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Executive Overview	☐	☐	☐	☐	☐	☐	☐
Complete report	☐	☐	☐	☐	☐	☐	☐
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M&S 633/01 12/89

INPUT

OCTOBER 1990

NETWORK SERVICE OPPORTUNITIES

INPUT®

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Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

Customer Service Program—International (CSP)

Network Service Opportunities

FCLAN • 414/100 • 1990

Abstract

This INPUT report identifies vendor opportunities and user requirements in the emerging market for network service and support. Local-area network (LAN) service requirements are contrasted to network service requirements generally.

The report provides a market forecast for a variety of network services from 1990 to 1995 for both the U.S. and Western Europe. Key user issues are analyzed and special attention is paid to the current and future positioning of customer service organizations in this market.

This report has 72 pages and 62 exhibits.

Table of Contents

Table of Contents (Continued)

Exhibits

Exhibits (Continued)

Exhibits (Continued)

VI

Introduction

Introduction

A

Scope

The following report, *Network Service Opportunities*, is produced by INPUT as part of the 1990 Customer Service Program—International. The report assesses user needs for local-area network (LAN) and wide-area network (WAN) services and identifies opportunities for customer service vendors. The report presents the current market size and forecast for services in the U.S. and Western Europe.

The purpose of this report is to examine the user and vendor issues surrounding network services in the U.S. and Western Europe. The report identifies the user and vendor issues related to network service, and assesses trends in network and network service development generally as well as those specifically pertaining to LAN services. The report provides a market forecast for the related markets in the U.S. and Western Europe, and provides an overview of the status of the network market environment as a whole.

B

Methodology

Research for this report was conducted during the beginning of 1990 and involved focused telephone or face-to-face interviews with 54 network users and telephone or face-to-face interviews with 14 equipment vendors. These interviews were conducted at the headquarters and at the country organization level in Western Europe and the headquarters level in the U.S.

These interviews were analyzed using a combination of spreadsheet programs—dBase III Plus (Ashton-Tate) and ABstat (Anderson Bell). Quality control was applied to the process at every stage from the interviewing process to the data analysis. Exhibit I-1 provides details of the user interview sample.

EXHIBIT I-1

User Sample

Country	Number of Interviews
France	5
Italy	6
Norway	6
Spain	1
West Germany	3
United Kingdom	4
Total Europe	25
United States	29
Total Sample	54

C

Report Structure

Following this introduction, an Executive Overview provides a summary of the main points of the report. Chapter III contains the market forecast and discusses factors relevant to the network market environment. Chapter IV provides identification and discussion of user requirements for network service and analysis of the sources of user network services. The identification of vendor opportunities and discussion of the key vendor issues related to network service and its future development are contained in Chapter V. Chapter VI presents INPUT's recommendation for network service as it relates to the customer services market.

Executive Overview

Executive Overview

A

Full Support—The Key to Network Customer Services

Data communication networks are increasingly critical to user organisations, but the service and support necessary to maintain uptime and accessibility remain fragmented. Few vendors offer comprehensive approaches to network support, thus leaving users underserved and exposed in a vital area of their information systems infrastructure. INPUT's new research study, *Network Service Opportunities,* recommends that vendors develop offerings to exploit the opportunities available.

As networks become more critical, the support of networks also becomes critical. The support of data communications networks is a complex task because of the technical complexity of network systems, the existence of a multitude of standards, the lack of network operational experience and the needs of network management not being fully understood. Additionally, considerable user confusion exists over network support needs and the likely development of networks.

A high proportion of vendors have made little progress in addressing the key issues and the full scope of network service needs. Many vendors approach the market on a narrow basis and do not meet requirements for full network support.

Network service can cover broad areas that include components of professional services, transmission services, and equipment. These services can be delivered as a *network integration* service or a *network systems operations* service. Exhibit II-1 summarizes these relationships.

The bulk of this report will focus on professional services as part of network systems operations, since this is an area that has, in INPUT's opinion, the most opportunity for customer service organizations. Large network integration projects will often not be within the scope of customer service organizations' capabilities; however, smaller projects—often associated with network systems operations activities—will often be very attractive opportunities and will be fully discussed in this report.

EXHIBIT II-1

Network Service Overview

	Network Integration	Network Systems Operations
Professional Services	Requirements/design consulting Implementation/ installation (equipment, circuits, software)	Problem management (diagnosis and restoration; hardware and software) Capacity planning and management Network administration (including configuration management and management reporting
Products/Other Services	Equipment provisioning (including owned circuits) Software products	Supplying or arranging transmission-related services

B

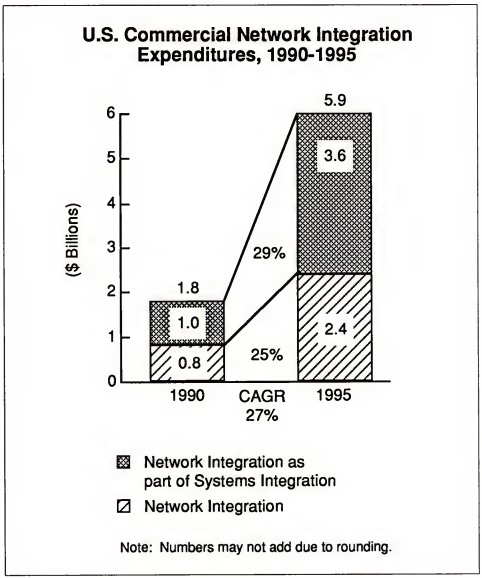
Network Service Market Opportunities

1. Network Integration

Large-scale network integration will, in most cases, not be an immediate opportunity for most customer service organizations.

- However, the size and exemplary growth of this market should be noted for long-term planning purposes (see Exhibit II-2).
- Smaller design and implementation projects will often be quite attractive in connection with network systems operations contracts.

EXHIBIT II-2



2. Network Systems Operations

Network systems operations also shows good growth, as portrayed in Exhibit II-3.

- The local-area network service market accounts for over $400 million in the U.S. and an additional $200 million in Western Europe, as shown in Exhibit II-4.

The pattern of network implementation between the U.S. and Western Europe is likely to follow similar trends, the major differences being the relative sizes of the two markets.

EXHIBIT II-3

U.S. Network Systems Operations Expenditure Forecast 1990-1995

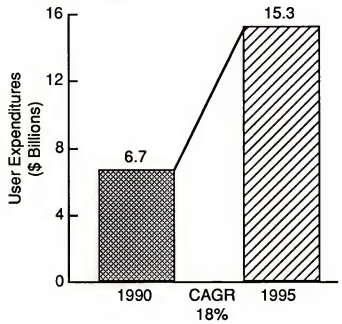


EXHIBIT II-4

LAN Service Market Growth 1990-1995

Market	User Expenditure ($ Millions) 1990	1995	CAGR (Percent)
U.S.	420	960	18
Western Europe	220	580	22

Market growth of network services is forecast at about 20% CAGR; although this rate does not reduce the need for vendors to be cautious in addressing this market, it must be recognized that growth figures forecast are significantly higher than those for the overall customer services market—where growth is forecast at around 6-7% CAGR.

One feature of network service that was mentioned by both vendors and users is the relative reliability of equipment—thus reducing the requirement for maintenance and, therefore, opportunities in this aspect of service.

3. Market Growth Factors

Factors that influence the growth of network services are listed in Exhibit II-5.

EXHIBIT II-5

Network Service Market Growth Factors

- Market drivers
  - Increasing service base
  - New applications
  - User service needs
- Market inhibitors
  - User self-service
  - User acceptance of service needs
  - Limited opportunities for traditional customer services

One of the major factors driving the growth of network services is the increasing base of network installation. Growth of installed LAN equipment in the U.S. and Western Europe is in the region of 30% CAGR. For example, INPUT estimates that almost 60% of all personal computers in the U.S. will be networked by 1991, a percentage similar to that in Western Europe.

Part of the growth in the installed base of networks is driven by new user applications; the result is an influence on the growth of user service needs.

One factor inhibiting the growth of network service is that users sometimes opt for self-service—usually experienced users in larger companies. A second factor is the high percentage of users who do not recognise the existence of or the need for a formal network services contract.

Limited opportunities for traditional customer services relate mainly to equipment maintenance. Once installed, network equipment is perceived to require relatively little maintenance compared with computer equipment; the result is a reduction in demand for maintenance relative to other services.

C

Significant Market Issues

1. Non-Uniformity

Exhibit II-6 shows that the LAN service market is now strikingly different in many of its characteristics compared to the market for WAN service. This can be a problem to vendors, in that the market environment will continue to change. It also represents opportunity to vendors, since there will be a constant need for new services and new ways of delivering existing services.

EXHIBIT II-6

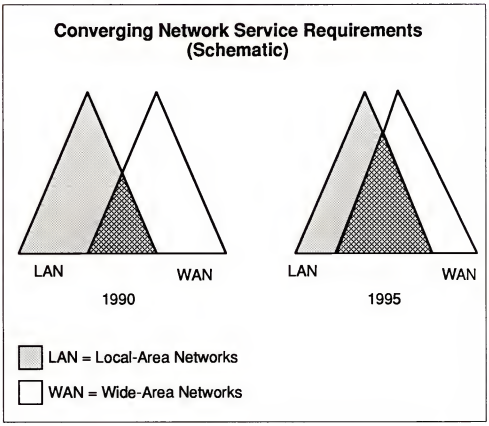
Critical Differences in Wide-Area and Local-Area Networks

Characteristics	Wide-Area Networks	Local-Area Networks
Network importance to customer	Very high	Varies widely, often low
Networking standards and protocols	IBM (de facto)	No vendor dominates
Networking software	IBM (de facto)	Multiple vendors
Maturity of network management tools	Medium	Low
Network management skills	Defined	Being defined
Network management organization	Within IS	Widely dispersed, often informal
Network management costs (corporate)	Very high ($15+ billion)	Being defined
Outsourcing of network operation	Occurring; issues understood	Issues being defined

2. Convergence

INPUT sees a gradual convergence in the requirements for wide-area network (WAN) support and LAN support throughout the remainder of the 1990s, as shown graphically in Exhibit II-7. However, these markets now differ appreciably in size, sophistication, and requirements. One of the challenges facing vendors in this market is the ability to structure a service offering that will meet the evolving needs of this market.

EXHIBIT II-7



3. New Skill Profile

Servicing of computer systems and networks requires a different mix of skills. Exhibit II-8 presents INPUT's views on the relative importance rating of skills in these two differing environments.

EXHIBIT II-8

Service Skill Profile

Service	Importance Rating	
	Computer Systems	Networks
Consulting	Medium	High
Environmental/ installation services	Medium	High
Project management/ implementation	Low	Medium
Applications support	Low	Medium
Systems software support	High	High
Equipment maintenance	High	Low/Medium

The predominant difference in the importance of skills is in relation to the network environment.

- Equipment maintenance plays a less significant role because of the relative high reliability of network equipment.

- More emphasis is placed on the need for software orientation and consulting skills. The reason for this emphasis is the need to support users who implement networks, particularly less experienced users, and to provide the specific type of support required by networks.

These new skills can be applied in the areas of network management and applications support.

The network environment tends to be more solution-oriented than computer systems, and more complex. Also, there is a likelihood that some users will be less experienced in networks than in computer systems. Importance ratings for the various services could vary, depending on the experience level of the user.

The requirement of network service is for skill profiles to be more biased towards professional services and less towards the "traditional" customer services. As noted in the preceding section, INPUT expects LAN service skill sets to continue to evolve.

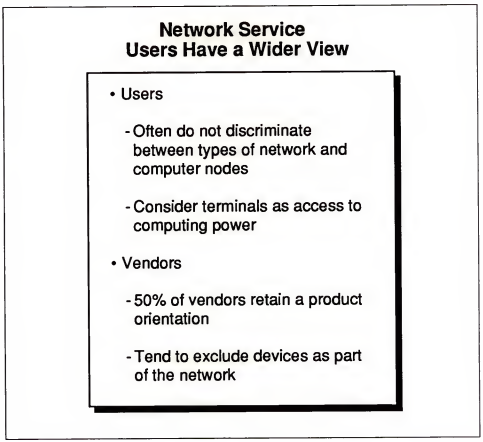
D

Meeting User Needs

1. Users Have a Wider View

As indicated by Exhibit II-9, users tend to take a wider view of networks than do vendors. This view can be summarized as follows:

EXHIBIT II-9



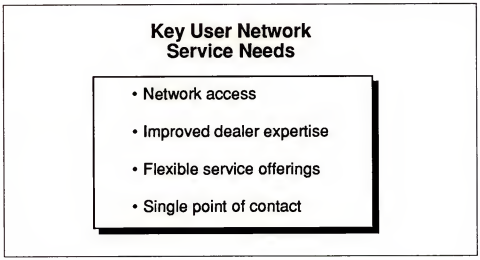
- Users tend to consider that a network encompasses all the elements that are connected. For example, interconnection between LANs, WANs, file servers and the main computer is considered a network by users.
- A "terminal" (including linked PCs or workstations) is considered a means of providing desktop access to a company's computing power—including access to graphics, CAD/CAM, data bases and communications.

This wider view is shared to varying degrees by vendors, but approximately 50% of vendors take a narrower view than users. For example, the narrowest view encountered during INPUT's survey of service vendors defined a LAN as dedicated cabling and device connections. Vendors who are more attuned to the network environment expressed a view that more closely matched that of the users. Vendors need to reappraise their more product-oriented approach in order to better understand the needs of users.

2. Key User Network Service Needs

Exhibit II-10 lists the key user needs for network service; in generic terms, these needs could be consolidated into a need for access to the network on demand. One requirement is to keep the network open for the needs of users and the users' business requirements. Embedded in this basic user need is a requirement for early detection of potential network problems in order to allow proactive responses.

EXHIBIT II-10



Support of smaller or inexperienced users requires special consideration.

- Smaller users tend to be driven towards the equipment vendor's distribution or dealer channels, a process that isolates the small users from the level of support that can be provided by the equipment vendor. Lack of dealer network knowledge and expertise can be an issue; the small user encounters difficulty in accessing the equipment vendor.

- Inexperienced users require above-normal levels of support when installing and operating networks. Inexperienced users also tend to be the smaller users. Equipment vendors need to develop service offerings, through dealer channels if necessary, to ensure that adequate levels of support are provided.

Flexible service offerings are required to satisfy the needs of a wide range of users, from large experienced users to smaller or inexperienced ones. Options are for the vendor to match individual needs or to provide a tiered structure of services.

Users highlighted the need for a single point-of-service contact because of the necessity of dealing with a number of suppliers and the possibility of falling between responsibility demarcation lines. Also highlighted was the need for a central help desk facility.

3. Meeting User Needs

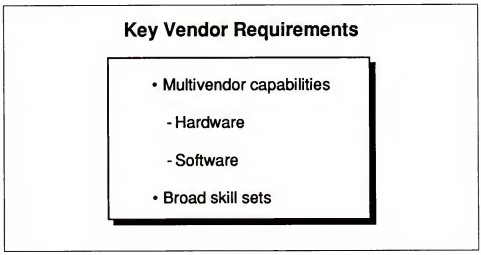
User networks increasingly function in a multivendor environment.

- Networks are, by definition, the means of tying together different hardware platforms. These different platforms are no longer limited to IBM and DEC hosts, but can include a variety of PCs and workstations that, increasingly, communicate with each other.

- Becoming even more important are the protocols and software that make up the network itself. Just as "hardware" maintenance encompasses a broader variety of software skills, network support and services are increasingly hardware-driven.

The skill sets to support these activities are having to expand also. Network service support must not only cover the different hardware and software capabilities discussed above, but must also add design, consulting, and management skills to technical skill sets. Exhibit II-11 summarizes these requirements.

EXHIBIT II-11



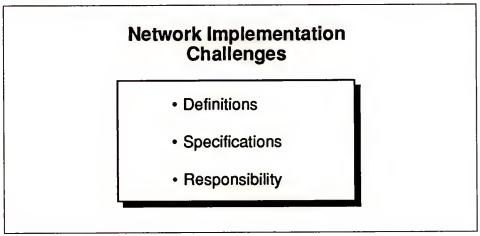
E

Vendor Opportunities

1. Challenges

The implementation of a network can pose special challenges for users; these challenges are listed in Exhibit II-12. The severity of any problems associated with network implementation is heavily dependent on both the experience of the user and the methodology chosen for implementation.

EXHIBIT II-12



The potential for network implementation problems is at its highest when the user is not only inexperienced, but also decides to subcontract implementation to a number of different suppliers or vendors. Briefly, those problems can be summarized as follows:

- In the case where the user is inexperienced in networks, it is likely that the requirements for defining the network will only be understood at a superficial level. Further, the need to specify the network in sufficiently definitive and specific terms may be beyond the user's capability. The result may be that the user produces a document that relates to an idea, not to a network specification, and may not have clearly thought out all the implications and business needs for the network.

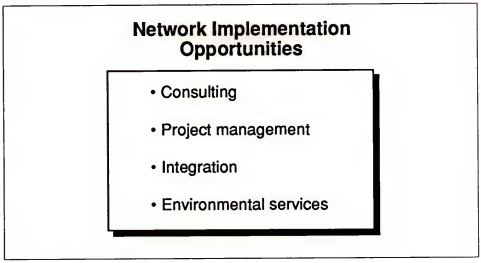
- Effective implementation of a network using a number of different subcontractors requires that the user also has a good appreciation of the need for project management and the skills to apply them. Failure to achieve effective project management control and coordination of the activities of subcontractors can be a recipe for disaster. Responsibilities of subcontractors need to be very clearly defined; otherwise, disputes can arise, resulting in protracted delays and ineffective implementation.

- When implementing a network, the design phase needs to consider future as well as current needs. Failure to achieve an implementation that allows for future growth can result in premature obsolescence and subsequent need or unnecessary and unplanned expenditure to correct deficiencies.

2. Opportunities

Lack of user skills to achieve successful implementation of a network can create opportunities for service vendors. These opportunities are listed in Exhibit II-13. Network implementation opportunities for vendors range from consultancy services to full project management. At the consulting level, the vendor is able to advise and assist the user in defining and specifying the implementation required, and also to help ensure that adequate potential for future expansion and growth of the network is planned at the implementation phase.

EXHIBIT II-13



Should the opportunity exist, the vendor could assume full project management responsibility for the network implementation, and could:

- Verify and monitor the specifications related to the implementation
- Coordinate and define the activities of the subcontractors involved in the project
- Undertake the tasks associated with verification and testing of the network when completed

Additional opportunities for vendors also exist. If the vendor can provide a cabling service, the opportunity to take advantage of using those resources is presented. The vendor could also undertake the task of integrating the network with the user's computer system, and could provide consulting services for software development.

Vendors undertaking project management responsibility, particularly for inexperienced users, can prevent the risk of unsatisfactory implementation, which can cause problems for the vendor providing network service.

Virtually every type of hardware and service vendor has at least some of the capabilities for servicing this market. No type of vendor presently offers a full set of capabilities; customer service organizations are at least as well suited as any other type of vendor to make the transition to providing full network service offerings. Exhibit II-14 examines the potential for selected types of vendors to offer network service.

EXHIBIT II-14

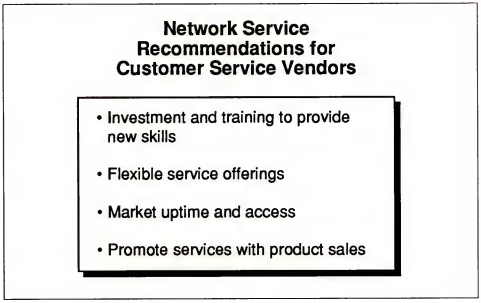
Potential for Selected Types of Vendors to Offer Network Service

Type of Vendor	Strengths	Weaknesses
Customer service organization	• Service orientation • Increasing network and software orientation • Geographic coverage	• Historic hardware orientation • Competition from other divisions
System integrator	• Broad technical skills • Software-oriented • Multiple-platform experience	• Development, not service, orientation • Usually, the network and hardware skills
Software products company	• Software and software support knowledge	• Often little communications experience • Product-oriented

3. Recommendations for Customer Service

INPUT's recommendations for customer service vendors are listed in Exhibit II-15. In order to be positioned to provide a wide range of services, vendors will need to invest in training and recruitment to develop the skill levels required. Two such skills are consulting and installation.

EXHIBIT II-15



Network services are required by a wide range of users. Customer service vendors should structure service offerings keeping in mind that the needs of large, small, experienced and inexperienced users will vary. The key user need is for network access. Vendors should market uptime and access.

User interest in network service is likely to be higher at the network conception/implementation phase. Vendors should develop a solution-oriented approach and promote services at the time of initial network negotiations.

Due to the relatively early stage of development of the network market, and taking into account the complex nature of the market, INPUT recommends cautious tactical development of service offerings. INPUT also recommends that vendors consider investment in training and skill levels to take advantage of opportunities for providing multivendor, professional services, and management services.

Market Forecast

Market Forecast

A

Network Service Components

The total network service market consists of:

- Network integration services
- Network systems operations services

These are in turn divided into:

- Professional services
- Products and other services (these include both the actual provisioning of circuits as well as the direct supply of or contracting with a third party for transmission services)

Exhibit III-1 summarizes the major components in matrix form. The focus of this report is primarily on the professional services segment, because:

- Professional services are increasingly the "glue" that holds together other products and services
- Equipment and transmission services are virtual commodities
- Professional services are a logical entry point for newcomers

EXHIBIT III-1

Network Service Components

	Network Integration	Network Systems Operations
Professional Services	Requirements/design consulting Implementation/ installation (equipment, circuits, software)	Problem management (diagnosis and restoration; hardware and software) Capacity planning and management Network administration (including configuration management and management reporting
Products/Other Services	Equipment provisioning (including owned circuits) Software products	Supplying or arranging transmission-related services

Exhibits III-2 and III-3 describe the major professional services functions within network service.

- INPUT believes that customer service organizations are well-suited to offer the full array of network systems operations services.
- In addition, the parts of network integration that are *not* application-driven megaprojects offer ongoing opportunities to customer service organizations (see Exhibit III-4).

EXHIBIT III-2

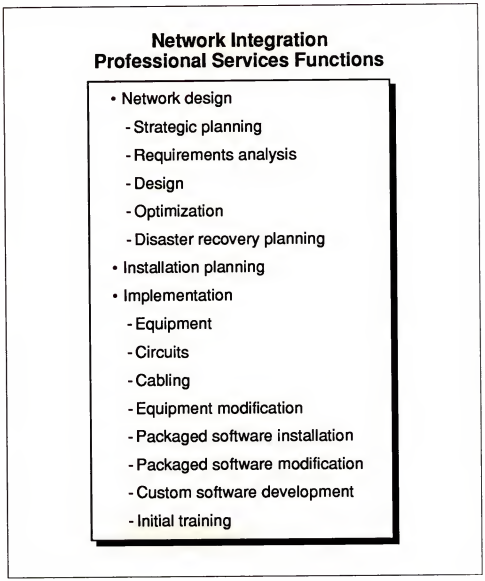


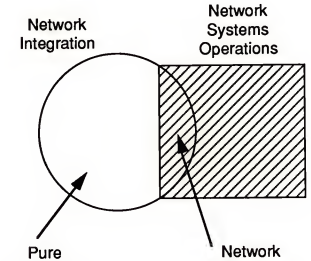
EXHIBIT III-3

Network Systems Operations Professional Services Functions

- Configuration management
  - Network inventory
  - Alternate routes
- Problem management
  - Monitoring
  - Diagnosis
  - Bypassing
  - Restoral
  - Training
- Capacity management
  - Traffic measurement
  - Performance measurement
  - Forecasting
- Network administration
  - Order handling
  - Equipment catalog
  - Directory
  - User billing
- Management reporting
  - Expense
  - Organisation
  - Training
  - User assistance

EXHIBIT III-4

Overlap of Network Integration and Network Systems Operations



Megaprojects	vs.	Smaller projects
Application-driven	vs.	Little applications content
Standalone projects	vs.	Evolutionary changes

Another "cut" of the market is between network service involving the more traditional wide-area networks (WANs) and local-area networks (LANs). Although INPUT believes that the characteristics of these WANs and LANs will increasingly converge, at present the differences are pronounced.

- Network importance to the customer organization: Currently, WANs carrying data are important in most organizations, often supporting strategic applications; such networks are becoming even more important. The importance of LANs, on the other hand, varies widely. A LAN that exists for the convenience and economy of shared file servers and output devices, for example, is of marginal strategic importance to an organization.

- Network standards and protocols are heavily influenced by de facto IBM standards (e.g., SNA and its variants). However, in LAN environments there is far more heterogeneity in both hardware and software.

Exhibit III-5 summarizes these differences. The LAN area is far more fuzzy and ill-defined in general. However, this is as much an opportunity as a problem.

EXHIBIT III-5

Critical Differences in Wide-Area and Local-Area Networks

Characteristics	Wide-Area Networks	Local-Area Networks
Network importance to customer	Very high	Varies widely, often low
Networking standards and protocols	IBM (de facto)	No vendor dominates
Networking software	IBM (de facto)	Multiple vendors
Maturity of network management tools	Medium	Low
Network management skills	Defined	Being defined
Network management organization	Within IS	Widely dispersed, often informal
Network management costs (corporate)	Very high ($15+ billion)	Being defined
Outsourcing of network operation	Occurring; issues understood	Issues being defined

B

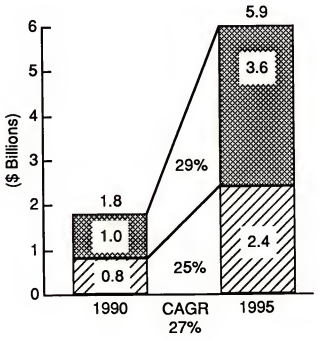
Market Forecast

Although this report does not intend to focus on the entire network service market, it is important to understand the larger market dynamics which exist:

- Exhibit III-6 shows the size and expected growth of the U.S. commercial (i.e., non-federal) network integration market. Note that over one-half is already associated with systems integration projects, i.e., is usually so large and complex as to be of interest only to well-established integrators.

EXHIBIT III-6

U.S. Commercial Network Integration Expenditures, 1990-1995

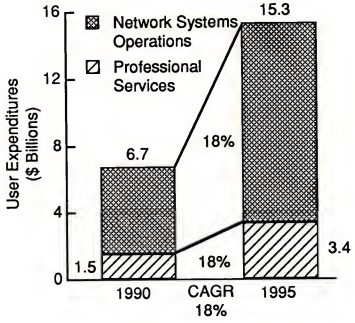


Note: Numbers may not add due to rounding.

Source: *Network Integration, 1990-1995* (from INPUT's Systems Integration Program)

- Exhibit III-7 shows the size and expected growth of the overall U.S. network systems operations market. (INPUT estimates that less than one-quarter of this market is currently made up of professional services.)

EXHIBIT III-7



Source: *Network Operations Management, 1990-1995* (from INPUT's Systems Operations Program)

Exhibit III-8 presents INPUT's forecast for the growth of the local-area network (LAN) services market in the U.S. and Western Europe over the period 1990 to 1995. Also shown in this exhibit is INPUT's estimate for the growth of network equipment over the same five-year period, to allow comparison of the relative growth rates.

LAN services are estimated to have a of 20% compound annual growth rate (CAGR) over this five-year period. These growth rates are significantly higher than those forecast for the customer services market overall, which are likely to have a 6-7% CAGR over the same five-year period.

In keeping with INPUT's practice, market forecasts are expressed in current rates (1990) and therefore include an allowance for inflation. (See INPUT's Market Analysis and Planning vertical reports for inflation factors.)

EXHIBIT III-8

Local-Area Network Service Market Growth 1990-1995

Market	Market Sector	User Expenditure ($ Millions) 1990	1995	CAGR (Percent)
U.S.	Network Equipment	3,100	12,400	32
	Network Service	420	960	18
Western Europe	Network Equipment	1,600	6,800	34
	Network Service	220	580	22

The LAN service market is expected to grow at a slower rate than the LAN equipment market, due to the impact of new technology which is continuing to improve the reliability of equipment and reduce the need for traditional maintenance services.

C

Factors Affecting Growth

Exhibit III-9 lists the factors that INPUT considers the primary influences on the growth of network service.

One of the key factors driving the growth of network service is the increasing base of LANs and related equipment. LAN installations will have a CAGR of more than 30% over the period 1990 to 1995, both in the U.S. and in Western Europe. In support of this growth, INPUT estimates that by 1991 almost 60% of all personal computers in the U.S. will be networked and that similar, parallel developments of the market are occurring in Western Europe.

EXHIBIT III-9

Network Service Market Growth Factors

- Drivers
  - Increasing service base of installed equipment
  - New user applications
  - User service needs
  - At least one-third of users do not have formal service contracts
- Inhibitors
  - >25% of users opt for in-house-provided services
  - Only 10% of users indicate a requirement for additional vendor service
  - Users resist the need for a formal service contract
  - Opportunities for traditional customer services are limited

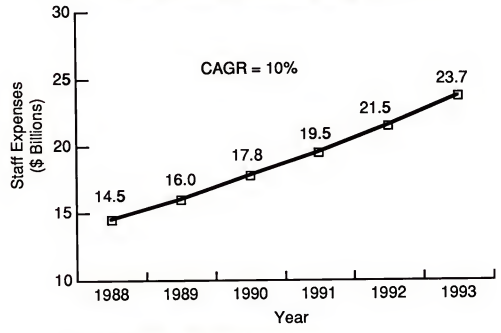
A portion of the growth of the installed base of networks is driven by users' implementing new applications that increase the installed base and extend existing networks. As the installed base of networks increases, so does the complexity of existing and new installations. This environment creates and stimulates a user need for service, which in turn stimulates the growth of customer service revenues for network service. The sheer weight of expense for corporate network mangement staff will act as a long-range driver for this market, as is shown in Exhibit III-10.

A factor inhibiting the growth of network service is the relatively high percentage of LAN sites (about 50% of the overall sample) that have opted for the provision of self-service covering a wide range of network services. Users making this choice tend to be larger, more experienced users; penetration of this portion of the market by customer service may be difficult and long-term.

This is consistent with the experience that customer service organizations have had in providing ancillary services generally: PC/workstation sites generally rate these services lower than sites with larger machines (see Exhibit III-11).

EXHIBIT III-10

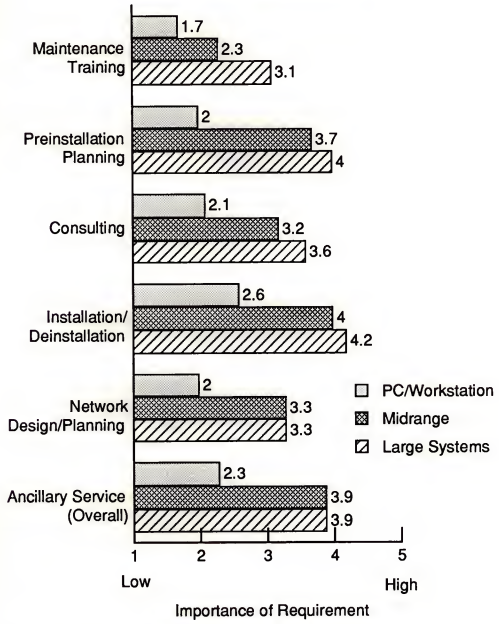
Expenditures in Companies of Over 500 Employees for Network Management Staff



Source: *Network Operations Management, 1990-1995* (from INPUT's Systems Operations Program)

EXHIBIT III-11

Ancillary Service Requirements



Source: *U.S. Customer Service Market Analysis* (April 1990)

Key User Needs

IV

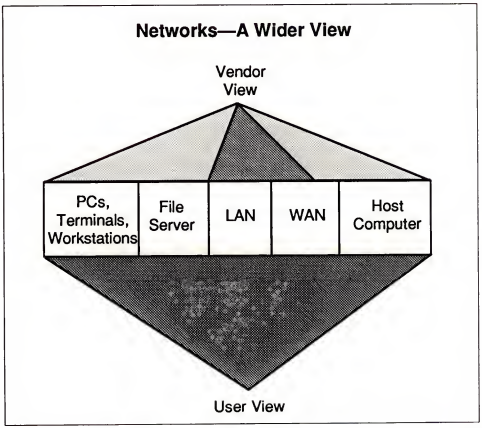
Key User Needs

A

User Networking

Users tend to have a wider view of networks than do vendors. The differences in viewpoint are illustrated in Exhibit IV-1. About 50% of vendors show a more product-oriented approach to networks, discriminating between a local-area network (LAN) and a wide-area network (WAN). An example of this narrower view was provided during interviews with vendors, when a LAN was described as including only the dedicated cabling system and the connections to the terminals. Vendors representing the narrower view believe that connected devices, such as terminals, are not part of the network.

EXHIBIT IV-1

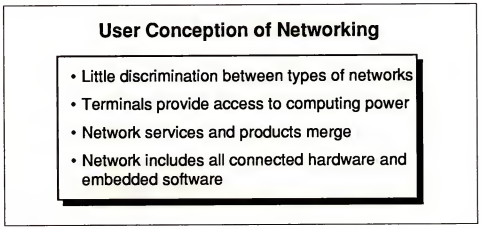


Compared with this vendor view, users have a much wider view of networks, a view that encompasses networking as well as networks. As illustrated by Exhibit IV-1, users believe that a network includes all connected devices, and do not discriminate between LANs, WANs, clustered systems or distributed processing systems.

Vendors more attuned to the networking environment tend to take a much less restrictive view which matches that taken by users.

Factors that describe the user conception of networking are listed in Exhibit IV-2. Apart from not discriminating between types of networks, users tend to consider that networks provide desktop access to computing power in the form of messaging, transaction processing, graphics, files and data bases. This conception applies whether the system is localized or dispersed.

EXHIBIT IV-2



Users become more solution-oriented as network products and services merge. For example, a network provides a solution to a business need—whether the need is the network or supporting services. Therefore, the following components of the network become transparent and tend to merge to form the network solution:

- Computer equipment
- File servers
- Cabling
- Terminals
- Applications
- Network management and support services
- Communications

Although many users do not discriminate between WANs and LANs from a needs standpoint, objectively speaking, there are many technical and usage differences between the two environments, as discussed in Chapter III and summarized in Exhibit III-5.

INPUT sees that there are numerous factors that both accelerate (Exhibit IV-3) and discourage (Exhibit IV-4) the convergence of LANs and WANs. On the whole, INPUT sees a steady convergence of needs, technical environments and vendor offerings for these environments.

EXHIBIT IV-3

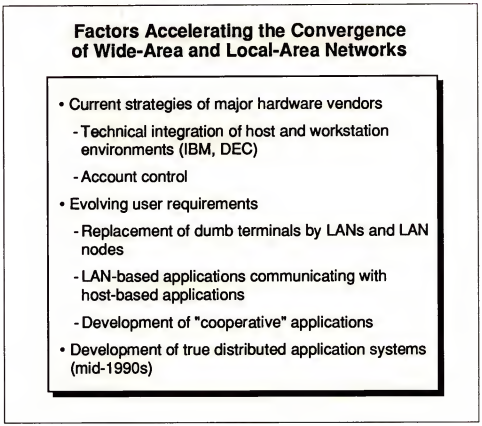
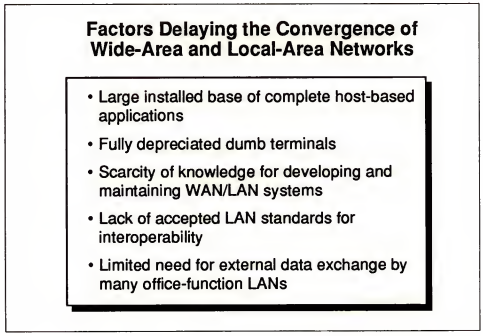


EXHIBIT IV-4



B

User Network Service Requirements

Exhibit IV-5 presents the key user requirements for network service.

EXHIBIT IV-5

Key User Network Service Requirements

1. Access and uptime
2. Early detection of problems
3. Resolution of small-user problems
   - Lack of vendor support
   - Lack of dealer expertise
4. Resolution of difficulties of inexperienced users
   - Vendor service offerings and effectiveness
   - Security and prevention of system corruption
5. Vendor flexibility in service offerings
6. Provision of:
   - Single point of service contract
   - Central help desk
7. Remote network monitoring and management

1. Access

The primary user requirement is for access to the network on demand. Waiting for access—to files, for example—can be a source of user frustration and annoyance. Delayed access can also result in productivity losses for the user. For example, on a network of 1,000 terminals, each individual user experiencing a five-second access delay results in a 1.4-hour productivity loss per access across the user base. Part of the access requirement is a need for early detection of problems or potential problems, a requirement becoming more critical as networks evolve, become more complex and have higher levels of line traffic. Early detection of problems allows the user to take proactive action and if necessary implement contingency plans—for example, restricting nonessential traffic.

2. Small Users

The requirements of smaller network users raise specific issues for vendors. These requirements can be summarized as follows:

- Smaller users tend to be directed towards the equipment vendor's dealer or distributor channels for supply of equipment. The issue raised by users was the lack of dealer expertise in most aspects of network implementation and support. The fact that smaller users tend to be less experienced compounds the lack of dealer expertise.
- Small users being supplied through the equipment vendor's dealer channels tend to become isolated from the equipment vendor's support services in circumstances where the need for expertise is high.

3. Inexperienced Users

Inexperienced users tend also to be smaller users, and not only suffer from the same problems, such as lack of dealer expertise, but also require additional support. One characteristic of this group of users is that they lack the experience to operate the network effectively and also lack the budget required to fund external support services. The term *inexperienced user* also applies to the personnel accessing the network via terminals. One problem mentioned by a user was inexperienced terminal users who inadvertently accessed the terminal or network operating system and consequently corrupted files.

C

Future User Requirements

When questioned about future requirements, the responses from users focused on network developments rather than service developments, providing further confirmation that products and service are merging. Key user requirements for network evolution are listed in Exhibit IV-6.

EXHIBIT IV-6

Network Evolution—Key User Requirements

1. Move from proprietary to nonproprietary network solutions
2. Increased desk-level processing power
3. Increased network access to computing power
4. Remote network management and monitoring
5. Improvements in user friendliness of networks

The primary future requirement mentioned by users was a need for open network standards. Larger users are concerned that proprietary standards will restrict growth and flexibility and create a captive environment for the equipment vendors (*lock-in* was the term used). However, the differing views of users reflect concerns and confusion over open standards, for example:

- One user commented that future network development contracts will likely go to an independent vendor that would supply a customized network using standard elements, thereby allowing a future progression path that incorporates flexibility.
- A second user remarked that any company decision regarding network development would need very careful consideration because of concern over the continuity of current standards.

Users see a need for increased desk-level processing power and access to computing power. This trend has two aspects. The first is replacing existing dumb terminals with intelligent terminals, and the second is a need for increased sophistication of intelligent terminals. One objective is to reduce line traffic demands; the other objective is to increase desk-level processing power.

The implementation of remote network monitoring and management was considered a likely future development. However, a need for caution was highlighted, in that implementation needs careful consideration. The larger users tend to feel that as networks increase in complexity and traffic levels increase, remote management technology is the key to ensuring that the network is kept open.

A requirement for increased user friendliness of networks was also indicated by users. One aspect of this need was for DOS application packages that will do what the user wants. A further aspect was the need to accommodate and provide ease of access for less experienced terminal users because of the continuing penetration of the office environment by networked terminals. Improvement in the user friendliness of networks has the potential to reduce user training costs and allow the use of less skilled terminal operators, which would enable further cost savings. Improvement in user friendliness reduces the chance that individual terminal users will inadvertently disrupt network operations.

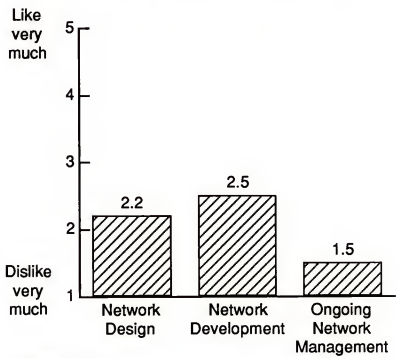
D

User Attitude to Systems Operations

Exhibit IV-7 illustrates users' attitudes to network operations management services. User attitudes relate to four key issues:

- Users have doubts regarding the vendor's ability to provide a service that will satisfy the needs of the user's business, and the vendor's ability to match the effectiveness of in-house resources. These doubts include concern over the vendor's ability to fully understand the user's business environment.

EXHIBIT IV-7



Source: *Network Operations Management, 1990-1995*
(from INPUT's Systems Operations Program)

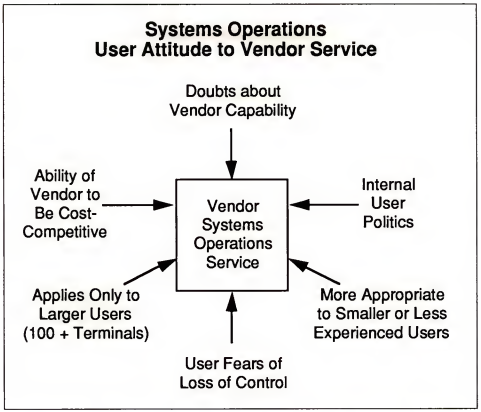
- Larger users expressed concern about the vendor's ability to be cost-competitive with the user's own resources in the long term. The vendor may be able to prove cost-effectiveness initially, but users feared that once the vendor assumed responsibility, the running cost of providing the service could escalate. Smaller users indicated that although a service of this type could prove attractive, particularly to less-experienced users, the cost would be out of proportion to the users' budget allocations.

- Larger users expressed concern over losing control in the event that systems operations responsibility was contracted to an external service vendor. Large users were concerned about the vendor's ability to fully understand the user's business needs and priorities. Users also doubted the vendor's ability to react quickly to change. Users felt that the requirements of their business environments contained a degree of specialization that was inappropriate to relinquishing control to external vendors.

- Any move to contract systems operations responsibility to an external vendor could cause a clash of internal politics. An example was provided by a subsidiary of a large petrochemical company. At this location, users felt that any such move would likely result in the parent company's imposing central resources to undertake systems operations responsibility. A further factor could arise at user sites that are unionized; the trade union concerned would most likely resist any move to contract services to outside vendors if such contracts would affect union members.

Exhibit IV-8 illustrates these concerns.

EXHIBIT IV-8



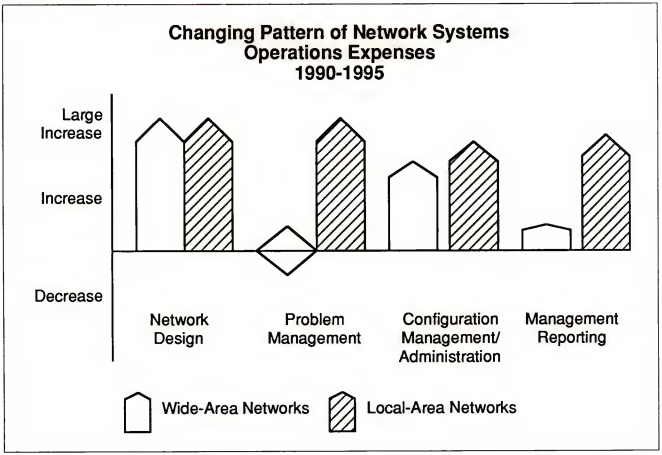
A conflicting view is that some users thought external systems operations responsibility was applicable only to larger sites. Whereas other users believed that the contracting of systems operations to an external vendor was more appropriate in the case of smaller or inexperienced users, INPUT contends that systems operations contracts are appropriate in both cases and that flexibility of implementation is key.

In planning for future network operations management services, venders should keep the following issues in mind:

- Network design needs will increase generally
- Problem management will show relatively little growth in WAN environments, but significant growth (from a low base) in LANs.
- Configuration management and administrative services will continue to increase steadily
- Management reporting needs in the WAN environment will show relatively little increase, while LAN reporting needs will increase greatly.

Exhibit IV-9 shows these developments graphically.

EXHIBIT IV-9



E

Source of User Services

Exhibits IV-10 through IV-12 provide data relating to the source of user services.

EXHIBIT IV-10

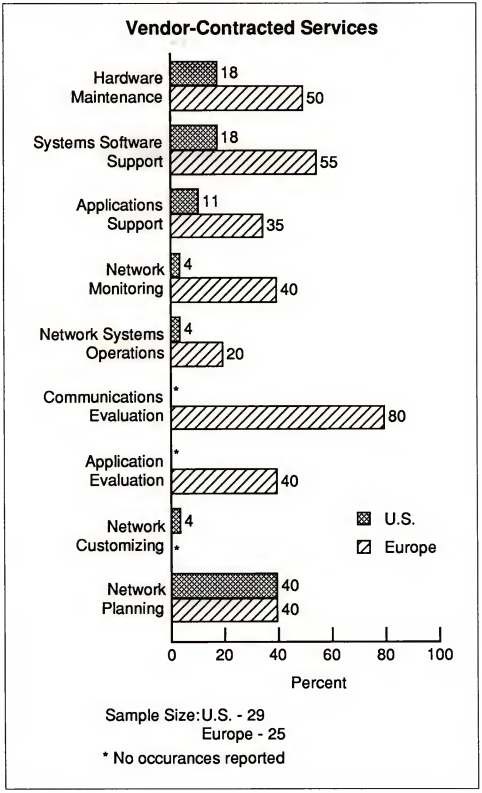


EXHIBIT IV-11

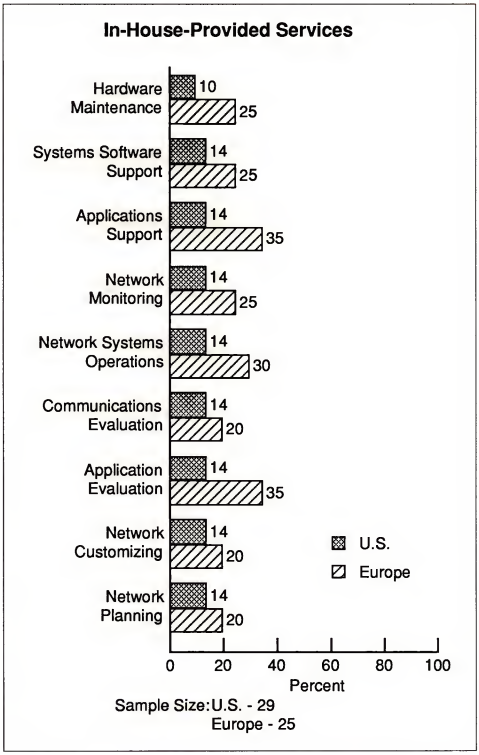
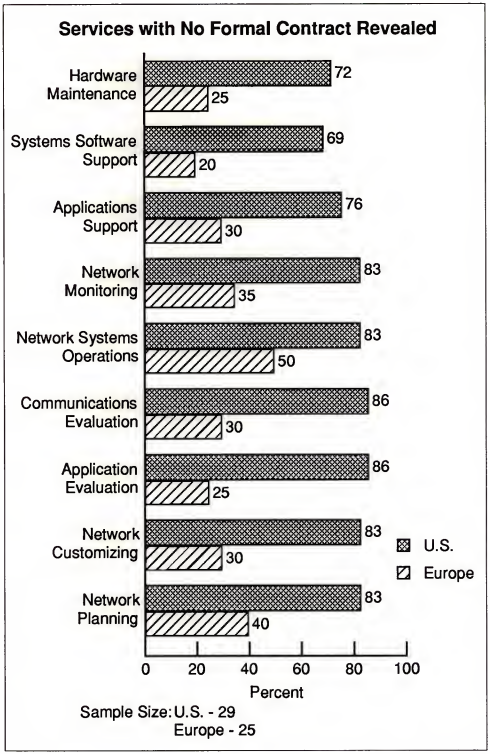


EXHIBIT IV-12



- Data relating to the percentage of the user sample with vendor-contracted services are presented in Exhibit IV-10. This exhibit indicates the percentage of users having vendor contracts for each individual service aspect. Overall, a lower percent of users in the U.S. reported having LAN-related services provided by their service vendor. Hardware maintenance and system software support topped the list with 18% of the U.S. users having these services from their service vendor and over 50% of the European users contracting these services.

- Data relating to the percentage of the user sample using in-house-provided services are presented in Exhibit IV-11. The exhibit indicates the percentage of users using in-house resources for each individual service aspect. As opposed to the European sample, the U.S. sample reported a relatively low percent of these services actually being provided by in-house staff.

- Exhibit IV-12 indicates the percentage of the user sample for which no formal source of service was reported for each individual service aspect. The services appear to be handled on a case-by-case basis with very few formal service contracts. In the European sample there appears to be more of a plan to either contract the services with vendors or provide them in-house.

In overall terms, these exhibits indicate that on average, for the U.S. sample, less than 10% of network service is contracted to vendors, and approximately 14% of network service is provided using in-house resources, with the remainder (approximately 76%) not covered by any formal service agreement, either with vendors or in-house. For the European sample, approximately 40% of network service is contracted to vendors, 25% of network service is provided by in-house resources, and the remainder (35%) is not covered by any formal service agreement.

Aspects of network service most commonly contracted to vendors include systems software support and hardware maintenance. The aspect of network service least commonly contracted to vendors is network systems operations.

The aspects of service most commonly provided using in-house resources include applications support and evaluation and network/systems operations. Aspects of network service least commonly provided in-house are customizing and communication evaluation in the European market, and hardware maintenance in the U.S. market.

For the sample overall, the aspects of service most often not covered by any formal agreement include network systems operations, network planning, and communications evaluation. Confirmation that these services tend to be neglected was provided during discussions with equipment vendors who commented that some users provide these ser-

vices informally. Moreover, users tend to provide these services on an ad-hoc basis without allocation of any formal organizational responsibility. The result, according to equipment vendors, is that network systems operations and network evaluation/planning are not handled effectively.

F

User Requirements for Vendor Services

During the course of interviews, users were asked to indicate which aspects of network service they would like to contract to equipment vendors. User responses to these questions are presented in Exhibit IV-13.

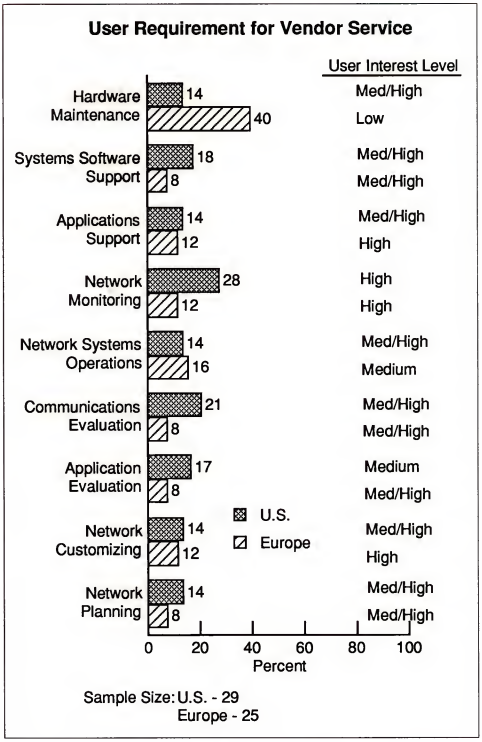
Based on the data contained in Exhibit IV-13, opportunities available to vendors can be rated as only moderate in Europe and medium to medium/high in the U.S. In the European market, the highest percentage of users requiring vendor-contracted service was indicated for network systems operations. Taking into consideration the fact that overall, about one-third of the European users do not reveal the presence of a formal service contract, user awareness of the need for service is relatively low.

The low level of European user awareness or appreciation of the benefits of formal service presents service vendors with a marketing challenge to change user attitudes.

In the U.S., a higher percent of users (ranging from 14% to 28%) expressed an interest in vendor LAN services. The U.S. user interest level also ranged higher than its European counterpart, from medium for application evaluation to high interest in network monitoring. This appears to be the opposite of the European market, with over 65% of the U.S. sample not having any type of formal service agreement, but expressing a requirement for vendor services.

The mean value of the data contained in Exhibit IV-13, across the range of network service, indicates that about 10% of the European users would like formal vendor-contracted service and about 17% of the U.S. users would be interested in formal vendor-contracted service. There appear to be more U.S. users interested in vendors' providing LAN services than European users.

EXHIBIT IV-13



G

User Interview Comments

To give a more in-depth understanding of the views presented by users, Exhibit IV-14 lists some of the comments made by users during interviews.

EXHIBIT IV-14a

User Interview Comments

- We are examining our network strategy very carefully due to the concern over being locked out of a logical growth path if we make the wrong decision. The problem is the lack of true network standards.
- For the next two or three years the need for early problem detection will become increasingly critical.
- We service our own network via a help desk and handle between 100 and 500 problems a day, with an objective to resolve these within an average time of one hour.
- We feel nervous about vendor proprietary networks due to being locked into that vendor's products; OSI/open standards would appear to be the way to progress.
- Remote network management is an interesting concept, but needs very careful consideration before implementation.
- On-site vendor FM (systems operation) is an attractive proposition for larger sites, say more than 500 terminals. But it is doubtful if smaller operations could afford the cost of on-site vendor services.
- Only real improvements and benefits to the user are of interest. We have no interest in fashion changes or trends.
- Equipment suppliers have an axe to grind, they like to sell networks as part of an overall solution and these tend to be proprietary. We would prefer to go to a third-party specialist who can provide a customised solution using standard network components.
- Our real interest is in flexibility of the solution—whether this is the network itself or the service.
- We like the idea of vendor-provided network services but are cynical about the vendor's ability to provide some services, for example network performance tuning.
- As a very large user and a relatively wealthy company, we can afford to provide our own network services, and these tend to be very specialized.
- Implementation of network standards—for example, OSI—needs to resolve the problem of the continuity of standards.

EXHIBIT IV-14b

User Interview Comments

- Networking seems to be at a crossroads where users are polarized between the IBM route and open standards.
- As a potential network user, we are concerned about network management:
  - What is it?
  - How is it achieved?
  - We hear a lot of talk about monitoring.
- Interest in vendor-provided network services tends to be high during the initial phases of implementation but decreases after installation. At present we have only 20 terminals and can manage our own network; when we have over 100 terminals, a vendor-provided management service would be interesting.
- I take a rather cynical view of vendor-provided consultancy services due to the lack of forward-looking responsibility and commitment on behalf of the vendor.
- There is a need for equipment vendors to put a "peg in the ground"—to define where we are today and what future directions and strategies are being adopted.
- Pricing and support are key items now and in the future.
- We are concerned with network performance, reliability, and problem determination.
- There is a need for vendors to cross hardware boundaries and provide networks with future expansion capabilities.
- Software support is the main problem that we have at this time.

Vendor Requirements

Vendor Requirements

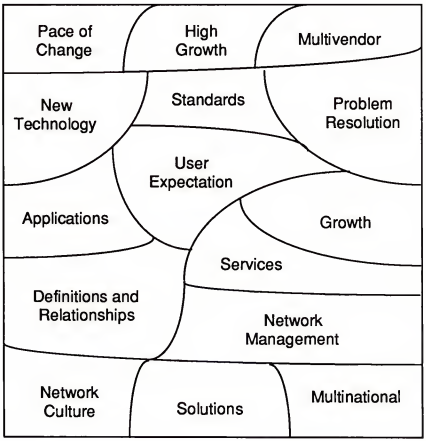
A

Need for Focus

Exhibit V-1 illustrates some of the elements that contribute to the network environment. This environment is a complex mix of interrelated elements and highlights the need for vendors to have clearly focused strategies. Otherwise, the elements can become confused.

EXHIBIT V-1

A Need for Focused Strategies



During interviews, users indicated the following views and concerns:

- The need for open standards, such as OSI, to provide a future vendor-independent growth path
- Concern over the lack of true standards
- Doubts over the future continuity of existing standards
- Need for vendors to define their current positions and future directions clearly

These comments refer to network solutions and include implications for products and services. The comments also indicate a degree of confusion and uncertainty in the user community.

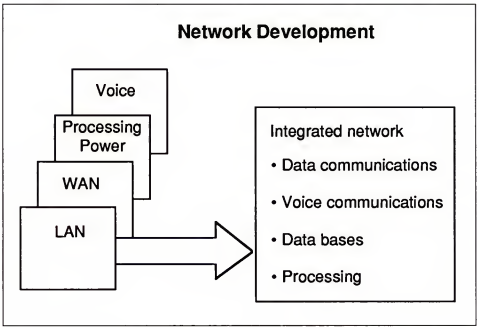
The comments from users indicate that vendors need to develop clear strategies to define the future of network developments and growth. In developing these strategies, vendors need to consider all the elements of networks and give users a focused approach to rectify the current confusion and uncertainty. Product and service plans should be developed in parallel.

B

Network Development

Discussion with users and vendors identified a development path for networks. This development path is illustrated in Exhibit V-2.

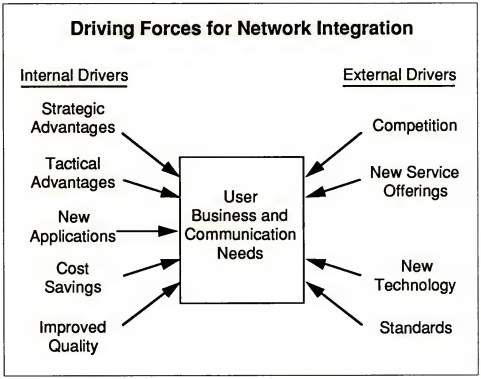
EXHIBIT V-2



The general trend is that the boundaries between various elements of networks and computer systems are disappearing with the formation of integrated networks. Integrated networks will combine voice and data communications with processing power and access to data bases. As discussed in Chapter IV, LAN integration will follow more slowly.

The driving forces behind the integration of networks are illustrated in Exhibit V-3. The primary goal is to meet user business and communication requirements. The trend towards integrated networks is driven by internal and external factors:

EXHIBIT V-3



- Internal driving factors include the need for:
  - Improved business efficiency and consequent cost savings
  - Tactical and strategic competitive advantages
- External driving factors include:
  - Competition between businesses
  - Continuing availability of new technology, such as packet switching, fiber optics and increasingly powerful network terminals
  - The emergence of standards for interconnection and data interchange

Networks are becoming increasingly complex in terms of their configuration and traffic demands.

C

Key Vendor Requirements

Key requirements mentioned by vendors are listed in Exhibit V-4.

EXHIBIT V-4

Key Vendor Network Service Requirements

Vendor Requirement	Importance Rating
• Need to work in multivendor environment	High
- Connectivity	
- Compatibility	
- Definition of responsibilities	
• Need for a wider range of skills	High
- Multivendor systems	
- Increased software orientation	
- Skill shortages	
• Compatibility of software	Medium
- Old/new	
- Revision levels	
- Multivendor	
• Need to structure a wider-ranging service	Medium
- Hardware becoming more reliable	
- Other services offer more opportunity	

1. Multivendor Environments

The major issue raised by vendors is the need to work in a multivendor environment. A network may contain equipment and software supplied by a number of vendors—for example, IBM and DEC equipment, and IBM and Novell software.

Connectivity and compatibility between different suppliers' equipment and software can create difficult problems for service vendors. Often, resolution of problems of this type requires referral to the original manufacturer. Service engineers require a higher degree of skill to perform successfully in a multivendor environment.

A further problem that can arise in multivendor environments is dispute between suppliers as to the cause of specific problems. Disputes indicate a need for very clear definition of responsibilities between suppliers and the user, but unfortunately these definitions are often less than clear. Service personnel are required to manage these situations while maintaining credibility and user confidence.

2. Wider Range of Skills

The need for a wider range of skills can be summarized as follows:

- Engineers working in the multivendor environments that are typical of networking require higher levels of skill to service multivendor equipment and software and to be capable of resolving equipment and software compatibility problems.

- Working in a network environment requires a higher degree of software orientation than is normally required by customer services. Vendors claim that network equipment is very reliable and that most problems that arise are software-related. Because of the complex nature of the network environment, resolution of software problems can provide a significant challenge to customer services.

- Consistent with the need for higher skill levels, vendors are concerned about their ability to recruit and train personnel at the level necessary to satisfy increasing requirements for network service.

3. Software Compatibility

Mixing different revisions of software within networks can cause problems for service vendors. Problems can arise in a number of ways—for example, different revision levels of systems software installed in two interconnected networks. In this situation, the service engineer must resolve compatibility problems by patching or defining problems for the supplier to resolve.

Mixing of multivendor software within networks can cause similar problems that are complicated by the need to interface the software.

Further problems can be caused by mixing older application software with new software. An example is when the user implements a new

application that is not necessarily intended to run on an older revision of the system software. Problems can also arise when networking software is required to interface with other software within the computer system.

Software compatibility problems tax the skill level of service engineers and underline the need for improved skills and a higher degree of software orientation.

4. Need for a Wider Range of Services

The need to provide a wider range of services was raised as an issue by vendors in recognition of the fact that network equipment is inherently reliable and offers less opportunity for traditional customer service. Equipment reliability causes vendors to look towards non-equipment maintenance for revenue growth and service opportunities. Part of the issue is the need for vendors to invest in training and skill levels in order to be positioned to take advantage of opportunities that range outside the traditional skills of customer service.

D

Factors Influencing Network Service Development

Vendors were asked to identify key factors that, in their opinion, would influence the development of network service. Exhibit V-5 lists the major factors that emerged from vendor interviews.

1. Influence of Standards

The increasing move towards open standards for computer systems and networks, such as OSI and UNIX, were considered by vendors to influence the development of service. Standards will increase competition between equipment vendors for service contracts and also tend to open the market to independent service vendors, as vendors compete to service similar installations. A further impact of standards is likely to be an increase in user requirements for flexibility of service offerings.

2. Growth of Networking

Growth of networking due to the factors listed in Exhibit V-5 will also influence service development. Vendors cautioned that user expectations of service could exceed the vendor's ability as a result of limitations being imposed by availability of skills/resources and user demand for transparent access to the network.

EXHIBIT V-5

Customer Services
Network Service Development
Influencing Factors

- Availability of standards
  - OSI
  - Turnkey solutions
  - Data interchange
- Growth of networking
  - Increased installed base
  - Increased use
  - Merging of voice/data/graphics
- Development of purpose-built buildings
- Relationships between vendors and users
  - Business planning
  - Security
  - Confidentiality
- Development of service technology
  - Service delivery methods
  - Remote management and monitoring
  - In-built diagnostics
- Single-source service

3. Intelligent Buildings

The development of purpose-built buildings (intelligent buildings) was considered by vendors to offer opportunities for network and cabling installation services. A negative aspect of this trend is the likely competition, in these areas, from project management and contracting companies.

4. User Relationships

In order to plan and provide long-term service contracts, vendors felt a need to develop secure relationships with users. The purpose of these

relationships is for the two parties to enter into confidentiality agreements in which the user would provide long-term visibility of business plans in return for access to the vendor's long-term strategies, directions and product plans.

5. Service Technology

Implementation and growth of service technology would also have an impact on the development of network service. These developments are related to service delivery changing as a consequence of remote network management and monitoring, and embedded diagnostic aids within network equipment.

6. Single-Source Service

User interviews also identified a need and an opportunity for single-source service by stating a preference for a single point-of-service contact. Users find that dealing with a number of vendors in a multivendor installation can be frustrating and time-consuming. Also, infrequently, disputes between vendors do occur—and the primary need of users is for problem resolution with minimum disruption. An integral part of the user need for a single-point service contact is the requirement for a central help desk. Larger users tend to provide their own help desk service, the primary aim of which is to resolve minor problems quickly and ensure reaction to more-critical problems.

One user claimed that the help desk was handling between 100 and 500 calls per day and achieving resolution of problems within one hour, on average. This user provided all network services using in-house resources and handled over 1,500 terminals.

The subject of remote network management and monitoring was raised by users only when prompted. One conclusion that could be drawn from this fact is that users consider remote monitoring and management a tool; provided that network access is available, the means of achieving smooth operation are transparent. An alternative conclusion, prompted by a user comment, was that users prefer to retain control and view remote services as a partial loss of network control.

E
Opportunities

1. Wider Opportunities

Exhibits V-6 to V-9 list opportunities for network service available to customer service vendors, and include INPUT's opinion on the level of service that could be offered. These levels of service range from providing a service that is shared with the user, to selected professional services, to total service.

Exhibit V-6 lists the opportunities available during the engineering and design phase of the network. The network design phase also includes selection of the technology to be used, the architecture/structure of the network and the initial planning of the network to define the capacity requirement.

EXHIBIT V-6

Network
Engineering and Design Activities

Aspect	Customer Service Opportunity
Network Design	Professional Services
Network Control Center Design	Professional Services
Facilities Design	Professional Services

Exhibit V-7 lists the opportunities available during the project management phase of the network. This phase includes the preparation of specifications, analysis and source selection, and procurement.

EXHIBIT V-7

Network
Project Management

Aspect	Customer Service Opportunity
Specification Preparation	Professional Services
Analysis and Source Selection	Professional Services
Project Management	Professional Services
Procurement	Professional Services

Exhibit V-8 lists the opportunities available during the network implementation phase. This phase includes planning, scheduling, ordering, installation and testing. It is during this phase that the service vendor may also have the opportunity to undertake project management responsibility. More details of this opportunity are provided in section E-3 of this chapter.

EXHIBIT V-8

Network Implementation

Aspect	Customer Service Opportunity
Installation	Total Service
Software Development	Professional Services
Integration	Professional Services
Test and Acceptance	Total Service
Facility Wiring and Cabling	Total Service

Exhibit V-9 lists the opportunities for providing network management operations service once the network is installed and running.

EXHIBIT V-9

Network Operations

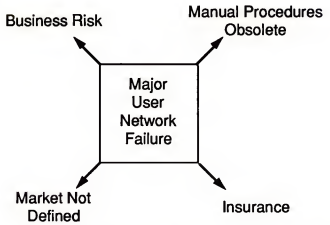
Aspect	Customer Service Opportunity
Network Monitoring	Total Service
Problem Management	Total Service
Communications/PTT Problem Management	Vendor-Managed Service
Network Modification/ Expansion	Shared with User
Terminal Installations	Total Service
Network Operations Staffing	Shared with User
Performance Analysis and Reporting	Total Service
Systems Operations	Shared with User
User Help Desk	Total Service
Equipment Service	Total Service
Systems Software Support	Total Service
Applications Support	Professional Services
Training and Education	Total Service
Disaster Recovery	Total Service

2. Network Disaster Recovery

The key elements resulting from a major user network failure are illustrated diagrammatically in Exhibit V-10.

EXHIBIT V-10

Network Disaster Recovery



Network disaster recovery is still being defined; this fact indicates the opportunity for equipment vendors to play a leading role in the definition. The computer equipment disaster recovery market provides an example of the growth opportunities available. Exhibit V-11 provides data relating to the computer equipment disaster recovery market and highlights the revenue growth opportunities. Because of higher growth in the network equipment market (over 30% CAGR compared with 9% CAGR for computer equipment), potential growth of network disaster recovery is much higher.

EXHIBIT V-11

Computer Equipment Disaster Recovery Market

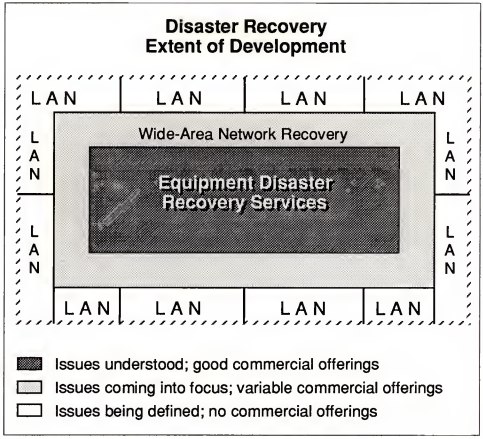
Market	User Expenditure ($ Millions) 1990	1995	CAGR (Percent)
U.S.	400	800	15
Western Europe	180	550	25

Implementation of networking causes users to implement radical changes in business and office policies and procedures. Once networks are implemented, previous manual procedures become obsolete and are

disregarded. Therefore, in the event of a major network failure, the user is unlikely to have any satisfactory manual backup system.

Exhibit V-12 shows the variation in the degree to which issues are understood in disaster recovery and the extent of commercial offerings.

EXHIBIT V-12



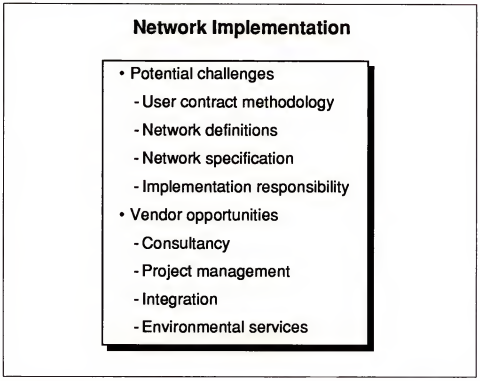
3. Network Implementation

Exhibit V-13 lists the potential challenges that could confront users who implement networks and the consequent opportunities for vendors. Potential problems can occur when a user decides to undertake network implementation without sufficient experience, or subcontracts to a number of different suppliers. Problems can arise from a combination of:

- The user's failing to define clearly the responsibilities of the various subcontractors involved and the responsibilities of the user
- The inability of the user to provide clearly defined specifications for the network
- The user's failing to allow for future growth and expansion of the network to meet the developing needs of the business and consequential increases in applications and traffic requirements

These potential problems can result in a network implementation that fails to meet user needs and retains the potential for being a cause of continual service problems and consequent user dissatisfaction.

EXHIBIT V-13



In situations of this type, vendors can assist the user to ensure that the implementation meets user needs and is successful. Vendors have the opportunity to provide:

- Consultancy services to advise the user of the necessary requirements of defining and specifying the network. Vendors can also define the responsibilities of the various parties involved in implementation.

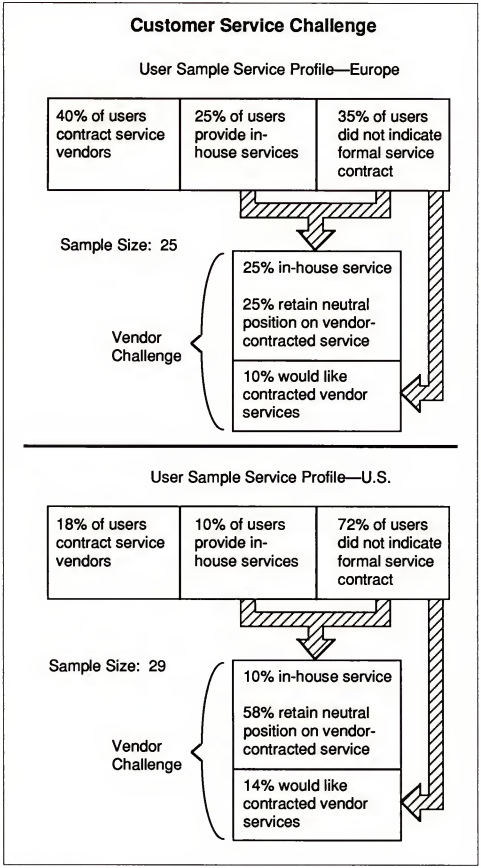
- Project management services to undertake management responsibility on behalf of the user for implementation of the network

In undertaking project management responsibility, the vendor creates additional opportunities to gain additional revenue from supplying the resources required for installation, cabling, testing and integrating the network with the user's computer system.

Exhibit V-14 illustrates in diagrammatic form the challenge facing service vendors, derived from data relating to the source of service for the sample of users interviewed. The purpose of this form of presentation is to indicate the magnitude of the challenges presented to customer service vendors and the opportunities available. The data are presented as an average for the user sample.

EXHIBIT V-14

Customer Service Challenge



Opportunities relate to the 10% - 15% (on average) of users that would like to contract additional services to vendors. These opportunities could be considered modest—although the interest levels are medium/high, the percentage of users is low.

The challenge to vendors is related to successful penetration of the remaining 50% of users that in the main do not have vendor-contracted services. This portion of users divides equally:

- About 25% of users provide service using in-house resources.
- About 25% of users retain a neutral position relative to vendor-contracted services.

Success in penetrating this portion of the market represents a more significant opportunity for vendors, even though penetration may be difficult.

- Opportunities for traditional customer service (equipment maintenance) are limited because of the high reliability and a perceived reduced complexity of network equipment compared to computer systems. The growth of network service is likely to be significantly slower than the growth of network equipment.

F Competitive Environment

Factors identified by INPUT as influencing the network service market competitive environment are listed in Exhibit V-15.

EXHIBIT V-15

Network Service Market
Competitive Environment

- Multivendor installations
- User capability and reluctance to lose control
- Equipment vendors
- Independent service vendors
- Vendor skill levels

The network market is a multivendor environment, with equipment and software at a user site originating from a number of suppliers. For example, a typical user site could include equipment from IBM, Hewlett-Packard and Compaq; system software could be from IBM, Novell, or 3Com. For the service vendor, working in a multivendor environment can impose special requirements on the skill levels needed—for example, the resolution of compatibility and connectivity problems. The competitive position of a vendor is decided not only by the vendor's ability to provide the skill levels required, but also by how the relative skill levels of competing vendors are perceived by the user organization.

The capability of the user to undertake self-service is a key element against which service vendors will need to compete. Reluctance on the part of the users to lose control of many aspects of network operations creates an additional competitive element for the service vendor. This reluctance is particularly strong among some larger, more experienced users.

Because the network environment is multivendor, competition between equipment vendors and other organizations could become intense. A trend in user requirements—for a shift from proprietary to open standards—is likely to add to the intensity of competition between vendors. Exhibit V-16 lists the different types of vendors that are already involved in different aspects of network service.

EXHIBIT V-16

Network Service Suppliers

- Computer hardware manufacturers: Customer services
- Computer hardware manufacturers: Other functional areas
- Communications and LAN equipment manufacturers
- LAN software suppliers
- Telcos
- Resellers/Computer stores
- VARs/Turnkeys
- TPMs
- Specialised LAN support and network integration vendors
- Professional services firms
- Systems integrators
- Systems operations vendors

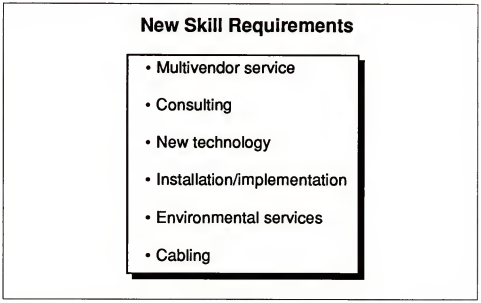
G

New Skill Requirements

Vendor skill levels play a key role in the network service competitive environment. Service personnel require more software orientation for the network service market than for the servicing of computer equipment. The importance of other skills, such as consulting, is also high. In order to remain competitive across a broad range of services, the vendor must match or improve upon the capabilities offered by competitors.

- In order for vendors to be positioned to take advantage of the opportunities offered by network service, new skills are required. Exhibit V-17 lists the areas of network service in which new skills are appropriate.

EXHIBIT V-17



The skill requirements of network service are:

- The ability to work in a multivendor environment of multivendor equipment and software. Particularly important is the ability to support and service multivendor software.
- Provision of consulting skills for a wide range of services. Examples are network management and network configuration.
- New technology requires not only the capability to embrace new technology, but continual upgrading of skills as new technology emerges. Examples of new technology are remote network management and monitoring techniques, and fiber optic data transmission lines.
- Development of the skills required for installing networks in user environments and undertaking network implementation projects on behalf of users. Skills required for network implementation range from consulting to project management.
- Skill in providing environmental services will be required. These skills include involvement in the provision of regular power and standby power systems, network environmental planning, and the provision and installation of cabling systems.

VI

Recommendations for Customer Service

VI

Recommendations for Customer Service

A Vendor Recommendations

INPUT's recommendations for vendors are listed in Exhibit VI-1 and can be summarized as follows:

EXHIBIT VI-1

Vendor Recommendations

- Develop flexible offerings to meet a wide variety of user needs
- Implement training and investment to develop a full range of skills
- Promote services at initial negotiation phase
- Market network uptime and user access

- Invest in the recruitment and training of people having the required skill levels, in order to provide as full a range of network services as possible. To enable vendors to take full advantage of network services opportunities, INPUT recommends a proactive response to skill requirements.
- Develop a wide range of service offerings to meet the wide range of user requirements. Vendors should also structure a range of flexible service offerings to satisfy the differing needs of individual users.
- A key user need is for transparent access to the network on demand. In response, vendors should develop services to meet these needs and promote uptime and access.

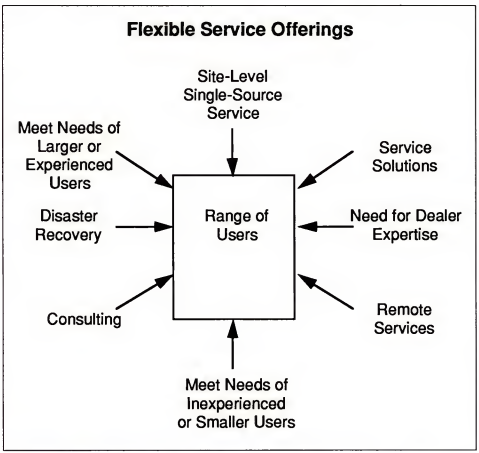
- Service should be promoted to users at the initial negotiation phase of network implementation. User interest in vendor service is likely to be higher initially, therefore increasing the vendor opportunity for contracted services.

B

Flexible Service Offerings

Exhibit VI-2 provides a diagrammatic representation of the elements of a flexible service package.

EXHIBIT VI-2



The installed base and future implementation of networks cover a wide range of users—from large corporations to small companies, and from experienced to inexperienced users. The service requirements of these users also span a wide range, from basic equipment maintenance to total-solution service.

Vendors should structure their service offerings to cover this range of user requirements. Delivery of service can be achieved either through direct channels or through dealer channels. If service to smaller users is provided through dealer channels, the vendor should ensure that a sufficient level of expertise is available.

The flexibility and range of services offered can be extended by the addition of consulting, project management and disaster recovery services. Total vendor requirements are summarized in Exhibit VI-3.

EXHIBIT VI-3

Vendor Requirements

- Training
  - Self-training materials
  - Built-in training guides/help
- Network management tools
  - Integrated solutions over a full range of problems
  - Multivendor
  - Easy to use/learn
- Disaster recovery
  - Network services
  - Bypass central office
- Services from carriers
  - Supply network usage and status information
  - Multivendor connection
  - Backup for failed private lines and local loops
- Support from vendors of equipment and communications services
  - Multivendor
  - Areas where the users are weak
  - Smaller users—full range of services
  - Large users as needed
- Equipment
  - Simple to learn and use
  - Capable of self-test and remote test and reconfiguration
- Geographic coverage
- Customer support tools and methodologies

The key factor is that the service offered should be sufficiently flexible to closely match the needs of individual users.

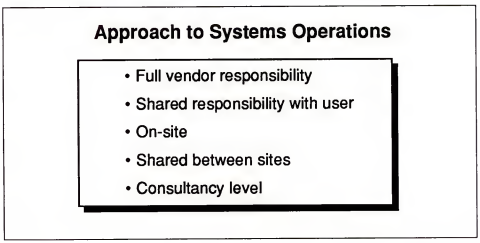
C

Approach to Network Systems Operations

The attitude of users to vendor-provided network systems operations is mixed.

INPUT recommends that vendors take a flexible approach in structuring a systems operations service. Exhibit VI-4 lists differing levels of systems operations services that could be offered to users that would match a wide range of user requirements and budgets. These levels vary from the vendor's taking full responsibility to consulting.

EXHIBIT VI-4



When approaching larger users who may be resistant to losing control of systems operations, shared responsibility may prove to be an acceptable solution. However, in the case of the smaller user who needs a systems operations service, but who also has a limited budget, the vendor has an opportunity to structure a service that can be shared between a number of users.