

NETWORK INTEGRATION

INPUT

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NETWORK INTEGRATION

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**Market Analysis and Planning Service
(MAPS)**

Network Integration

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Abstract

This report, produced as part of INPUT's Market Analysis and Planning Service (MAPS), takes a comprehensive look at network integration directions. It emphasizes the attitudes and intents of users. It includes an analysis of vendor attitudes, user case studies, and a discussion of the driving forces towards network integration.

The market for network integration is quantified. Market forecasts are provided for 1986-1992, and recommendations to current and potential market participants (including network service, RCS, and equipment vendors) are presented.

This report contains 76 pages, including 24 exhibits.



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Table of Contents

I	Introduction	1
	A. Background	1
	B. Scope	5
	C. Methodology	7
	D. Purpose	7
	E. Related Reports	7
<hr/>		
II	Executive Overview	9
	A. Users Are Acting Now	9
	B. Benefits and Cost Savings Are Driving Users	10
	C. Users Want Performance and Good Treatment	12
	D. The Market Is Growing Rapidly	12
	E. Recommendations to Vendors	13
<hr/>		
III	Market Definition and Forecast	17
	A. Market Definition	17
	B. Network Integration Defined	20
	C. Internal Driving Forces	20
	D. External Driving Forces	23
	E. Methodology	23
	F. Market Forecasts	24
<hr/>		
IV	The User's Point of View	27
	A. A Pipeline Company with its own Microwave Network	28
	B. A Very Large High Technology Manufacturing Company	29
	C. A Very Large Manufacturer which Decided NOT to Proceed after Extensive Planning	31
	D. A Computer Company which Finds its Network Very Important	32

Table of Contents (Continued)

E.	A Large Bank Reducing Paper and Mail at its Branches	33
F.	A Major University which has Wired its Campus	34
G.	A Conglomerate, in Manufacturing	36
H.	A Large Manufacturer which has been Integrating its Network for Years	37
I.	A Large Manufacturer which has just been Involved in a Merger	38
J.	A Large Decentralized Manufacturer at the Start of its Planning	39

V	Competition and Opportunities	41
A.	Consulting/Management Service Suppliers	41
B.	Public Network Suppliers	43
C.	Network Equipment and Services	44
D.	User Premises Equipment	45
E.	The Vendor's Point of View	46
1.	Significance of Network Integration	47
2.	Driving and Retarding Forces	48
3.	Typical Projects and Users	48
4.	Requirements for Successful Network Integration	50
5.	Role of PBX	53
6.	Role of Public Networks	53

VI	Conclusions and Recommendations	57
A.	Recommendations to Network Services Vendors	57
B.	Recommendations to RCS Vendors	61
C.	Recommendations to Hardware Vendors	63
D.	Concluding Remarks	65

A	Appendix: Vendor Interview Guide	67
----------	----------------------------------	----

B	Appendix: User Questionnaire	71
----------	------------------------------	----

Exhibits

I

-1	Network Integration	2
-2	Integration by Multiplexer and T1 Switch	3
-3	Integration by PBX and Public/Private Network	4
-4	Integration by a Public Network	6

II

-1	Users are Acting Now	10
-2	Benefits and Cost Savings are Driving Users	11
-3	Users Want Performance and Good Treatment	13
-4	The Market Is Growing Rapidly	14
-5	Recommendations to Vendors	15

III

-1	Amount of Integration	18
-2	Driving Forces for Network Integration	21
-3	Integrated Network Services Forecast	25

V

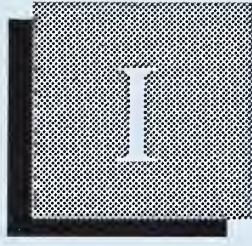
-1	Competition for the User Dollar	42
-2	Vendor Respondent Types	46
-3	Significance of Network Integration	47
-4	Driving Forces	49
-5	Retarding Forces	50

Exhibits (Continued)

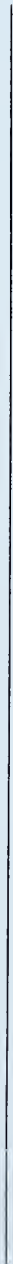
-6	Typical Projects and Users	51
-7	Requirements for Successful Network Integration	52
-8	Role of the PBX	54
-9	Role of Public Networks	55

VI

-1	Recommendations to Network Service Vendors	58
-2	Recommendations to RCS Vendors	62
-3	Recommendations to Hardware Vendors	63



Introduction





Introduction

A

Background

This report, produced by INPUT as part of the Market Analysis and Planning Service (MAPS), examines trends in Network Integration.

Network Integration is the use of a single network to transmit a combination of voice, data, graphics and image information between multiple sites of an enterprise and/or to sites of different enterprises.

There are many methods of electronically combining electronic information for communications. The major user alternatives are:

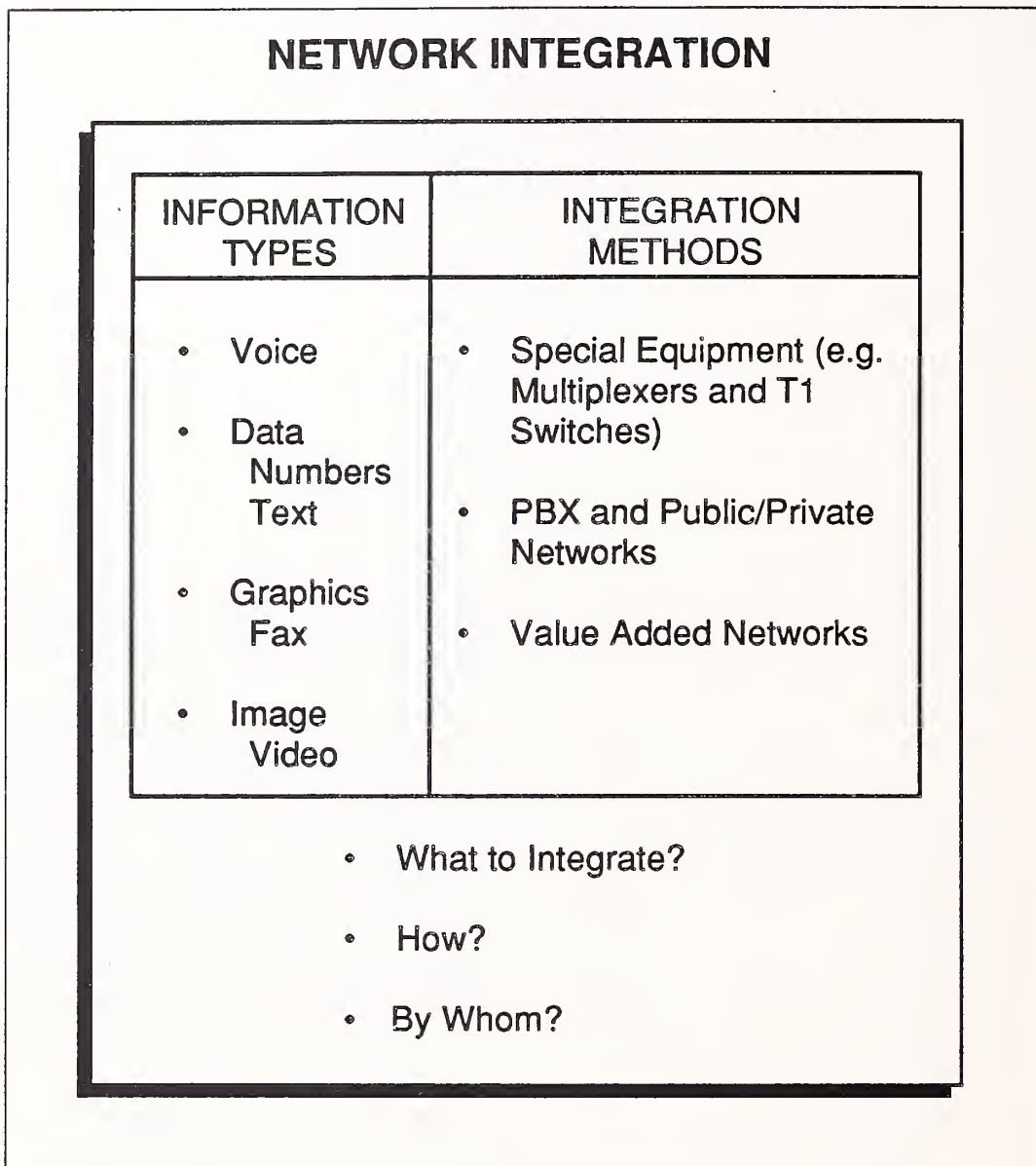
- Use of special telecommunications equipment (at the user's site) such as multiplexers, PBXs, and digital switches (T-1).
- Use of public value-added network services (VANS). (Exhibit I-1 graphically illustrates this environment.)

The concept of integrating Voice, Data, Graphics, and Image is shown in more detail in Exhibits I-2 through I-4. These exhibits also illustrate the major user alternatives.

The use of equipment at the user's site, together with use of special equipment (also located at the user's site) to perform network integration, is shown in Exhibit I-2:

- Word Processing equipment (WPs), Personal Computers (PCs), and Mainframes are shown connected together by a Local Area Network (LAN). This provides the Data information stream.
- Graphics information is shown by a facsimile unit. The output is a digital information stream. However, it is not shown connected to the LAN, because facsimile information is not usually computer compatible.

EXHIBIT I-1



- Image information is provided by a video camera/projector which is assumed to be connected to a “slow scan” device to reduce bandwidth requirements.
- Voice is shown by telephones. In this example the voice information is shown connected to, and routed by, a voice-only PBX.

In this example of Network Services Integration a multiplexer combines all of the information streams, and digitizes the voice information. The multiplexer output is assumed to be one (or a few) T1 streams. This T1 stream is connected to other sites through a T1 switch which is assumed to be part of the user’s private network. Note that lower than T1 bandwidth information streams exist but are not shown, for simplicity.

EXHIBIT I-2

INTEGRATION BY MULTIPLEXER AND T1 SWITCH

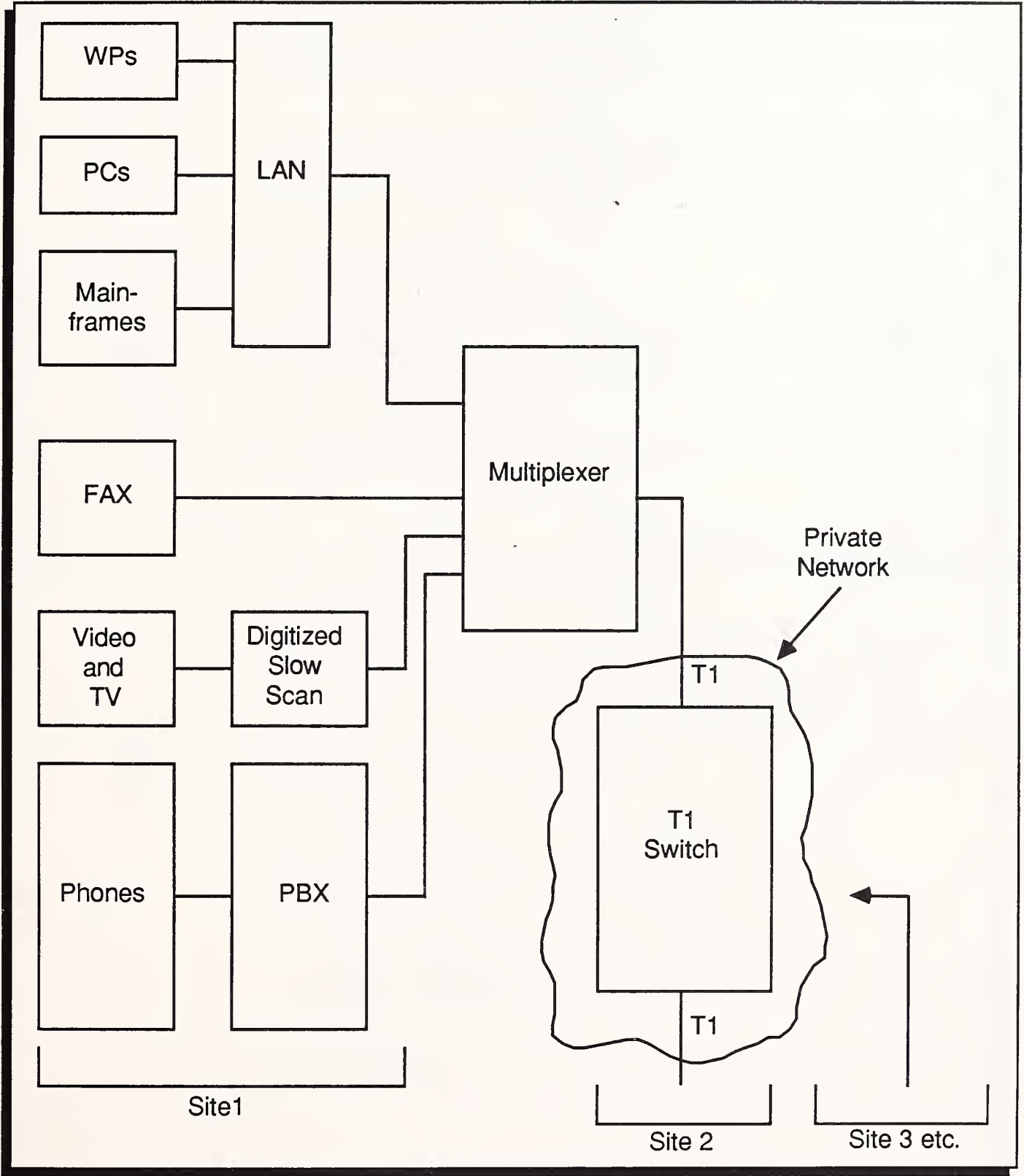


EXHIBIT I-3

INTEGRATION BY PBX AND PUBLIC/PRIVATE NETWORK

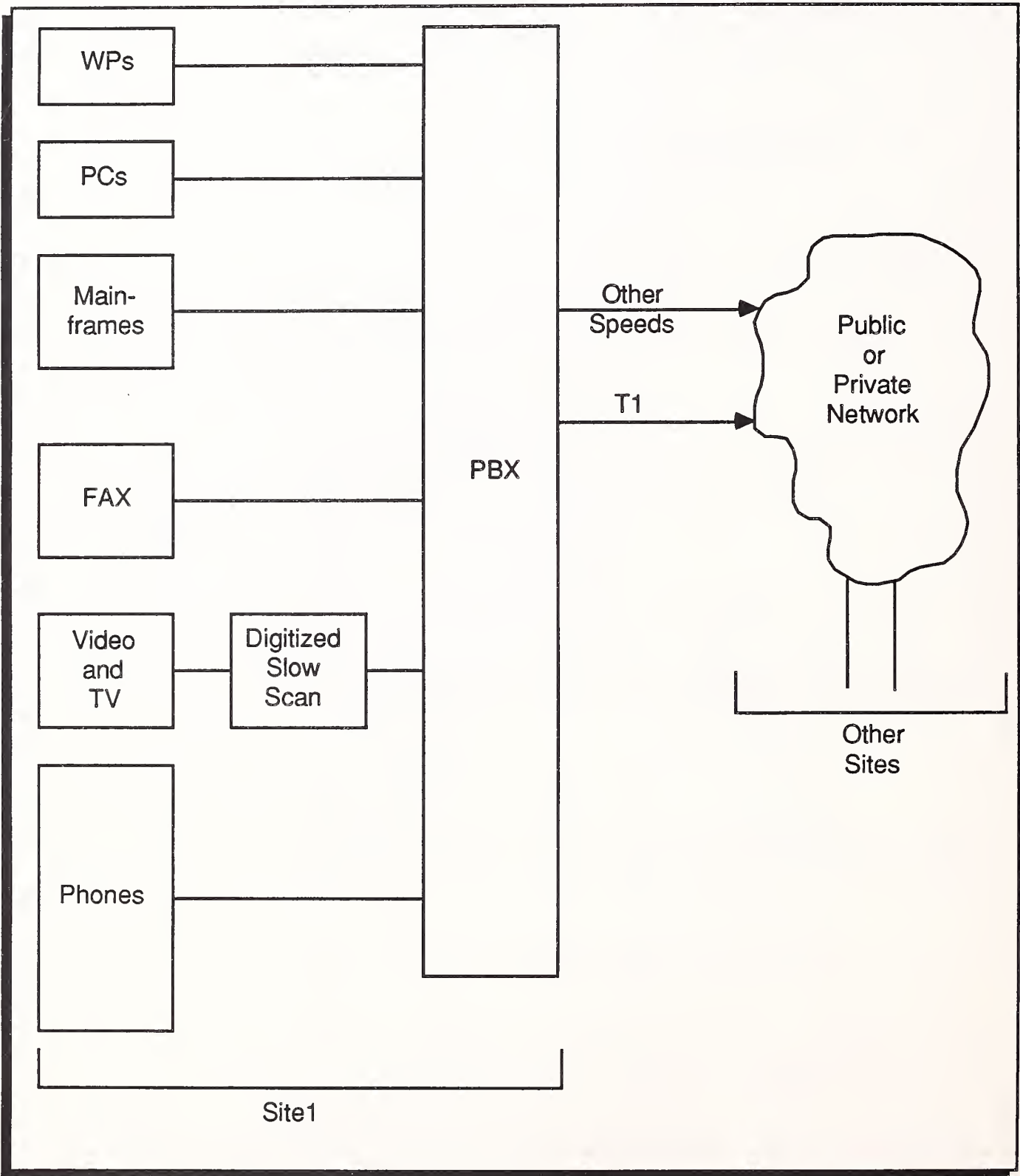


Exhibit I-3 shows that integration of information streams can also be accomplished by the PBX at the user's site. This PBX is shown connected to public and private networks at T1 and at other network speeds. In this example the PBX is also shown as implementing the function of the LAN.

Implementation of the LAN function by the PBX is shown as another example of the possible variations.

The integration function can also be implemented by a value added public network, and this is shown in Exhibit I-4. Some of the issues which are addressed by this report are what are the opportunities for:

- Hardware vendors?
- Computer service vendors?
- Providers of public networks (carriers)?
- Users?
- What is driving Network Integration?
- What is critical for success?
- What can cause failure?
- Is network integration accomplished "all at once" or is it evolving?
How?

B

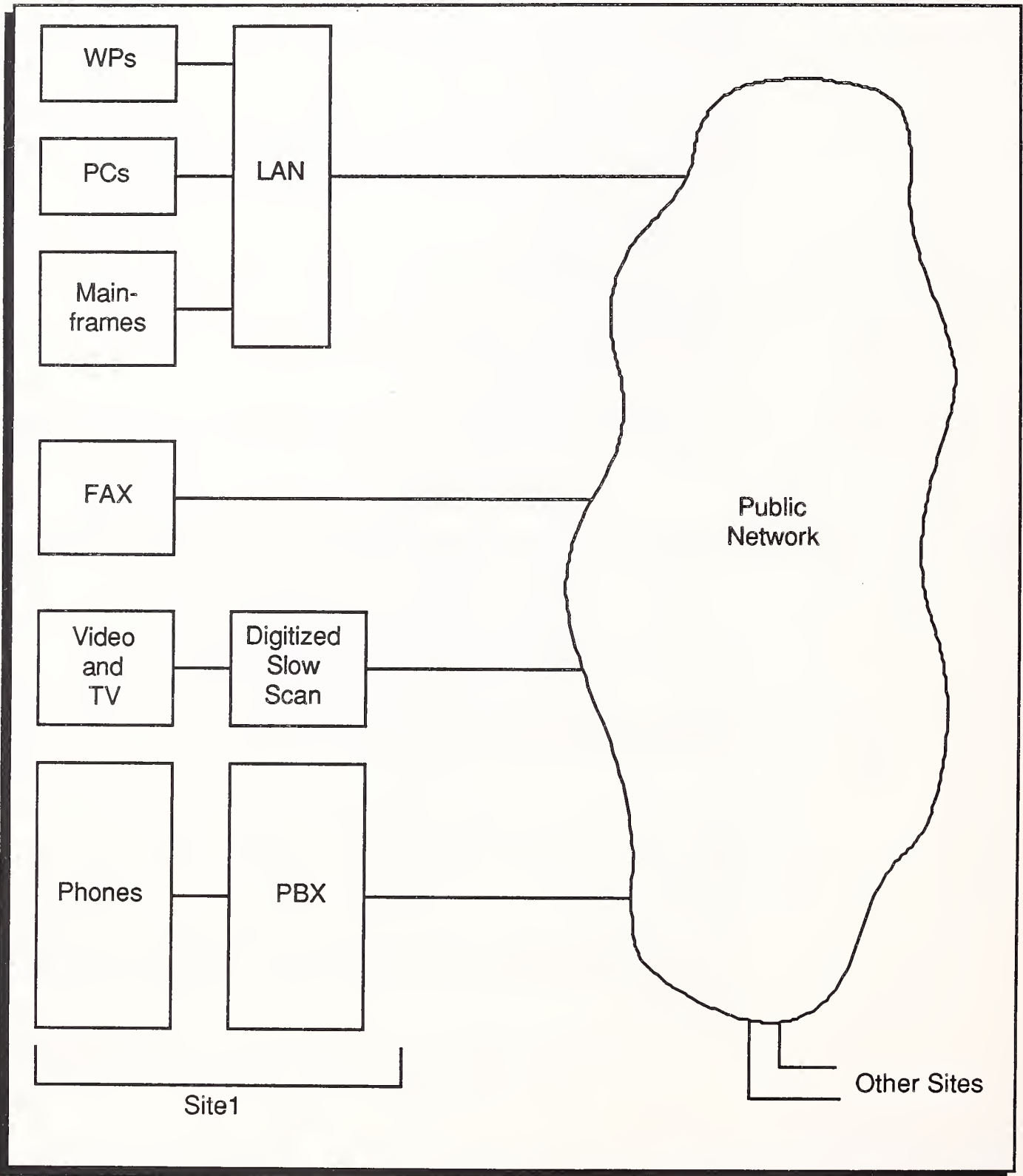
Scope

This report addresses the issues suggested above. More specifically:

- Chapter II is an executive summary of the entire report.
- Chapter III discusses what is driving Network Integration.
- Chapter IV analyses the market by segmenting it, and by forecasting the opportunities for each segment.
- Chapter V describes the market as the vendors view it.
- Chapter VI describes the market as the users view it, by the use of case studies.
- Chapter VII describes competition among competing vendors with similar products and from different methods of implementing network integration.
- Chapter VIII summarizes the study and contains recommendations.

EXHIBIT I-4

INTEGRATION BY A PUBLIC NETWORK



C**Methodology**

The research for this report came from several information sources. INPUT first questioned a majority of its clients to determine what issues needed consideration and clarification in this report.

Ten in-depth user interviews were conducted using the questionnaire shown in Appendix B. Eight in-depth discussions were held with vendors of equipment and network services in areas relevant to Network Integration. The point of view of different competing vendors was sought because they would "balance each other off" and provide INPUT with an objective view. A copy of the vendor interview guide is shown in Appendix A.

Product literature, trade literature and other sources of secondary research were used to add information and different points of view to the project.

D**Purpose**

The purpose of this report is to determine trends and user needs in the area of Network Integration.

The vendor point of view will provide guidance as to how different types of vendors will compete with each other to solve the user's problems. This is an analysis of competition to solve user problems in different ways.

The user point of view will provide guidance as to how users are reacting to the opportunities in Network Integration and what vendors must do to have the users select them and their approach and solution to the issues.

E**Related Reports**

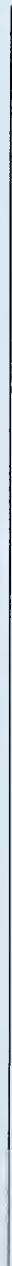
Interested readers are referred to the following related INPUT reports:

- *Network Services Directions, 1986*: Describes the opportunities in the area of network services. Extensive user interviews were performed for this report. Included are descriptions of technology trends and a competitive analysis of participants.
- *LAN/CBX: Planning for Change, 1986*: Reports current experiences with these data and data/in voice communications technologies and looks at the future of office-oriented communications devices.
- *Integrated Voice/Data Communications, 1985*: This report describes the current effort toward voice/data integration and discusses some of the problems and possibilities of such integration. It examines the limitations imposed by present technology, analyzes the requisite functional areas, and includes recommendations for future planning.

- *Federal Communications Market, 1986-1990*: Covers the telecommunications systems and services programs listed in governmental five-year plans, related federal agency long-range processing plans, and information technology budgets; provides an analysis of issues impacting vendors selling into this market; and forecasts agency expenditures.



Executive Overview





Executive Overview

A

Users Are Acting Now

Users are knowledgeable about Network Integration and what is involved in its implementation.

Almost all large companies are either planning to implement Network Integration or are studying it now.

They have a basic understanding of the technology and the applications that can effectively use the technology.

Implementation of Network Integration is taking place now:

- Twenty-five percent of Fortune 100 companies have already implemented or started a project to perform Network Integration.
- Some of the Fortune 50 companies have been involved in Network Integration for over five years and have attempted to maximize the benefits of Network Integration.
- At the present time Network Integration is primarily a large-company phenomenon. Large enterprises have the greatest payback and applications advantage.

By 1991 most of the Fortune 2000 companies will have been involved in Network Integration. The success of the larger organizations will be noticed and the other Fortune 2000 companies will follow suit. These companies have problems and needs similar to the very largest corporations and will want the cost savings and benefits enjoyed by the very large enterprises.

The larger of the user's sites will be integrated first because these sites have the most interaction, traffic, and need for Network Integration. The full process of Network Integration is one that will take years of continuous effort to fully implement.

The user's outlying smaller sites might never be involved in the total Network Integration program, i.e., using the modern technology that allows Network Integration.

EXHIBIT II-1

USERS ARE ACTING NOW

- Knowledgeable
- Implementing Now
 - 25% of Fortune 100s
 - 10% of Fortune 500s
- Implementing by 1991
 - 90% of Fortune 100s
 - 50% of Fortune 500s
- 25% of a Company's Sites Will Be Integrated

B**Benefits and Cost Savings Are Driving Users**

Only a few users say that cost savings is the sole reason for becoming involved in Network Integration.

The majority feel that cost is not very relevant as long as it is not excessive. That is, although cost is ultimately a factor, users are not looking for the lowest possible cost.

Those users who are required by management to justify Network Integration only by cost savings do not think that management understands

telecommunications and the major benefits the organization can derive from effective use of telecommunications.

The main reason for Network Integration (and for other telecommunications projects) in most companies is the benefits to the corporation. Decisions are better if all of the information is available.

Most companies will permit customers and suppliers to access their network to check on orders, verify inventory, and use other applications where information can be interchanged. An example of an application receiving much attention now is Electronic Data Interchange (EDI). This application is important to most large companies because it allows leading-edge applications -- such as Just-in-Time, order entry, and sales acknowledgement -- to drive the business.

The users prefer to use a combination of cost savings and benefits of new applications to justify Network Integration. A popular strategy is to use cost savings initially to justify the cost of new applications or new network features. Thus, for the same dollars or fewer, the enterprise receives more.

EXHIBIT II-2

**BENEFITS AND COST SAVINGS
ARE DRIVING USERS**

- Only Few Users Use Cost Only
- Benefits to the Corporation are of Greatest Importance
 - Better Decisions
 - Better Customer Interaction
- Cost-Benefit Mixture
 - Hold the Line on Costs
 - Use Savings to Pay for New Applications

C**Users Want
Performance and
Good Treatment**

In most cases equipment and service performance do not require major breakthroughs in technology. Users are concerned with the business basics, such as:

- Keeping promises so that the telecommunications manager can keep his promises (plans) to management.
- Providing reliability as a key to satisfaction.
- Using new technology to provide new products and cost-effective solutions.
- Adhering to standards. Standards are very important to telecommunications managers who have to coordinate multidivision companies.

How the telecommunications managers are treated by vendors is very important. Almost universally there is a user sensitivity to "being talked down to" by some vendors. Professional sales/consulting attitudes need to be improved.

At headquarters locations, telecommunications managers believe they have good staffs and do not need much consulting assistance.

The situation changes in the outlying divisions of companies. This is where help is often desired and necessary.

D**The Market Is
Growing Rapidly**

The market (as measured by user expenditures affected by Network Integration) will grow from about \$2.2 billion in 1987 to \$17.6 billion in 1992.

The average annual growth rate is 52%.

The reason for this extremely rapid growth is the fact that the use of telecommunications, especially data, is growing at a fast rate (12% AAGR) and that this rate is superimposed upon the fast acceptance of Network Integration.

Such rapid growth creates a situation of change in the marketplace.

New vendors are being considered (e.g., T1 vendors, professional services firms) for the job of putting together the network plan and taking responsibility for implementation.

EXHIBIT II-3

**USERS WANT PERFORMANCE
AND GOOD TREATMENT**

- Performance
 - Promises
 - Reliability
 - Technology
 - Standards
- Treatment
 - Users Are Also Knowledgeable
 - Help with Divisions

Previous major obstacles to change are eliminated at the same time as solutions are made available.

New opportunities exist for new vendors to break into an account by using new technology and functionality that solve the corporation's network problems.

Existing vendors will have to protect their existing accounts by solving the user's problems and satisfying the needs of today and the future.

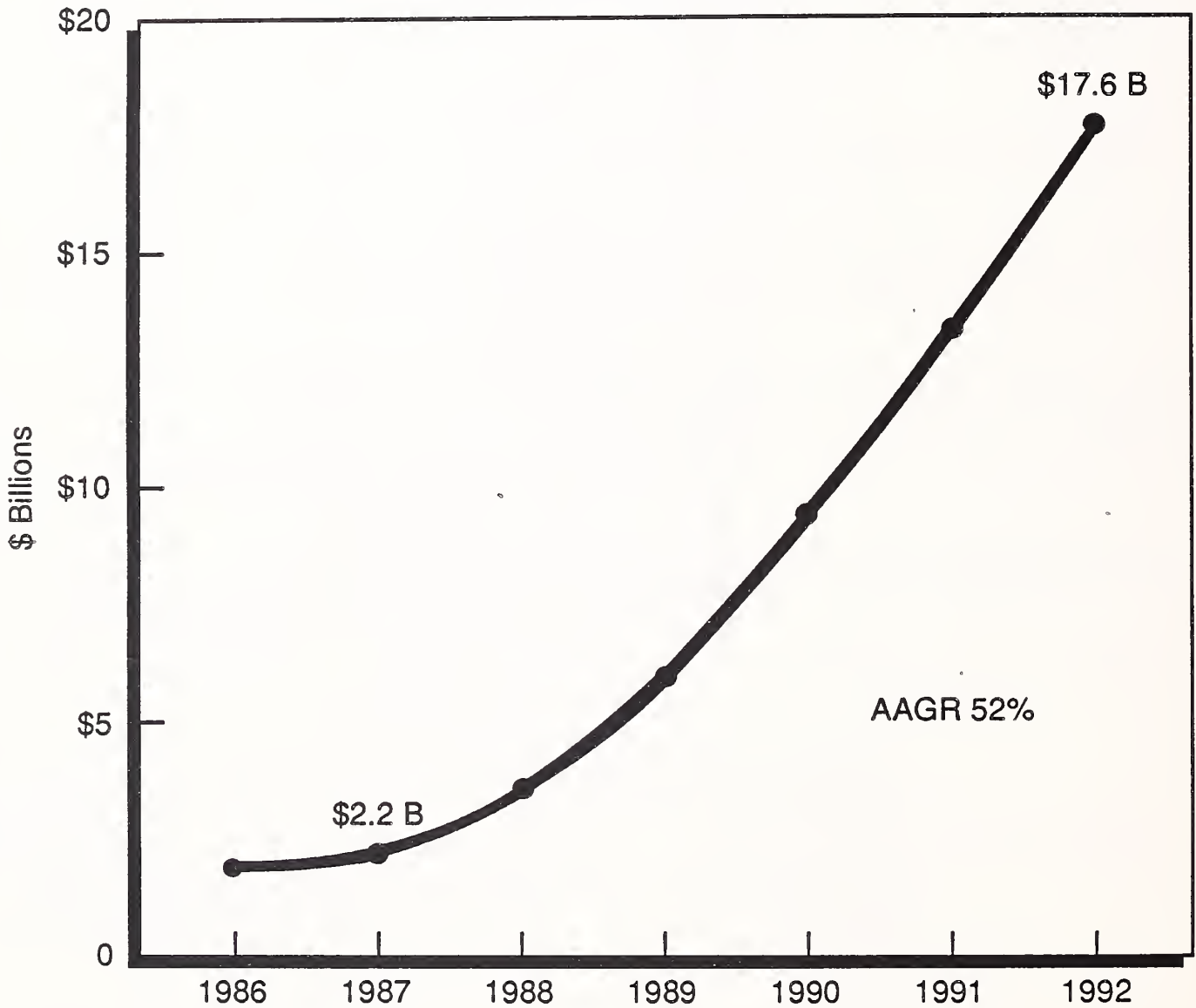
E**Recommendations to
Vendors**

Be flexible. There are many different ways in which users are choosing to integrate their networks.

It is important not to lose an account because of unwillingness to meet the user's perceived needs.

EXHIBIT II-4

THE MARKET IS GROWING RAPIDLY



Understand how each separate account justifies Network Integration, and help them in the way they want to be helped.

- For accounts that plan to use cost justification as some or part of the justification, provide them with data that match that approach.
- For accounts that plan to use benefits, help them convert benefits that are often “soft dollar” advantages into “hard dollar” numbers.

Do not antagonize telecommunications managers by treating them in any way that **THEY** might think does not respect their expertise.

Helping telecommunications managers support their outlying divisions is a real benefit, because the telecommunications manager often does not have the time or staff for this activity. Support will make the telecommunications manager an ally rather than an opponent.

The magnitude of the Network Integration program -- in terms of people, logistics, training, and dollars -- will generally require the approval of senior management, if not the board of directors. Companies need to recognize the plan as essential to the corporation.

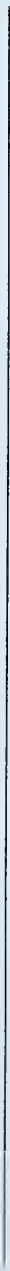
EXHIBIT II-5

RECOMMENDATIONS TO VENDORS

- Flexibility
- Cost Benefits
 - Hard Dollars
 - Soft Dollars
- Try to Help with Divisions
 - Real Need
 - Ally with Telecommunications Manager



Market Definition and Forecast





Market Definition and Forecast

A

Market Definition

The market for Network Integration can be defined in the two following ways:

- The expenditures for communications services carrying integrated information.
- The percentage of equipment and of accounts which could be affected by Network Integration.

This raises another issue, namely, “how much integration is integration?”

- Is it voice and data only? Must it be the full four types of information: voice/data/image/graphics? Can it be any three of the four?

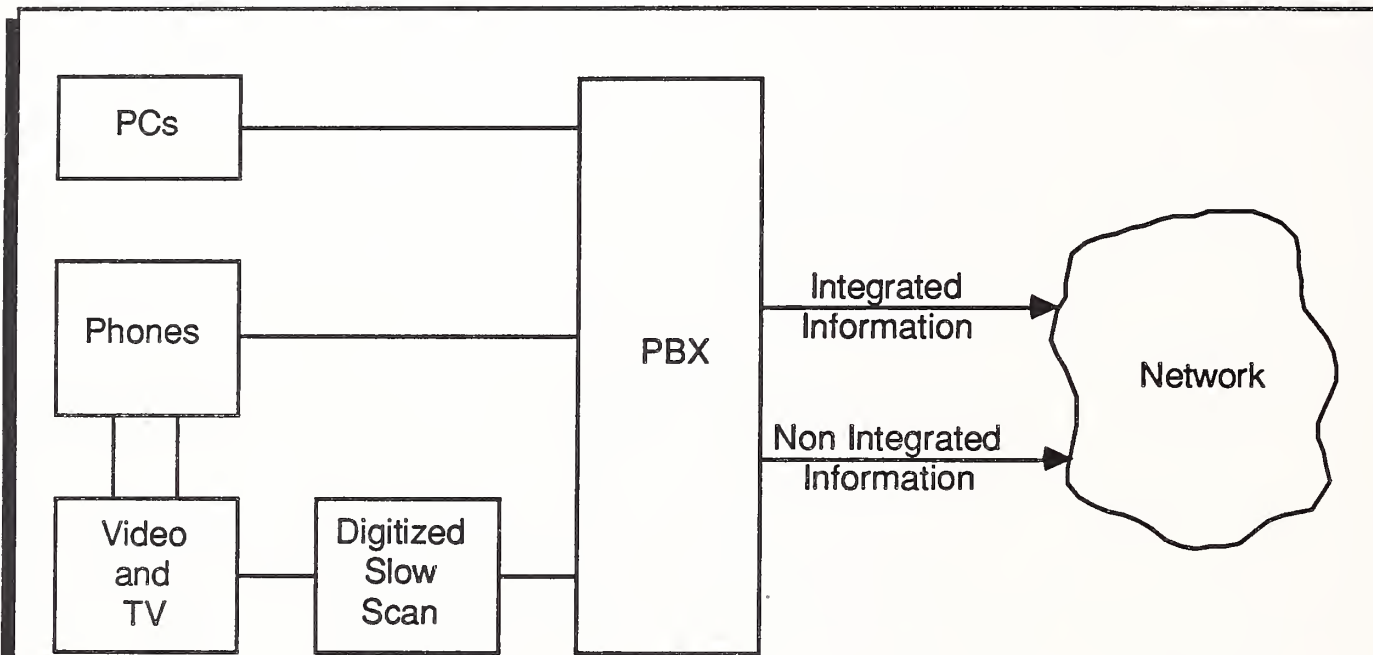
This section of the report will define how INPUT answers these questions, and thereby explain the market definition used in this report. The market sizing is compatible with the INPUT report *Network Services Directions* , published late in 1986.

Exhibit III-1 illustrates the issues involved in definition of the market. In the top half of the exhibit “Integration by the PBX,” data from PCs, voice from telephones, and image from the slow scan video output are all combined and integrated by the PBX before they are transmitted to the network.

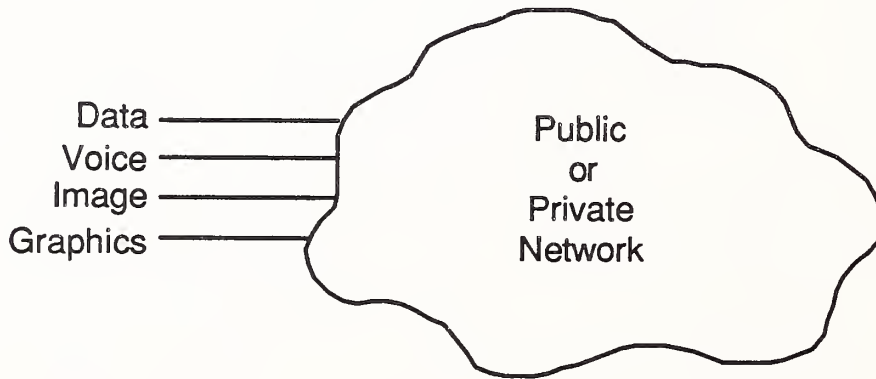
In those instances where voice, data, and image are all integrated to be transmitted to another location, where they will then be separated to be distributed to the appropriate devices, the PBX is implementing “Network Integration.”

EXHIBIT III-1

AMOUNT OF INTEGRATION



INTEGRATION BY THE PBX



INTEGRATION BY THE NETWORK

In the instances where voice information is transmitted to a location where voice only is used, the PBX is implementing no integration at all.

The percentage of the PBX which is dedicated to Network Integration is certainly not the entire PBX, and the percentage of the PBX which is involved in Network Integration (defined by value) varies as a function of specific applications.

It is very difficult, and perhaps misleading, to say that a given percentage of the PBX is used for integration, and to define the Network Integration market for PBX equipment in that fashion. It is more realistic, and of greater value to manufacturers to define the market as "the PBX must be capable of **supporting** the integration of voice, data, image, and graphics." The market definition INPUT will use is: the percentage of PBXs which must be capable of supporting Network Integration, as a function of all of the PBXs in Fortune 500 companies.

The bottom half of Exhibit III-1 shows the integration of data/voice/image/graphics by a public or private network. Again, in some cases all four types of information are integrated, and in other cases there is no integration at all.

In the case of public networks there is no useful information to be gained from determining which of these networks will offer integration services, because they all will. Thus the market size will have to address the definition by the measure "what percentage of accounts will require integrated services?"

Private networks are similar to PBXs in that the definition of what percentage of private networks perform Network Integration services can be used. In addition, the definition "what percentage of network expenses is for integrated services?" is valuable.

To summarize, the following market definitions will be used:

- For equipment: What percentage of PBXs in Fortune 500 companies are/will be capable of supporting Network Integration?
- For public networks: What percent of accounts require/will require integrated services?
- For private networks: What percent of expenditures are/will be for transmission of integrated services?

B**Network Intergration Defined**

A selection of what Network Integration really is needs to be determined to make the definition clear.

The simultaneous integration of voice/data/image/graphics is one end of the spectrum; unless all four are integrated, there is no total Network Integration. The other end of the spectrum is to consider integration if there is voice and data only.

Requiring all four (voice/data/graphics/and image) is too restrictive because all company sites may not use both image and graphics, and because it does not match user's actions or requirements.

Requiring the integration of only data and voice is too general because that is not a "new" market development, and because the integration of either graphics, or image is a "different" type of integration.

Thus INPUT uses the definition of integration to mean at least of three of the voice/data/graphics/image types of information to call the process "Network Integration."

Network Integration is the result of many driving forces (Exhibit III-2). These driving forces can be divided into two major types:

- Internal, from the corporation itself.
- External, from vendors of telecommunications equipment and services.

The internal driving forces are really the key driving forces which affect the telecommunications manager. External driving forces are more in the order of "facilitators" which allow Network Integration to take place.

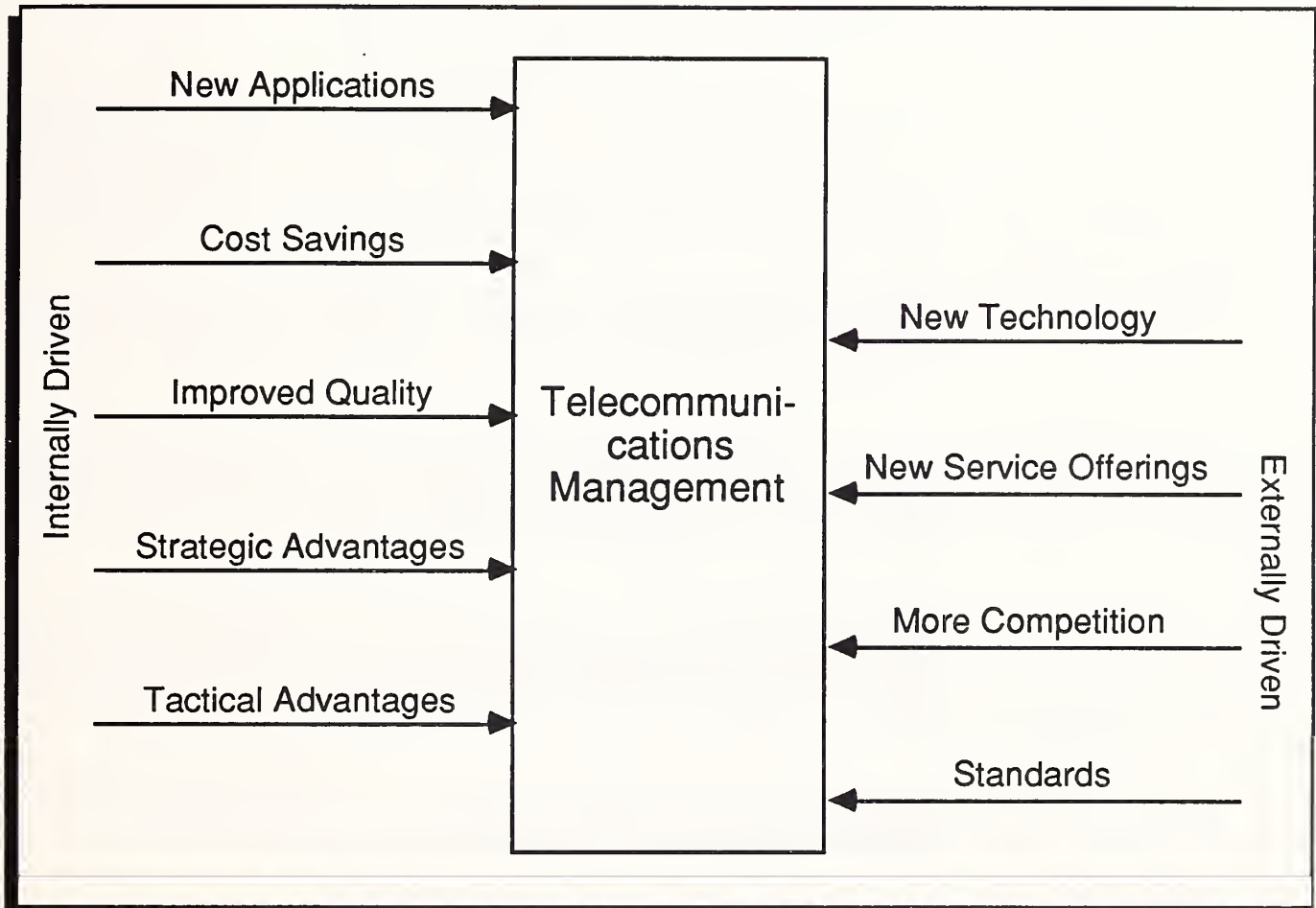
C**Internal Driving Forces**

Internal driving forces are the result of the extreme competition in U.S. industry. These driving forces are stimulating users to review their network resources and develop plans on how to make more efficient use of the existing facilities, as well as provide functional capabilities to provide new services or support new applications. These forces will increase over time, which in turn will increase the need for Network Integration. The driving forces are:

- New Applications.
- Cost Savings.
- Improved Quality.

EXHIBIT III-2

DRIVING FORCES FOR NETWORK INTEGRATION



- Strategic Advantages of Communications.
- Tactical Advantages of Communications.

The types of new user applications being implemented are ones that improve the running of the business and/or the quality of the decision process. Examples are:

- CIM, the computer-oriented integration of the manufacturing process impacting the order flow through shipping and accounting aspects of the business;

- EDI, the use of electronic document interchange to interact with suppliers and customers in an efficient manner, minimizing paper flow;
- Video conferencing, the ability to meet with others within the company in a more effective manner with minimal travel requirements or others external to the company;
- Complex communications, i.e., the tying of users/workers together with voice and graphics to discuss computer information in a realtime fashion with simultaneous viewing of the data on the distant display terminals. This requires an integrated voice display terminal (IVDT).

These applications generally require “faster communications” and also simultaneous availability of graphics or image and data, or the availability of data together with voice.

Cost is an important aspect of business in our increasingly competitive environment. The cost impact is present even if it is to “hold the line” while increasing applications.

Network Integration can save expenses by use of the same communications facilities for multiple functions, a significant factor in its implementation

It is important that information be transmitted accurately and rapidly. It is also important that communications such as voice be clear.

Improved quality can be obtained from the all-digital networks which are used in Network Integration projects.

Strategic advantages of the communications network include, e.g., connection of the network to customers and suppliers and sharing of corporate resources. A new and sophisticated network is required to allow this to happen.

Tactical advantages of the communications network include, e.g., faster quotations which require information and sometimes images to be available during voice discussions.

Network Integration allows all of these different types of information to be available, together, when and where they are needed.

D**External Driving Forces**

External driving forces essentially answer this question: Why should Network Integration start now? The answer is that it can happen now, and it could not easily have happened much earlier. External driving forces include:

- New Technology.
- New Service Offerings.
- More Competition.
- Standards.

New technology such as fiber optics has made large “pipes” of bandwidth available at low cost. Digital techniques have greatly improved the flexibility and quality of the network at a low cost. Thus, the products which are required to implement Network Integration plans are now available.

New services offerings from carriers, such as value added services, turnkey Network Integration, and wide bandwidth transmission (i.e. T1), make it possible to purchase Network Integration components from the carriers.

Most users cannot easily physically maintain networks very far from their corporate sites. Network offerings solve this problem and make it possible to implement Network Integration without maintenance concerns.

More competition by new vendors of communications equipment and services has caused the development of new products such as the much improved digital PBXs, digital facsimile, and video compression. These products are also the building blocks for Network Integration.

Standards such as Integrated Services Digital Network (ISDN) and Electronic Data Interchange (EDI) make it possible for new network components to talk to each other. They also remove the users’ concerns that their telecommunications networks will not be able to connect to other networks or be able to use newly developed equipment.

E**Methodology**

INPUT interviewed a number of the leading users to understand what is occurring in this emerging market. Ten case studies provide insight into the practical application of Network Integration in the U.S. today.

The market forecasts in this report are derived from the following additional sources of information:

- Knowledgeable vendors.
- INPUT estimates.
- Previous INPUT reports.
- Secondary research sources.

Forecasts are included for the following equipment and services:

- The amount of expenditures for integrated network communications.
- Percentage of PBX units in Fortune 500 companies which can support Network Integration functions.
- Public networks which perform Network Integration functions.
 - The percent of accounts that utilize this functionality.
- Private networks (leased line or virtual).
 - The percentage of companies with networks that carry integrated information.

F

Market Forecasts

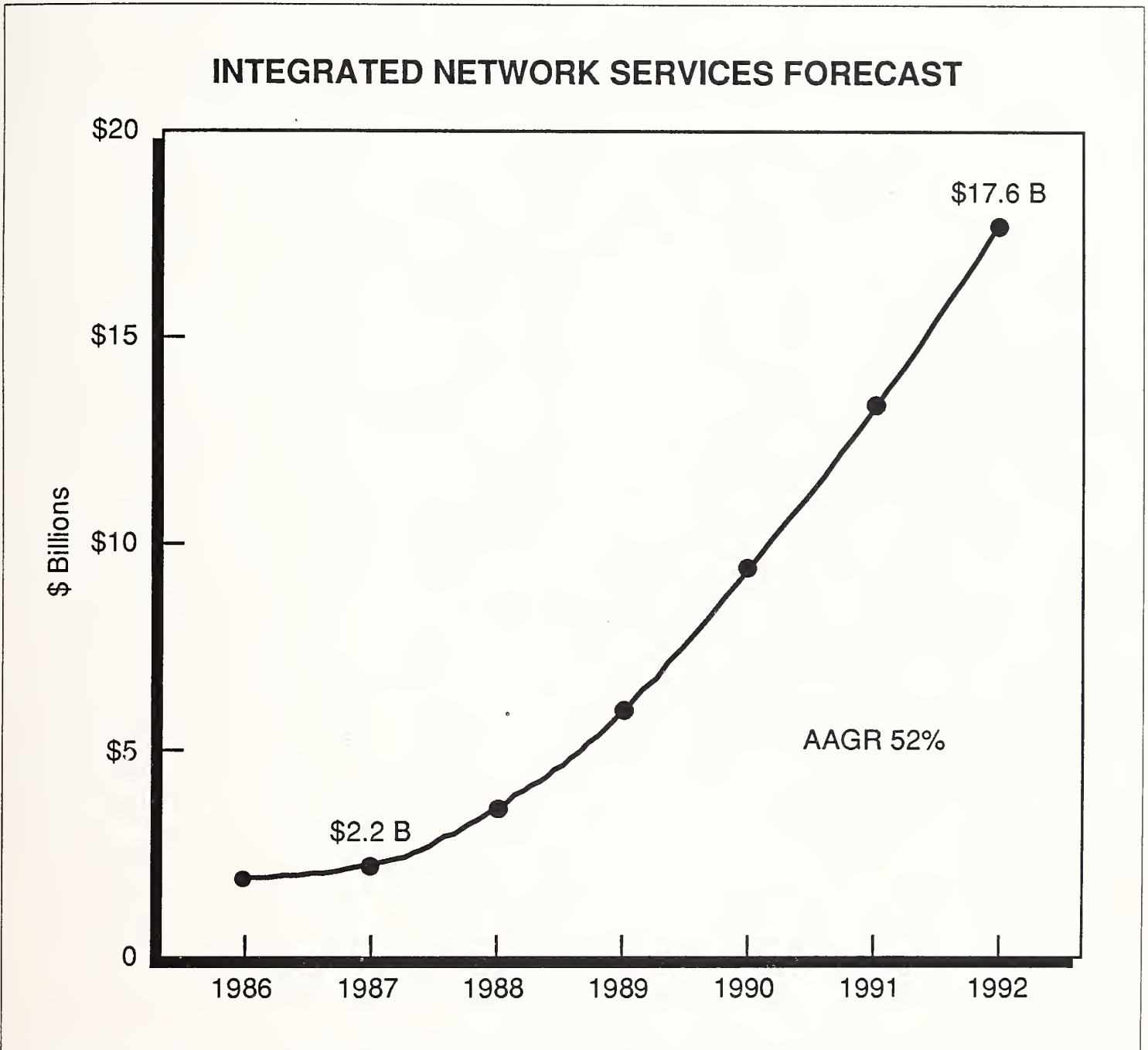
INPUT estimates the current market (1987) for voice communications to be carried on Integrated Networks to be \$2.6 billion, based on user expenditures, is growing at an average annual growth rate of 50% to become \$13.8 billion by 1992.

The current (1987) market for data communications to be carried on Integrated Networks, based on user expenditures to be \$430 million, is growing at an average annual growth rate of 55% to become \$3.8 billion by 1992.

Exhibit III-3 shows that the combination of voice and data communications to be carried on integrated networks is now (1987) \$22 billion, and will grow at an average annual growth rate of 52% to \$17.6 billion by 1992.

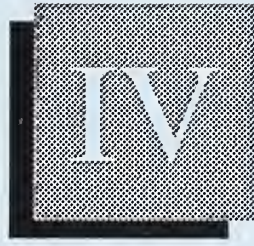
The percentage of PBX units in Fortune 500 companies which will support (or be involved in) Network Integration in 1987 was 8% and in 1992 will be 50%.

EXHIBIT III-3

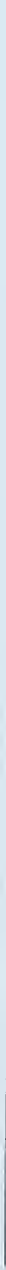


The percentage of private network (accounts) in Fortune 500 companies, which will be able to transmit integrated information will grow from 16% in 1987 to 71% in 1992.

The percentage of accounts (that require Network Integration to some extent) for public networks in Fortune 500 companies will grow from 16% in 1987 to 71% in 1992 for an average annual growth rate of 35% for these accounts.



The User's Point of View





The User's Point of View

This chapter discusses the user's point of view regarding network integration by means of case studies. The cases reveal unique approaches of these users to network integration.

The cases were selected to obtain the judgment and experience of leading-edge companies. They were not selected to be typical of the average U.S. company in the Fortune 500 category. In fact, if an interview was started with a user, and it was determined that they were not planning for, or preceding with network integration, the interview was terminated.

Ten user companies were interviewed, for this report. They had the following characteristics:

- A. Pipeline company with its own microwave network.
- B. A very large high technology manufacturing company.
- C. Very large manufacturer which decided NOT to proceed after extensive planning.
- D. A computer company which finds its network very important.
- E. A large bank reducing paper and mail at its branches.
- F. A major university which has wired its campus.
- G. A conglomerate, in manufacturing.
- H. A very large manufacturer which has been integrating its network for years.

- I. A large manufacturer which has just been involved in a merger.
- J. A large decentralized manufacturer at the start of its planning for network integration.

A

A Pipeline Company with its own Microwave Network

This company is using mostly voice and data integration now. It will soon add facsimile for graphics capability. Video will be added later. It has its own microwave network.

The present network has 80 sites. There are about 200 - 300 voice lines, 40 data lines of 9,600 BPS, and two T1 "pipes." There is little expense incurred for transmitting image and graphics. The new network will have more data lines and T1 lines of the same type.

Because the microwave capacity can go up to 2,000 lines, and because the company does not pay a great deal of money to communications transmission providers, cost was not the major issue in deciding to integrate the network. In fact, cost savings were not even measured or calculated.

The driving force for network integration was to improve the functioning of the company by having the proper information to make decisions at all locations. The proper information allows "better" decisions, which involve large amounts of money. In addition, faster decisions provide a competitive edge.

Computer data transfer, conferencing, and quotations are the applications which are driving network integration. Although the company did not use cost improvement as a reason to integrate its network, cost for video was perceived as a retarding force for that form of information.

The company planned and implemented the project itself. It took a few months to implement a minor portion of the network. However, the entire network will not be integrated for four to five years.

The planning process involved talking to the users to assess their needs and then going to officers of the company to receive permission to proceed. It took about three months to plan this large project and receive permission to proceed.

The company's critical concerns about the project are the lack of time to plan and execute the network integration process due to the day-to-day pressures of managing the telecommunications department.

The strategic advantage of an integrated network is the competitive edge is obtained from better decisions which are made because of more avail-

able information. The tactical advantage of network integration is faster quotations. This makes the sales-closing process quicker.

The company used no consulting services from carriers or others because it has a staff sufficient to plan and manage the task by itself. It will monitor and manage its own network. However, it will purchase outside software to help implement this task. It is not open to a proposal from a vendor which would supply network facilities management.

The company expects to make its network available to customers and vendors, and expects to use Electronic Data Interchange (EDI) to relate to them. However, there are no firm plans in place to do so now.

Network access security is not viewed as a problem, because there is little secure information transmitted. There are no formal methods or standards by which management is planning to assess network integration, or the entire telecommunications department. "If it works" is the measure.

To sum up this company's advice to other companies which plan to integrate their network: the company thinks that it is a lot harder than it looks, and they (i.e., the other companies) should pay particular attention to the logistics involved.

Advice to vendors is that they should learn how to integrate networks for their customers; essentially they should improve their capabilities to supply network systems.

B

A Very Large High Technology Manufacturing Company

This company is presently combining graphics and data together. In some cases voice is also combined with the data and graphics. Video is mostly transmitted on a separate network. But data is also sent on these video lines.

The company is in the process of combining the transmission of voice, data, graphics, and video on most of its lines because this will allow alternate use of lines (with regard to routing) in case of failure. The savings in cost which is achieved by network integration is also a driving force.

The company is a large one with hundreds of sites, thousands of voice lines, and thousands of data lines. It is in the process of evolving its network into an integrated network. There is no formal project and there was not a formal cost reduction analysis.

There were really no factors which inhibited network integration: "It just takes a while." Although parts of the network are integrated now, it will take years for the whole network to be integrated.

Decisions for network design, or in this case for integrating the network, are made by the corporate telecommunications group which provides strategic network direction and performs cost analysis.

Although in general the company provides its own equipment, performs its own network design, and manages its own projects, it did let an RFP for a supplementary packet switching network. The RFP was sent to three companies.

The packet switching network started two years ago as 90% public and 10% private. It is now 50% public and 50% private. In two more years it will be all private.

All applications such as order entry, manufacturing control, and conferencing are on the network. The analysis was subjective. However, the company believes that its telecommunications network does provide a competitive advantage by making it a more efficient company.

Faster response to the customer is also perceived as a major advantage of the integrated network. There were few concerns about implementation of network integration because the company has a strong telecommunications staff.

There is some concern about maintenance of the network at remote locations. There is a priority structure for data transmission. Data with lower priority is transmitted when the network is in low use.

The company does not think that it needs consulting services or network design services from others because of the strength of its internal staff. It monitors and manages the network itself. "The equipment may be old, but it and the people are in place."

It would consider an offer from a vendor which supplies network facilities management, but it would be a "hard sell." The company now allows its suppliers and customers to access its network by the use of electronic mail. It relates to customers and dealers with EDI, to some extent now.

Network security is important, and was a big factor in awarding the packet switching contract. There are strong guidelines on access to the network to implement security. Management measures the success of a development-type communications project by milestones. Once the project is completed the telecommunications effectiveness is assessed by cost per transmission.

For advice to other companies which are considering network integration, the company feels that standardization is key. Some other companies, for example, have five electronic mail systems, which can hardly talk to each

each other. It is also important to plan well and to have a good internal telecommunications group. Advice to vendors is to be flexible in product offerings.

C

A Very Large Manufacturer which Decided NOT to Proceed after Extensive Planning

This company reorganized its telecommunications department to plan for network integration of voice, data, and graphics. It did not plan to integrate video. After over a year it abandoned the plan.

It felt that it would not obtain any cost savings from network integration. Because the only driving force for network integration (in this company) was cost savings, there was no justification for the project.

The network is large. There are 800 sites, hundreds of thousands of voice terminations and about 8,000 data lines. The company spends hundreds of millions of dollars for voice transmission and tens of millions of dollars for data transmission each year. The expenditures for graphics (facsimile) were about 2% of network costs.

There were no reasons other than cost for the company to integrate its network. The "climate of the company" would not allow "soft dollar" justification such as better decisions.

The network which was planned was to have about the same number of lines as the old network. The goal for network integration was a 10-15% decrease in cost. There was no planning for excess network capacity since the company is stable in size (downsizing if anything) and communications needs are proportional to people.

Other negatives perceived in the decision not to integrate the company network were lack of technical improvements in telecommunications for bandwidths less than T1, and the fact that, geographically, the voice people and the data people were in different locations.

The company believes that it had designed its network very efficiently, and it also had a very large network. Thus there were no "inefficiencies" which some other companies were removing to justify network integration.

This analysis was performed by the company's own telecommunications staff over a three year period. The staff was reorganized specifically for the task. However, the decision that only cost savings was the criterion for network integration came from management.

The company neither uses, nor plans to use, consulting, network design, or network management services from outsiders or carriers because it thinks that it is too big to need outside help.

It is presently providing access to its network for customers and suppliers and is presently using EDI.

Network access security is important, and the company is implementing it without network integration. Advice to users which are contemplating network integration is to really look to see if there is a real benefit. Advice to vendors is to design and implement technical improvements other than just more bandwidth.

D

A Computer Company which Finds its Network Very Important

This company presently has voice, data, and graphics all combined on T1 lines. It also owns its own fiber optics and microwave lines. It is presently using video on some of its lines.

The basic reasons for integrating its network are cost effectiveness and flexibility. It also has a growth in the use of its network of two times (doubling) each year, and it needs network integration to service this growth.

The company has 14 sites. There are 120 voice lines mostly supported by the switched network, and 35 computer sites connected with twelve 9.6K BPS and three 56K BPS lines. It is paying about 3% of its communication costs to transmit image and graphics.

The network into which it is evolving is mostly fiber and microwave, so that the number of lines is not a good measure of size. The payback from network integration is 5-10 months, depending on the project. Overall cost savings are 25-50%.

The company is planning for extensive growth. The fiber capacity installed now is planned to be twice as much as its most optimistic plans for the next five years. Microwave capacity will be 50% in excess of planned growth. The company is moving from T1 to T2 lines.

Additional reasons for network integration (over cost) are better control of the network, and faster response to the user needs. The company can put in a 56K BPS circuit in a matter of hours.

The only negative for integrating the network were capital costs. However, with a payback of less than a year this was not considered a problem.

The Data Network Operations Management group ran the project. It took three years to install the first fiber network. The second fiber network took six weeks to install.

The network is partially integrated now. It never will be 100% integrated. All of the design was performed by the company, so there was no RFP let

for the project. However, microwave construction and installation of the fiber optics cable were subcontracted.

There are about 150 applications on the network, including order entry, manufacturing control, conferencing, etc. All of these applications are perceived to be important for the company's competitive position. The strategic advantages of the network are great. The company feels that "the network is the company."

The major concern about the integrated network is failure. The network is designed with many alternate paths, and many vendors for leased lines. The company feels that it is on the leading edge of telecommunications technology, and that it knows more than most vendors. Thus it does not need consulting services, or network design.

It intends to monitor and manage its own network. It will not be receptive to network facilities management proposals. Customers and suppliers will not have access to the entire network because it is international and there may be legal problems. However, they do have access by X.25 to a large amount of the network.

The company relates to its customers and dealers with EDI now to some extent and will do more of this in the future. Network security is important, and there is a whole group which works on this task.

Management assesses program success by judging network effectiveness despite growth of two times a year. In addition, cost is a parameter. Advice to other users who are planning to integrate their network is to be very careful. The first installation was not redundant and had problems. Now they have redundancy and hot standby equipment.

Advice to vendors is to have a clean installation which is easy to work on and easy to service. There should be a high MTBF, and the installation and equipment should be attractive, not an eyesore.

E

A Large Bank Reducing Paper and Mail at its Branches

The bank is in a two-stage network integration project. First (now) it is implementing data and voice on a packet switching network to go to individual tellers in branches of the bank. The next stage is to use image processing to transmit images electronically, instead of by mail, on the same network. Video is far out in the future.

The purpose of this project is to cut down on paper flow to save the cost of mailing paper, and to decrease the amount of paper lost in the mail. An additional purpose of the project is to reduce the number of cables and the amount of wiring in each branch. There were no perceived negatives in the reasons to integrate the network.

There are 255 branches (sites) attached to the network. They are served by the packet switching network. There will be no change in this network. However, more information will be transmitted on the same network.

The decision process, for the project, involved the technology group determining that they should do it, and then implementing a pilot network. After that, management was given an analysis, together with a report about the performance of the pilot network, asking for approval to proceed.

It took six months to put voice and data on the pilot packet network. It will take longer to add graphics.

There was no RFP let, since off-the-shelf products were used and the bank implemented the project itself. They were already using the packet switching network for other purposes, so they simply stayed with the same vendor.

The applications for the integrated network are branch banking applications. The competitive advantage expected is from having information available faster so that the branch can provide better service to its customers.

The bank's concerns were cost control and the chance that processed images will overload the packet switch. The bank expected consulting services from its network vendor in the form of throughput analysis and network design.

They will monitor and manage the network themselves, and are not receptive to an approach from an outside vendor for network facilities management.

Security is important to the bank. They encrypt at the T1 (backbone) level of the packet switching network. Management will assess program success by cost, reliability of communications, and ease in maintenance.

The bank advises other companies involved in network integration to plan very carefully and to know the products they use. Advice for vendors is to work very closely with customers and to give them good support.

F

A Major University
which has Wired its
Campus

This university is presently integrating voice, data, and graphics (facsimile) now, and will add video in the future. It has two networks, fiber with Ethernet LANs, and also an ESS switch for voice and data.

The entire purpose of the networks and the use of network integration is to fulfill the needs of the university community. There are three sites in the network, the main campus and two remote sites. There are 10,000 voice and data connections to terminals and telephones.

The network is evolving to keep the same number of lines however the new #5 ESS will provide better service. The fiber backbone has great potential for future growth, so that there was no deliberate planning for a certain percentage of excess capacity.

The main reason to integrate the network was to spread information and services to all who needed it. Cost was not the driving force. The only negative was the difficulty in integrating video into the network.

The telecommunications department makes network decisions after talking to users. Large projects are approved by the VP for Information Processing. The #5 ESS was a very large project which went to the board of directors for approval. There was no major contract let to construct the network. The telecommunications department managed the process itself; It subcontracted the job of installing fiber optics.

Driving forces for the network are academic needs and heavy computational useage. There is no competitive advantage unless it is felt that universities with better facilities will draw better students and professors.

The goal of the telecommunications department is to have information and communications capacity available when and where it is needed. There are no plans to restrict the use of the network for some types of information to some times.

The most critical concern about the network is the fact that it is vulnerable to faults because there is no alternate routing. The topic of alternate routing was discussed from time to time, but no action was taken. This continues to be a concern.

The university telecommunications department plans to implement the network design by itself without any consulting services or network design services from outsiders. It will monitor and manage the network itself, a task which "is getting easier and easier."

Network security is important, and a special network server is being designed for the task. One of its features is to have passwords (used when data from another computer is needed) automatically cancel in a few hours so that passwords can not be effectively stolen.

Management assesses network success by cost for voice, and by performance (how fast people's needs are being met) for data. Advice for other users planning to integrate their network is to be flexible and to use more

than one technology. Also, have reasonable goals and do not build excessive expectations in the user's minds.

Advice for vendors is to recognize that other people have knowledge, and not to try to sell what is not needed.

G

A Conglomerate, in Manufacturing

This company is planning to implement ISDN based upon a Southwest Bell network and a #5 ESS. It already has fiber and patch panels which allow switching of fiber in some divisions. Voice, data, and graphics are being implemented first; image will be added later.

The network will be integrated (initially) to set standards for future developments and for the divisions. Cost is also an issue. The company thinks they now see only "the tip of the iceberg" for what they will be able to do. The divisions all have their own networks. At headquarters there are six sites, and 5,000 PBX terminations. There are four data centers connected by about 50 lines.

The new network will have a #5 ESS switch and fiber optics lines. Because fiber optics have such a large capability there is a great deal of excess capacity for future growth. The driving force for network integration is cost containment for future services, not current savings. Standards are very important so that different divisions can talk to each other. Negatives in integrating the network include the fact that new standards might not be stable, and there is also the danger of having an obsolete technology.

The telecommunications group made the decision to integrate the network by itself. It took one year to plan the project and to let the RFP. It will take fifteen months to install it. The RFP went to eight companies including Southwest Bell, switch manufacturers, and distributors. All eight responded.

The key to the contract award was reliability. Present applications are "standard" 3270 data applications. But many more new applications are expected. It is hard to quantify how much of a competitive advantage will be obtained from the integrated network, but there will be some. The strategic advantage of the project will be integrating the different company divisions. The key concerns are: Will the standards really be stable? Will new technology make what they buy obsolete?

The company uses vendors to analyze capacity requirements but "leg work" only. Other than that it feels it has a good group and can do its own planning. The company will monitor and manage its own network. It thinks that this is a very important task. It is not open to a vendor providing network facilities management services at headquarters. How-

ever, it might be open to such a service at a division if the division is weak in telecommunications capability.

Several of the company's divisions make their network available to customers and vendors now. It is expected that this trend will continue. The company expects to use EDI to interact with customers and suppliers. Security is very important at some divisions (which use encryption) but not at headquarters.

Management (in the respondent's opinion) has no real understanding of telecommunications. It assesses program success by economics and by reliable operation of the network. Advice for other users planning to integrate their network is to organize the telecommunications group to do it, to plan well, and to have a good staff. Advice for vendors is to become better educated and to know business applications.

H

A Large Manufacturer which has been Integrating its Network for Years

This company has integrated voice, data, graphics, and image now. It has a very large private digital network. The network is in a star configuration, it uses T1, microwave, 56K BPS lines, etc. The network uses Electronic Tandem Nodes (ETN) with AT&T system 85's at the end. They are bypassed for data. There is also a corporate packet switching network.

Actually, video (with compression) is being integrated into the network because the capability exists. The main reason for this extensive project which was started in 1979, was quality, not cost. This is why the network is all digital.

The present network has 26 major sites and hundreds of smaller businesses. It still is evolving. Because large bandwidths were obtained at the project start (1979 to 1983), there is excess capacity for all anticipated needs. The only negative about a private integrated network (in the respondent's opinion) is that if dial-up costs keep dropping and only analog leased lines were used they could not cost-justify it.

In this particular company the telecommunications group decides upon the network capability and design. Users are not involved in the decision. The company has the policy of using all vendors that can resolve its requirements, and has had this policy since 1975. It feels that this approach gives it the most flexibility.

Order entry, manufacturing control, and conferencing all provide cost justification for the network. There are many ways in which the network provides the company with a competitive advantage. Some examples include order entry, which ties customers in to the company's packet

switching network. Customers can also check inventories, status of orders, etc. A unique application is remote monitoring of generators at customers' sites by means of AI. The system can even predict failures.

The company believes that connecting its network to customers and suppliers is very important. It does this now and also participates in numerous industry task forces. Individual corporate data centers control their own communications. They can use bandwidth at night for data transmission if they feel that it is a good idea. In general the company does not need consulting services from vendors. It does use AT&T large modeling capability.

It has been doing its own network design for 15 years. The company monitors and manages its own network and it is a very big function for them. It is not open to a vendor supplying network facilities management. Security is very important. They have a security task force, and already encrypt data, especially for defense locations.

Management assesses success of the telecommunications network by: measuring the cost of outside voice vs. network voice; measuring quality in terms of parameters such as up time, lack of noisy spikes, dropouts, internal user groups, and the opinion of data center managers. Advice to other users planning to integrate their network is to learn technology and to put a percentage of cost savings into network management. Advice to vendors is to deliver what is promised.

I

A Large
Manufacturer which
has just been
Involved in a Merger

This company presently has integrated voice, data, and graphics in its network. It is studying video but at the present time video is not integrated. Voice, data, and graphics, are presently integrated in the networks for each of the companies which have merged. However, the two networks have not been merged yet.

Cost is the key driving force for network integration. The present network has ten nodes and 61 access sites. There are 1100 voice lines and 300 data lines. The new network will consist of T1 pipes, so that a line count is not used by the respondent for sizing. A 20% cost savings is planned, and the project would never have proceeded without the cost savings. However, once the cost savings was justified the T1 pipes provide the flexibility to have virtual networks and dynamic control. Negatives in the decision to integrate the network were the technical risk in having T1 multiplexors connect to a central switch. There were other technical risks.

The project was designed by the telecommunications group which proposed it to management. The project start was August 1985, and it is due for completion April 1987. The RFP was sent in 1985 to only two com-

panies: AT&T and Northern Telecom. Northern Telecom declined to bid (the respondent thinks that their management made a mistake and actually had a chance to win) and thus the project went to AT&T.

Voice communications was the key to major savings. Then data was transmitted on the network at essentially no additional cost. Of all the applications, faster quotations are perceived to provide a competitive advantage.

It is planned that access to Europe for voice and data will be limited to non prime-time (U.S.). Voice mail was installed to facilitate this operation. Vendor consulting services are also important to the respondent. He felt that AT&T could have performed better. It is also important that the vendor can provide help in pulling together the network and in testing and debugging. AT&T has INDS which is a useful testing program.

The company intends to monitor and manage the network itself. It is not open to a vendor providing network facilities management. The company is already providing its customers and suppliers with access to its network. It also uses EDI at the present time.

Security is an important issue and there is a special group which implements it. Management assesses program success without any formal goals. The measure is "if it works."

Advice to other users who are planning to integrate their network is to take control of the project, get substantial bids, and not to be afraid of the unknown. Advice to vendors is to do their homework. Users are sophisticated. Vendors should not sell equipment cheaply and expect to make it up with adds, moves, and changes.

J

A Large Decentralized Manufacturer at the Start of its Planning

This company is planning to integrate voice, data, and graphics. It is not doing so at the present time.

Cost is the first priority after which other benefits will be designed into the network integration project. The company has 175 divisions all of which were previously managed in a completely decentralized manner. Now the company is being combined into three major sectors for resource sharing and for other benefits. It is this consolidation which is providing the driving force for network integration, and indeed for a corporate network. Previously the different divisions had intra-company traffic but very little traffic to each other and to corporate headquarters.

The goals of network integration are not set yet, thus they do not know what cost savings or other benefits to expect. However, they do plan to have customers access the network for each sector when it is constructed.

They also plan to standardize information so that sector business management control can be implemented. There is no plan or time scale in place at the present time for the project.

In the typical purchase process for a PBX, a RFP will go to three to six big (only big) vendors. Typical are AT&T, NTI, Rolm, and the Bell companies. It takes three to four months to make a decision.

They have no concerns about the network integration project because they buy only from major vendors and they expect these major vendors to handle technology in the right way. They do not plan to limit access to the network by time, etc. Perhaps this will change in the future.

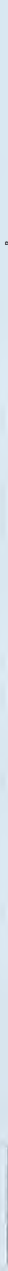
This company might want some help in the area of consulting from vendors but plans to analyze its needs itself. If it needs network design consulting it will not accept it from any vendor which might also supply the network. It will go to an outside firm for neutrality.

The company plans to monitor and manage the network itself at corporate level. However, it will consider network facilities management services for its divisions. Any contracts awarded will go to large reliable vendors. The plan is to let customers and suppliers access the network at the sector level. EDI is also planned. Security is not important now, though perhaps it will be in the future.

Management plans to assess program success by cost savings which the respondent called a "no brainer." Advice to other users is to be careful to have internal plans set. Advice to vendors is not to deal with customers which do not know what they are doing.



Competition and Opportunities





Competition and Opportunities

The market which includes equipment and services for network integration is very important because it deals with the leading edge Fortune 500 / 50 companies. These companies are prime customers because they can spend large amounts of money and because they are reference accounts.

Network Integration is complex and thus there are many different vendors which participate in the market. Exhibit V-1 shows the types of equipment and services which are used to provide network integration.

A

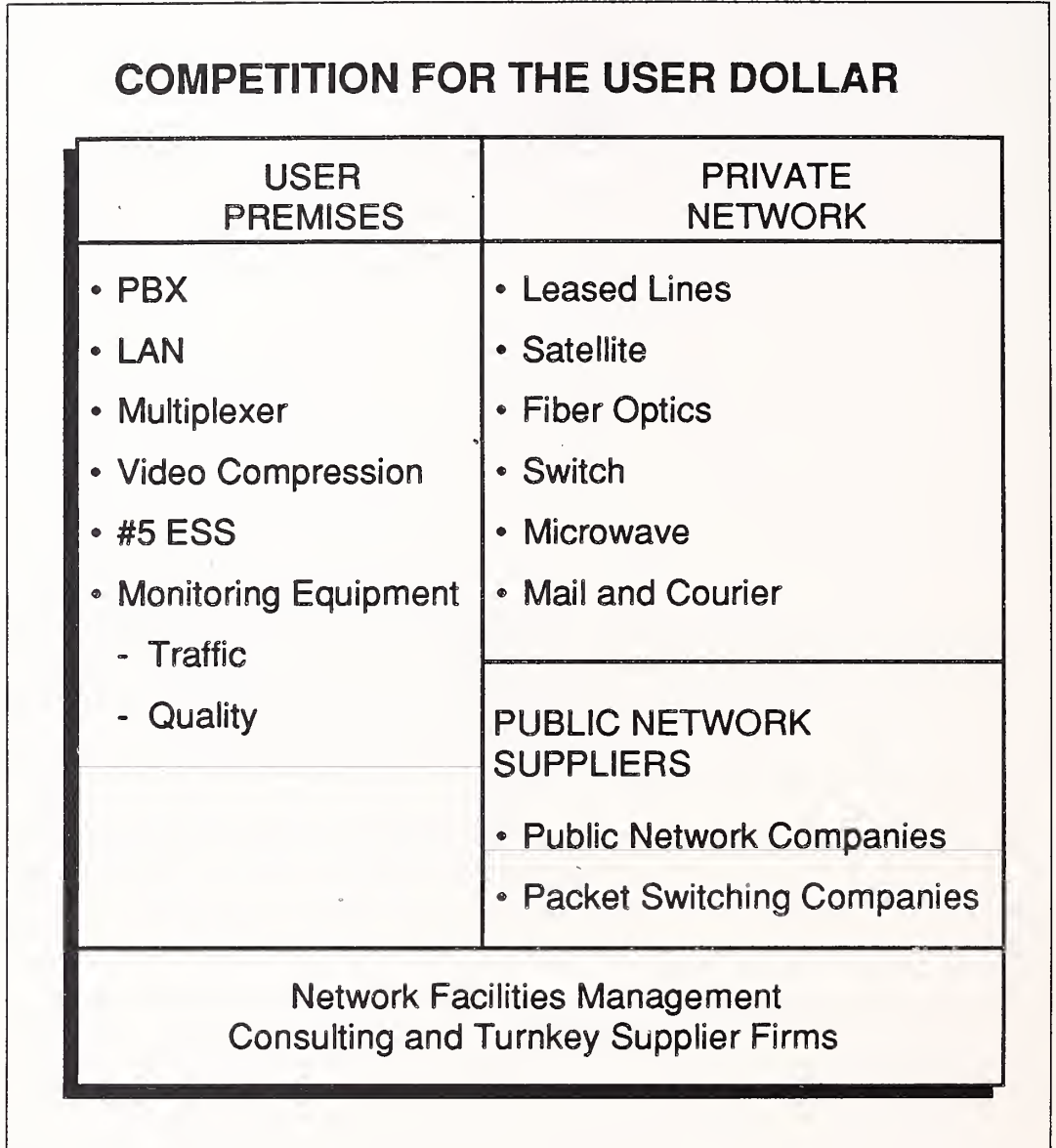
Consulting/ Management Service Suppliers

The bottom of the exhibit shows that firms which provide management consulting, implementation, and operating management assistance to users have a role in network integration. Examples of companies providing this type of consulting are Arthur Andersen, Computer Sciences, Contel, and DMW Group.

Consulting help can range from the design of the new network and its justification for management, to the "leg work" involved in obtaining specific data used for network design. Depending upon the type of support offered, it should be sold to the telecommunications department.

This is contrasted with the sales strategy of some consulting/management service suppliers wherein they sell at the most senior levels in an attempt to take over the entire telecommunications function on a facilities management basis. Clearly this will alienate the telecommunications staff. In some cases network vendors supply this assistance. However, large users may feel that they do not want to get advice from someone "trying to sell them something" and will thus do business with a more neutral consultant.

EXHIBIT V-1



Telecommunications management is sensitive about the capabilities which they do, or do not, have. Thus a good strategy is to position the assistance for divisions which have less staff ability than corporate headquarters. Network Facilities Management is a service for which telecommunications management at headquarters has little interest. They feel that they can do this themselves, and indeed it is their job.

However, case study respondents indicate they will accept network facilities management assistance for the "weaker divisions," where telecommunications managers are not threatened by the loss of a large part of their job, and where they can control the quality of the network facilities management assistance received by the corporation.

Another approach to selling Network Facilities Management, is to follow the example of EDS at General Motors and sell it to the head of the company. This is the same policy which was used by MIS facilities management vendors. It has the advantage of a potentially large contract, together with the disadvantage of not having any support from telecommunications management. There is a potential advantage in having several companies share the same network during network facilities management.

B

Public Network Suppliers

These companies can provide a full network for voice / data / graphics / image. They also offer network management and rerouting in case of failure. The assessment of users and vendors is that they are good for companies:

- With changing needs.
- Which do not want to/or cannot manage their network.

It is generally accepted that the user company gives up a certain amount of control over its network. Start-up (investment) costs are lower (than for a private network), which is essentially a trade for higher running costs.

Some people feel that a company makes the best decision if it uses a private network for its high density sites, and public networks at the "tail of the network."

The same analysis holds for packet switching companies, which compete against internal (private) packet switching networks, and against methods other than packet switching which accomplish the same tasks.

Vendors of public networks should target large companies for parts of its main network or for division networks. Smaller companies which do not have the telecommunications staff of large companies are ideal candidates for the use of public networks.

Of course, unique application or network management services are what really makes public networks attractive.

In selling to large companies particular care should be made to place a dollar value on the additional services which public networks offer. In some companies "soft dollar" analysis will not be accepted and the

vendor has the job of converting "soft dollar" advantages to "hard dollar" cost benefits, by means of market and cost analysis.

C

Network Equipment and Services

This market segment includes equipment which allows a user to construct his own network, generally for shorter distances, such as:

- Microwave links.
- Fiber optics.
- Switches.

Network equipment is sold to users (as well as to the providers of network services). Examples of companies in this category are Network Equipment Technologies, Motorola (Codex), General Datacom, Timeplex, Digital Communications (Cohesive), and Equatorial.

Vendors of equipment should stress the speed of the payback period, and the rate of return which is obtained from the investment. It is also important to stress that the products will not become technically obsolete, as well as their reliability.

The bandwidth capability of microwave and especially fiber optics is sufficient for many years of growth; this is important to many companies.

Leased line communications services, whether terrestrial or satellite, are the backbone of private networks. They are sold as a matter of course to the telecommunications department. Some companies provide network control and consulting services along with the leased lines.

Users vary as to how much of these additional services are wanted. It is a good idea to consider unbundling these (added) services in competitive price situations, so that users can obtain full services or bare bones low-cost services as they wish.

When providing or offering additional help along with the communications services, vendors should be very careful about the sensitivities of user telecommunications management with regard to their expertise.

Network switches can be sold to the very largest users which are trying to implement as many of the network functions as they can themselves.

User concerns in this area include:

- Stability of standards.
- Flexibility of functions.
- Technical obsolescence.
- Reliability.

Mail and courier services are included in this section to point out that competition is not only against electronic services and equipment. There are a lot of cost benefits which mail and courier services have, and a full cost and benefits analysis will include this type of competition.

D

User Premises Equipment

Included in this area are items of equipment which process information (compress, store, change formats, encrypt, etc.) and items which switch and transmit information. Of course, the same equipment can do both.

Competition includes similar equipment from different suppliers, and different ways of doing the same function, such as distributing data by a PBX or by a LAN. There are different selling strategies such as:

- Provide a full system such as a PBX together with LAN and Multiplexer.
- Make business sales connections with system integrators and turnkey suppliers.
- Try to become a system integrator / turnkey supplier.
- Become a low-cost supplier.

Whichever of the strategies (or multiple strategies taken), the key user needs are:

- Adherence to standards.
- Not technically obsolete.
- Reliability.
- Flexibility.

E**The Vendor's Point of View**

This chapter discusses the market as the vendors see it. It is based upon discussions with vendors of:

- PBX Systems Providers.
- Communications Services Suppliers.
- Value Added Communications Network Services.
- Network Integrators (turnkey design and installation).

It is important to note that these interviews represent the vendor point of view. The vendor point of view is compared to the user point of view (presented in Chapter IV) as appropriate in this chapter to present a balanced perspective of the marketplace.

Exhibit V-2 details the type of vendors interviewed and provides a number for that vendor type. This number is used in the subsequent exhibits to provide the summary comments for that particular vendor. Thus in exhibits V-3 through V-9, the number 4 represents the comments of a specific PBX vendor (see exhibit V-2 again); number 6 represents the comments of a network integrator, and so on.

EXHIBIT V-2**VENDOR RESPONDENT TYPES**

1. Public Network
2. Telco
3. PBX
4. PBX
5. Network Equipment/Integrator
6. Network Integrator
7. Public Network
8. Satellite Carrier

1. Significance of Network Integration

Network integration is an important trend in the opinion of the vendors which were interviewed (Exhibit V-3). They all relate its importance and potential to standards and to ISDN. It is important (for market development) that the vendors consider Network Integration as significant or else they would not put the effort into designing the required products and services.

Because the planning process for network integration is long and complex, the sale process is also long, complex, and expensive. Vendors are willing to undertake this effort because Network Integration is an important market for them and represents significant revenue potential.

EXHIBIT V-3

SIGNIFICANCE OF NETWORK INTEGRATION

1. Important trend, users must control costs and applications.
2. Important trend to make information age work, cannot afford information services without it.
3. Increasing importance as users become aware of what is available.
4. Important trend but five years away.
5. Important trend, with new technology users can reduce cost of can increase functions.
6. Important trend, users get bigger "bang for buck", and more important, better performance.
7. Important trend driven by economics and bandwidth availability.
8. Sounds like ISDN, not sure if it makes economic sense in all cases.

2. Driving and Retarding Forces

Network Integration, in the opinion of the vendors, is driven by cost savings and by better performance (Exhibit V-4). The vendors unanimously believe that cost is the largest of the driving forces. It is interesting to note that the users do not uniformly consider cost as the most important of the driving forces. For some users cost reduction is a major reason to become involved with Network Integration. For some other users cost is not a factor at all.

It is very important to know the driving force of a particular user before responding to an RFP for Network Integration. If cost is not the key parameter then the RFP should stress all of the key applications and strategic improvements which can be obtained. If cost is the key parameter then the RFP should stress cost savings. In general, the driving forces as described by the vendors are not a perfect fit with the driving forces listed by the leading edge users in the case studies. The users are much more interested in business applications and improvements, and the vendors talk more about technical improvements. This provides a slightly different perspective even if one considers that technological improvements tend to beget applications improvements.

Retarding forces as viewed by the vendors (Exhibit V-5) are based upon lack of education on the part of the users and the users' concern about the risk. Here again the users do not confirm these opinions. Most of the users interviewed (of course, these are the ones that are proceeding) have little concern with the risk factors.

The users say that vendors should realize that they (the users) have technical expertise, and know just as much as the vendors do. This seems to be one of those difficult areas where the users think that the vendors do not respect their expertise. The vendors that INPUT has interviewed confirmed this attitude.

3. Typical Projects and Users

Network Integration is viewed as a large company market. First, it requires a large company to have a large network to integrate, and secondly, the large companies tend to be leading edge users and Network Integration is a leading-edge development (Exhibit V-6). This assessment was confirmed by the users which INPUT interviewed. They all have sophisticated telecommunications staffs. Most of them think of themselves as leading edge users.

EXHIBIT V-4

DRIVING FORCES

1. Cost savings; better utilization and control of network, necessary to use EDI.
2. Cost; necessary for some applications such as split screens.
3. ISDN and other standards; information can be treated as a resource.
4. Lower cost and network optimization.
5. Cost and the potential for competitive advantage.
6. Mostly cost and increased reliability.
7. Cost; receive an incrementally free network which allows companies to offer new services.
8. Cost savings; if they exist and can combine information.

The vendors feel that the users are only integrating the larger of their sites, and that the smaller sites at the "tail end" of the network will not be involved in Network Integration for a long time, if ever.

The users interviewed confirmed this. Network Integration is viewed as a multi-year project. It can take up to one year to plan for Network Integration and more than one year to implement the project at the major company sites.

This is confirmed by the users who mostly think of Network Integration as an ongoing process because more types of information and more applications will be added to the network. If connecting the communica-

EXHIBIT V-5

RETARDING FORCES

1. Lessening, but the complexity of dealing with many suppliers.
2. Turf issues between the voice and data people, hard to sell to the data people.
3. Lack of education, must find applications.
4. Users lack education on technology; resistance to anything new by managers; average company is scared of ISDN, up-front cost.
5. T1 and other products available to high end companies only, video is still expensive.
6. Up front dollars, but the main thing is fear because the user does not have the expertise and all eggs are in one basket.
7. Reliability, all eggs in one basket, risk of vendor non performance.
8. No overwhelming user need.

tions network of a company to its customers and suppliers, and Electronic Data Interchange is considered to be a part of Network Integration, then it will be a long time before the Network Integration project is completed.

4. Requirements for Successful Network Integration

Exhibit V-7 shows that the vendors think successful Network Integration requires users to be informed about what is technically available and about the use of the network (business applications and the business case). There were also some comments about the need for planning.

EXHIBIT V-6

TYPICAL PROJECTS AND USERS

1. Major companies, banks, retail.
2. Start with ISDN on one large campus and then move out, takes a year to integrate out, Fortune 100 companies.
3. Fortune 500 companies, integrating 10% of their sites and driven by the computer side which is familiar with large projects.
4. Typical projects take one year to plan and up to two years to complete. About 25% of sites are integrated, the project is implemented in one shot, but they keep back up.
5. Fortune 100 companies integrate 25% of sites or less. It takes six months to a year to plan and then six months to a year to implement.
6. Data users are leading the trend. Slow to implement because of the complexity in making the business case. Goal is to integrate all sites but in practice the system will be hybrid with the tail end not integrated.
7. Start with three to five sites, become familiar with vendors, and then go to 20+ sites. Now starting to do 20+ sites all at once. Applications include financial and insurance, retail with video to stores, government for control, highly automated manufacturers such as auto, transportation.
8. ISDN systems, companies are large Fortune 500/50 which use SNA.

The users agree with this. However, they are much more insistent upon the importance of planning, and of a good telecommunications staff. The users seem to have a higher opinion about the capabilities of their (user) telecommunications staff, and the professional way in which they (users) manage products, than the vendors do.

Both users and vendors are effectively saying that Network Integration is a large and complex project. It is very important that this project be managed in a professional manner because it is complex, and technically new.

Both users and vendors also say that business applications and the business case is important. Perhaps technology has made Network Integration possible, but it will be successful only if there are business problems solved in the user companies.

EXHIBIT V-7

REQUIREMENTS FOR SUCCESSFUL NETWORK INTEGRATION

1. Network management is key to success, relatively few users do it well.
2. Must understand applications and have top management support.
3. Be well informed, insist on standard compliance throughout company, plan.
4. Users must look at strategy and benefits to corporation, revenue generation is much more important than cost reduction.
5. Must educate the people in the corporation which actually use the network.
6. Plan well and meet schedules.
7. Planning and choice of a good network service vendor, to augment the telecommunications department expertise.
8. Persuasive business case.

5. Role of PBX

Vendors feel the role of the PBX is to manage information flow and transmission on the premises of the user company (Exhibit V-8). There is not an overwhelming driving force toward making the PBX the center of the Network Integration project. Even the PBX companies interviewed seem to agree with this perception. In addition, the PBX seems to be surrounded with other products which are involved in Network Integration, but are not part of the PBX. For example:

- Local Area Networks (LAN) are separate from the PBX and may or may not transmit through PBX at all.
- Multiplexers are also separate from the PBX and may actually be connected to the network without going through the PBX.
- Video and other wide bandwidth signals are connected to the integrated network or to another network without the PBX.
- Patch panels are used to switch fiber optics, without any PBX involvement.

It would seem that the PBX vendors must decide if they are to be full "network suppliers" by selling and integrating PBX, LANs, Multiplexers, Fiber optics switching gear, etc. If not they have the risk of becoming only a component supplier.

It may or may not be practical to integrate all of the communications support equipment into the PBX. However, it is quite possible to integrate all or these products into one system quotation and maintenance offering.

6. Role of Public Networks

Vendors believe (Exhibit V-9) that the role of public networks can be useful to:

- Fill in geographic applications gaps for private networks.
- Provide software and unique applications.
- Provide network control and monitoring capability.

The users that were interviewed for this report also believe this is the case.

EXHIBIT V-8

ROLE OF THE PBX

1. Improve capability to provide central switching.
2. Problem is low capacity for data, poor connection to and knowledge of the network.
3. Set standards, including control standards so that different manufacturers PBX equipment can control each other.
4. Can implement functions such as store and forward at less busy time. Can connect directly to T1, can provide value-added features.
5. The PBX costs too much and cannot handle network integration.
6. Build relationships with systems integrators, cannot sell standalone.
7. PBX not designed to optimize or manage the network. PBX cannot do real time network management.

Public networks were not mentioned by the users interviewed for this report (except in two cases, where the idea is to phase them out).

It would seem that the providers of public networks must find ways to coexist with private networks, in order to maintain their business position in Fortune 500 companies. Some ideas are:

- Back-up in case of a failure at some sort of back-up fee. This is similar to the disaster recovery services offered by some vendors for computer sites.

EXHIBIT V-9

ROLE OF PUBLIC NETWORKS

1. Use to "fill in" gaps in private network.
2. Provide software and support network management.
3. Provide network management (continuously) to insure optimum performance.
4. Compete to perform applications between PBX and VAN network, better at distributing information.
5. Good for the carriers but the user is losing control and can't manage his network.
6. --
7. Real time network management can be implemented, also re-routing for failure.
8. Sell new services to users.

- Handle the tail-end of the private network.
- Offer unique applications, such as EDI.
- Combine forces with PBX and other system suppliers of hardware.
- Offer very high reliability networks.
- Offer to manage the DIVISION networks for the corporate telecommunications staff.



Conclusions and Recommendations





Conclusions and Recommendations

This chapter presents INPUT's recommendations to present and potential participants in the market for Network Integration, and also summarizes the study.

A

Recommendations to Network Services Vendors

These recommendations are summarized in Exhibit VI-1, for the convenience of the reader.

The largest of the Fortune 500 companies are now actively planning for Network Integration or they are already participating in it. Thus, these are the accounts vendors should focus upon. The window of opportunity is very short. It is important to relate to telecommunications managers while they are planning, and they are planning now.

These accounts are all very different from each other. Even in the same industries each company is doing things differently. For example some people are using fiber optics for very large bandwidth potentials, some are not. Thus, there must be a separate plan for each account. A standard "cookie cutter" approach for each industry will fail.

Network Integration is being driven by benefits and applications far more than it is being driven by cost reductions. Therefore it is necessary to understand the applications and benefits as each particular company perceives them.

Justification to management of Network Integration is also different for each company and is based far more on benefits than costs. Vendors must understand this justification, and match it in their proposals, or else their proposals and analysis will not be accepted.

EXHIBIT VI-1A

RECOMMENDATIONS TO NETWORK SERVICE VENDORS

- Focus upon the largest accounts:
 - Have a separate plan for each account.
 - Learn their applications.
 - Understand how they justify projects (costs, benefits).
 - Be willing to plan for the long term.
 - Relate well to the telecommunications and MIS management.
- Understand standards.
 - Insure that you meet user standard needs.
 - Participate in committees, etc.
 - Know Electronic Data Interchange (EDI)

Vendors must be willing to relate to the users and plan for the long run. Network Integration projects can take over a year to plan and several years to implement. In fact, many of them are evolving situations, not single projects.

It is important to relate well to telecommunications managers who are very sensitive to:

- Being talked down to by vendors.
- Being sold what they do not want.
- Broken promises.

EXHIBIT VI-1B

RECOMMENDATIONS TO NETWORK SERVICE VENDORS (CONT.)

- Relate to equipment manufacturers and to RCS vendors.
 - Make joint proposals as necessary.
 - Understand how they can help you meet specific needs.
- Know how to connect to fiber, microwave, and satellites.
- Learn applications
 - Have industry/applications specialists.
 - Insure that account managers use specialists.

Standards are important for Network Integration because it involves a great amount of different equipment connected to each other. Thus, vendors must insure that they meet the standards (e.g., ISDN, OSI, EDI). The users must know that the vendors have this commitment and that they will keep this commitment over a period of years.

Electronic Data Interchange (EDI) is important to many large users. Vendors should be able to assist them in its implementation. Required is product knowledge and also the participation on committees, sales knowledge, and experience.

EXHIBIT VI-1C

RECOMMENDATIONS TO NETWORK SERVICE VENDORS (CONT.)

- Be flexible in willing to meet user needs and desires.
- Be willing to perform consulting functions as needed:
 - Especially for divisions of large companies.
 - Including network facilities management.
- Be willing to handle the tail end of the network (smaller sites).

Network services cannot function without equipment on the user premises such as PBXs, multiplexers, and LANs. Thus, the network service vendor must relate to the manufacturers of such equipment. This can include:

- Joint proposals.
- Connection of this equipment to fiber optics and microwave if necessary.
- Joint systems design and perhaps joint service relationships.

Benefits are another way of saying applications, and if the vendors do not really understand user applications they will not be able to discuss benefits. Vendors should have central applications groups and insure that the account managers use them.

Flexibility in meeting user needs is important because the users are implementing Network Integration in so many different ways. The vendors should do "what it takes" to help the user. This includes consulting assistance and network facilities management, if it is asked for.

It is likely that this assistance will be wanted for the divisions of large companies, and that is where it should be supplied, even if the divisions are in a different geographic area than the vendor normally services. Vendors should be prepared to support what the users need. If the user needs help at the smaller sites, (i.e., the "tail of the network"), it should be undertaken with the awareness that it can open doors to the bigger sites, and more vendor participation.

B

Recommendations to RCS Vendors

These recommendations are summarized in Exhibit VI-2 for the convenience of the reader.

RCS companies have a great deal of expertise in network design and management. In addition, they are not trying to sell communications equipment or network services to the users. This makes RCS vendors knowledgeable and neutral consultants about Network Integration. This provides a way RCS vendors to participate in the Network Integration market.

Just about all of the large companies will have their own integrated networks, and the great majority of your customers are currently or soon will be connected to these networks. Thus, an important way to reach users is through their own network. RCS vendors should learn how to connect to the networks of their large customers, so that they can easily reach the people who use their services.

RCS vendors should determine if they can make a profitable product line by selling their skills in the consulting area. Turnkey and network facilities management markets should also be considered.

The marketing approach should be to provide assistance to the headquarters telecommunications manager for the division or subsidiary area, or at the tail end of the network. In both of these areas the headquarters telecommunications managers will more likely accept assistance because they are not challenged and because they need the help. Once the relationship is established, it can extend to the network core.

Network service vendors which do not have the applications expertise of RCS vendors might find common ground with RCS companies in meeting the applications needs of large companies. RCS vendors should relate to the network service vendors to seek out these opportunities. Relationships should extend to the tactical level where sales and contacts are made (regional and branch sales).

Develop relationships with manufacturers of hardware such as PBXs and LANs to find applications needs which can be solved by the RCS company together with the hardware company. Joint proposals may be necessary to implement the sales.

Relationships should be made at the product manager level where applications expertise is of interest, and the tactical sales level where the opportunities are found. The smaller of the Fortune 500 companies, as well as the rest of the Fortune 2000, should be targeted if they have the applications needs which RCS vendors can meet. These companies have less expertise than the largest of the Fortune 500 companies and are more willing to accept assistance.

EXHIBIT VI-2

RECOMMENDATIONS TO RCS VENDORS

- Learn how to connect to the networks of large companies.
- Use your own network expertise for consulting.
 - Perhaps turnkey and network facilities management.
- Relate to network service vendors which do not have your application expertise.
 - Especially at the regional sales and account manager level.
- Relate to manufacturers of hardware such as PBXs.
 - Be willing to make joint proposals.
- Try to work with the smaller of the Fortune 500s where you have industry and application expertise.

C**Recommendations to
Hardware Vendors**

Exhibit VI-3 shows that users are concerned about standards because standards are required for compatibility. They need to be sure that they are buying equipment which will implement present and future standards.

Equipment manufacturers must adhere to standards and ensure that the users know about this commitment. It is important for hardware vendors to relate to network service and RCS vendors because system opportunities will develop for these vendors. The relationship should be initiated at the product manager level where market planning is implemented. The relationship should also be maintained at the regional and district sales level where the opportunities actually exist.

The largest accounts will implement Network Integration first. These companies are also very different from each other in how they will design their new networks. Hardware vendors should focus upon these largest accounts and have a separate marketing plan for each one of them. To

EXHIBIT VI-3A**RECOMMENDATIONS TO
HARDWARE VENDORS**

- Know standards and insure that you meet users needs in this area.
- Relate to network service vendors.
 - Make joint proposals when opportunities exist.
- Focus upon the largest accounts.
 - Have a separate plan for each account.
 - Learn their applications.
 - Understand how they justify projects (cost, benefits).
 - Relate well to the telecommunications and MIS management.

EXHIBIT VI-3B

RECOMMENDATIONS TO HARDWARE VENDORS (CONT.)

- Develop technology.
 - Handle large bandwidths.
 - Communications control functions.
 - Protocol and format conversion.
 - Connect to fiber optics and microwave.
- Combine with other manufacturers to have a group which includes PBX, local area network, multiplexers to solve user needs.
 - Joint service and support is always a possibility.
- Be sure that equipment is flexible.
 - Change and grow with user needs.
- Develop an industry expertise, even if it has to be shared with other vendors.
 - Be sure that this industry expertise reaches the field sales force.

market to the largest accounts it is important to learn their applications and also how they justify products. Proposals must match both their applications needs and their approach to project justification.

Relate well to telecommunications managers. Relationships with vendors is a sensitive area for them. It is worth the effort to "do it right."

New technology developments are important for hardware vendors which are involved in Network Integration. Needs exist to handle large bandwidths, control equipment at remote nodes, convert protocols and formats, and connect to microwave and fiber optics.

Most hardware manufacturers do not, by themselves, solve all of the user's needs. A group of hardware vendors working together at the product manager and tactical sales level will have an advantage over other vendors. Hardware vendors should develop such strategic relationships.

Consider the advantages of joint service and support. Better response time and critical mass efficiencies might be obtained.

Equipment must be very flexible because of the varied user needs and different methods each user is taking to implement Network Integration.

Knowledge of industry and applications needs must be developed to insure that users understand how the hardware products meet their needs. This expertise must reach the tactical field sales force, and not just be resident at headquarters.

D

Concluding Remarks

The market for Network Integration is growing very rapidly among the largest users. It is an extremely important market for vendors because:

- The largest Fortune 500 companies are key accounts.
- They are leading-edge users who will set the pattern for other users.

Network Integration is a complex market because every large user seems to be developing its own network solutions.

There are personal relations problems between telecommunications managers and vendors. Vendors who solve these problems will be at a great advantage over vendors who do not solve them.

Standards are very important to insure connectivity. Vendors should really understand what is happening in this area and participate in the process.

Network Integration is a "new wave" in the telecommunications and information processing marketplace. It is a major change in telecommunications, and it is occurring now. It is extremely important for all vendors to understand what is happening and to participate.



Appendix: Vendor Interview Guide





Appendix: Vendor Interview Guide

INPUT is preparing a report on Network Integration, which we define as the combination of voice/data/graphics/ and image in one communications path. We are very interested in your perspectives on these developments.

In exchange for your cooperation we'll send you the executive summary of the report for your personal use.

A

Issues

1. Do you think that this is an important trend? Why?
2. What are the driving forces (advantages) for the users?
Cost savings?
3. What do you think are the retarding forces (disadvantages) for the users?
4. How complete is Network Integration (voice/data/image/graphics)?
5. What are typical user projects in this area?
Percentage of sites integrated?
Timetable?
How are they evolving?
6. Which types of users are leading the trend?
7. Are users implementing Network Integration for internal use only? Or are they integrating suppliers and customers?

8. What concerns do users have about Network Integration? How are they minimized?
9. What is critical for user success?
10. What can cause user failure?
11. What are the advantages and the disadvantages of implementing Network Integration in the following ways?

The PBX?

Special multiplexers and T1 equipment?

Public networks?

Other? (please define)

12. What are the opportunities for vendors in this area?

PBX?

Other Equipment?

Network services?

13. What percentage of users are in the process of implementing Network Integration, to one extent or another?

How will this change over five years?

14. How do you estimate the market and its growth in the following way?

Percent of PBX systems which will have to support Network Integration Now? In five years?

Percent of shipment of other equipment which will have to support network equipment? Now? In five years?

Percentage of private networks (lease lines, or virtual) which will have to support Network Integration now? In five years?

15. What do you think future network requirements are to support Network Integration?

Bandwidth?

Accessibility?

16. What do you think users should do?

17. What do you think vendors should do?

18. Do you have any reference accounts which you would allow us to interview? Any other users you think we should interview?

Thank you. May I check your name and address so that we can send you a summary?

Name:

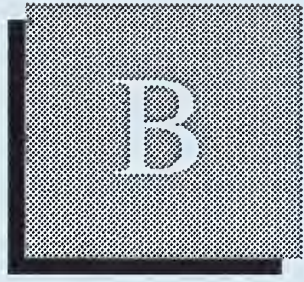
Title:

Company:

Address:

City, state, zip:

Phone:



Appendix: User Questionnaire

.....

B

Appendix: User Questionnaire

My name is _____. I'm with INPUT in the New York area. We're a management planning firm and we're working on a report regarding integration of voice/data/image/graphics. I'd appreciate your perspectives and I think that you'll find the discussion interesting. In return for your cooperation, I'd be happy to send you a copy of the executive summary of the report for your personal use. The interview should take about 15-20 minutes. Is now a good time?

First I would like to discuss definitions.

A PRIVATE NETWORK would be one which is completely managed by your company. It consists of equipment such as tandem switches, T1, and bulk capacity linkages which are owned or leased by you over a long term.

NETWORK SERVICES is defined as the use of a public-switched or packet network, or other method such as satellite or microwave links. It may be dial-up, or you may have dedicated access lines to a network serving office. Generally, the communications equipment attached to the network is provided by the service. The key points, however, are that your company pays by the hour and/or amount of traffic and that the network is managed by the vendor.

NETWORK INTEGRATION is the combination of different types of information for transmission. The types of information are:

- VOICE.
- DATA, defined as text or numbers.
- IMAGE, defined as full speed or slow scan TV.

- GRAPHICS, defined as facsimile, or similar systems such as scanner input.
- FULL NETWORK INTEGRATION is defined as the combination of all four of the information types voice/data/image/graphics.
- PARTIAL NETWORK INTEGRATION is defined as the combination of three of the four, which would be either voice/data/image; or voice/data/graphics.

The integration of data/voice only is not considered Network Integration for this particular study, but is of interest.

1. Are you in the process of “integrating” your network now or are you planning to integrate your network?

If no, terminate. If yes, continue.

2. Could you please describe the project in the following ways:

What types of information are you planning to integrate out of (voice/data/image/graphics)?

Why are you planning to “integrate” your network?

3. Please tell us about your present network (before the integration project).

Number of sites?

How many voice lines are there in the “old network,” defined as number of lines of any distance, and how much do these lines cost?

How much are you paying to transmit image and graphics?

4. Please tell us about your “new network” (integrated).

How many lines (of all types) will there be in the “new network” and how much do these lines cost? How do you apportion this expense among voice/data/graphics/image?

What percent savings are you expecting the “new network” to have over the “old network” for the same applications (voice/data/graphics/image), and for the same sites?

What percent of the “new network” is for planned growth, or to put it another way, are you presently planning your new network to have “excess capacity” now?

5. Are there reasons other than cost for you to integrate your network? Will you please describe them?
6. Were there reasons which were negatives in your decision to integrate your network (retarding forces)? Will you please describe them?
7. What was the process you used to make the decision to integrate your network (Who was involved, how long did it take, what type of justification, etc.)?
8. How long will it take before the “new network” is integrated? Are there phases and milestones? What are they?
9. Please share some project specifics with us:

When was (or will) the RFP be let?

How many companies did you send it to? And who?

How many responded?

When did the first phase start?

What applications are providing the major cost justification (such as order entry, manufacturing control, conferencing, etc.)?

Which applications are perceived to give your firm a competitive advantage (such as better information to the customer, faster quotations, tie-in to customer's network, etc.)?

10. What did you perceive to be your critical concerns about this project?
11. What are the strategic advantages of the project (such as being able to implement just in time shipments for your customers, or providing total shipping data for your customers so they do not have to do it themselves)?
12. What are the tactical advantages of the project (such as faster sales quotes)?
13. Are there any plans to control some applications or to limit network access for certain applications to non-prime-time vs. prime-time?

14. The next questions is about what services you expect from your vendor. Which of the following do you expect? Which are important to you?

Consulting services

Analyze capacity requirements

Systems analysis

Network design

Provide ability to pull together

Assistance in testing and debugging

Custom software/hardware requirements

Network Management

Do you intend to monitor and manage the network?

Are you open to a vendor providing network facilities management?

Besides cost, what key characteristics will you use to award the contract?

15. Is part of your networking plans and proposal to provide services and access to your suppliers or vendors?

Will you relate to your customer/dealers by Electronic Document Interchange (EDI)?

16. What plans are being made for providing network access security?

17. How is your management planning to assess program success?

18. What advice do you have for other users who are planning to integrate their network?

19. What advice do you have for vendors who are involved in Network Integration?

Thank you. May I have your name and address so that we can send you a summary of the report?

Name:

Title:

Company:

Address:

City, state, zip:

Phone:

