000 has unusual capabilities, making it a genuine "compunications" hybrid. These include:

  - The ability to store customer applications programs in the network.

  - The ability to store customer data in the network.

- While these characteristics imply an RCS capability where customers may access data bases and execute "timesharing" programs, the software available for these functions appears elementary. There is, for example, no data base management system currently available. Further, the choice of DEC/VAX 11/780 constrains the choice of software packages.

- Net 1000 will offer a store-and-forward message service, i.e., Electronic Mail. In this market there is intersection with the offerings of RCS vendors, VANs and, to some extent, with record carriers such as Telex.

  - The service will offer three priority levels which vary in price.

  - The service will offer a broadcast capability for single message delivery to multiple locations.

- Conventional E-mail capabilities such as verified receipt will be available.

- American Bell claims three major categories of use for the network when it is operational. These are:

  - Integration of hosts and data. Envisioned is the ability to link disparate hosts and terminals belonging to a single customer such as a large manufacturing firm. Prior INPUT studies indicate that the average number of networks among Fortune 500 firms is 4.8 per firm. This suggests that certain economies are available by eliminating redundancy of equipment and simplifying network management through the use of the announced Net 1000 service. This type of usage may be stimulated by increasing private line charges.

  - Intercompany communications integration. American Bell states that there is a substantial need to eliminate the present equipment incompatibility between firms. INPUT expects that order entry and order fulfillment systems between manufacturers, jobbers, distributors and dealers are a prime target for such integration.

  - Network Use By Service Firms. American Bell proposes that programs and data be stored in the network for use by clients of service firms. With very limited utilities and programming languages limited to a subset of COBOL, this would seem to have very minor potential in the present offering.

- Conceptually at least, the provision of network distribution plus processing on a "turnkey" basis could prove attractive to small service firms. This approach is an extension of the current VAN services to include not only communications but processing. INPUT believes that this approach will play a role in future telephone-based videotex services such as telebanking, travel reserva-

tions, and similar consumer offerings, but will have little impact on conventional RCS business.

- A key aspect is the price of the various services to be offered by American Bell. Exhibit III-1 shows what is known about the pricing of various services. Analysis of the available information suggests that Net 1000 prices appear to be competitive with those of other vendors.

  - Dial-up charges for speeds up to 1200 BPS are $4.20 per hour connect and are approximately comparable to charges from current VANs.

  - Storage charges at $.10 per kilobyte/month are relatively inexpensive at low storage volumes but not better than parity with offerings of RCS vendors for larger storage volumes.

  - Processing charges equivalent to $.20 per CPU/second on the VAX 11/780 appear inexpensive, but in terms of useful work this is extremely difficult to judge without benchmarking. When comparing these charges with vendors of RCS services, it must be remembered that even the most basic services provide extensive utilities, multiple choices of languages, and a variety of other services which are "bundled" into processing and storage charges.

- Underlying apparently competitive prices to future users are massive charges to American Bell for the BPSS (Bell Packet Switched Service). According to tariffs (now under revision) filed with the Federal Communications Commission, the minimum charge for a BPSS switch was to be $75,000 per month. There was also a $2 million installation charge which could be paid at a rate of about $34,400 per month over five years. An additional one-time fee of approximatey $85,000 is levied, plus other "minor" charges.

- These massive expenditures for switches alone (packet assembly, disassembly and trunks between switches are not included, nor are personnel expenses) confirm that Bell believes there is a huge market for their services.

EXHIBIT III-1

AMERICAN BELL ADVANCED INFORMATION SYSTEMS
NET 1000 SELECTED PRICES

Public Dial Ports	
0-1200 bps	$4.20/Hour
1201-2400 bps	6.60/Hour
2401-4800 bps	9.60/Hour
Dedicated Dial Ports	
0-1200 bps	$275/Month and Installation (a)
1201-2400 bps	475/Month and Installation (a)
2401-4800 bps	700/Month and Installation (a)
Private Analog Ports	
0-300 bps	$250/Month and Installation (a) + (c)
301-1200 bps	275/Month and Installation (a) + (c)
1201-1800 bps	300/Month and Installation (a) + (c)
1801-2400 bps	475/Month and Installation (a) + (c)
2401-4800 bps	700/Month and Installation (a) + (c)
4801-9600 bps	1,100/Month and Installation (a) + (c)
Private Digital Ports	
0-2400 bps	$400/Month and Installation (b) + (c)
2401-4800 bps	550/Month and Installation (b) + (c)
4801-9600 bps	800/Month and Installation (b) + (c)
Processor and Storage	
Interactive Processing = $0.02/ARU	
Noninteractive Processing = $0.005/ARU	
Demand Storage = $0.01	
Data Transmission	
Call Services	$1.75/Kilopacket
Message Service	2.25-1.50/100K Characters

(a) = $450 Installation Charge
(b) = $300 Installation Charge
(c) = $10 Network Standard Address/Monthly

- This is confirmed by the Bell statement that they received approximately $4.5 billion in revenues from data communications during calendar 1981.

- INPUT believes that a very substantial portion of Net 1000 revenues will migrate from other Bell-offered services such as intercity private line and DDS. As migratory revenues, these expenditures will not increase the size of the market.

- Regulatory events surrounding the tariffing of the BPSS switches have been snagged on an FCC finding that AT&T should have but did not obtain proper certification for the BPSS offering under Section 214 of the Communications Act.

- As of this writing (November 1982) the requested filings have not yet been made. At such time as they are made, they may be subject to requests for hearings before the FCC by competitors and may also be subject to litigation. The effect of these actions could be a substantial stretching of the announced availability date, most recently stated as May 1983.

- It remains possible that to implement its Net 1000 service on a timely basis American Bell will use the services of existing and competitive Value Added Networks until such time as BPSS or a successor packet system is approved and deployed.

  - This turn of events, should it occur, illustrates well the difficulties of operating in this currently chaotic marketplace.

  - In this scenario American Bell would be purchasing a packet service from an "outside" supplier (such as Telenet) which would be purchasing the lines underlying that service from AT&T.

- While certainly subject to change as the offering moves along the convoluted trail to the marketplace, INPUT believes American Bell and its predecessors have targeted certain markets other than those staked out by VANs and RCS companies. These include:

  - The market for connections to IBM 3270 terminals which has not been thoroughly addressed by the traditional VANs.

  - The market for RJE devices, also not addressed by VANs with the possible exception of Uninet.

  - A potential market for collecting and formatting data for applications which are currently operating only in the batch mode. Net 1000 could collect data for such applications, format that data, then send it to a central customer site for processing.

- It is also possible that Net 1000 will interconnect with existing VANs to obtain geographic coverage beyond the initial 17 cities, relatively sparse coverage by today's VAN standards. This would have the effect of temporarily expanding VAN revenues to the extent that they move traffic to or from Net 1000 nodes.

- In summary, INPUT believes that the main thrust of the American Bell offering will be in directions different from those of existing services although the ability to compete with existing services is present to some degree. The existing VAN market is simply not large enough to support the scale of activity proposed by Net 1000.

IV MARKET SIZE AND FORECAST

IV MARKET SIZE AND FORECAST

A. MARKET SIZE

- The market for Value Added Network Services is technologically defined, i.e., revenues of publicly available packet-switched networks. The actual applications running on these networks are technologically accomplishable by a variety of means. For example:

  - Various forms of Electronic Mail may be accomplished by message networks such as Telex and TWX or USPS E-COM.

  - Applications such as order entry and inventory may be performed on private "in-house" networks.

  - Access to timesharing systems for data inquiry may be performed either by private network or the switched telephone network.

  - The combinations and permutations of technologies to accomplish a specific application are multiple and are continuously expanding.

- There is a high degree of interchangeability between various communication alternatives, including Value Added Networks.

- In 1981 Value Added Network suppliers received revenues of approximately $135 million. The combination of the two leading networks, Telenet and Tymnet, plus secondary RCS vendors account for approximately 70% of revenues, INPUT estimates.

- Respondents to INPUT's survey for this study indicated that VANs accounted for an average of 6% of their total data communications expenditures for non-computer service firms. The equivalent proportion for computer service firms interviewed was 40%, reflecting the fact that many RCS firms depend heavily on VANs for distribution.

- Another INPUT study indicated the approximately 12% of firms employing 1,000 or more persons utilized Value Added Networks.

- Taken together, these facts indicate that the market is in the early stages of its growth with relatively low penetration, both in terms of firms served by VANs and in revenues per firm. This is a positive factor.

- There are several structural factors underlying this growth. One important one is the increasing tendency of communications users to employ the services of Other Common Carriers (45% were found to be using OCC services in 1981 for either voice or data traffic.

  - By 1987, 68% expected to be using the services of OCCs.

- Based on respondent-provided data, INPUT forecasts an increase in the voice and data traffic of OCCs to increase at a rate of approximately 19% per year for the next five years.

- The increasing willingness of communications decision makers to employ services alternative to those provided by traditional telephone companies is an important structural positive for Value Added Network carriers.

- Another important structural or environmental factor is the expected continued growth in the application of low speed data terminals, i.e., RS 232 devices. Despite the fact that approximately 97% of all large firms currently employ such devices, the mean number per firm - according to INPUT survey data - will grow from slightly over 600 to more than 1,000 devices per firm in the next five years.

- Further, the proportion of such devices involved in communications outside the building will rise moderately to approximately two-thirds by 1987.

- The growth of low speed communications (the primary business of major VAN carriers) could be further accelerated by developments in:

  - Personal computers, of which a significant number installed in businesses may have communicating capabilities.

  - The implementation of Local Area Networks which will increase the demand for communications from LANs to remote computers or from LAN to LAN.

- Recently gathered data indicates that the growth in number of lines for packet-switched VANs exceeds that of other communications alternatives.

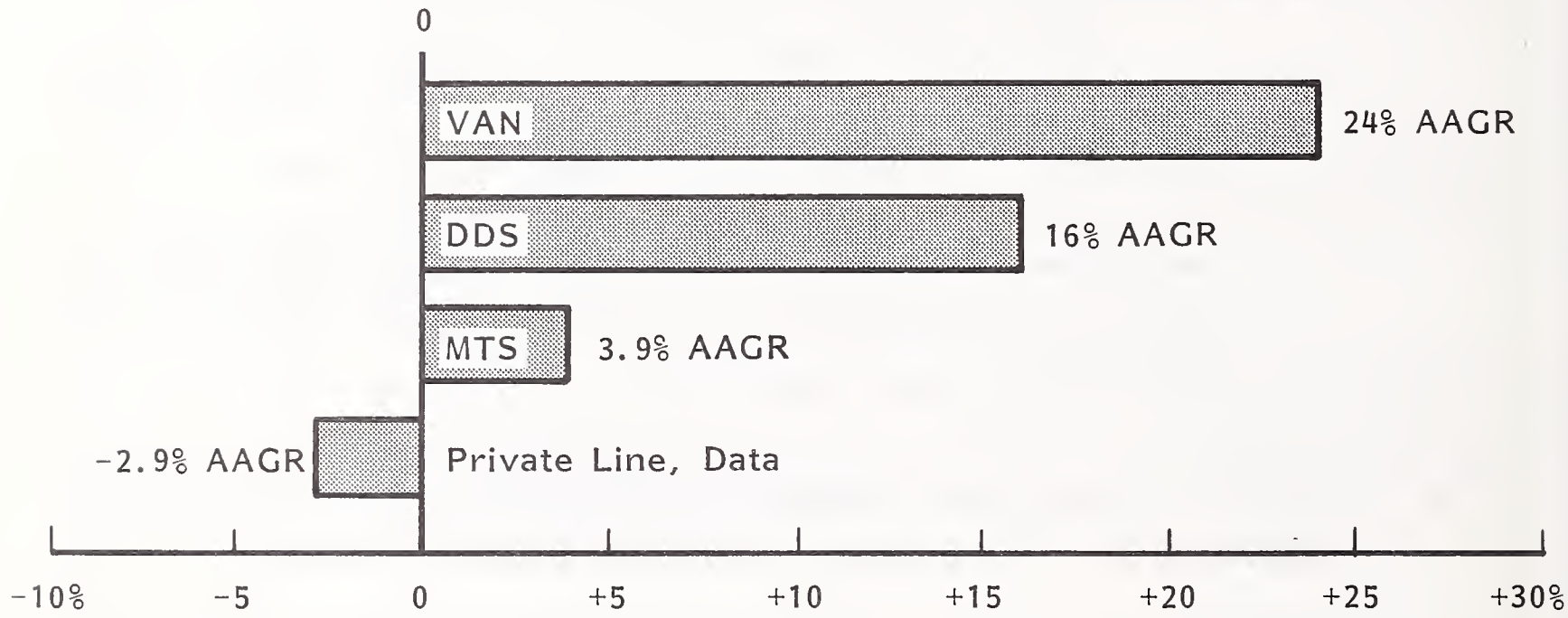
- The share of large firms employing VANs over the next five years will rise from the current 12% to about 26%. Likewise, the number of lines per using firm will more than double.

- The underlying growth rate in packet-switched lines will approximate 24% per year, as shown in Exhibit IV-1.

- During this same period, the number of large organizations employing DDS (Dataphone Digital Service) will also increase greatly, but not as rapidly as packet-switched lines. The number of lines per firm using will not quite double.

EXHIBIT IV-1

FIVE YEAR COMPARATIVE AVERAGE GROWTH RATES
EXPECTED FOR FOUR COMMUNICATIONS METHODS
(Number of Lines, Large Organizations)



AAGR = Annual Average Growth Rate

- The underlying growth rate in DDS lines will approximate 16% per year. At the end of the forecast period approximately 43% of large firms will employ DDS as a method of moving data.

- While VAN and DDS service will experience good growth, INPUT expects that private lines dedicated to data traffic will actually experience slight attrition. The proportion of firms using dedicated private data lines will remain about the same at approximately 90%, but the number of lines per firm will decline modestly resulting in a -2.9% (negative) growth rate.

- Use of MTS (Message Toll Switched) or direct distance dialing for data traffic will remain about the same, according to respondents. The proportion of large firms employing this method for moving data will remain constant at approximately one organization in four, while respondents expect a slight rise in the number of lines used for this purpose. The result is a low positive growth rate of less than 4%.

B. FACTORS INFLUENCING MARKET GROWTH

- In the context of presently available data communications technology Value Added Networks can be expected to do well, significantly outperforming present alternatives.

- While presenting a strong secular picture for continued rapid growth, the market for Value Added Network services also shows some potentially large hazards.

- Key among these is the commodity nature of the current services. This is illustrated by:

- The high degree of interconnectivity among current participants.

- The frequent use - on a more or less interchangeable basis - of more than one supplier by high-volume users.

- Users emphasize price as the key factor in choosing a VAN supplier and in the decision to change VAN suppliers. This emphasis on price is a strong indicator of the commodity nature of the services.

- Concomitant with the emphasis on price and the fungibility of the services provided is a potentially high degree of volatility in the customer base. Fully 87.5% of the respondents using VANs indicated that they were currently evaluating alternative communications methods, as shown in Exhibit IV-2.

- Among those investigating alternatives, the change being investigated was approximately equally divided between in-house networks and other VAN services.

- To some extent the choice of alternative is influenced by the type of business in which the respondent engaged.

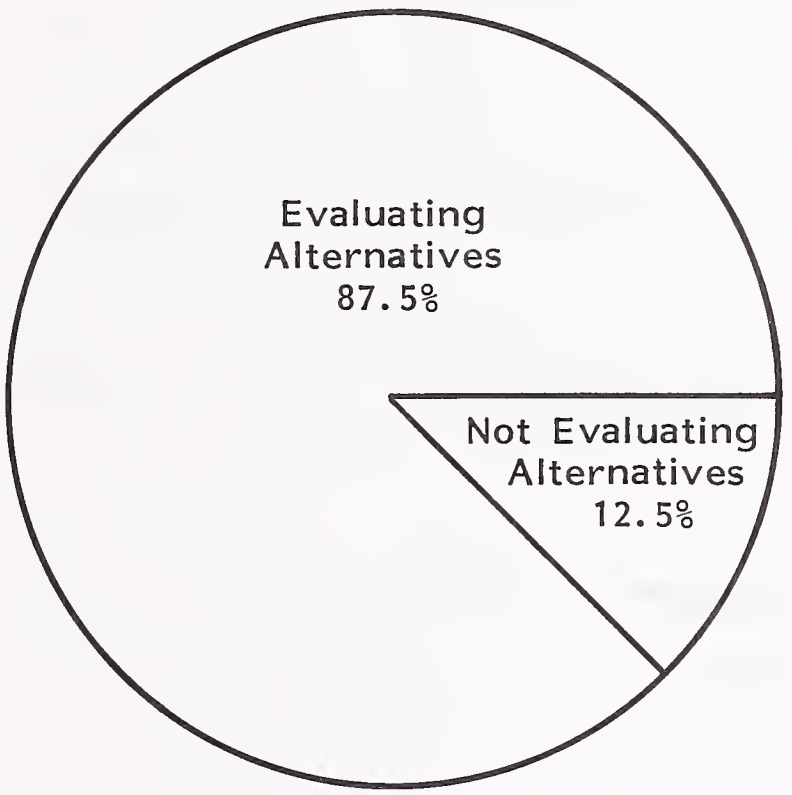
  - Among RCS firms there was a greater tendency to consider replacement of the VAN service with an expanded in-house network.

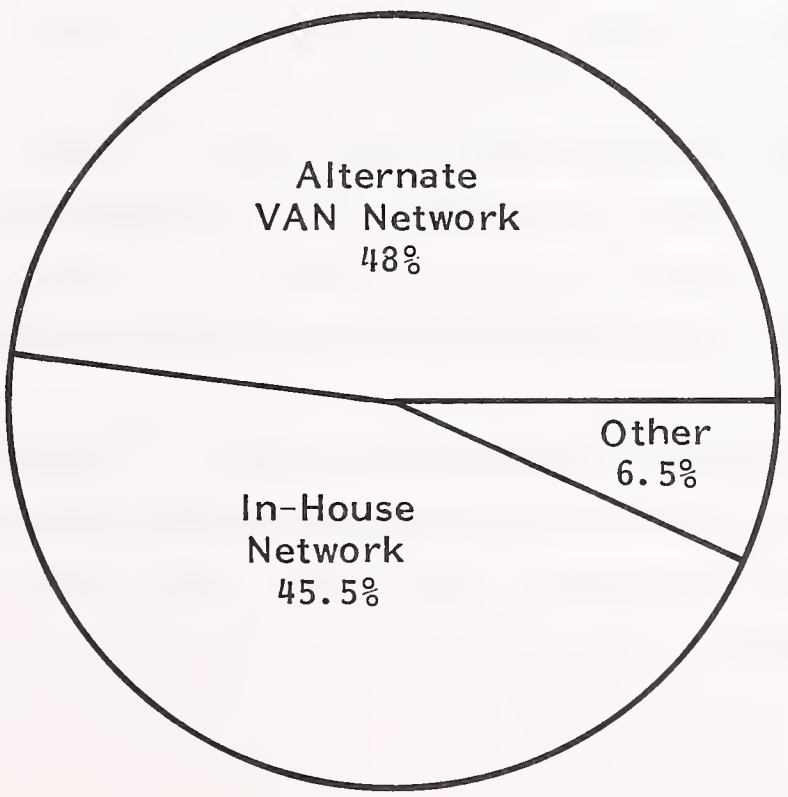
  - Among Industrial and Financial respondents, there was a greater tendency to replace one VAN with another, in effect swapping services in the hope of improving cost performance.

- It is particularly important to note that the majority of the respondents not evaluating alternatives (only 12.5% of the total respondents) gave as the reason for not evaluating alternatives the fact that they were new users of VANs.

EXHIBIT IV-2

PERCENT OF USERS CONSIDERING ALTERNATIVES
TO PRESENT VAN SERVICE





- INPUT concludes, therefore, that any VAN subscriber with more than one year of experience with these services is a potential migrator.

- Whether the subscriber will migrate to another VAN or to an in-house network is a function of the nature and size of the application, the subscriber's business and the amount expended.

- In any case, the extremely high potential volatility of VAN customers appears to be a fact of life, one caused by the commodity nature of VAN service and the subscribers' sensitivity to the cost of the service.

- This high volatility has significant implications for those considering entry into the market. Key among them is the probable high sales expense/revenue ratio caused by high turnover in the customer base.

- Attracting subscribers on a basis other than cost and then retaining them appears to present a very large challenge in the VAN market and one which has not yet been met with effective strategies on the part of existing vendors.

- INPUT believes that the potential for volatility and turnover in the VAN market is a condition not likely to improve in the foreseeable future. It is conceivable that turnover may increase as new firms enter the market.

- At the present state of market development price is the key competitive variable. If a new firm is able to price its VAN service on the incremental use of its existing network (as in the case of an RCS company), then such a firm should be able to price lower than some of the existing players.

  - Accordingly, subscribers and traffic will migrate to the new entry. Such an entry can do well until another participant achieves a lower cost of production, at which time traffic will migrate to that participant.

- Price competition of this type is destructive of both profit margins and service levels.

- Accordingly INPUT believes that potential entrants and recent entrants should consider carefully the benefits of competing in a commodity market. They should carefully assess their ability to compete in price-sensitive services if they do not already have a record of success in such markets.

- While price is the overwhelming factor in a potential decision to change from current VAN suppliers - constituting 46% of all responses, as shown in Exhibit IV-3 - certain other factors also enter in. These factors are all secondary to cost but many, in aggregation, form the basis for a strategy emphasizing service quality.

  - Fifteen percent of respondents mentioned that they would seek improved network availability in selecting an alternative to their current VAN supplier.

  - Nine percent mentioned that they would look for greater ease of access for users of the network. This response most frequently came from RCS vendors.

  - Nine percent indicated a desire for improved support on the part of the VAN supplier. This was typically cited by Financial and Industrial customers, not RCS vendors.

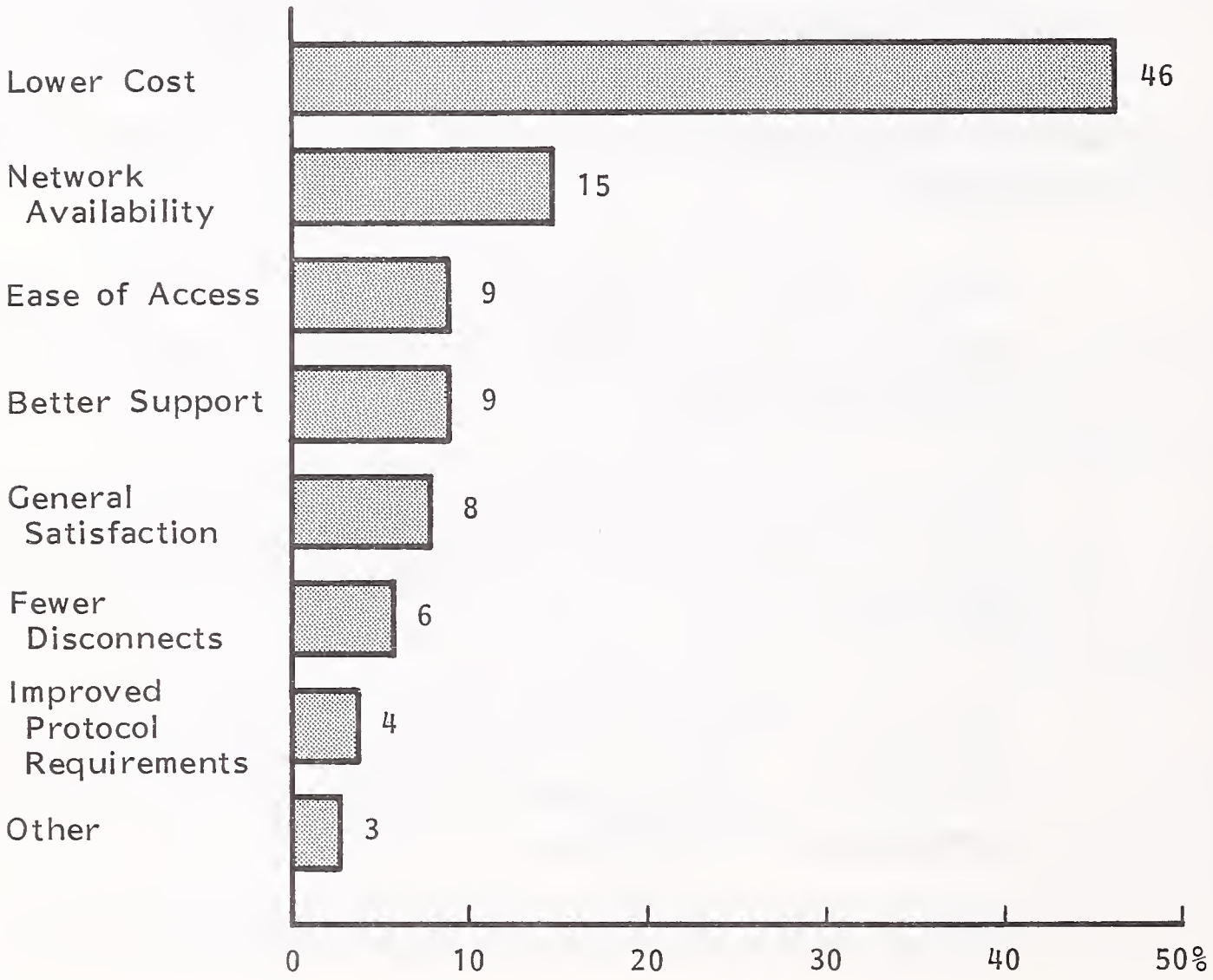
  - Eight percent sought to improve their general level of satisfaction.

  - Six percent specifically cited a need for fewer disconnects as a reason to change vendors or convert in-house.

  - Four percent had specific protocol requirements which were not successfully being met by the current vendor.

EXHIBIT IV-3

REASONS WOULD CHANGE FROM CURRENT VAN SERVICE
(Percent of All Mentions)



- Three percent had other concerns. Most typically, these involved network error rates or the quality of the billing from the VAN supplier.

- It is worth noting that cost has triple the frequency of mention of the next most important factor, network availability. For the second most important factors - ease of access and improved support - price is mentioned five times more often.

- Clearly, the market for VAN services is a difficult one in which to differentiate an offering. Only relatively small proportions of respondents are highly sensitive to factors other than price. When such sensitivity occurs it is almost invariably subordinate to economic considerations.

- Purely technical considerations such as protocols and error rates - the original raison d'etre for the VANs - are clearly not a factor in the decision to change vendors.

C. MARKET FORECAST

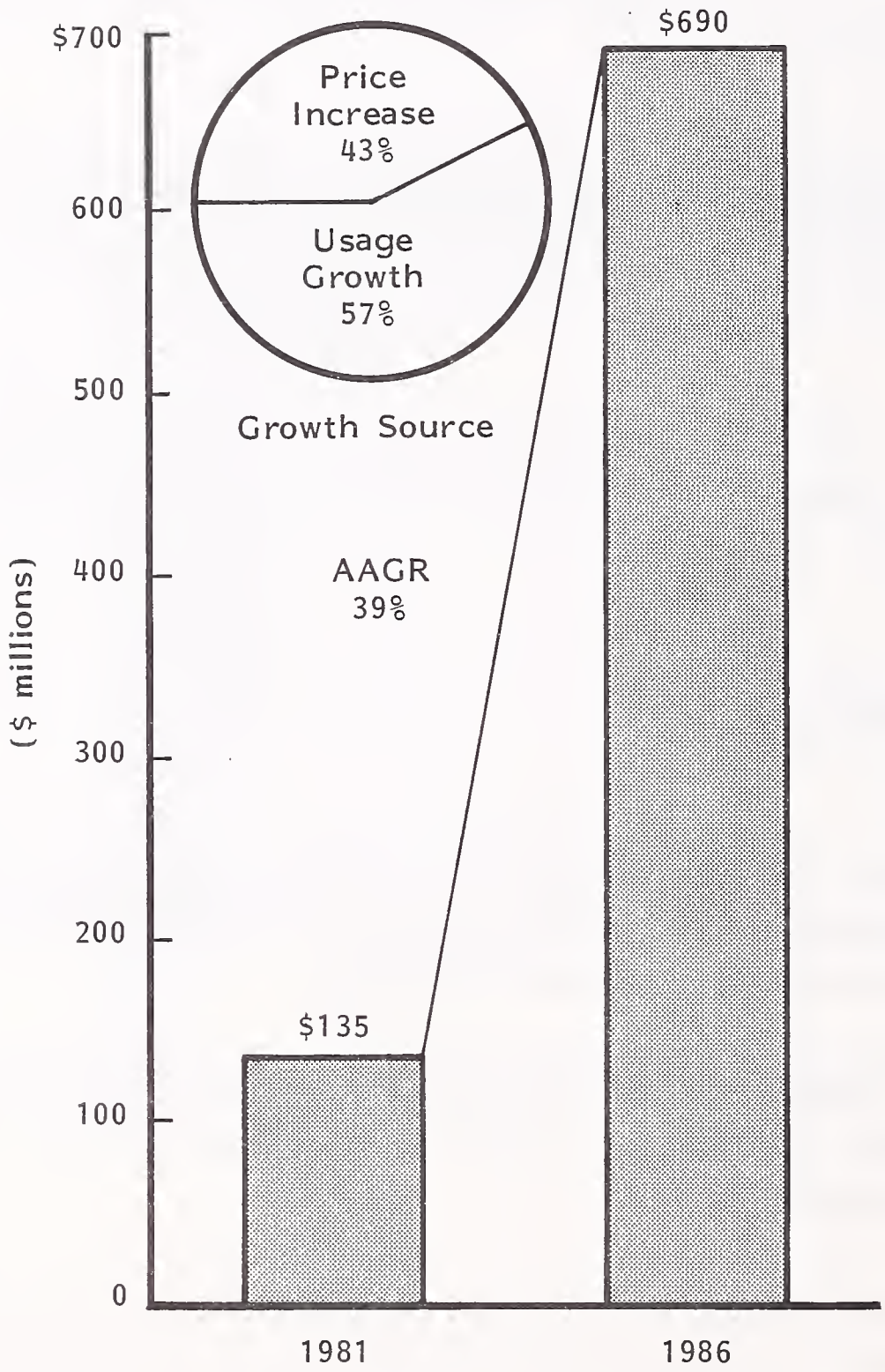
- Between 1981 and 1982 respondents reported a growth in VAN expenditures of approximately 42%. INPUT estimates the 1981 market size as $135 million and the 1982 market size as $190 million.

- The market will grow from its 1981 size to about $690 million by 1986. This equates to an Average Annual Growth Rate of 39% per year, as shown in Exhibit IV-4.

- A very important factor in the revenue growth of this market is price increases. In the period 1977 through 1982 the average annual rate of price increases in basic charges for connect and data transmission was about 17% per year for a major vendor.

EXHIBIT IV-4

COMBINED USAGE AND PRICE INCREASES
VAN REVENUE GROWTH,
1981-1986



- Should this trend continue, VAN connect time will exceed $9 per hour in high-density cities by 1987 while basic data transmission charges will exceed $.10 per thousand characters.

- These may be compared to current rates of approximately $4 per hour connect and $.05 per thousand data transmission for low volume users.

- Recently one major vendor raised both connect and transmission rates 25% over the prices in effect one year ago. Other changes to price schedules such as distinctions between high and low density cities have differential effects, depending upon usage.

- In fairness to the vendors it should be pointed out that during 1981 relevant Bell tariffs (those for the underlying services) rose at an annualized rate of 35% in some cases.

- The effects of price and usage growth from the 1981 base of $135 million are shown in Exhibit IV-5.

  - Were usage to remain constant, price increases alone would increase revenues to almost $300 million.

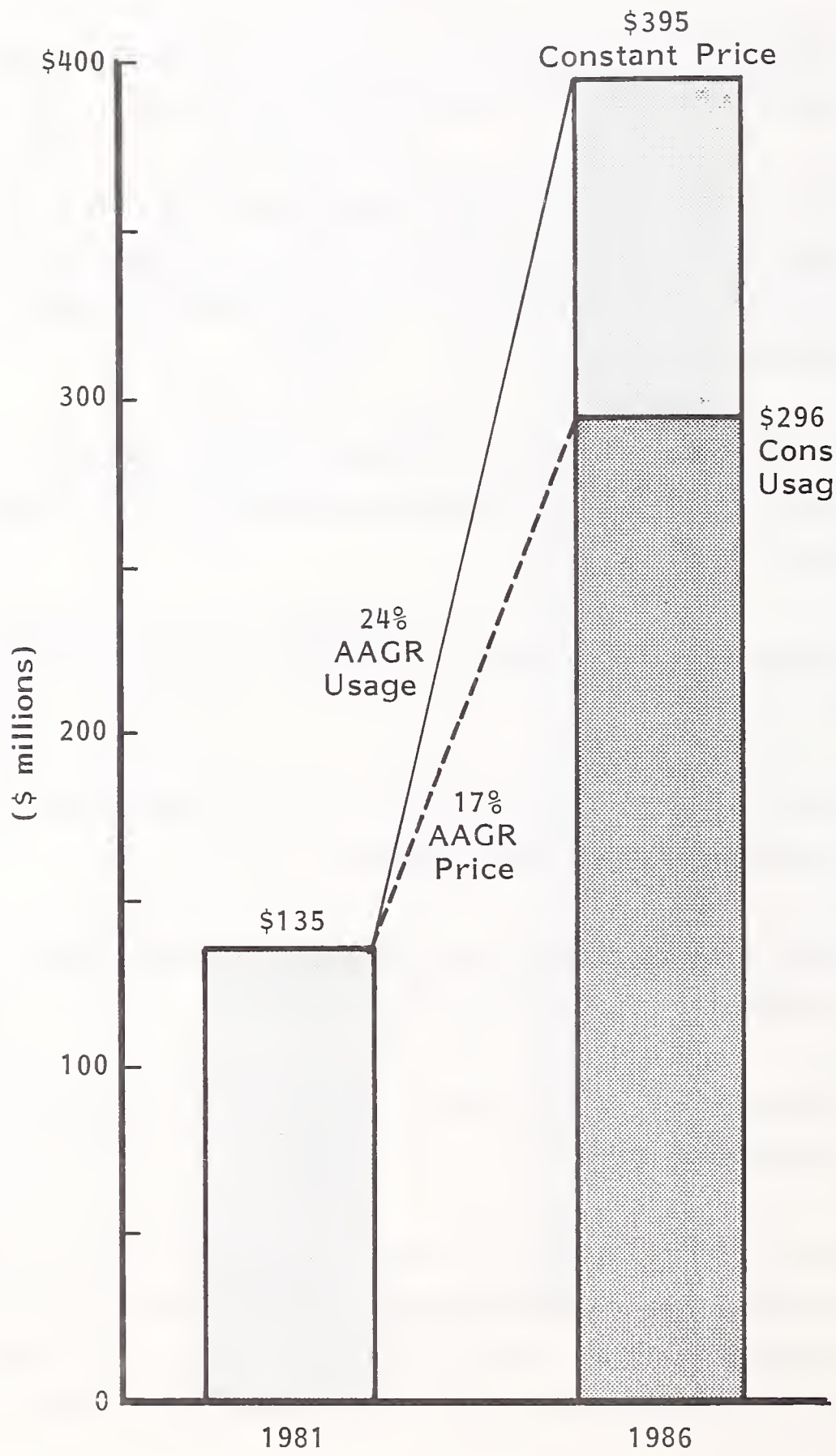
  - Were prices to remain constant, respondents' estimates of usage growth would raise revenues to almost $400 million.

  - The price and usage growth components are both impounded in the market forecast.

- If service prices continue to rise at such precipitous rates, INPUT expects that the protocol conversion functions and some error-checking capability will evolve in both terminals and modems by the end of the forecast period in response to high service prices. This technological change may serve to

EXHIBIT IV-5

USAGE-BASED REVENUE FORECAST IN CONSTANT 1981 DOLLARS
VERSUS HISTORICAL PRICE INCREASE GROWTH



dampen demand for VAN services, particularly among those with simple network requirements.

- The spread between the basic rates of the dominant carriers and new entrants for basic connect and transmission rates already exceeds 25%. INPUT believes that the increasingly competitive nature of the marketplace may dampen price increases to some extent if new entrants prove to be effective competitors. The effect of this will be to place the dominant carriers under increasing margin pressure.

- Alternatively, VAN suppliers may reduce service levels in an attempt to hold the line on costs and retain margins. Deteriorating service will have the effect of increasing the customer turnover among competitors without an incremental gain in the size of the market and will lead to increased sales expense as vendors "resell" customers converting from one service to another.

- Astute competitors will seek to package basic low-speed communications with other capabilities such as on-line data bases or will address the specific needs of discrete market segments such as personal computer users. Only by increasing the utility of the service provided will it be possible to escape the cost pressures which will be increasingly felt in the future.

D. FACTORS CONDITIONING FORECAST

- Certain factors play an important role in the growth of the market but are not forecastable by traditional methods. Key among these is the long-term trend in the prices vendors pay for underlying carrier services.

  - These prices will be heavily influenced in the future by the allocation of assets under the proposed court-ordered breakup of AT&T, by the present and future actions of state and Federal regulators, as well as

matters both currently before the courts and which may come before the courts in the future.

- If, for example, pricing of long-haul services stabilizes at a lower growth rate than has been historically experienced, the effect under the methodology employed will be to reduce the market size which is currently heavily influenced by prices for basic services.

- Alternatively, if basic services experience an even higher rate of increase than has historically been the case, users may seek alternative solutions to communications needs, thereby dampening market growth. Rapid price increases serve to precipitate the development of alternative technology.

- Transmission alternatives such as DTS (Digital Termination Services) are available to VAN carriers. Such technologies may be used to offset to some extent the rapid rise of basic service rates.

- This service type is not currently in use by any carrier, and there is little operational experience with it.

- Conceptually, however, it may serve to moderate price impacts upon VAN suppliers and their customers by reducing dependence upon traditional providers of basic services in both local-loop and long-haul environments. (ATV-based data transmission has a similar potential in the case of the local loop).

V USER CHARACTERISTICS

V USER CHARACTERISTICS

A. MARKET OVERVIEW AND SEGMENTATION

- Users of Value Added Networks may be conveniently divided into two groups:
  - The first group may be considered to be the RCS vendors which "distribute" their services on the VANs either exclusively or as a supplement to an existing in-house RCS network.
  - The second group constitutes industrial, financial, and other using firms which employ the VANs to distribute company applications.
  - These two groups have significantly different characteristics, needs, and growth rates.
- Growth rates for Industrial and Financial firms are substantially higher than for RCS firms. I&F respondents to INPUT's survey indicated a year-to-year expenditure increase of 46% while RCS respondents indicated an expenditure increase of approximately 14%. Analysis reveals the reasons for this apparent disparity.
- Slow growth in the RCS sector is essentially due to subscriber saturation, i.e., there are few RCS firms remaining which do not already use VAN services. As a result, VAN revenue growth approximates the rate of industry growth.

- Within the RCS user group there are substantial variations in growth rates among companies.

  - Small vendors of E-mail, database and personal computer-oriented services are growing extremely rapidly.

  - Conversely, large vendors are growing more slowly, and these are in the traditional RCS markets.

  - Removing the largest users (about 60% of VAN revenue studied) leaves the remaining vendors with VAN expenditure growth in the range of 34%.

- It is also likely that many RCS users have contractual arrangements with VAN suppliers which temporarily insulate them from the effects of large price increases. This serves to further depress the rate of revenue growth in the short term.

- In contrast, expenditures by I&F respondents rose 46% in 1982 compared to 1981. A major portion of this growth was due to the addition of new VAN customers.

  - Forty-seven percent of the revenue growth resulted from the addition of new subscribers.

  - Expressed another way, existing users experienced a 19% increase in expenditures in 1982 over 1981.

  - A significant number of these users felt that their increased expenditures were the result of price increases not usage increases.

- Approximately 27% of the respondents had been using VAN services for less than one year. Such subscribers were relatively small compared to longer-term users, accounting for about 15% of the revenue to VANs from Industrial and Financial users.

- It can be seen that the VAN market can be segmented into various user classes and is not monolithic, despite its relatively small current size.

B. NUMBER OF USER LOCATIONS

- A typical number of user locations for industrial and financial respondents is 25. The range is wide with four using locations reported as a minimum and 1,500 reported as a maximum. Fourteen percent of the respondents indicated that they used VAN services at 150 or more locations.

- Among RCS respondents, geographic spread was extremely wide with use reported in 150 or more VAN locations by the majority of users surveyed.

C. INTERNATIONAL TRAFFIC

- Among I&F users traffic across international boundaries accounted for about 9.6% of all data communications traffic.

- The growth rate for internationl traffic was judged to be slower than traffic growth in general by 52% of the respondents, about the same by 21%, and faster by 23%.

- Only a minor portion of this traffic moves on VANs. Sixty-two percent of the respondents with international traffic make no use of VAN services for it.

- Because of the extremely small quantities involved, it is not possible to accurately measure the VAN share of international traffic from Industrial and Financial users.

- It is, however, considerably less than domestic share and is probably in the range of 2% to 4% of internationl traffic for these users.

- Among RCS vendors international traffic accounts for 9% of all traffic among vendors surveyed.

- The growth rate for internationl traffic was judged to be slower by 35% of the respondents, about the same by 35% of the respondents and faster by 30% of the respondents.

  - Unlike Industrial and Financial respondents, RCS vendors were better able to calibrate the growth of international services with 60% able to estimate the rate of growth for this traffic.

  - Among those able to estimate, the mean growth rate was found to be 23.5% per year.

- Share of the international market for VANs among RCS firms is much higher than among industrial and financial companies with 53% of RCS firms surveyed using VANs for 100% of their international requirements.

- In summary, the data provided by respondents does not indicate that international use of VAN services (as presently offered) is a market of great opportunity at the present time, nor is it a very large market in comparison to domestic use.

- While internationl VAN services may not represent a ripe opportunity on a standalone basis, INPUT clients should consider the market in their planning

activities. Consideration is warranted because the absence of an international capability may be a "knock-off" in some competitive situations.

- Preliminary research by INPUT confirms the existence of a very substantial market for international communications when combined with applications software and processing services.

D. USER APPLICATIONS OF VAN SERVICES

- The actual applications for which the Value Added Networks are employed are a key factor in understanding the dynamics of the market.

  - Each respondent was asked to enumerate up to five key applications and then estimate the proportion of network expenditures for which each accounted.

  - As a result of this procedure it became possible to identify predominant applications and express these applications as a percentage of the total expenditures.

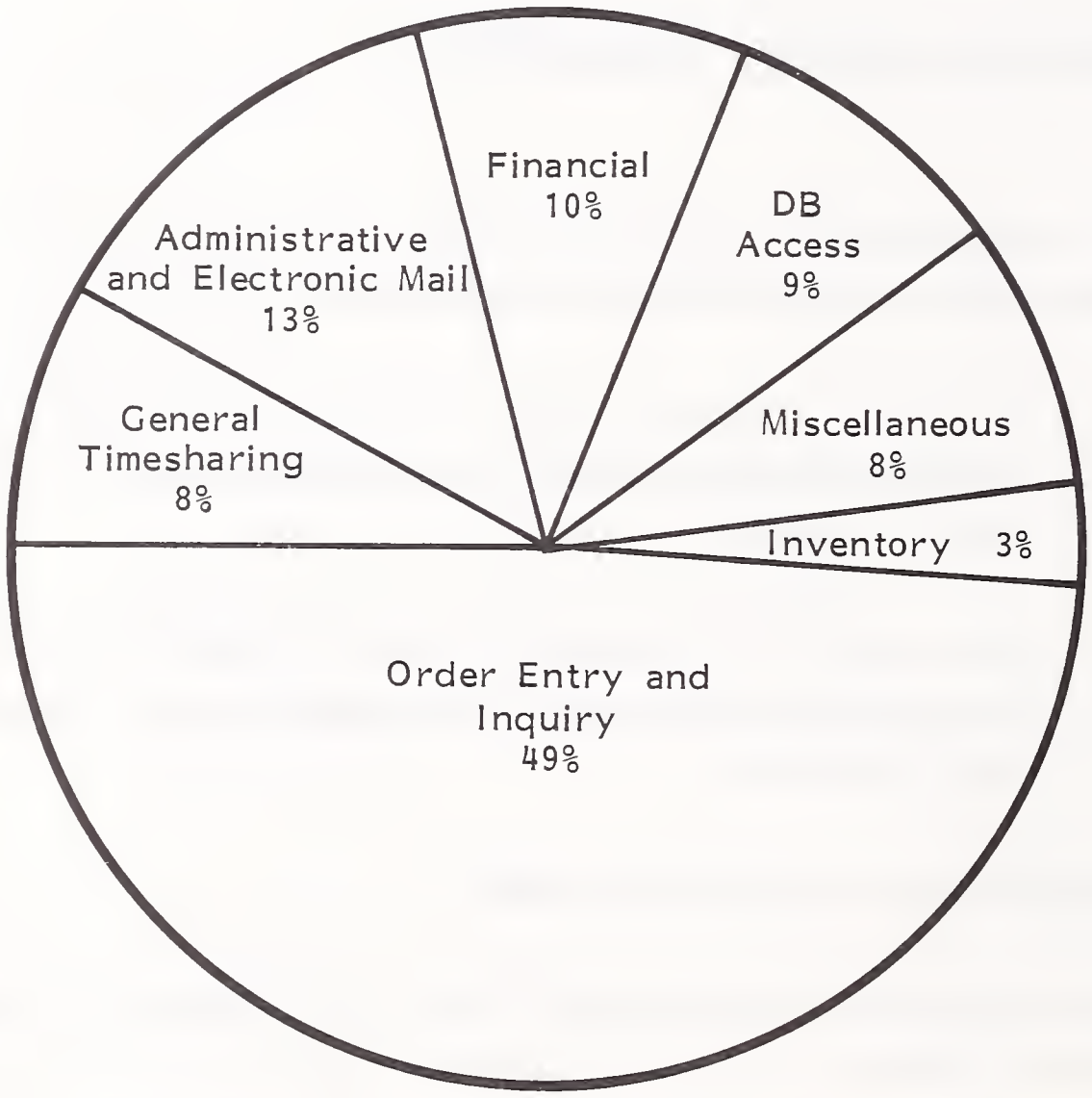
1. INDUSTRIAL AND FINANCIAL USERS

- On a revenue basis, approximately 75% of the expenditures of industrial and financial respondents could be classified by application. The remaining 25% represent the respondents' inability to classify expenditures by application. Exhibit V-1 shows the distribution of classifiable applications.

  - Clearly the largest single applications area is that related to order entry and order inquiry. These applications account for 49% of expenditures.

EXHIBIT V-1

EXPENDITURE DISTRIBUTION OF IDENTIFIABLE VAN APPLICATIONS FOR INDUSTRIAL AND FINANCIAL USERS



- In second place is administrative and electronic mail traffic. This class accounts for 13% of expenditures. This share indicates strong growth since E-mail service has only been formally available on the VANs since 1980.

- Financial reporting and data base inquiry (not order related) comprise two other approximately equal applications categories at 10% and 9% of total expenditures.

- Inventory reporting constitutes a small but discrete category equal to about 3% of expenditures.

- Separate from the miscellaneous applications falls general timesharing for the delivery TSO, and similar applications at 8%.

- The dominance of order-related functions is most pronounced and can easily be considered the premier VAN application at the present time. Excluding order inquiry, order entry represents approximately 30% of total expenditures for VANs among industrial and financial respondents to INPUT's survey.

2. RCS VAN USERS

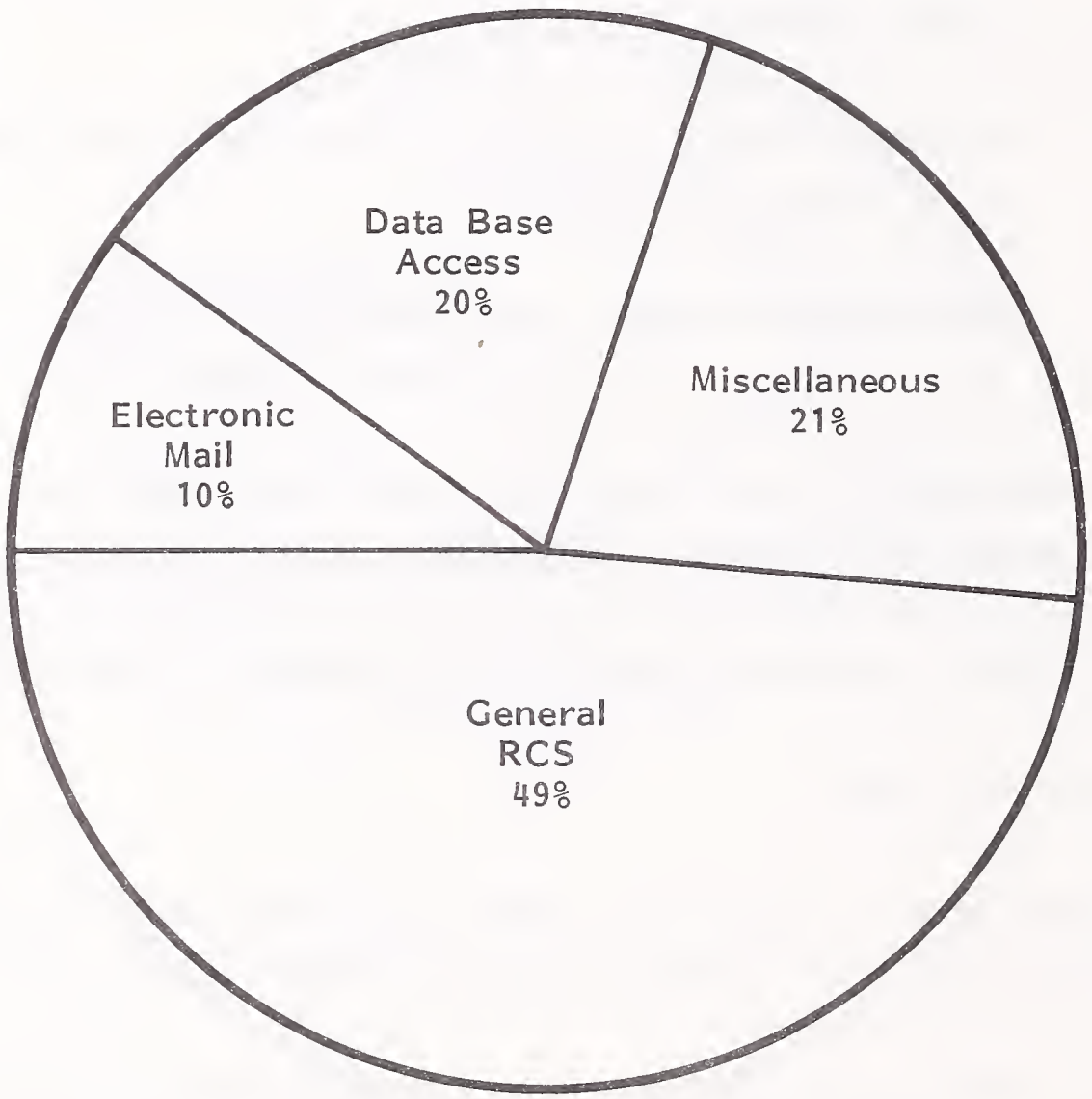
- As would be expected, RCS company applications differ substantially from those of Industrial and Financial users, as shown in Exhibit V-2.

- By far the single largest category is distribution of timesharing applications of the classical variety. These include engineering and scientific computation, program development, and financial analysis. Smaller RCS vendors use VANs as a surrogate for an in-house network while larger firms extend their geographic coverage via the nets.

- The predominance of general RCS usage - 49% of expendiutres - is a prime factor in the slower expected growth of the RCS market segment. Approxi-

EXHIBIT V-2

EXPENDITURE DISTRIBUTION OF IDENTIFIABLE VAN APPLICATIONS FOR RCS COMPANIES



mately 10% of this sector is accounted for by IBM based TSO utility timesharing.

- Respondents indicate rapid growth in the data base access sector with 20% of expenditures, and this application area could easily grow at 30% per year but from a relatively small base.

- "Resale" by other firms of VAN capacity in conjunction with electronic mail constitutes a rapidly growing sector. This is unusual in that the dominant VANs themselves offer E-mail services. A single firm currently dominates this small sector and is expecting to triple its volume on an annual basis. This sector accounts for 10% of classifiable expenditures.

- The miscellaneous category includes nonclassifiable applications (21% of expenditures) such as on-line payroll, internal use of VANs by RCS firms and a wide variety of small applications not conveniently classifiable.

E. USER SATISFACTION WITH VAN SERVICES

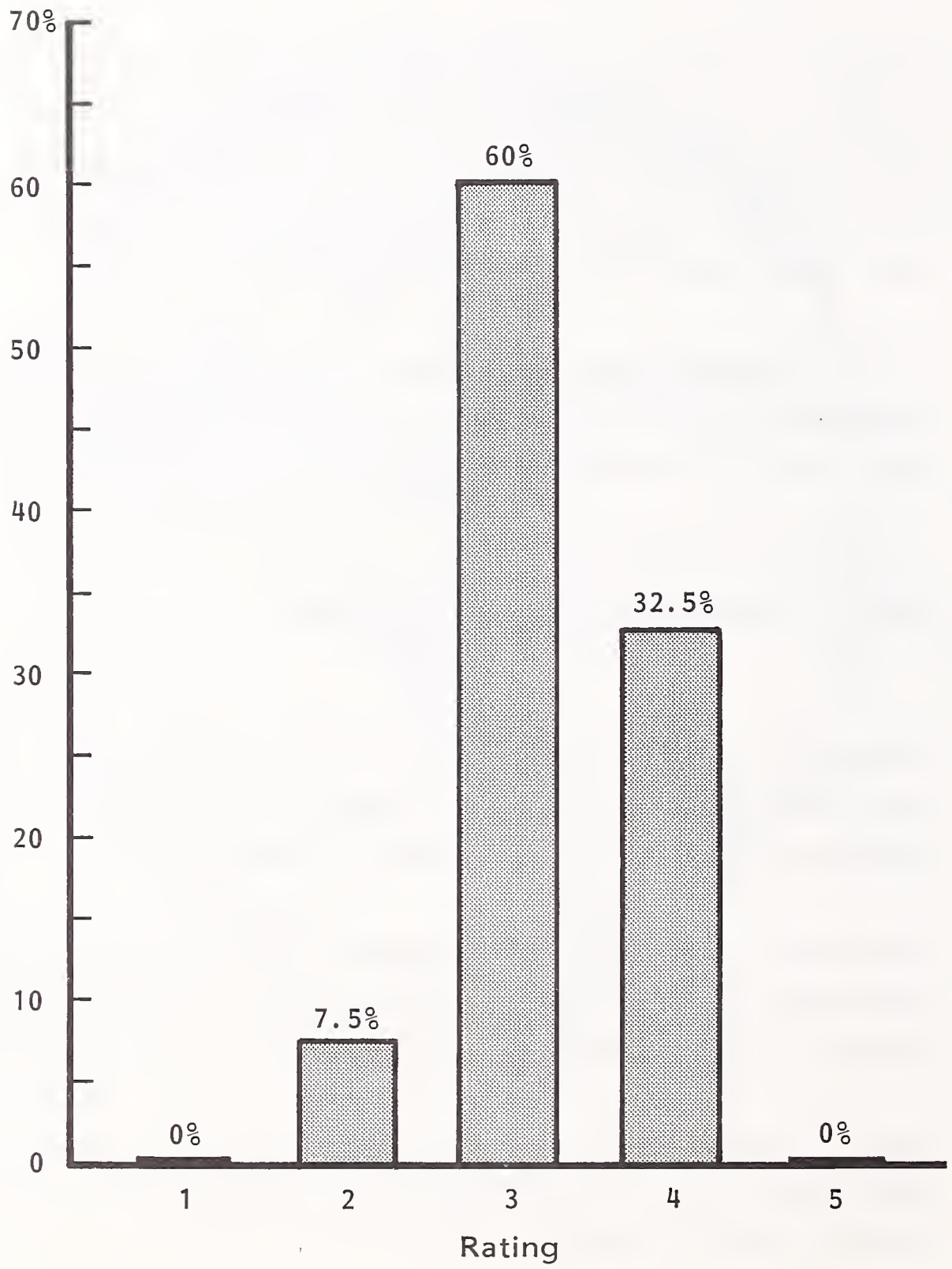
- Respondents to INPUT's survey were asked to rate their general satisfaction with VAN services on a one-to-five scale. On this scale one represents low satisfaction while five represents high satisfaction.

- The overall mean rating for satisfaction with VAN services was 3.25. In comparison to other product and service ratings in INPUT's research experience this is not a rating typically associated with excellent performance.

- Examining the distribution of the scores, as shown in Exhibit V-3, we see that 60% of the respondents were neither highly satisfied or highly dissatisfied and rated the VAN services as 3.

EXHIBIT V-3

DISTRIBUTION OF OVERALL SATISFACTION RATINGS
BY VAN USERS



- A rating of 4 was given by 32.5% of the rspondents while 7.5% rated overall VAN satisfaction as 2. No respondents rated service at the scalar extremes of 1 or 5. The total absence of polar responses - indicating great satisfaction or great dissatisfaction - is somewhat unusual.

- Looking beyond the aggregate mean, modest differences occur between the two major market segments and also between the primary vendors, Tymnet and Telenet, on the dimension of overall satisfaction. While not statistically significant (being within the 95% confidence interval for the means), they are noted because an examination of the score distributions indicates that they are persistent tendencies.

  - Basically, Tymnet appears to have a slight edge over Telenet in terms of general satisfaction, though the difference is not statistically significant for the sample size employed.

  - RCS firms have a tendency to be more satisfied with the VAN service of the two major carriers than Industrial and Financial users.

- These findings on users' satisfaction should be considered in light of the fact that 87.5% of all respondents were currently evaluating alternatives to their current supplier of VAN services, either in the form of switching VAN carriers or building/augmenting an in-house network.

- The available evidence does not suggest a high degree of user loyalty or a high degree of differentiation between major services. Among RCS respondents to INPUT's survey, only 33% elected to employ a single vendor exclusively. The balance of two-thirds employed two or more VAN vendors. More than one in five employed three or more vendors.

- The typical expenditure split in the two vendor cases was approximately 60% to the prime vendor and 40% to the secondary vendor, on average. Data available was not sufficient to compute a representative split for the three and four vendor cases.

- Vendor splitting was much less common in the Industrial and Financial segment. In this segment only 15% of the respondents employed two networks and none employed more than two. The primary response of interviewees in the segment was that they were evaluating the other dominant VAN and would switch for reduced costs.

F. MARKET PRICE DYNAMICS

- Given that VANs may now make "special" arrangements with customers, execute long-term contracts, and are free to provide various other pricing concessions, the possibility of competition on price - a "price war" - emerges.

- Such price competition could be seen as a method of enlarging market share. Many elements are already in place in such a scenario:

  - Users do not behave as though the VAN services are highly differentiated.

  - The price of the service is a paramount factor in user decision making.

  - Lower cost services - by as much as 30% - from secondary vendors are becoming available.

  - Rapid price increases have recently taken place.

- While INPUT does not specifically predict a market in which price competition of the "gas war" variety occurs, those firms considering entry into the market should consider the possibility of price-based competition occurring to a destructive degree in what is fundamentally a market for a communications commodity.

- It is obviously not in the interest of the two dominant VANs to start a price competition as current margins at present price and service levels are thin to nonexistent. Such price competition could, however, be precipitated by a new or recent entrant gaining sufficient market share to force further price concessions from the dominant vendors.

- If this type of competition occurs it will not necessarily be manifested by reductions in published "list" prices but by negotiations at the account level. The only visible sign of such activity will be reductions in the reported profitability of the major services or their failure to achieve profitability.

- Planners are cautioned to fully consider the implications of such hidden price competition in a commodity communications market and its impact upon capital requirements for entry, projected profitability, and pay-outs.

- A further hazard in commodity markets is predatory pricing by well-capitalized entrants. At the present time the market for VAN services is not of sufficient size - in INPUT's opinion - to warrant such tactics. If the market grows as expected or if it becomes strategically linked with access to a much larger market, then the possibility of predatory pricing by an entrant emerges.

- These risks are mentioned because they are not customary risks in markets in which user decisions are dominated by service, technology, or performance concerns. Our research indicates that the primary concern in the VAN market is price, and other factors are distinctly secondary. This is confirmed by conversations with vendors who concede the commodity nature of basic VAN low speed services.

G. USER RANKINGS OF SPECIFIC FACTORS IN VAN PERFORMANCE

- As a part of the survey instrument administered to VAN users, data was obtained on the performance of existing carriers on a number of variables. To enhance the utility of this data, respondents were asked to evaluate their primary vendor's performance on thirteen variables and to also indicate how important performance on that variable was to the respondent.

- By comparing the ratings of importance to the ratings of performance it is possible to develop an index of the relative satisfaction of the respondents. On a common sense basis, it is clear that good performance on an item of minor importance is "worth" less to a user than good performance on an item of major importance. The comparison of the two ratings is expressed as a percentage which has been termed the "Index of Fulfillment" or IOF.

- Prior to examination of the IOF scores it is useful to first review user importance ratings. These show that there are differences between the needs of I&F users as a group and RCS firms as a group. These may be summarized as follows when ranked in order of the larger market, I&F users:

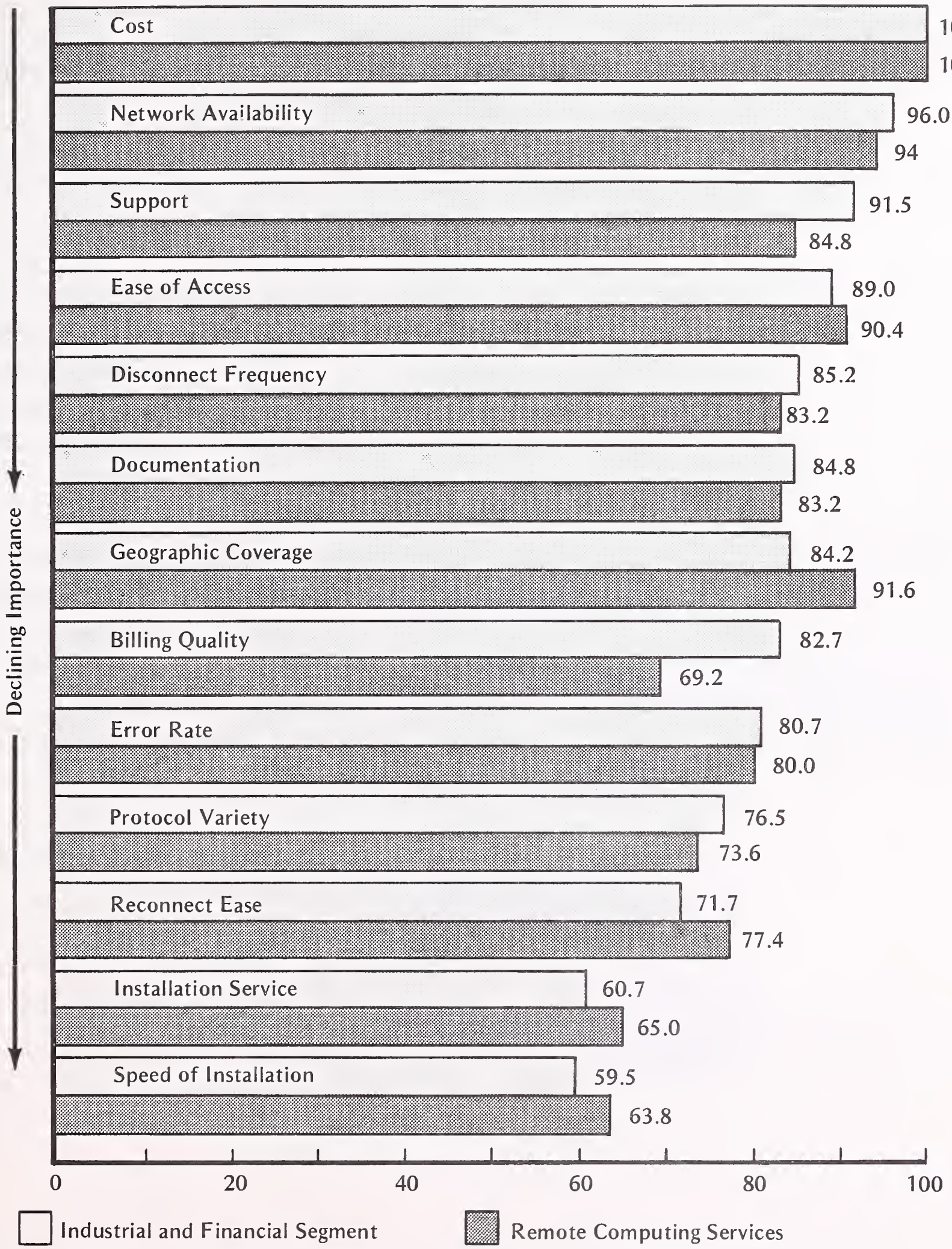
  - Cost is the most important factor for both groups with RCS firms weighting the factor slightly more heavily with a mean of 5.0 (on a one to five scale) compared to 4.81 for I&F users. These means are indexed at 100 in Exhibit V-4.

  - The second most important factor is reliability or network availability. There is little difference between the indexed ratings between groups on this factor.

  - The third factor is support from the VAN vendor. This is more important for I&F respondents than it is for RCS respondents. The factor is fifth most important for RCS companies.

EXHIBIT V-4

NETWORK FACTORS BY ORDER OF IMPORTANCE INDEX VALUES



- The fourth factor is ease of user access. There is no significant difference in the relative index values for the two segments.

- Fifth is disconnect frequency. This factor is of marginally larger importance to I&F respondents than RCS respondents.

- Sixth is documentation, given approximately equal weight by both groups.

- Seventh is geographic coverage. There is a marked difference in evaluation of this factor by the two groups. The RCS group places more importance on this factor. For RCS firms geographic coverage ranks third in importance. This places the factor ahead of ease of access, disconnect frequency and documentation in importance to RCS companies.

- Eighth is billing quality. Here there is also a divergence between the two segments. Billing quality is much more important to Industrial and Financial users than RCS users. Among RCS users it is the eleventh ranking factor.

- Ninth in importance is network error rate. This receives about the same index rating for both user groups.

- Tenth is protocol variety which is modestly more important to I&F respondents than to RCS respondents.

- The eleventh most important factor is ease of reconnection after a disconnect. This is less important to the I&F segment than it is to the RCS segment.

- Quality of installation service is the twelfth factor for both groups although it is somewhat more important to RCS users than I&F users.

- Thirteenth and last is the speed of installation in the rankings of both groups. It is also somewhat more important to RCS respondents than I&F respondents.

- The importance rankings deliver relatively clear messages to both existing participants in the VAN market and to potential participants:

  - Typical "technical" features such as protocol variety and network error rates are not very important to users.

  - Cost and network reliability are very important.

  - Support and ease of access could profitably be emphasized.

  - Geographic coverage is not very important to the larger group of users, Industrial and Financial firms.

- It appears that the "classical" advantages of VANs - protocol conversion, error rate reductions and geographic coverage - are now taken for granted and that other factors have risen to positions of prominence in the user importance hierarchy.

H. USER NEEDS ON AN INDEX OF FULFILLMENT

- While straightforward analysis of user needs indexed on importance is of value in an examination of the marketplace, further insights are available by a comparison of the importance scalar with a performance evaluation scalar.

- The data presented here is combined data for the two dominant vendors (Telenet and Tymnet). There are minor differences in the performance profiles of these two vendors, but these differences do not achieve statistical significance (.05) for the sample sizes employed.

- The overwhelming majority of respondents evaluated one of these two vendors as their primary vendor. The small number of other primary vendors found in this study were excluded from this analysis. Since Tymnet and Telenet are the prime vendors, maximum planning utility is obtained by focusing on their performance profiles and excluding the potentially "deviant" profiles of minor vendors.

- The Index of Fulfillment (IOF) scores are obtained by expressing the average scalar value of the respondent's rating of performance as a percentage of the respondents' rating of importance, as shown in Exhibit V-5. If the performance is equal to importance then the index value is 100. If the performance is in excess of importance then the index exceeds 100. If performance is less than importance then the index is less than 100. Values found ranged from 61.1 (IOF, cost) to 127.3 (IOF, installation speed).

- A low index of fulfillment indicates a potential competitive weakness which may be exploited by new entrants, given that the dominant vendors do not take steps to address the low IOF values.

- The following summarizes findings with regard to the Index of Fulfillment for Value Added Network Services:

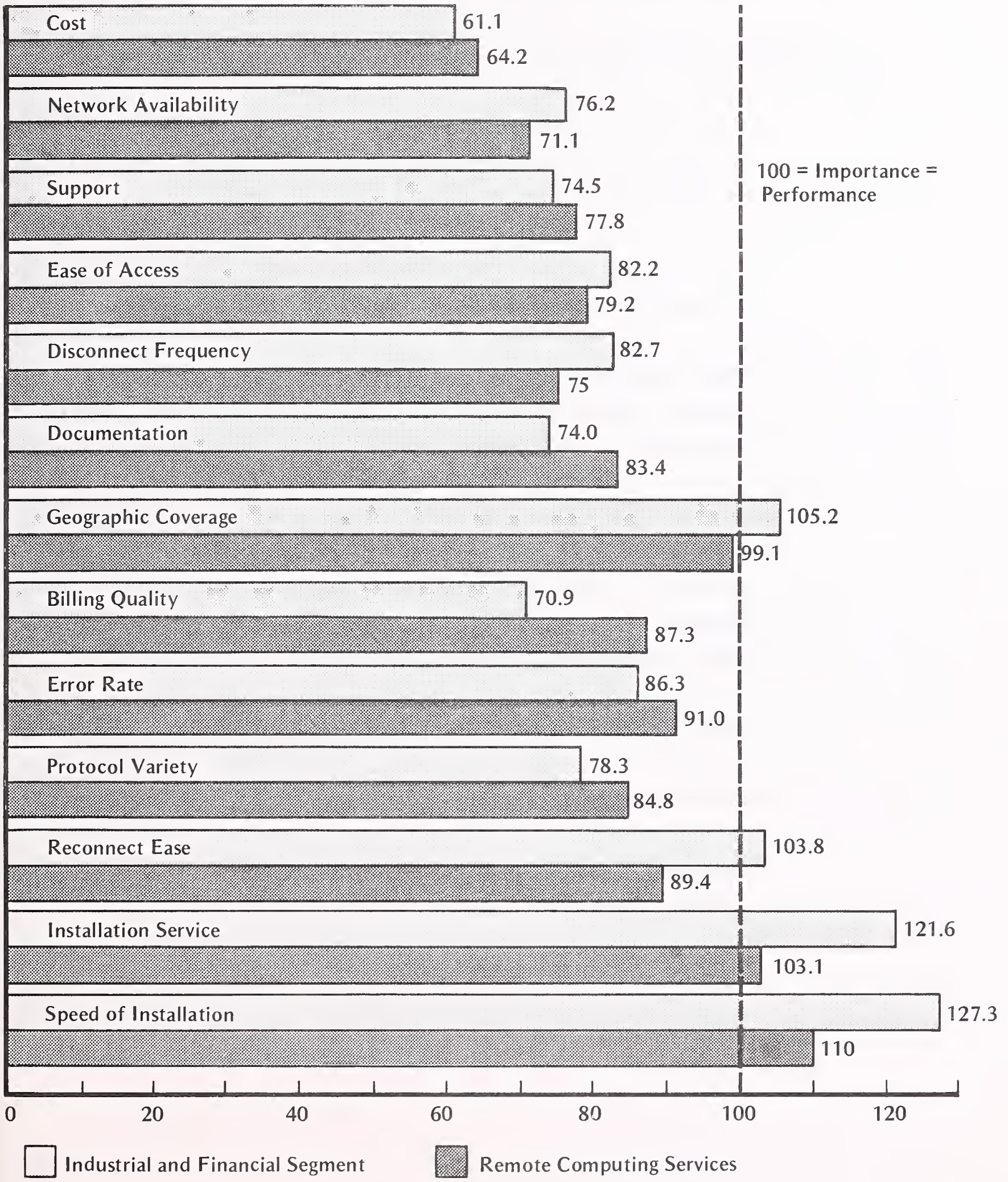
  - The overall values are reflective of and consistent with the moderate overall satisfaction scalar scores given by respondents.

  - Vendors are over-performing on two factors, performing at parity in another and under-performing (to users' expressed importance values) in the balance of the thirteen categories evaluated.

EXHIBIT V-5

INDEX OF FULFILLMENT

USER IMPORTANCE AND PERFORMANCE EVALUATIONS



- The wide variance in scores - over 2:1 in range - indicate that the categories chosen are meaningful to the respondents.

- Specific commentary on the Index of Fullfillment values is as follows:

  - Price of these services is the most important factor and also exhibits the highest deviation from the parity value. Both user segments rate price low on the index.

  - RCS users are somewhat more sensitive to and less approving of vendor performance on the network availability factor.

  - Support fullfillment scores are approximately equal for both groups. It should be remembered that I&F users indicated support was more important than RCS users.

  - Ease of access receives approximately equal indices from both groups.

  - Disconnect frequency performance achieves substantially higher ratings from the I&F group. This may be related to the tendency for I&F users to access VANs from fewer locations.

  - While the importance of documentation is judged about equal by both groups, the I&F is substantially lower for I&F users. Apparently there is an unmet need here.

  - Geographic coverage is at parity with respect to the importance/performance ratio.

  - Billing quality is of much greater importance to the Industrial and Financial segment than the RCS segment. Additionally and significantly, the I&F gap is large.

- Error rate values, while below parity, are somewhat different for the two groups. RCS users are marginally better satisfied.

- The unmet need for protocol variety is greater among I&F users than RCS users, but this factor was not high in importance among either group.

- With regard to ease of reconnection, I&F users are at parity while RCS users are well below. The spread between the two index values is large at greater than 14 points.

- Installation service and speed are at or in excess of parity for both groups. I&F users indicate that VANs are substantially over-performing while there is modest over-performance indicated by RCS users. In this regard, it is worth noting that the rapid and effective installation equates with revenue for the VANs and they are not, therefore, likely to reduce service levels even though this factor is not of great importance to subscribers.

- From a strategic standpoint, the ability to provide lower cost service is extremely important in this market. Speculatively, it is possible that the ability to prove prior to installation that lower cost service is available might be even more important.

- Other differentiating factors - visible prior to the sale - could include quality of documentation and quality of billing.

- Availability of the network and support appears to be of greater significance than documentation and billing quality but are more difficult to establish prior to the commencement of service.

- In general, it does not appear that there are large numbers of important factors sufficient to overcome the users' strong concern with the cost of VAN services.

VI RESPONDENT VIEWS OF THE FUTURE AND THEIR MARKETPLACE EFFECTS

VI RESPONDENT VIEWS OF THE FUTURE AND THEIR MARKETPLACE EFFECTS

A. RESONDENTS' VIEWS OF FUTURE COMMUNICATION COSTS

- In addition to querying respondents on their present practices and views, INPUT's survey of VAN users also sought to capture data on the respondents' perception of the future. A key inquiry area was the future cost expectations of communications services.

- Respondents were first queried about the general direction of communications costs over the next five years. One hundred percent of the respondents had a viewpoint on this topic which can be tabulated as follows:

  - 80.4% believe that communications costs will increase.

  - 8.7% believe that communications costs will remain about the same.

  - 10.9% believe that communications costs will decrease.

- Approximately 74% of all respondents were able to attach a numerical value to the forecast of communications cost direction.

- The mean expected increase among respondents forecasting rising costs was 45.3% over the five year horizon. This is equivalent to an average annual growth rate of 7.8% per year, a modest rate.

- The mean expected decrease among respondents forecasting falling costs was 27.5%. This is equivalent to a negative annual average growth rate of about 5% per year.

- Among the few respondents expecting reduced costs, there was no consensus as to the underlying cause. Competition, increased use of satellite and microwave channels, and declining equipment costs were cited by individual respondents.

- Among the vast majority forecasting increasing costs, there was consensus on a single causal factor. This factor was "deregulation" which was cited as the principal or primary factor by 48.6% of the respondents. Respondents apparently do not accept the conventional economic wisdom that deregulation breeds competition which reduces costs, or at least do not expect the effects to be felt within the five year period for which they were asked to estimate the direction and rate of changes. Deregulation was frequently cited as the principal factor by respondents expecting increases above the mean, with several respondents forecasting 100% increases in costs.

B. ACTIONS RESULTING FROM RESPONDENT COST FORECASTS

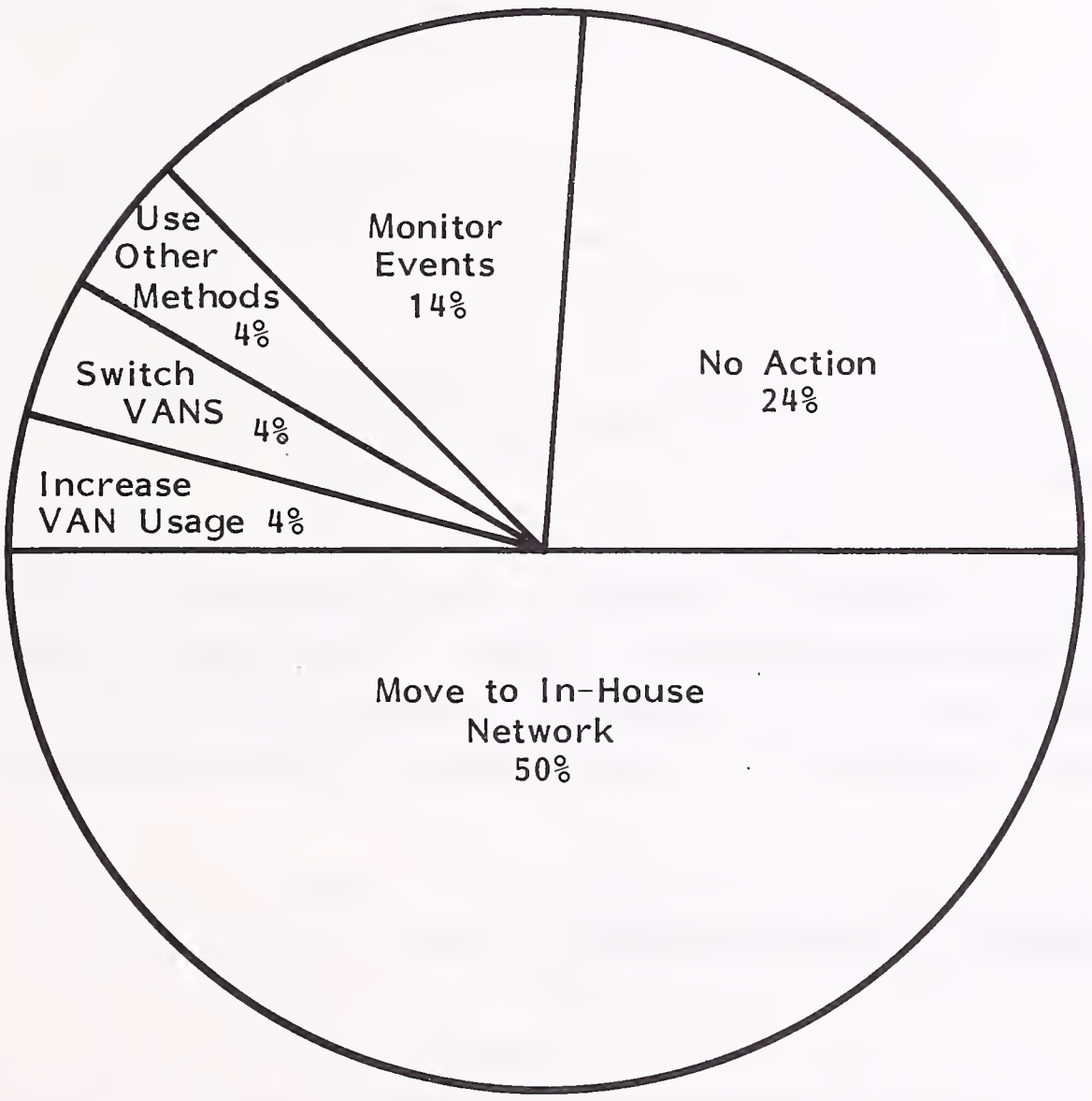
- In addition to determining the rate and direction of cost increases expected by respondents, these respondents were also queried on specific actions they might take as a result of their forecasts, as shown in Exhibit VI-1:

  - Fifty percent indicated that they would move to or increase their use of in-house networks under their currently held price scenario.

  - Twenty-four percent did not plan any change in action as a result of their forecast.

EXHIBIT VI-1

ACTIONS OF RESPONDENTS TO PRICE FORECASTS



- Fourteen percent indicated they would continue to monitor events before deciding on a course of action, if any.

- Four percent indicated they would increase their use of satellite and microwave systems in an attempt to control costs.

- Four percent indicated that they would switch Value Added Network suppliers as a result of expected price increases.

- Four percent also indicated they would increase their usage of VANs to control costs. This latter group indicated the increased use of E-mail to offset voice phone expenses.

- The respondents to INPUT's survey do not perceive VANs as a cost-cutting tool or as a "least cost" communications solution.

- The data also makes clear that respondents perceive in-house networks as a "final" communications cost solution. In this regard, it appears that the market for VAN services parallels the market for RCS services in which many users also believe that an in-house system is the final, lowest cost solution.

C. VENDOR STRATEGIC OPTIONS

- It is expected, therefore, that over the long term the VAN market will be characterized by relatively high turnover among subscribers along roughly the following lines:

  - At the entry level new subscribers will utilize VAN services to implement communications-based applications. There is ample room for such VAN utilization given the relatively low penetration rate of VAN services at present.

- As these applications grow - particularly on the dimension of traffic per location - users will respond by negotiating special pricing from VAN suppliers. As an interim solution, this will retain business at some cost to revenue and profitability of the suppliers.

- Negotiations may also serve to increase turnover of subscribers and subscriber swapping among competing vendors. Subscriber swapping may prove to be a more prevalent phenomenon in the VAN market than in the RCS market because of the greater fungibility of the service and the lack of a software "lock," which is common in RCS applications.

- At some point subscribers will then move the application in-house. Increased movement in-house in expected during the forecast period in the VAN market as it is in the RCS market.

- VAN suppliers have several strategic options in this scenario. The first of these - price negotiations - is already being exercised in the cases of extremely large clients. It is expected that this price flexibility will "trickle down" to smaller customers during the forecast period, roughly paralleling past events in the RCS market.

- The second strategic option includes increasing the value-added provided by the Value Added Networks. Functionally, this involves a redefinition of the strategic mission from the provision of protocol conversion, error checking, and low-speed data transmission to include more complex services which employ processing and data bases more extensively. The objective is to remove the service (or services) provided from the realm of commodity items. This option is also being exercised by major vendors. An excellent example of this approach is AMA/NET offered by Telenet.

  - AMA/NET is targeted at health professionals and offers four data bases including drug and disease data plus an E-Mail service.

- Data base usage is priced at $25-$27/hour, about triple the typical $8/hour INPUT estimates VANs receive from communications services.

- The third strategic option is to become the low-cost producer. Typically the low-cost producer is also the share leader in highly price-sensitive markets. Price negotiation is facilitated for low cost producers, while higher value-added services increase traffic and contribute cash for development or subsidization of basic service. INPUT expects that the present view of VAN services by their users will "guide" successful vendors into the adoption of this general approach to the market.

D. USER PLANS FOR NEW APPLICATIONS

- Another force shaping the market is user plans for new applications. This was probed in the INPUT user survey. Respondents were asked if they anticipated VAN usage during the forecast period for applications not available today. If they answered affirmatively, respondents were queried as to those applications which they believed to be most promising. In the aggregate, users responded as follows:

  - Sixty-three percent did not anticipate VAN usage for new applications during the forecast period.

  - Thirty-three percent expected to use VANs for new applications in the forecast period.

  - Four percent were unsure if new applications would be developed which would use VAN services.

- As in many areas, significant differences arose in the area of new applications intentions when respondents were segmented into the two groups, RCS vendors and Industrial and Financial firms, as shown in Exhibit VI-2.

- In general, RCS users were more than twice as likely to be expecting the development of new applications which would employ VAN services. Applications cited by RCS respondents included:

  - Electronic mail, apparently to be offered in competition with available VAN services.

  - Microprocessor-based applications in which the VAN would be used to access data bases.

  - Videotex and electronic banking services aimed at consumers.

- Nearly one-fourth of the RCS respondents would not disclose the nature of the applications they anticipated being developed for VAN delivery, citing competitive reasons. The resulting small base is not amenable to quantitative analysis.

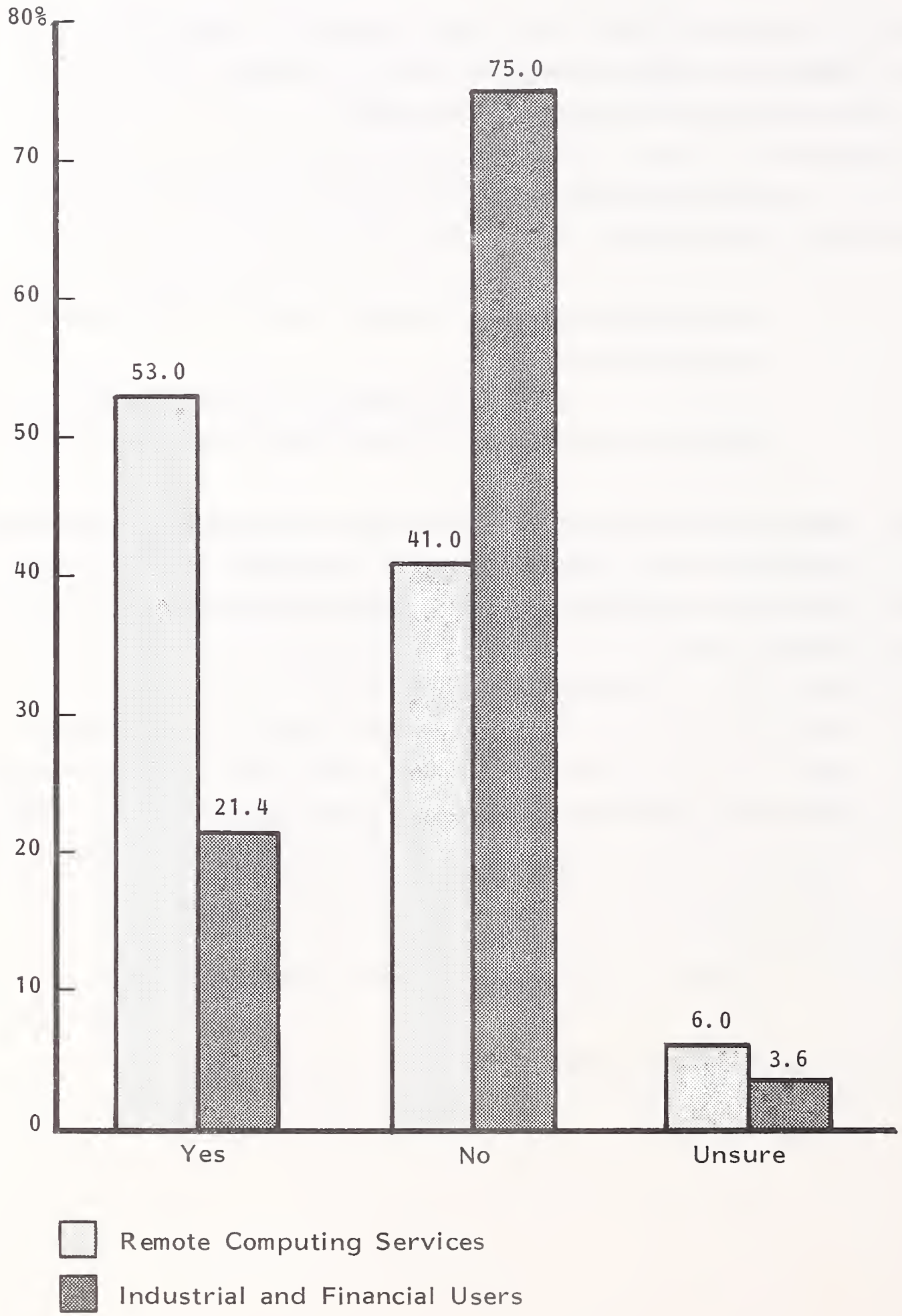
- Among Industrial and Financial users there was much less propensity to anticipate the development of applications utilizing VAN services. Approximately 21% of the respondents anticipated such developments while 75% did not expect such applications to be developed. Among the small group anticipating the development of new applications, the following were cited:

  - Electronic mail, usually to offset voice telephone costs.

  - Order entry systems.

EXHIBIT VI-2

PERCENT ANTICIPATING NEW APPLICATIONS
EMPLOYING VAN SERVICES



- Financial reporting.

- Data base access.

- It should be noted that the I&F anticipated applications do not constitute new classes of applications but instead represent adoption of traditional VAN applications by new users. This is contrasted with the RCS vendors who anticipate innovative applications involving microprocessor-based services.

- The absence of new technologies such as microprocessor and local area networks in the plans of industrial and finacial respndents is notable. Apparently these users do not expect to employ these innovative technologies to any great extent in conjunction with VAN service during the forecast period.

E. CONDITIONING FACTORS

- There are two external factors which should condition the application of the anticipation data as gathered. The first of these is the weak economic environment. Other INPUT studies indicate that in-house data processing is not currently in an expansionary phase due to controls placed by general management. I&F respondents may (or may not) revise their anticipated VAN use for new applications when strength in the economy increases.

- The second conditioning factor relates to the timing of this study and the increases in VAN charges which occurred immediately prior to it. These price increases have the effect of reducing the relative advantage of VANs versus other communications alternatives and may have influenced user perceptions of VAN utility. Future changes in prices among alternatives may cause utility perceptions to be revised again, perhaps in favor of VANs. The proximity of the price increases to the time of data gathering for this study may result in an amplification of users' negative reactions to the price increases. The

effect may be a temporary "depression" in user intentions to employ VANs which will lessen as users "forget" the price increases for VAN services. The data does, however, accurately reflect user perceptions at the time of this study.

VII USER ASSESSMENT OF TECHNOLOGICAL AND APPLICATIONS DEVELOPMENTS

VII USER ASSESSMENT OF TECHNOLOGICAL AND APPLICATIONS DEVELOPMENTS

A. DEVELOPMENTS COVERED

- As a part of the survey, respondents were asked to assess the importance of a selected portfolio of nine developments and their influence on the use of public networks.

- It was expected that respondents would vary not only in their assessments of importance but also in the degree of familiarity they possessed about each of the developments. A wide variation was found on both the familiarity and importance of dimensions.

- Respondents were asked to evaluate these developments:

  - Digital Termination Services (DTS).

  - CATV or Cable TV based data transmission.

  - Data transmission by FM or TV stations.

  - Local Area Networks.

  - Office automation.

- Personal computers.

- Electronic mail.

- Decision support systems.

- Items in the portfolio were presented with the above wording and the same order.

  - For each item the respondents were asked to first calibrate their familiarity with the development on a scale of one to five with five being "very familiar" and one being "unfamiliar."

  - They were then asked to estimate the importance of the development to their use of public networks where five is "very important" and one is "unimportant."

- The lowest average scalar rating was found to be familiarity with Digital Termination Services which had a mean score of 2.59 among RCS firm VAN users. The highest mean familiarity was found to be Familiarity with Electronic Mail, which received an average rating of 4.76 among RCS firm users.

- Among Industrial and Financial users the lowest familiarity was also with DTS, which achieved a mean rating of 2.97 among this group. The highest familiarity was with Local Area Networks, which scored 4.52 as a mean value.

- On importance to respondents the most important factor for both groups was Electronic Mail which achieved a rating of 4.0. The effect - as posited by respondents - would be to increase utilization of VAN services.

- In each group a second development was of equal importance to Electronic Mail and would be considered a positive for network utilization. For Industrial

and Financial users the second development was Office automation and for RCS users the development was Decision Support Systems.

- It was noted in examining the score distributions of familiarity for each group that approximately equal familiarity scores were obtained for both groups in many cases but that the rank order of the scores was different. To solve the interpretative problems posed by this phenomenon and to account appropriately the effects of familiarity and importance simultaneously, it was determined that the means of the familiarity and importance scores would be multiplied together. Combined scores so obtained for both groups of users were then indexed to the highest value. This process creates a rank-ordered and indexed presentation of the nine developments. This is referred to as "significance."

B. SIGNIFICANCE COMPARISONS FOR THE TWO SUBMARKETS

- As can be seen by examination of Exhibit VII-1, the two segments vary to a considerable degree in their assessment of the significance of the portfolio of developments presented.

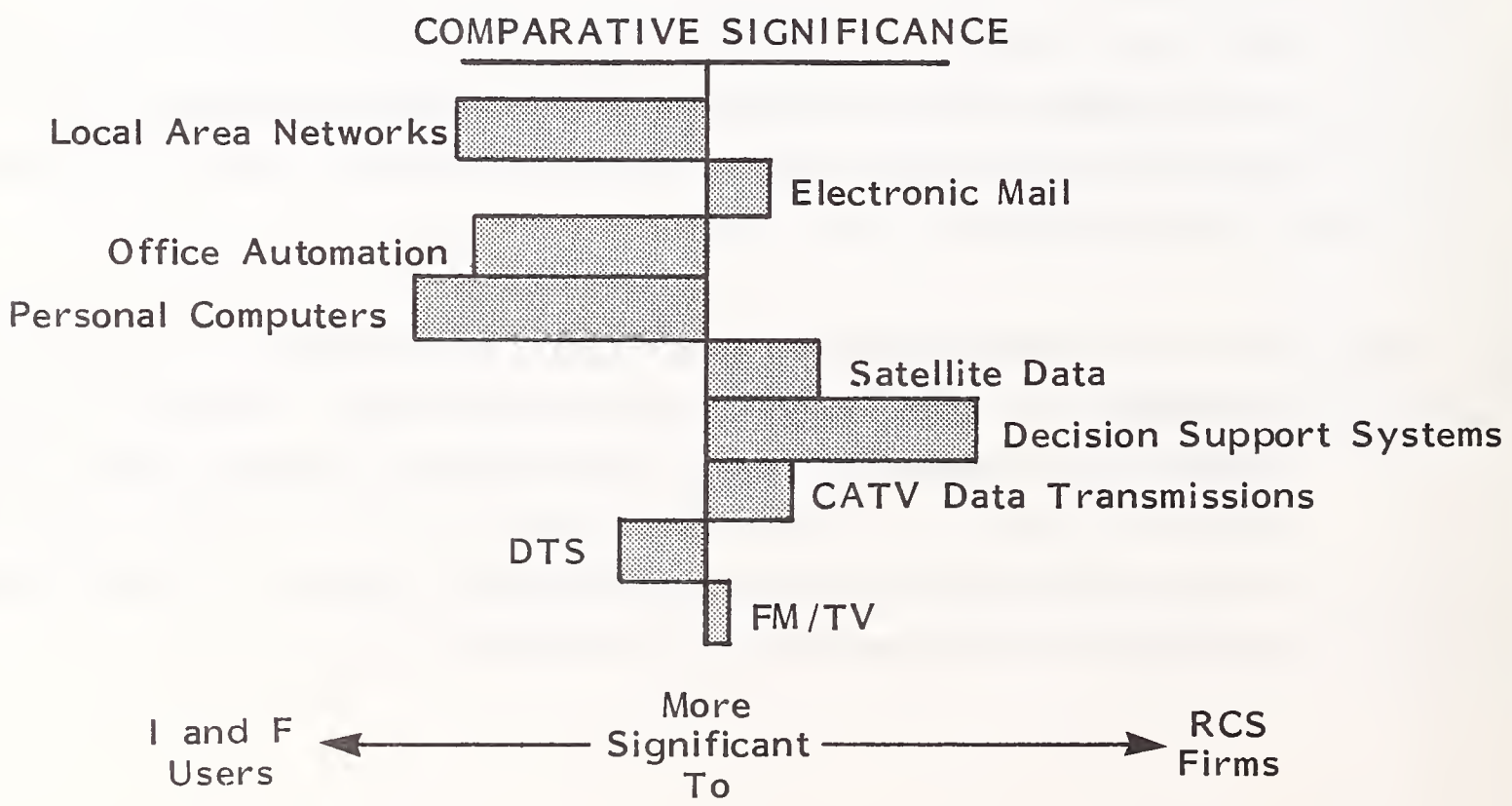
- The most significant to the I&F users - Local Area Networks - is fourth-ranking among RCS firm users. A VAN's ability to connect to LANs is of potentially great significance to I&F respondents but of much less importance to the other sector.

- There is a higher degree of congruence with respect to the significance of electronic mail, with both groups rating E-mail highly. A divergence in intent occurs here, however. RCS firms apparently plan to employ VANs to deliver their own E-mail services while I&F users employ VAN E-mail directly. Under current rate structures this means that the majority of E-mail revenues generated by RCS firms will remain with those firms.

EXHIBIT VII-1

SIGNIFICANCE RANKING OF DEVELOPMENTS

INDEX	INDUSTRIAL AND FINANCIAL	INDEX	REMOTE COMPUTING SERVICES
100	Local Area Networks	100	Electronic Mail
97.5	Electronic Mail	91.4	Decision Support Systems
93.9	Office Automation	90.0	Satellite Data
85.9	Personal Computers	89.9	Local Area Networks
85.7	Satellite Data	84.3	Office Automation
80.7	Decision Support Systems	75.3	Personal Computers
67.6	CATV Data Transmissions	71.2	CATV Data Transmissions
61.4	Digital Termination Services	57.8	Digital Termination Services
49.4	FM/TV Data Transmissions	50.3	FM/TV Data Transmissions



- The third ranking factor among I&F respondents in significance is developments in office automation. The effect of these developments should be positive for VAN traffic and revenue. As in the case of Local Area Networks, there may be technological hurdles to overcome in the interconnection of these devices with the networks.

- The fourth ranking factor among I&F respondents is personal computers. Dependent upon the nature of the application, this development could have either positive or negative effects on VAN traffic. To the extent that PC applications substitute for current utility timesharing, the traffic implications are negative. To the extent that PCs are employed to access corporate data bases, the effect is positive. INPUT hypothesizes that initially the effect will be negative and, over the longer term (end of forecast period), VANs will see an increase in traffic originating with PCs in I&F respondent environments.

- While well down the list (sixth rank) in terms of significance to RCS firms as a group, it is worth remembering that a few respondents indicated that they would be developing microprocessor-based applications utilizing VANs to access central data bases.

- Satellite data transmission occupies the fifth rank position among I&F respondents and the third rank among RCS respondents. The traffic implications of this transmission method are negative for VANs. A few respondents indicated that they were investigating satellite transmission as a lower cost alternative (in conjunction with an in-house network) to VAN data transmission.

- Decision support systems rank sixth among I&F resondents but second among RCS respondents in terms of significance. The traffic implications are positive in either instance. While this development ranks high among RCS firms, no firm admitted that it was developing a service which respondents classified as DSS. It is possible that some of the microprocessor-based system under development by RCS firms properly fit this category. Many of the RCS firms

interviewed supply data bases at the current time which might also fit into the DSS category.

C. ASSESSMENT OF ALTERNATIVE TRANSMISSION METHODS

- At the bottom of the significance ranks were the three new technological alternative data transmission methods. Significance rankings were in the same order for the three among both groups of respondents.

- At the seventh position was cable TV data transmission. As currently available (and this availability is limited to only a handful of markets) this is a local transmission alternative of an essentially intracity nature. Conceptually, cities might be linked via satellite transmission to provide a service essentially fungible with VANs. Based on the relative rank and low index scores, both groups of VAN users seem to implicitly forecast limited application of this service over the study horizon.

- It is worth noting with regard to CATV transmission that this method could conceptually become a local loop replacement for VANs. Strong upward pressure on local communications costs which is virtually certain to be experienced in the future could spur the use of this alternative by VAN suppliers. The result of such application would be a temporary relief of upward cost pressures. This is because the costs of communications alternatives rise along with the rates of the dominant carrier under what is funcationally a "price umbrella." Accordingly, a VAN selecting this method of local distribution would find that its percentage of revenues allocated to local communications costs would be reduced at the transition point but would thereafter be subject to similar, though possibly lagged, upward pressure.

- With the major VANs currently serving about 250 locations, the availability of CATV-based data transmission facilities in the majority of them during the

forecast period seems unlikely. The municipal basis for CATV franchises makes coverage likely to be spotty even in markets where the capability is present.

- Digital Termination Services constitute another nascent transmission method judged to be of low significance by respondents. Another local loop alternative which had its basis in Xerox's ill-fated XTEN proposal, DTS has the potential to be fungible with VANs for higher volume users.

- Tymnet, GTE, and United Communications all have positions in DTS with applications in various stages before the Federal Communications Commission. Should these services become operational as envisioned, they have the potential to reduce both local and long haul communications costs.

- A low-power cellular microwave system is employed for intracity communications with an effective radius of less than ten miles per installation. In concept, data from one location is moved via satellite to another location outside the operating radius of the originating station. At the second location (another city) a second low power cellular microwave system transmits the data locally to its destination.

- A full explication of the complexities of DTS, its potential markets, technologies, and regulatory aspects is beyond the scope of this report. In INPUT's view this market is unusually turbulent, even for a nascent technology. Among the "wild cards" are:

  - The application by Bell operating companies for DTS licenses.

  - Unsettled technology with the possibility of new entrants with superior transmission schemes.

  - The strong possibility that some firms who have applied for licenses are involved in spectrum speculation.

- Unknown final demand.

- A variety of legal and regulatory issues.

- It would appear that the respondents are well-justified in their assessment of the significance of DTS during the study timeframe.

- In ninth and last place is another "experimental" data transmission scheme which has had limited commercial use in the distribution of commodities data. It is fundamentally a one-way medium but has the advantage of being very low cost.

- Basically the method involves encoding data on the subcarriers of commercial FM and TV stations (audio transmission for TV is also frequency modulated). An inexpensive receiver at the user's site detects the signal and demodulates the subcarrier containing the data. This is an analog transmission scheme requiring a modem. The data can then be displayed on a CRT. Long-haul transmission is accomplished by satellite or land lines to the distribution point. Experiments have taken place with the transmission of programs as well as data employing this method.

D. SUMMARY COMMENT

- INPUT believes that the developments evaluated as to significance are of a longer term nature than those dealt with in early sections of this report. As such they have greater value in a strategic as opposed to a tactical context.

- Users of this report are directed to the distinct profiles in significance assessments of the two submarket groups.

- There appears to be a clear consensus on the high significance of E-mail to both groups.

- Thre appears to be a consensus on the low significance of alternative transmission technologies among both groups.

- In addressing the long-term market, planning emphasis should be placed on building capabilities in Local Area Networks, office automation, and personal computers to target the I&F VAN users.

- Over the longer term - perhaps by the close of the decade - there will be little to distinguish the present VANs from RCS companies. Based on the forces currently in operation, the distinctions between the two types of companies will become less and less visible. Regarding VANs, it is worth recollecting that their market segment was defined more by regulatory action than by forces in the marketplace.

- As VANs offer data bases while communications-based services such as Net 1000 offer processing, and as RCS companies "parse out" their networks as discrete services, the distinction between the various type of services will become largely historical. A large number of firms will provide a mix of communications, data base, and processing services.

APPENDIX A: INTERVIEW SUMMARY

APPENDIX A: INTERVIEW SUMMARY

- Respondents were randomly selected from a list of firms with revenues greater than $1 billion in calendar 1981. Firms using public network services distributed as follows:

SECTOR	Percent of Respondents
Discrete Manufacturing	33
Process Manufacturing	23
Retail	13
Financial Services	13
Transportation	10
Utilities	8
	100%

- RCS respondents were randomly selected from INPUT lists of such firms. The firms were distributed as follows:

SECTOR	Percent of Respondents
General RCS	45
Specialized RCS	35
Data Base Oriented RCS	20
	100%

APPENDIX B: DEFINITIONS

APPENDIX B: DEFINITIONS

COMPUTER SERVICES

- These are services provided by vendors which perform data processing (DP) functions using vendors' computers (processing services) or assist users to perform such functions on their own computers (software products and/or professional services).

- The following are definitions of the modes of service used in this report.

- Remote Computing Services (RCS) provide DP to a user by means of terminals at the user's site(s) connected by a data communications network to the vendor's central computer. Thre are five submodes of RCS:

  - Interactive (timesharing) is characterized by the interaction of the user with the system, primarily for problem-solving time-sharing but also for data entry and transaction processing: the user is on-line to the program/files.

  - Remote Batch is where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements.

- Data Base is characterized by the retrieval and processing of information from a vendor-maintained data base. The data base may be owned by the vendor or a third party.

- User Site Hardware Services (USHS). These offerings provided by RCS vendors place programmable hardware on the user's site (rather than the EDP center). USHS offers:

  - Access to a communications network.

  - Access through the network to the RCS vendor's larger computers.

  - Significant software as part of the service.

- Videotext is a variant of interactive RCS.

  - Access may be through cable television systems as well as ordinary telephone lines.

  - The display is a television set equipped with a keypad or typewriter keyboard and special circuitry.

  - The user may not create programs on the remote computer.

  - The user may query or enter transactions to the remote computer through menu-driven software.

  - Prestel and QUBE are examples of videotext.

- Batch Services include DP performed at vendors' sites of user programs and/or data which are physically transported (as opposed to electronic-

ally, by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and Computer Output Microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor's site where a terminal connected to a remote computer is used for the actual processing.

- Processing Services Facilities Management (FM). (Also referred to as "Resource Management" or "Systems Management.") The management of all or a significant part of a user's DP functions under a long-term contract (not less than one year). To qualify as processing services FM, the contractor must directly plan and control as well as operate its own computers/communications network, including providing computers at the client's site, to deliver the service. Simply providing resources, even though under a long-term contract, and/or providing for all of a user's processing needs, does not necessarily qualify as FM.

TYPES OF PROCESSING SERVICES

- Processing services encompass processing services (FM, RCS, and batch services). They are categorized by type of services bought by users as follows:

  - Function-Specific services are the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but cut across industry lines. Most general ledger, accounts receivable, payroll and personnel applications fall into this category. General purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included in this category. However, when the application or tool is designed for specific industry usage, then the service is industry-specific.

- Industry-Specific services provide processing for particular functions or problems unique to an industry or industry group. The software is provided by the vendor either as a complete package or as an applications "tool" which the user employs to produce a unique solution. Specialty applications can be either business or scientific in orientation; data base services, where the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry specialty applications are: seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

- Utility services are those where the vendor provides access to a computer and/or communications network with basic software that enables any user to develop its own problem solution or processing system. These basic tools include terminal-handling software, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

USE OF PROCESSING SERVICES

- Processing can be categorized by use as follows:

  - Transaction Processing indicates those services where the primary or predominant purpose of the application is to process transactions, usually in a highly repetitive fashion. Most business accounting fits into this category. Payroll, accounts receivable, order entry, portfolio accounting, and inventory control are all good examples of transaction processing.

- Information Analysis services are processing services where the primary or predominant purpose of the application is to convert data into information through the use of mathematical, statistical, or financial analysis tools that readily and easily display the results in report or graphical form. The tools may be rapidly adapted to address a variety of nonrepetitive problems. These tools are often in the areas of financial analysis, marketing, planning, and statistical analysis. Many of the techniques incorporated have their origins in scientific and engineering applications, which also generally fall within this category.

- User Data Base Management services are processing services where the primary or predominant purpose of the application is to organize and maintain a data base of user information in a manner that facilitates its rapid and efficient retrieval and display according to user-defined parameters, either in ad hoc or fixed form.

- Vendor Data Base services are processing services where the primary or predominant purpose of the application is to retrieve and/or process data supplied by the vendor who controls access to it (although it may be owned by a third party). There are two modes of delivery of this service:

  . Inquiry data base services provide a means of selection and retrieval of data only. They neither provide, nor usually allow, for the subsequent processing of the data. Stock market statistics, news services, and bibliographic data bases are commonly offered in this mode.

  . Application Processing services in addition to providing a means of selection and retrieval, also provide a means of further processing the data into information through the full use of information analysis tools and data base management systems which permit the merging of vendor data with user data. Demo-

graphic, marketing, and financial and economic data bases are commonly offered in this mode.

COMMUNICATIONS

- The following definitions apply to general communications terminology which is employed in this report.

  - Broadband. A general term used to describe bandwidth greater than a voice grade channel (4kHz).

  - Circuit-Switched Network. The source and destination are connected by a communications path that is established at the beginning of the transmission and broken at the end.

  - Concentration. Concentration refers to sharing schemes in which a number of input channels dynamically share a small number of output channels on a demand basis.

  - DDS (Dataphone Digital Service). A fully digital communications service offered by AT&T since 1974 as a private line, interstate data transmission offering.

  - DTS (Digital Termination System). A class of microwave-based systems intended as alternative to conventional wired local communications methods. Transmission speeds up to 1.544 Megabits per second are possible. Conceived as a technological alternative to wire line local loops which have a maximum practical throughput of 9600 bits per second. First proposed as Xerox's XTEN network.

- LAN (Local Area Network). A network which interconnects multiple terminals, computers, and storage devices which are physically separated but in relatively close proximity and typically with common ownership of the devices and the network. There are numerous technological approaches to the design of these networks.

- MTS (Message Toll Switched). The conventional "long distance" telephone communications method.

- Multidropping. A single line connects a remote station to the computer. The line may be either switched or nonswitched.

- Multiplexing. The transmission of a number of different messages simultaneously over a single circuit. This may be done by either dividing the frequency of the circuit (Frequency Division Multiplexing - FDM) or allocating specific slots of time to low-speed devices (Time Division Multiplexing - TDM).

- Packet-Switched Network. A packet-switched network maintains high average utilization of transmission facilities by: (1) combining the traffic of many users, (2) using network lines in both directions simultaneously, and (3) balancing the asymmetric traffic of many users.

- PL (Private Line). A full-period, analog, point-to-point communications channel which typically accommodates data transmission at rates up to 9,600 bits per second. "Wideband" channels of up to 56,000 bits per second are also available.

- Point-To-Point. A single line connects a remote station to the computer; the line may be either switched or nonswitched.

- Private Network. A communications network operated by the customer.

- Protocol. Protocols are required for bit synchronization so that the receiver knows when a bit starts and ends so that it can be sampled; for character synchronization so that the receiver can determine which bits belong to a character; and for message synchronization so that the receiver can recognize the special character sequences which delineate messages.

- Public Network. Any network which provides service to many customers.

- Value Added Network. A value added network (VAN) typically uses common carrier network transmission facilities and augments these facilities with computerized switching. These networks have become associated with packet-switching technology because the public VANs which have received the most attention (Telenet and TYMNET) employ packet-switching techniques. However, other added service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are also important.

APPENDIX C: QUESTIONNAIRE

MARKET OPPORTUNITIES IN NETWORK SERVICES
USER QUESTIONNAIRE

1. We'd like to begin by asking you which of the public networks you are currently using? (Multiple Okay)

a. ( ) Telenet
b. ( ) Tymnet
c. ( ) Uninet
d. ( ) Graphnet
e. ( ) ADP Autonet
f. ( ) GE Net
g. ( ) Other (specify)_____

1a. If multiple to 1., then: Which of these accounts for the largest share of your expenditures? Second largest? Third largest, etc.?

a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. _____

1b. If 1a. then: What is the percentage of total public network expenditures accounted for by your primary network? _____%

1c. By your secondary network? _____%

1d. By your third network? _____%

1e. If 1b, 1c, 1d do not equal 100%, probe: Why is it that the percentages for your public network expenditures don't total to 100%? Are we missing something?

_____
_____
_____

1f. Of your <u>total</u> data communications and message expenditures what portion is spent on public networks?

_____%

2. Thank you. Now thinking about your network usage -- and let's talk about your primary network -- we would like to know a little basic information about usage. In a typical recent month what is:

2a. Number of locations from which the network is used? _____

2b. Number of connect hours? _____

2c. Number of characters transmitted? _____

2d. Number of ports in use? _____

2e. Number of sessions? _____

3. I see. What proportion of your transmission is at the following speeds?

a. _____% 110
b. _____% 300
c. _____% 1200
d. _____% 9600
e. _____% 56 KB
f. _____% Other (Specify)_____

_____

3a. What is the make and model of the in-house system or systems to which the network connects?

_____

_____

4. What are your total monthly expenditures for services from your primary vendor?

$_____ per month

5. Thinking back to a year ago, how have these expenditures changed?

( ) Up
( ) Down
Percent Change _____
( ) Same

6. What is the principal reason for this change?

_____
_____
_____
_____

7. What percentage of these expenditures are for connect time? _____%

8. What percentage of these expenditures are for transmission charges? _____%

9. What percentage of these expenditures are for equipment provided by the network vendor such as nodes or concentrators? _____%

10. If 7, 8, 9 do not equal 100%, then: I noticed that these percentages don't add up to 100%. Are we missing some expenditure category? If so, what is it?

_____
_____
_____

11. Thank you. Now we would like to move on to a related area. What are your five largest applications for which you use this network and what percentage of your monthly expenditures do they account for?

	APPLICATION	PERCENT EXPENDITURE	PERCENT GROWTH '81/'82
1.			
2.			
3.			
4.			
5.			

11a. If respondent mentions fewer than five applications, probe. If truly less than five, check here ( )

11b. Thinking about the growth rates for these applications, how much did _____ grow between last year this time and now? (Repeat each application in question #11.)

12. Thinking now about your future use of public networks, how do you think that your usage will change in five years, that is in 1987? Will it:

( ) Increase
( ) Decrease
( ) Disappear
( ) Remain same

12a. For change: By what percent do you think your monthly expenditures will change? _____%

13. Why is that?

_____

_____

_____

14. Considering future applications, what do you expect will be your most important applications in 1987?

_____

_____

_____

14a. What percentage of expenditures will this application account for?
_____%

( ) Don't Know
( ) N/A

14b. What will be your second most important application?

_____

_____

_____

14c. And what percent of expenditures will it account for?

_____%

( ) Don't Know
( ) N/A

14d. Do you anticipate any usage for applications not available today?

( ) YES ( ) NO ( ) Don't Know

14e. If YES, then: What do you consider to be some of the most promising future applications?

_____

_____

_____

14f. What percentage of your companys public network expenditures will these applications represent in 1987? Of course, we realize that this is only an estimate.

_____%

( ) Don't Know
( ) N/A

15. Thinking once again about the present status of public networks, we would like to get your opinion of the importance of certain factors and your assessment of how well your primary vendor accomplishes the task.

15a. On a scale of one to five, we would like you to rate the importance of Geographic Coverage. Five is very important, One is unimportant. What rating would you give the importance of Geographic Coverage?

1 2 3 4 5

15b. Thank you. And how would you rate your primary network vendor's performance on Geographic Coverage?

1 2 3 4 5

16. Just as a double check, which vendor are you rating?

_____

17. Now here are a few other factors which we would like your opinion and rating on importance and performance.

Category	1-5 Importance	1-5 Performance	Change for
a. Ease of end-user access	_____	_____	_____
b. Network availability	_____	_____	_____
c. Disconnect frequency	_____	_____	_____
d. Ease of reconnection after a disconnect	_____	_____	_____
e. Trasmission error rate	_____	_____	_____
f. Variety of available protocols	_____	_____	_____
g. Vendor response to installation requests	_____	_____	_____
h. Rapidity of installation	_____	_____	_____
i. Vendor support	_____	_____	_____
j. Vendor documentation	_____	_____	_____
k. Vendor billing procedures and detail	_____	_____	_____
l. Cost effectiveness of vendor	_____	_____	_____
m. General satisfaction with vendor	_____	_____	_____

18. Are there any other factors of great importance which we missed, in your opinion?

_____

_____

_____

19. Now, would any of the factors we have discussed influence strongly a decision to change primary network vendors?

( ) YES ( ) NO
( ) Don't Know ( ) N/A

20. Which ones are particularly important? (Check in "Change For" in #17).

( ) Don't Know ( ) N/A

21. Are you currently evaluating alternative network solutions?

( ) YES ( ) NO
( ) Don't Know ( ) N/A

21a. If YES, then: What method or methods are your evaluating?

( ) Alternative public network (Name _____)
( ) Convert to in-house net.
( ) Other (specify) _____

21b. If 21a, then: What benefits do you hope to obtain? Probe.

_____

_____

_____

21c. If NO, then: Do you expect to be involved in such an evaluation in the next year?

( ) YES ( ) NO
( ) Don't Know ( ) N/A

21d. If YES to 21c. then: What benefits do you hope to obtain? Probe.

If NO to 21c., then: Can you see any factors or developments in the next couple years which might alter your decision? Probe.

22. Thank you, that's very helpful. Now we have just a few more questions of general nature. Your responses have been very helpful. Now...

What do you think are the three most important factors affecting your use of public networks in the future?

23. Are any of your current needs unmet by present public network offerings but which you believe could be met by any of these vendors?

_____

_____

_____

24. Can you anticipate any needs which you will have in the next five years which are presently unmet by public networks?

_____

_____

_____

25. Thank you. In closing, we would like to ask your viewpoint on the importance of some future developments as they affect public networks. We will first ask you to indicate how familiar you are with the development and then ask whether it will affect your use of public networks.

25a. On a scale of one to five would you say that you are Very Familiar (5), or Unfamiliar (1) with:

Digital Termination Services (DTS)

1 2 3 4 5

25b. How important do you think DTS will be in the future of public networks?

1 2 3 4 5 Don't Know

Now here are a few other concepts we would like you to rate. First rate how familiar you are with them and then how important you think they will be.

		KNOWLEDGE	IMPORTANCE	DON'T KNOW
25c.	CATV or cable TV-based data transmission	_____	_____	_____
25d.	Satellite-based data transmission	_____	_____	_____
25e.	Data transmission by FM or TV stations	_____	_____	_____
25f.	Local area network	_____	_____	_____
25g.	Office automation	_____	_____	_____
25h.	Personal computers	_____	_____	_____
25i.	Electronic Mail	_____	_____	_____
25j.	Decision support systems	_____	_____	_____

NOTE: If respondent rates 4 or 5 on IMPORTANCE, Probe: "Why do you think _____ will be important?" Record answers on attached probe sheet.

26. One of the topics that has been in the news lately is the cost of communications. Over the next five years -- through 1987 -- do you expect that communications costs in general will rise, fall or stay the same?

( ) Rise ( ) Fall ( ) Stay the same

27. If #26 is Rise or Fall, then: What do you estimate will be the percentage change by 1987? _____%

28. What is your view are the major factors which will account for this? Probe.

_____

_____

_____

29. Are there any specific actions you expect to take as a result? Probe.

_____

_____

_____

_____

30. Thank you. Now as a last question area, how important is international communication capability to your company? On a scale of 1 to 5 with five as Very Important, and 1 as Unimportant, please rate the importance of international communications today.

1 2 3 4 5

31. About what percentage of your communications involve transmission across international borders now? _____%

32. About what percentage of your communications across international borders takes place on public networks? _____%

33. Do you expect international communications traffic in your company to grow faster, slower or at about the same rate as other data traffic between now and 1987?

( ) Faster ( ) Slower ( ) About the same

34. If faster or slower in #33, then: About how much faster/slower? What would you estimate the growth rate for this traffic to be?

_____

_____

_____

Thank you. That completes our interview. Your responses have been very helpful. When the study is complete we will send you an overview of our findings.

APPENDIX D: RELATED INPUT REPORTS

APPENDIX D: RELATED INPUT REPORTS

- Data Communications Considerations for New On-Line Systems, 1980.
- Impact of Communications Developments on Information Service Vendors, 1981.
- Merging of Hardware, Software and Services, 1981.
- New Directions In Local Networking, 1981.
- Office of the Future: Opportunities for Service Companies, 1979.
- Personal Computer Use in Large Companies, 1981.