USER ACCEPTANCE OF IBM'S SYSTEM NETWORK ARCHITECTURE

A Research Report Prepared For IDC

Continuous Information Services Clients

International Data Corporation
214 Third Avenue
Waltham, Massachusetts 02154

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MANAGEMENT SUMMARY

By the spring of 1978, three and a half years after its announcement, many industry observers were of the common belief that IBM's System Network Architecture was a far cry from success. In fact, a number of these watchers had gone so far as to label SNA a "flop". Although not quite so pessimistic, IDC was skeptical.

- A number of separate IDC research studies had revealed only minimal acceptance of IBM's terminal products specifically designated as part of the SNA scheme of things -- although these products have been announced for a number of years.
- Specific research on IBM's new models of its 3270 product line indicated that only a handful of users were ordering 3276/3278s with SDLC capabilities.
- The media had turned up seemingly few sites to write about as SNA case studies.
- Input from independent terminal vendors indicated that their salesmen were rarely coming up against the SDLC protocol, although many had added that capability to their own product lines.

To obtain a more substantial reading of the actual acceptance of SNA, IDC conducted a mail survey of large communications users. Results from this survey, although somewhat biased in favor of very large IBM systems users, reveal that usage of SNA at present time is, indeed, minimal, but the future sees a growing number of sites implementing IBM's network architecture.

- Of the 241 IBM sites in the survey, 16.6% were operating under SNA at the end of 1977. Of that same group of IBM sites, another 20% will have implemented SNA by yearend 1979. An additional 20% of the IBM sites plan to operate under SNA sometime in the future, but could not be specific as to actual dates.

In addition to questions about SNA, respondents were asked about their current and future usage of terminals. Survey analysis indicated that:

- The number of terminals in use by the IBM systems users in the survey will grow at almost 18% a year in the next 2 years. While growth is expected for all types of terminals, plug-compatible 3270s will show particular gains.

- The number of terminals transmitting data via SDLC will increase dramatically by yearend 1979. From 12/77 to 12/79 SDLC terminals will grow from 2,111 to 11,521. Most of this growth can be attributed to IBM 3270s. At 12/77 just 5% of the IBM 3270s being used by survey respondents were transmitting data via SDLC while 30% of the estimated number of IBM 3270s at 12/79 at these IBM sites will be operating under that protocol.

The survey attempted to probe into the reasons behind a user's decision to accept or reject SNA. From analysis of the non-SNA users in the survey, the general attitude may best be summed up with "what's in it for me?" For those that have already converted, the reasons behind the move seem to have been based more on improving performance, than on cutting costs. While the first SNA users were probably die-hard IBM users, those who haven't made the conversion may be more concerned with economically justifying it.

- When implemented it would seem that conversion to SNA is a less complicated task when implemented while upgrading major hardware installations. A site which has analyzed SNA for a 370/158 installation may be waiting for his new 303X to come in before he switches to SNA. With the huge number of 303Xs on order, it has to be assumed that a certain portion of the users taking delivery on these products will acquire some of the building blocks necessary for SNA.

- Some survey respondents indicated that IBM was ill-prepared in the early years to successfully market SNA. Now, as time has gone by and enhancements on SNA-related products have been made, IBM is probably tuning up its marketing forces for an even greater push. More and more emphasis will probably be made on the necessity of going to the MVS and VM 370 operating system.

- Future marketing strategies from IBM may also give added incentive to unconverted users. Perhaps software pricing policies will change and perhaps such yet-to-be-announced products as the E Series and the newly announced 8100 will make conversion easier. Increasing the number of existing IBM product offerings that can operate under SNA should also be an impetus. This is already being done with the recent enhancement on the System 34 to allow

it to communicate via SDLC. In addition, future enhancements to SNA itself may make conversion more palatable, especially if these enhancements are made on the VTAM software and in SNA's networking capabilities.

The future for SNA seems brighter than it ever did before. Below and in the following table are IDC's expectations of current and future usage of SNA. These estimates are based on a number of research inputs. First, estimates for future shipments and installed bases of IBM in-production products were analyzed from IDC's 1978 360/370/303X Migration Study. Secondly, data received from users in this particular survey on SNA as well as from other IDC related research was considered to determine user acceptance of SNA. The fact that this SNA survey was heavily weighted toward large IBM users was also taken into account. Forecasts include only the U.S. market and the introduction of IBM's "E Series" or replacement products for the 303X systems was not factored into the forecast. Some thought was given to possible early successes of the 8100 in late 1979 and 1980.

These estimates are presented in Table 1A where SNA penetration by site, system and by site dollar value is outlined. The information in this table as well as that found in other tables throughout this report indicate that SNA is, indeed, gaining acceptance in the user community, although it has had a slow and somewhat shaky beginning.

A few overall observations follow:

- By site or system -- not dollar value -- SNA penetration is currently just over 10% but will increase to almost 30% by yearend 1980.
- By dollar value of 370/303X systems installed at SNA sites, however, the penetration is probably as high as 25%. By the end of 1980, it will rise to 45% of the total dollar value of all IBM systems installed as a result of 303X shipments.

- At yearend 1978, some 5% of the IBM 3270s installed should be transmitting data via SDLC, with even fewer plug-compatible terminals. However, at 12/80, it is estimated that some 40% of the then-installed IBM 3270s will be operating under the SDLC protocol, and close to 15% of the plug-compatibles.

TABLE 1A

SNA PENETRATION
(IDC REAL WORLD ESTIMATES FOR U.S. MARKET)

	12/75	12/76	12/77	12/78	12/79	12/80
Total SNA Eligible Systems (370/303X)*	9,577	9,265	10,420	11,100	11,785	12,525
Systems at SNA Sites**	200	430	800	1,600	2,500	3,400
Estimate of SNA Sites	150	350	650	1,250	1,900	2,500
% Penetration						
By Site	2%	5%	8%	13%	19%	24%
By Site Value	5%	10%	15%	25%	35%	45%

* PCM CPUs not included.

** Not all SNA-eligible systems (370/303Xs) at an SNA site are necessarily SNA machines; thus, in a way, the number of systems at an SNA site represent an upper bound to SNA penetration.

THE HISTORY AND NATURE OF SNA

Four years ago, IBM pulled together some of their new terminal offerings and a new line protocol into what IBM termed Systems Network Architecture (SNA). Just a year before, IBM had announced the 3650 point-of-sale system for retail stores and the 3600 on-line banking system. These two product lines became two of the first SNA products along with the 3770 family of data communications terminals. Also introduced was the bit-oriented communications technique known as Synchronous Data Link Control (SDLC).

SNA, the blueprint for Advanced Function for Communications, defines how various communications functions are distributed among the components (in advanced function systems). Virtual Telecommunications Access Method, for instance, provides a link to the central processor, while the transmission control technique handles duplex (simultaneous, two-way) communications and data error recovery.

The distribution of function allows many network control operations to be removed from an IBM System/370 and allocated to terminals where they can be performed more effectively.

The major components in an advanced teleprocessing network and their key tasks are:

- A Virtual Storage IBM System/370 running under Disk Operating System/Virtual Storage, Operating System/Virtual Storage 1, Operating System/Virtual Storage 2, or Virtual Machine Facility/370 in conjunction with other virtual storage programming. This provides the facilities and services required by teleprocessing applications.

- Virtual Telecommunications Access Method (VTAM), residing in a System/370, is the access method -- or link -- that gives users at remote terminals access to application programs. It also provides resource sharing, a technique for efficiently using a network

to reduce transmission costs. For example, VTAM permits one terminal to "share" many application programs, eliminating the need to install a separate terminal and communications line for each application.

- An IBM or 3705 Communications Controller and Network Control Program/Virtual Storage (NCP/VS) that works in conjunction with VTAM to manage the communications network. The two programs provide a variety of administrative functions -- such as scheduling the operation of lines, collecting error statistics, polling terminals for messages and handling some error recovery. When equipped with another program, Partitioned Emulation Program Extension, a 3704 or 3705 also permits currently installed terminals and application programs to operate over existing start-stop or binary synchronous transmission lines, while VTAM uses the communications controller to access SDLC lines.

- Synchronous Data Line Control (SDLC), IBM's newest line discipline, that initiates, controls, checks and terminates information exchanges over communications lines. Designed for duplex operation -- simultaneously sending and receiving data over the same line -- SDLC permits as many as seven messages to be sent before a response is required from the receiving device, further enhancing communications efficiency.

- Terminals with integrated control units, or linked to programmable controllers, permit some communications functions to be handled at the terminal location -- further reducing demands on the central processor.

According to IBM, SNA formally defines the functional responsibilities of communications systems components, and all nodes (linked elements) adhere to these definitions. As a result, SNA relieves the user of many network control and resource management headaches and lets him concentrate on application functions. Resources can be shared across a wide range of applications.

The proposed advantages from SNA's distribution of communication functions throughout system elements are:

- Improved response time -- except for transactions requiring access to data bases, processing can take place locally. SNA provides the DDP window for IBM users.

- Decreased line costs -- both through increased support for DDP and in the diminished need for communications lines provided by terminals supporting more than one application.

- Decreased main processor load -- the distribution of functions across the network under SNA all contribute to reducing main CPU load.

- Improved availability -- critical functions can continue to be handled locally following CPU or network failure.

IBM claims that SNA defines paths between end users of the communication system. The end users (programs, devices, or operators) are presented with access to the paths that does not depend on the physical network configuration. Thus, modification or extensions to the network configuration may be made without affecting the end user.

The key concept of SNA is the division of communication functions into a set of well-defined logical layers. By and large, these functions exist in earlier IBM product support programs, however, their separation into logical entities had not been formalized. The major functional layers of SNA are:

- Applications layer -- which performs the user's application processing. This layer need not be concerned with communications protocols or procedures or routing of data units through the network.

- Function management layer -- which is concerned with the presentations of information from one application layer to another. This is the layer that allows device-specific transformations to be distributed out of the main processor into new SNA products.

- Transmission substem layer -- which routes and moves the data between origins and destinations. Since routing of data is independent of the contents of the data units, change in transmission methods between nodes requires no change in the data units themselves. Paths through the network may be shared by many applications and may consist of several physical components with interconnecting data links.

End users are the ultimate sources and destinations of information under SNA, and include programs, operators (such as terminal users and network administrators), and certain physical device media such as cards, tapes, etc. End users are independent of -- and unaffected by -- the specific services and facilities used for information exchange.

In the communication systems under SNA, network addressable units are the origins and destinations of information units flowing in the communication systems. NAUs provide the ports into the communication systems for end users, and come with both a network "name" (for end users) and "address" (for the communications system). Before end users can communicate, a formally-bound pairing, called a "session", must be established between NAUs.

NAUs come in three flavors. Systems Services Control Points (SSCP) are command processors that manage the network and service requests from terminal operators. Physical Units (PU) represent the nodes in a network defined to the SSCP and are actual devices. (Communications controllers provides PU services for certain terminals. Finally there is the Logical Unit (LU), the port through which an end user accesses the SSCP's services. Logical units also act as ports for end user-to-end user communications.

In other words, the types of sessions defined between logical units are three:

(1) LU to LU
(2) LU to SSCP
(3) PU to SSCP

And it is the functional management layer that provides the support services for the various NAU to NAU sessions.

For all its logical elegance, SNA, in its initial embodiment in hardware and software products, came with some drawbacks. For one, the SNA terminals that worked only with SDLC and VTAM locked out a major segment of IBM users as a customer base. Nor did SNA support any multiple-host networking scheme. These problems were in addition to the fact that SNA software required MUS operating software and used considerable amounts of main memory.

Some of these problems were subsequently solved. Support for SNA terminals working with the older team access method was provided, for instance. And in November, 1976, IBM announced support for multiple computer networks under SNA. The latter announcement implements what IBM calls "Advanced Communication Functions (AFC) "-- not to be confused with the original advanced function for communications (AFC) announced with SNA. ACF is actually a series of separately-priced program products designed to extend SNA to multiple-host nets. The products include:

- Advanced Communications Function (ACF) modules for VTAM and TCAM access methods -- host-resident under SNA -- and for the Network Control Program (NCP/VS) that resides in the 3705 communications controller.
- Multisystem Networking Facilities (MNF) for linking multiple CPU hosts operating under the various access methods and for the automatic routing of data. (Without MNF, line switching is performed by the operator at the host computer or by user-written procedures).
- A Network Operation Support Program (NOSP) for consolidating the routing of commands and allowing operator control of network functions from 3270 consoles; a System Support Program (SSP) for generating ACF/NCP/VS in a host computer before loading into the 3705.
- Network Job Entry (NJE), an enhancement to JES 2 under OS/VS2 MVS, that allows the "loose-coupling" of CPUs connected by communications lines.

Perhaps because the software products are optional under its VS operating systems (or perhaps because of inroads by the plug-compatible CPU makers), IBM unbundled these program products -- and the monthly license fees in a network can add up. Each host in a multi-host network, for instance, must have the appropriate ACF/VTAM or ACF/TCAM and Multisystem Networking Facility (MNF); each 3705 must have the regular VTAM/TCAM and NCP required by SNA. Users will also end up paying -- one way or another -- for the added tax on system resources that the new ACF modules and support programs levy.

The enhancements to SNA in the last four years have significantly improved the scheme, but users still see some drawbacks. For optional benefit, for instance, SNA still requires the new IBM software and hardware products. Users not inclined to go through conversions to MVS or SDLC networks are deprived of SNA's major benefits.

Other drawbacks came from SNA's hierarchical aspects. Even in multiple-host networking under SCF, sessions between terminals operating in separate host domains must be initiated through the host CPUs. While ACF thus facilitates intranetwork transmission, if a host CPU goes down functioning terminals in its domain cannot communicate with the good host(s).

But drawbacks or not, users are slowly converting to SNA, as a later chapter in this report will point out. And if they are not being converted with evangelical fervor, by and large those that have switched are happy with their decision.

METHODOLOGY

In the spring of 1978, IDC set out to determine the user community's acceptence of SNA. In order to make this assessment, a large mail survey was conducted. Questionnaires were sent to some 3,000 names on IDC's Datacomm Advisor subscription list. The list was chosen because the people who receive this publication were considered by IDC to be the most likely users of SNA and the most likely to have been involved in any analysis of SNA.

Approximately, 10% of the questionnaires were returned. Specifically, 241 responses were classified as IBM sites, i.e., the senior system at that site is an IBM system. Another 55 responses were from sites where non-IBM systems are the senior systems.

Of the IBM sites responding to the survey, most were users of large IBM computers. Because large (i.e., 370/158 and 370/168) users are considered to be the most likely candidates for SNA, survey results should be considered somewhat biased in favor of SNA usage. Care should be taken when extrapolating survey data to the real world of all IBM systems users as IDC's survey is so heavily weighted to 370/158 and 370/168 users.

Despite this bias, IDC believes that the survey responses provide meaningful information about the acceptence of SNA among large IBM users, its most likely target market.

SURVEY CHARACTERISTICS

To understand the nature of the sites responding to IDC's survey, sites were broken down into IDC's size class distinctions. Table 1 presents IDC's standard size class definitions for easy reference. Survey sites were assigned to size classes according to the senior system at that site. For example, if a site had a 370/168 and a 370/138 the site would be classified in Size Class 7.

The 296 sites in IDC's survey -- including IBM and non-IBM sites -- are broken out by size class in Table 2. Over 38% of the sites were classified as Size Class 6 sites with another 22% of the survey respondents falling into Size Class 7. With over 60% of the survey sites belonging to either of IDC's largest size class distinctions, the results are indeed biased to large system users. Nonetheless, large users are generally considered as the forerunners of later more universal activity so survey results may be considered to some extent as indicators of what the future may bring for the rest of the IBM world.

At the close to 300 sites which responded to IDC's questionnaire, some 438 systems are currently installed. Table 3 breaks down all these systems by vendor and by size class. As can be seen, more than the majority of all the systems in the survey belong to Size Class 6 or 7.

Table 4 goes one step further and more specifically examines the IBM systems found in the survey. The number of systems in the survey are distributed according to their specific model number. For comparison, IDC's estimates of the real world installed base at yearend 1977 are also provided. Most of the percentages seem small when compared to the real world, but there is good representation of the largest IBM systems which are the most likely users of SNA.

TABLE 1

SIZE CLASS DEFINITION
REPRESENTATIVE MODEL ASSIGNMENTS

Size Class	IBM	HIS	Univac	Burroughs	NCR	CDC	Others
2	System/3-4 System/3-6 System/3-8 System/3-10	H-61/58 H-61/60 G-50	9200 1004, 1005	B-1710 B-1712/14/16/18	8350 Century-50, 75		Singer-10
3	370/115 System/3-12 System/3-15 360/20	H-Level 62 H-105/115 H-200 H-2020	90/25 90/30 9300	B-1800 B-1776/26/28 B-500	8450, 8550 Century-100, 101 Century-151		XDS 530
4	370/125 370/135, 138 360/30, 40	H-Level 64 H-66/05, 07 H-2040, 2050 H-1200	90/60 9400/80	B-25/27/2800 B-35/37/3800 B-6803/05	8560, 8570 Century-200, 201 Century-251	Omega 480-1 Cyber-71, 171 31/3150 3200	DEC 2040, 2050 DEC 1040/50 XDS Sigma 5, 6
5	370/145, 148 360/50	H-66/10, 17 H-66/20, 27 H-3200 G-6020, 30, 40	90/70, 9700 90/80 1100/10, 20 Spectra 70/45, 46	B-45/47/4800 B-6807/11	Century-300 8580, 8590	Cyber-72 3300, 3500 Omega 480-2	DEC 1060/70 Itel AS/4 XDS Sigma 7 XDS 940
6	370/155, 158 360/65 3031, 3032	H-66/40 H-66/60 G-6050/60 G-6070/80	1100/40 1100/81, 82 1106 Spectra 70/60 Spectra 70/6, 7	B-65/6700		Cyber-172, 173, 174 Cyber-73 6400, 6500	DEC 1080/90 Itel AS/5, AS/6 XDS Sigma 9 Amdahl 470/V5
7	370/165, 168 3033	H-66/80, 85 H-68/80 G-6180	1100/83, 84 1108 1110	B-7700 B-7800		Cyber-175, 176 Cyber-74, 76 Star-100 6600, 7600	Amdahl 470/V6, 7 Cray 1A

TABLE 2

SURVEY SITES BY SIZE CLASS
(Determined By Senior System At Site)

Size Class	# IBM Sites	# Non-IBM Sites	Total # Of Sites By Size Class	% Of All Sites By Size Class
3	2	5	7	2.4%
4	29	9	38	12.8
5	48	11	59	19.9
6	103	11	114	38.5
7	59	5	64	21.7
B*	-	13	13	4.4
C*	-	1	1	0.3
TOTAL	241	55	296	100%

* Minicomputers
* Small Business Computers

TABLE 3

SURVEY SYSTEMS BY VENDOR

Size Class	Other Vendors' Systems									Others Sub-Total	IBM Sub-Total	Total	% Total
	Amdahl	Burroughs	CDC	Data General	DEC	HIS	Itel	Univac	Other* Systems				
3	-	3	-	-	-	-	-	3	1	7	2	9	2.1
4	-	9	-	-	2	1	-	-	-	12	34	46	10.5
5	-	3	3	-	-	5	2	1	3	17	53	70	15.9
6	1	3	7	-	-	8	3	5	-	27	159	186	42.5
7	2	2	5	-	-	2	-	2	-	13	92	105	24.0
B	-	-	-	6	10	-	-	-	5	21	-	21	4.8
C	-	-	-	-	-	-	-	-	1	1	-	1	0.2
TOTAL	3	20	15	6	12	16	5	11	10	98	340	438	100%

*Other Systems: Interdata, NCR and Xerox

TABLE 4

MAJOR IBM CPU POPULATIONS AT 12/77 VS. SURVEY SAMPLE

Model	U.S. Population At 12/77	# CPU's In IDC Sample	%
360 Subtotal	3,730	35	0.9
370/135	1,820	11	0.6
370/138	1,270	18	1.4
370/145	1,600	26	1.6
370/148	860	27	3.1
370/155	475	18	3.8
370/158	1,500	121	8.1
370/165	120	6	5.0
370/168	525	78	14.9
370 Subtotal	10,420	305	2.9
Plug-Compatible	132	8	6.1
TOTAL	14,282	348	2.4

CURRENT SNA USERS

Of the 241 IBM sites in the survey, some 40, or16.6%, claimed to be operating under SNA at yearend 1977. By the end of 1978, this percentage will increase to 27% and by yearend 1979, some 36% of these IBM sites will be using SNA. In view of the length of time SNA has been available, these percentages may be considered somewhat disappointing. However, acceptence is growing. In addition to the 36% of the sites with actual plans to implement SNA at a specific point in time, another 20% indicated that they will eventually convert their operations to SNA sometime in the future.

The following section will more closely examine the 40 SNA users who responded to the survey. Table 5 breaks out the number of SNA users by specific IBM model. Over three-quarters of the SNA users have 370/15X or 370/16X as their senior system, while only a few sites with smaller senior systems are currently operating under SNA.

Reasons For Conversion To SNA

Survey respondents were asked about their reasons for switching to SNA. IDC suggested a number of possible reasons and in addition, users could identify any other specific reason IDC had not mentioned. Table 6 presents the responses to these suggestions. It should be noted that because a site could identify more than one reason for conversion, the number of responses or mentions is not additive to the actual number of SNA users.

In general, the responses to this question were evenly distributed among the suggested reasons for conversion. Only "better throughput" somewhat stood out with 25% of the total number of mentions. The other suggested reasons each

TABLE 5

CURRENT SNA SURVEY SITES BY IBM SENIOR SYSTEM

Size Class	# SNA Sites	% Of Total IBM Sites
370/168, 165	17	42.5%
370/158, 155	14	35.0
370/148, 145	4	10.0
370/138, 135	4	10.0
370/125, 115	1	2.5
360/	0	-
TOTAL	40	100.0%

TABLE 6

REASONS FOR CONVERSION TO SNA
(SNA USERS ONLY)
(# OF MENTIONS)

IBM Model	Better Network Throughput	Better Hardware Performance	New Application, SNA Worked Best	Communications Cost Savings	Hardware Cost Savings	New Application, But SNA Is Inevitable	Total # Of Mentions
168/165	8	4	1	3	3	6	25
158/155	7	4	5	6	3	4	29
148/145	1	2	3	2	1	-	9
138/135	2	1	2	1	1	1	8
125/115	-	-	1	-	-	-	1
TOTAL	18	11	12	12	8	11	72
% Of Mentions	25%	15.3	16.7	16.7	11.0	15.3	100%

received between 11% and 17% of all responses to this question. The fact that the distribution of mentions was so even suggests that conversion to SNA was driven by a number of reasons of equal importance.

SNA users were also asked about whether SNA has lived up to their expectations. Over half of the SNA users reported that SNA had, indeed, provided them with what they had expected. Another 27% of the sites are still in the implementing stages and feel that it is still too early to tell if SNA is really doing what was desired. Just over 17% of the SNA users in the survey indicated that they were disappointed in SNA and that the promises from IBM had not been met.

Conversion Problems

SNA users were also asked about any problems they had encountered during the conversion process. Again, a number of specific problems were suggested in the questionnaire with the opportunity given to the respondent to outline any other problems not mentioned by IDC. Table 7 presents the number of responses to the suggested problems in the questionnaire. As in Table 6, a site could mention more than one problem so the total number of responses is not additive to the number of SNA users.

- Software leads the list as the most commonly mentioned problem by SNA users. Survey respondents generally considered VTAM unstable and requiring too much memory overhead.
- Training of in-house programmers had the second largest percentage of mentions. Users indicated that training was a difficult and lengthy process.
- Because of all the elements involved in implementing SNA, it is no wonder that problems would arise during the conversion process. Nonetheless, just over 14% of the responses to this question indicated that the site encountered no problems during implementation.

TABLE 7

CONVERSION PROBLEMS
(SNA USERS ONLY)
(# OF MENTIONS)

Size Class	None	Training	Hardware	Software	IBM	Total Mentions
168/165	3	4	4	6	2	19
158/155	3	6	7	10	1	27
148/145	1	2	-	1	-	4
138/135	-	2	1	1	-	4
115	1	-	-	-	1	2
Total Mentions	8	14	12	18	4	56
% Of Total Mentions	14.3%	25.0	21.4	32.2	7.1	100%

- A number of sites mentioned that they had difficulty in converting their terminals to SDLC.

- A problem, not suggested by IDC, but mentioned a number of times by survey respondents, was IBM itself. These sites felt that IBM began marketing SNA before IBM itself fully understood all the ramifications involved and that they had, consequently, not adequately trained their field people.

Current SNA Applications

SNA users were asked about the applications which were being performed under SNA. As had been alluded to in other surveys, implementation of new applications was often the driving force behind a conversion to SNA. In this particular survey, new applications were indeed a significant reason for conversion.

Table 8 shows the distribution of responses by specific IBM model according to the type of application being performed under SNA. In general, inquiry/response was mentioned most often. This is not surprising in view of the large number of 3270-type terminals found at survey sites. In addition, this application requires the least amount of difficulty in converting to SNA. Sales order entry was mentioned the second most often with inventory control and 36XX applications ranked third and fourth respectively.

Respondents were also asked what additional applications might be performed under SNA. Those sites not already doing inquiry/response generally will be adding that application while users indicate that they expect to be increasingly involved with order entry and 36XX applications in the future.

TABLE 8

CURRENT APPLICATIONS
(USERS ONLY)
(# OF MENTIONS)

Size Class	Sales Order Entry	Inventory Control	36XX Applications	Inquiry/ Response	Total Mentions
168/165	2	3	1	6	12
158/155	6	3	3	5	17
148/145	-	1	2	3	6
138/135	2	2	1	1	6
125/115	1	-	-	1	2
TOTAL	11	9	7	16	43
% Of Total Mentions	26%	21%	16%	37%	100%

EVENTUAL SNA USERS

IDC was also interested in learning more about those sites in the survey who have plans to implement SNA in the future. Table 9 shows the growth of SNA users by year according to specific IBM model. The greatest areas of growth will be among the 370/158 and 370/168 users although a significant number of 370/138 and 370/148 users reported that they planned to implement SNA sometime in the future.

The reason most often cited for making the eventual conversion to SNA was the expectation of better network throughput. This reason received almost 44% of the total number of mentions to this question. Over 33% of the responses to this question indicated that they were making the conversion to take advantage of better prices and newer hardware. Significantly smaller percentages of the total number of responses were given to new application development as the driving force behind the decision to implement SNA. Those sites who did indicate that new applications were the primary reason behind their plans to convert indicated that they expected SNA to make the application implementation easier and more efficient. (Table 10)

TABLE 9

SITES PLANNING TO IMPLEMENT SNA BY IBM MODEL
(SURVEY DATA)

Size Class	Will Implement In '78	Will Implement In '79	Future	Total # Of Future SNA Sites	% Of Total Future SNA Sites
168/165	9	8	9	26	27.7%
158/155	12	13	17	42	44.7
148/145	3	1	9	13	13.8
138/135	1	-	10	11	11.7
125/115	-	-	-	-	-
360/	-	1	1	2	2.1
TOTAL	25	23	46	94	100%

TABLE 10

REASONS FOR EVENTUAL SNA ACCEPTANCE
(# OF MENTIONS)

Size Class Of System	Better Network Throughput	New Application, SNA Worked Best	Better Prices/ Newer Hardware	New Application, Easy To Go To SNA	Total Mentions
168/165	9	4	7	3	23
158/155	17	2	12	4	35
148/145	2	-	2	1	5
138/135	1	1	-	-	2
125/115	-	-	-	-	-
360/	-	-	1	-	1
TOTAL	29	7	22	8	66
% Of Total Mentions	43.9%	10.6	33.4	12.1	100%

USER REJECTION OF SNA

Some 44% of the IBM survey sites have analyzed SNA and have rejected it for their site. IDC suggested a number of possible reasons for rejection in the questionnaire. While users reported a wide variety of reasons for eliminating SNA from future plans, the largest number of responses were related to "no proven savings." In many of these cases, users indicated that while they may have seen benefits to implementing SNA, they could not justify them with the high costs that they expected to incur during implementation.

Reluctance to switch to MVS and/or VTAM received the second largest percentage of mentions with over 20% of the total number of mentions to this question. The other reason for rejection which stood out was users' apprehension about too much memory overhead. Some users also indicated that they were dissatisfied with IBM's SNA terminal offerings and actually preferred to use plug-compatible terminals instead. Other users mentioned that they wanted to stick with their existing bisynchronous protocol while a number of others are leery of IBM's ability to successfully implement SNA.

Table 11 distributes the number of responses among the different reasons for rejection of SNA by IBM system.

TABLE 11

REASONS FOR REJECTING SNA
(# OF MENTIONS)

Size Class	Don't Understand It	Too Much Memory Overhead	Don't Want SNA Hardware	Want To Use PCM Terminals	Want To Stick With Bisynch.	Don't Want Centralized Network	Reluctance To Switch To MVS & VTAM	IBM Marketing Practices	No Proven Savings	Total Mentions
168/165	3	11	6	2	5	6	6	6	10	55
158/155	4	19	7	7	5	5	18	8	26	99
148/145	4	14	7	4	7	2	22	2	12	74
138/135	-	4	1	-	2	2	4		4	17
125/115	-	1	-	-	1	-	2	-	1	5
360/	3	3	6	3	5	1	8	3	9	41
TOTAL	14	52	27	16	25	16	60	19	62	291
% Of Total Mentions	4.8%	17.9	9.3	5.5	8.6	5.5	20.6	6.5	21.3	100%

CURRENT AND FUTURE TERMINAL USAGE

In order to obtain a better understanding of terminal usage, IDC asked respondents to this survey to report the number of terminals installed at yearend 1977 and the number they expected to be installed at yearend 1979. In addition, users were asked to indicate the protocol their terminals were operating under both now and in the future. Analysis of those terminals found on the IBM systems in the survey is presented below.

On all 340 IBM systems found in the survey, over 50,500 terminals were reported. In gross terms, that means that there is an average number of 149 terminals per IBM system. Healthy growth is expected for the number of terminals on these IBM systems with at least 70,000 terminals expected to be in use by yearend 1979. This represents a compounded growth per year of over 17%. By 12/79 the average number of terminals per IBM system in the sample will have increased to over 200 per computer.

Terminal Type

All the terminals found on the IBM systems in the survey can be broken down into four major categories: IBM 3270s, plug-compatible 3270s, other IBM terminals, and non-IBM terminals. Table 12 breaks down the total number of terminals both at 12/77 and 12/79 by terminal type and by the protocol the user reported for his terminals. It should be noted that the numbers for 12/79 represent the least number there may be installed at that time. Quite a few users could not be specific about the exact number of terminals they expected to be using at 12/79. Consequently, totals for that time represent only known quantities. It should also be noted that the "other" protocol is generally asynchronous, although in some cases, particularly at a few 3270 locations, users have customized their protocols and as such, classify them as "other" rather than as bisynchronous.

TABLE 12

TERMINAL TYPE BY PROTOCOL
12/77-12/79
(SURVEY DATA)

	12/77					12/79					
Terminal Type	# Bisync Terminals	# SDLC Terminals	# Other Terminals	Total # Terminals	% Total	# Bisync Terminals	# SDLC Terminals	# Other Terminals	Total # Terminals	% Total	% Δ From 12/77
IBM 3270	12,774	510	273	13,557	26.7	13,388	5,783	171	19,342	27.5	19.5
3270-Type	5,434	501	382	6,317	12.5	11,230	1,268	183	12,681	18.0	41.7
Other IBM	1,853	1,100	3,820	6,773	13.4	2,311	3,820	3,894	10,025	14.3	21.7
Non-IBM	7,891	-	16,154	24,045	47.4	8,912	655	18,640	28,207	40.2	8.3
TOTAL	27,952	2,111	20,629	50,692	100.0	35,841	11,526	22,888	70,255	100.0	17.6

A number of interesting observations can be made from Table 12.

- While all types of terminals will show growth over the next two years, plug-compatible terminals will most dramatically increase their share of the total installed base on the IBM systems in the survey. At 12/77, non-IBM 3270-type terminals represented only 12.5% of the total number of terminals reported on the IBM systems, while at 12/79, this percentage will increase to 18% of the total.

- IBM terminals other than 3270s will increase by almost 22% per year over the next two years. This growth can be attributed to a large increase in the number of IBM 3770 and 36XX terminals.

- The number of IBM 3270s will increase by close to 20% each year reaching almost 20,000 devices installed by yearend 1979 on the IBM systems in the survey.

- The high growth rates of the IBM and plug-compatible terminals will come at the expense of the non-IBM terminals with only an 8.3% per year increase expected. The non-IBM terminals, which are comprised primarily of Teletype-compatible devices, usually keyboard/printers, represent some 47% of the total number of terminals on the IBM systems in the survey at 12/77 and will decrease to only 40% by yearend 1979.

Table 12 also reveals some interesting changes in protocol usage. Probably the most dramatic difference between 12/77 and 12/79 is the number of terminals operating under SDLC. At yearend 1977, only 2,111 terminals were transmitting data via SDLC. Over half of these terminals were IBM terminals other than 3270s, primarily 3770s. By yearend 1979, the number of terminals operating under SDLC will increase to 11,526, or some 134% per year. By that time IBM 3270s will constitute the largest segment of the SDLC population although other IBM terminals, particularly 36XXs and 3770s, will make up a large portion of those SDLC terminals.

For further clarification of IBM terminal usage now and in the future at survey sites, such devices are distributed by protocol according to specific terminal model number in Table 13.

TABLE 13

USAGE OF IBM TERMINALS
12/77-12/79
(SURVEY DATA)

12/77						12/79					
Terminal	Bisync	SDLC	Other	Total	% Total IBM	Terminal	Bisync	SDLC	Other	Total	% Of Total Other IBM
3275/3277	12,771	510	276	13,557	66.7%	3275/3277	12,165	4,537	171	16,873	57.5%
3274/76/78	-	-	-	-	-	3274/76/78	1,208	1,246	-	2,454	8.4
3771/3/4/5	445	129	-	574	2.8	3771/3/4/5	518	516	-	1,034	3.5
3776	51	11	1	64	0.3	3776	42	49	3	94	0.3
3777	46	4	-	50	0.2	3777	34	19	-	53	0.2
3790	2	92	1	95	0.5	3790	8	274	-	282	1.0
3790/3760	-	1	-	1	0.02	3790/3760	-	36	1	37	0.1
36XX	58	476	-	534	2.6	36XX	120	1,908	-	2,028	6.9
3767	6	127	143	276	1.4	3767	-	375	61	436	1.5
3780/2780	182	-	-	182	0.9	3780/2780	188	-	-	188	0.6
3740	84	-	-	84	0.4	3740	29	-	-	29	0.09
3735	50	-	-	50	0.2	3735	-	-	-	-	-
Series 1	1	-	-	1	0.02	Series 1	15	15	-	30	0.1
Sys/32, 34	7	6	-	13	0.06	Sys/32, 34	31	10	-	41	0.1
2740/2741	-	-	1,490	1,490	7.3	2740/2741	-	1	1,486	1,487	5.1
1030	-	-	1,298	1,298	6.4	1030	-	-	1,250	1,250	4.2
1050	-	250	152	402	1.9	1050	-	250	101	351	1.2
2980	550	-	-	550	2.7	2980	550	-	-	550	1.9
Other IBM	370	4	735	1,108	5.5	Other IBM	776	372	991	2,139	7.3
TOTAL	14,623	1,610	4,096	20,329	100%	TOTAL	15,684	9,608	4,064	29,356	100%

- At 12/77, IBM 3270s constitute two-thirds of all IBM terminals reported by the IBM sites in the survey. At 12/79 when the number of new Model 3270s are added to the expected number of older 3270 models, this percentage basically stays the same.

- Particular growth areas for specific IBM terminal products will come from increases in usage of 3770 and 36XX terminals.

- A number of IBM's older terminal product offerings will show decreases in the installed base over the next two years. The 2740/2741 keyboard printers, the 3740 and the 1030 will all decrease their percentages of the total number of terminals installed on the IBM systems in the survey.

- IBM terminals operating under SDLC will increase by 145% a year for the next two years. Older 3270 models comprise a great portion of this spectacular growth. Interestingly enough, an almost equal number of the newer 3270 models -- 3274/76/78 -- will be operating under bisynch as under SDLC at yearend 12/79. Almost all of the 3790 and 36XX that are expected to be installed by yearend 1979 will transmit data via SDLC.

Remote vs. Local Terminals

As users were indicating current and future terminal usage by terminal type and protocol, they were also encouraged to identify the location of these terminals. Tables 14 and 15 present the four terminal types by remote vs. local designation according to IBM model number. Because a certain number of respondents could not be specific as to the actual breakdown of local vs. remote, an "unknown" category was created.

At both yearend 1977 and 1979, the number of remote terminals connected to the IBM systems in the survey is equal to over 84% of the total number of terminals. The number of terminals at unknown locations increases somewhat at 12/79 due to users' uncertainty in future plans.

TABLE 14

TERMINAL LOCATION VS. IBM SENIOR SYSTEM
12/77
(SURVEY DATA)

	IBM 3270				3270-Type				Other IBM				All Other Terminals				TOTAL			
Size Class	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	TOTAL
168/165	1,792	5,585	870	8,247	10	4,730	-	4,740	402	3,355	26	3,783	303	14,549	458	15,310	2,507	28,219	1,354	32,080
158/155	1,797	2,136	598	4,531	265	426	-	690	14	1,240	26	1,280	383	4,161	5	4,549	2,458	7,963	629	11,050
148/145	225	208	119	552	129	95	207	431	44	431	-	475	33	1,854	40	1,927	431	2,588	366	3,385
138/135	66	77	20	163	25	268	-	293	-	114	-	114	30	534	69	633	121	993	89	1,203
125/115	3	-	-	3	-	-	-	-	-	-	-	-	1	46	-	47	4	46	-	50
360/	18	43	-	61	31	132	-	163	-	1,120	1	1,121	15	1,564	-	1,579	64	2,859	1	2,924
TOTALS	3,901	8,049	1,607	13,557	459	5,651	207	6,317	460	6,260	53	6,773	765	22,708	572	24,045	5,585	42,668	2,439	50,692

TABLE 15

TERMINAL LOCATION VS. IBM SENIOR SYSTEM
12/79
(SURVEY DATA)

	IBM 3270				3270-Type				Other IBM				All Other Terminals				TOTALS			
Size Class	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	Sub Total	Local	Remote	Unknown	TOTAL
168/165	2,365	7,370	400	10,135	-	10,463	50	10,513	161	4,564	358	5,083	320	16,772	1,034	18,076	2,846	39,119	1,842	43,807
158/155	2,043	4,536	1,255	7,834	398	608	100	1,106	14	2,473	255	2,742	276	4,516	100	4,892	2,731	12,133	1,710	16,574
148/145	400	510	150	1,060	43	234	137	414	45	923	2	970	51	1,939	153	2,143	539	3,606	442	4,587
138/135	52	90	20	162	37	317	-	354	1	157	1	159	37	326	284	647	127	890	305	1,322
125/115	10	5	-	15	-	-	-	-	-	-	-	-	-	45	-	45	10	50	-	60
360/	31	105	-	136	26	268	-	294	-	1,071	-	1,071	22	2,382	-	2,404	79	3,826	-	3,905
TOTALS	4,901	12,616	1,825	19,342	504	11,890	287	12,681	221	9,188	616	10,025	706	25,930	1,571	28,207	6,332	59,624	4,299	70,255

Terminal Type vs. IBM System Model

Table 14 and 15 also reveal the distribution of terminals according to IBM system. As can be expected, the larger the senior system at a site the more terminals there are that are communicating with it. The percentages do not really change by 12/79.

GENERAL ISSUES: SURVEY RESPONSES

Penetration Of AT&T's Dataspeed 40/4

To determine the penetration of AT&T's 40/4 on the IBM system marketplace, IDC asked the survey sites about their exposure to and usage of these CRT, bisynchronous products. Some 29 respondents indicated that they had the 40/4 installed, representing over 1,000 terminals. The survey also revealed that about a third of these sites replaced IBM 3270s with the AT&T model. In addition, survey results indicate that by 12/79, some 6,000 40/4s would be installed, with most of the increase coming from one site who is planning on adding several thousand 40/4s as 3270-type terminals. From this particular survey and from other indications, AT&T's product offering is highly competitive and stands to capture a significant share of the plug-compatible 3270 marketplace.

Satellite Business Systems Exposure

Users were also asked in this survey about the extent of their knowledge of SBS. It should be noted that this survey was conducted a number of months prior to the U.S. Court of Appeals decision to turn down the FCC's recommendation to grant SBS a license. Nonetheless, the responses to the questions are interesting.

- Of the IBM sites in the survey, over 46% of them indicate that they would consider becoming SBS customers. Eighteen percent reported that they had actually attended SBS presentations or seminars.
- Of the 55 non-IBM sites in the survey, over 34% would consider using SBS as a carrier. Almost 13% of these sites had been to SBS presentations.

IBM vs. AT&T

Users were asked to comment on a potential confrontation on the battlefield of data processing between AT&T and IBM. Overall, the general feeling is best summed up by the survey respondent who said, "Healthy competition will be good for us all." A few of the more interesting comments are presented below, more for entertainment than for any serious analysis.

- "I believe these giants will divide and dominate the market and will peacefully co-exist."
- "Sick 'em."
- "They should play on the same court."
- "Leave transmission to AT&T and let IBM stick to computers."
- "Will AT&T, the largest monopolistic corporation in the world, treat their smaller adversary (IBM) in the same ruthless manner IBM has dealt with its competitors???????"

OVERALL USER COMMENTARY

IDC asked respondents to the survey whether they thought SNA was a success. Respondents were also invited to include their own comments on SNA. Although this analysis is interesting, it probably should not be taken seriously as the question itself was not really meant to do more than stir up controversy. Nonetheless, some percentages of responses follow.

- Of the 241 IBM sites in the survey, 41.5% reported that they think SNA is a failure.
- Some 52% of the IBM sites indicated that SNA was not a failure, while another 6.5% said that SNA was probably floundering, but that IBM would remedy the situation.
- Of the 55 non-IBM sites in the survey, over 50% indicated that they think SNA is a failure. This is practically meaningless data since none of these sites have ever evaluated SNA in the first place and are anti-IBM in the second.

The variety of comments from the survey respondents was notable. Along with some pretty comical as well as cynical remarks, there were a number of interesting insights into IBM's marketing strategies as these large users perceive them. Rather than analyze the comments, some of the most typical ones are presented below, in unedited fashion.

- It won't be a flop because IBM is pushing it.
- SNA is inevitable, it's just a matter of time.
- SNA will come late and cost more, like everything else in data processing, but it will definitely come.
- SNA is geared to large network users. System requirements make the payoff difficult to see for small users.
- Too big, too much overhead.
- IBM software is not cost-effective.

- While there may be benefits to be gleaned from SNA, the need to support existing bisync equipment further complicates teleprocessing support.

- SNA is a gimmick to force users to buy more equipment.

- IBM caught others napping. SNA is an IBM fighting tool. SNA is nothing really new except its a codification of a lot of common sense ideas and concepts all designed to sell terminals while protecting large mainframe business.

- Typical IBM software product: large overhead, poor performance.

- SNA locks you into IBM.

- Good hardware concept . . . lousy software support. VTAM is the flop, not SNA.

- SNA by definition is acceptable - - implementation is questionable --- 370/168 hardware is no place to control a network, it was designed to process data not to high speed control it.