ISSN 0910-6707

1991

Japan Computer Quarterly

Japan Information Processing

Development Center

VAN Services in Japan

No. 86

Japan Computer Quarterly

1991

Japan Computer Quarterly (JCQ) is published quarterly by the Japan Information Processing Development Center (JIPDEC), Kikai Shinko Kaikan Bldg., 3-5-8 Shibakoen, Minato-ku, Tokyo 105 Japan.
Publisher: Eiji Kageyama, President
Editor: Yuji Yamadori, Director Research & International Affairs

JIPDEC is a non-profit organization founded in 1967 with the support of the Ministry of International Trade and Industry, the Ministry of Posts and Telecommunications and related industry circles for the purpose of promoting information processing and the information processing industry in Japan.
JCQ, formerly called the *JIPDEC* Report, was first published in September, 1970 and is prepared with the assistance of the Japan Keirin Association through its Machine Industry Promotion Funds.

Translated and Printed by The Translation Institute of Technology Science & Culture
Printed in Japan, August, 1991

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FROM THE EDITOR

The eighties saw a sharp reorientation towards the informatization of Japanese industry, and this trend shows no sign of abating in the nineties. Indeed, what with increasing office automation and the proliferation of strategic information systems (SIS), companies actually seem to be raising their level of information-related investment, and the fusion of information processing and telecommunications is progressing along with the rapid developments in computers. As a result, information networks are breaking out of their in-house confines, in a leap not only towards inter-company applications but also towards global linkages. Companies that fail to keep abreast of network application developments seem doomed to extinction. However, the use of networks is no longer confined to the cloistered business world; network use is branching further and further a field, into society and the nooks and crannies of daily life. Japan is steadily progressing along a path towards the realization of an information network society.

In this country, cultural as well as industrial activities tend to concentrate in and around the capital. Thus it is no wonder that an ever-widening difference is also perceived between Tokyo and provincial Japan in the rate of progress in informatization. To close this gap, efforts to promote regionalization can be seen today in national and regional government policies and in the plans of large as well as small industries to transplant production facilities into the provinces. All these efforts are aimed at developing the economies of the provinces and smaller cities. For example, in a new trend in retailing, convenience stores are now sprouting up in distant regions side by side with voluntary chains, and large shopping centers are even appearing in the provinces. Local VANs are being developed steadily, mostly to serve wholesalers and retailers in processing orders.

The word "VAN" (value added network) is a term that originated in the U.S. early in the seventies. The expression "VAN" reached Japan soon thereafter and quickly gained popularity, but the term "VAN" gradually lost its currency, since the Federal Communications Commission (FCC) lifted its statutory restrictions on these kinds of network in 1980. Today, the companies operating VANs follow their own norms and are not subject to restrictions imposed from outside, but in the seventies, VAN users in Japan had to follow telecommunications services regulations, a difference in mode of usage from that in the U.S. In the eighties, however liberalization of the restrictions on the use of telecommunication channels for these networks and the subsequent branching out of telecommunication related activities have led to a variety of interpretations of the role of the VAN. Thus, in Japan the term "VAN" has yet to be defined

once and for all. However, defined in a broad sense, the use of the expression "VAN" is widespread today throughout Japan.

A survey of specific service industries by the Ministry of International Trade and Industry revealed that in 1989, information service industry sales in Japan stood at 4.3514 trillion yen, up 32% from the preceding year. Over the last ten years, Japan's information service sales have grown 7.3-fold, registering an average advance of 22%, progress unparalleled elsewhere in industry. This growth was sustained, among other factors, by copious investments in industry for the development of new online systems for financial institutions, the introduction of point of sales (POS) systems in the distribution services industry, and the construction of new networks by business enterprises in general.

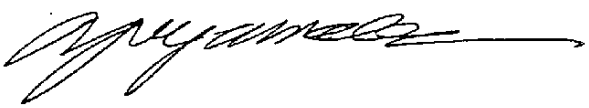
The MITI survey also shows that Japan's VAN market posted 141.3 billion yen in sales in 1989, making up 3.2% of the total information services market. The spread of inter-company networks is expected to push the VAN services market steadily forward in coming years as well. Thus, the 1991 White Paper of the Information Services Industry of the Japan Information Service Industry Association (JISA) predicts that the industry will grow annually at an average rate of 18.8%, to reach 396.6 billion yen in 1995, 4.2% of the total market. After this it will grow an average of 12% a year, reaching 700 billion yen (4.4% of the total market) in 2000. Its growth will be the highest among all service industries.

Japan's information services industry is grappling with a number of issues, such as the need for manpower, the challenge of improving engineering and marketing potential and increasing productivity, and the need to expand globally. Future growth ahead will hinge on the industry's ability to find solutions for these problems.

Corporate globalization is not restricted to Japan; it can be seen today everywhere in the advanced industrialized nations. Advances in electronic data interchange (EDI) facilities are paving the way for active trading and distribution of data across national boundaries, promoting the creation of a borderless world. This has sparked a sharp demand for international VANs. However, this globalization also involves problems of adjustment, standardization, and security.

In this issue we will try to adopt a clear perspective of the above conditions and tackle the current status of Japan's VANs. We hope that readers will find the articles interesting and useful.

Finally, we would like to thank everyone who cooperated in bringing out this issue.



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VAN Services Market in Japan

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Introduction

It is well known that VAN (Value Added Network) is a type of network service introduced for the first time in the U.S. in the early 1970s. The word VAN was firstly introduced as a regulatory concept, "packet switching network service on resale basis leased line with protocol conversion" (FCC decision on "Packet Communications, Inc.," October, 1973). However, in April, 1980, the FCC classified communications services into "basic services" (pure transmission svc) and "enhanced services" (value added svc) in its Second Computer Inquiry Decision. As the decision fully deregulated enhanced services and terminal equipment, legal word VAN disappeared in the United States.

The first VAN in the U.S. was an experimental network for the Department of Defense's Advanced Research Planning Agency (DARPA), completed in 1969. The second was an internal network for Tymshare called "Tymnet," completed in November, 1971. Packet Communications, Inc. (PCI) did not implement their plan, for which they had received approval from the FCC, because of a shortage of funds. The first commercial network was Telenet, which became operational in August, 1975. Tymnet also received authorization to become a common carrier, and started to provide commercial services in April, 1977. At that time, AT&T could not enter the VAN business due to restrictions in their consent decree of 1956, and other remote computing service providers did not have interest in conducting business in regulatory environments. Therefore, the VAN market has developed with Telenet and Tymnet dominance.

In Japan NTT started R&D of digital data exchange networks (DDX, circuit switched type and packet switched type) in 1971. Its DDX technology was completed as soon as the ISO and CCITT international standards were finalized. NTT began offering DDX-C (circuit switched) service in December, 1979 and DDX-P (packet switched) service in July, 1980.

While NTT was developing public data networks, Japan's computer industry noticed the VANs development in the U.S. and increased their demands for the liberalization of the use of communications lines, something they had desired since the late 1960s, adding the demand for "free entry in the VAN market."

In March 1981, the Ad Hoc Administrative Reform Committee was formed in order to eliminate financial deficits and realize "cheaper government" through deregulation. The Committee also was to study the privatization of public corporations. During the course, the Public Telecommunications Law

was partially revised based on the second recommendation of the Committee. Starting in October, 1982 the VAN business for medium and small companies (with less than 100 million yen in capital) was liberalized on an interim basis. In its third recommendation (July 1982), the Committee called for a drastic reform of telecommunications regime including the full liberalization of telecommunications market and the privatization of NTT Public Corporation. Subsequent deliberations resulted in the reform bill in April 1984, then the discussion & coordination in the Diet and finally the implementation of the reform in April 1985.

As shown in Figure 1, the government has adopted a unique framework of regulations for the VAN business, creating two categories of telecommunications carriers, facility based and resale based. This framework differs from the U.S. framework of dichotomy, which divides communications services into regulated basic services and unregulated enhanced services. The Japanese government has classified telecommunication business into two categories: "Type 1 business" that provide service by establishing circuit facilities and "Type 2 business" that provide service by leasing circuit facilities. The latter was further divided into "Special Type 2," large-scale& general-use, and "General Type 2," small-scale & specific-use. This framework is to vary the regulatory rigidity not in terms of service but in terms of business. When starting up a business and setting tariffs, the procedures to be followed by carriers are the least strict for General Type 2 carriers, and become progressively stricter for Special Type 2 and Type 1 carriers. Although this is not indicated in Figure 1, there is a regulation that restricts foreign capital to up to 1/3 of the total shares of a Type 1 carrier. (Foreign investment in NTT and KDD is prohibited.) There is no foreign capital restriction on Type 2 carriers. Within this framework, all carriers can provide a new or customized service, but it is most practical for the users to utilize a General Type 2 carrier because of its unregulated pricing. Services by Special Type 2 and Type 1 Carriers are provided through more orthodox procedure.

VAN Service Market

The word "VAN" is said to have been originally coined by Tymshare, Inc. in order to attract the attention of users of information processing services. This appeal was based on the characteristics of packet switching services, that is, high quality and reliability due to error checking and alternative routing functions, and the flexibility and efficiency of packet transmissions.

However, at present, the VAN services provided by large U.S. services providers vary widely from one company to another. There is no common definition of a "VAN." For example, IBM-IN and Infonet include sales from electronic messaging such as E-Mail and electronic fund transfers under the VAN sales category, but with BT Tymnet and General Electric Information Services, these fall into a separate, non-VAN category. With U.S. Sprint, "VAN" includes transaction processing, but with BT Tymnet, it does not. IBM-IN includes remote computing services, but GEIS does not.

VAN services in the U.S. currently include: a) packet switched and public data services with code & protocol conversion and control functions, including billing and security (Traditional VAN); b) enhanced network services such as electronic mail, EDI, enhanced fac-

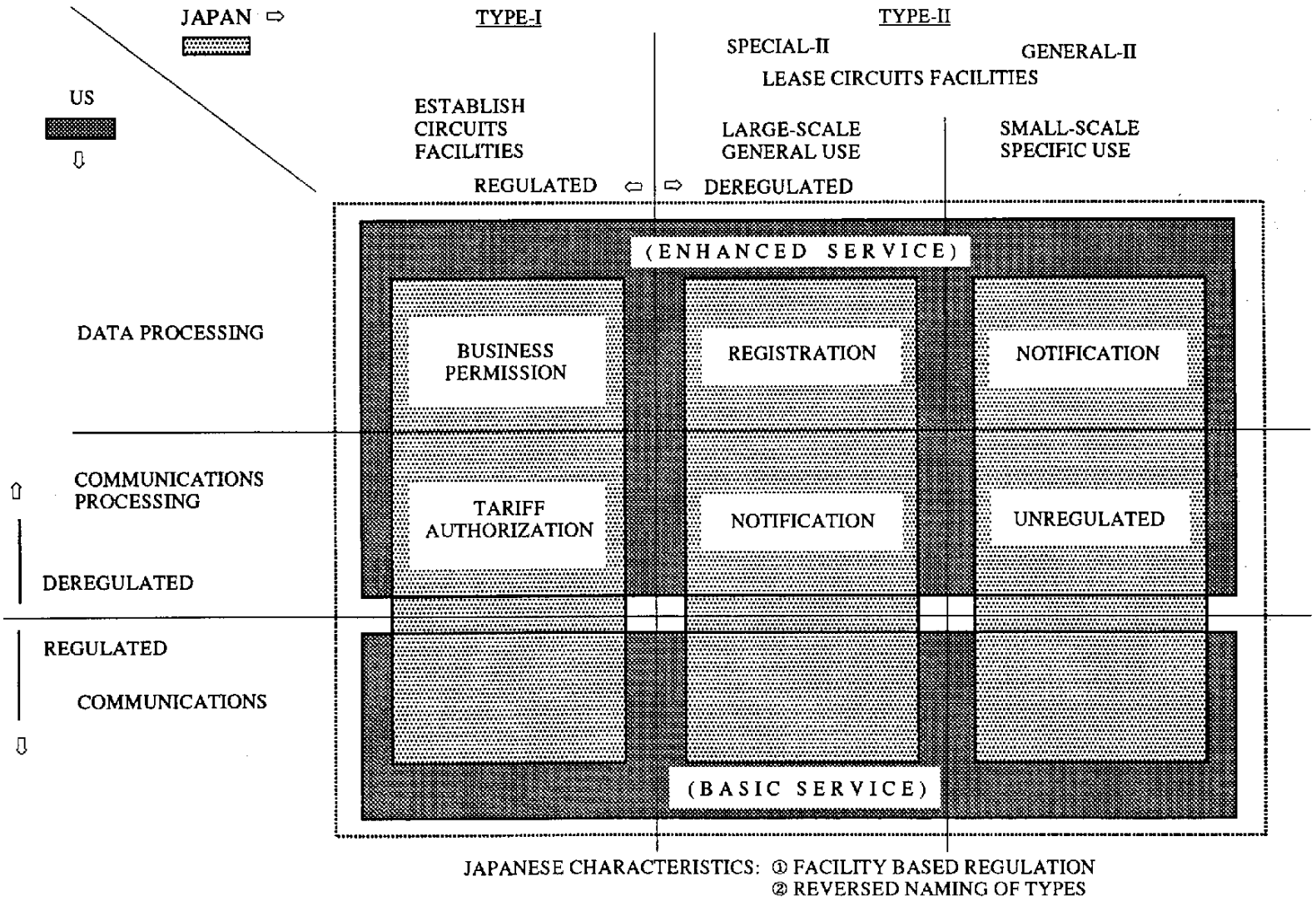


Figure 1 US-Japan Comparison

simile, voice mail, videotex and data base access; 3) transaction services such as card verification, ATM, EFT and POS; 4) computer services such as data processing, remote computer monitoring, electronic software distribution services; 5) information retrieval service; 6) services such as alarms/ security, telemetering and tele-control. All kinds of enhanced services are included in VANs.

In Japan, there was a great deal of heated discussion about advanced informatization in the early 1980s in the background of the telecommunications reform mentioned earlier. The commonly held view was that "Advanced Information and Communication Services" could be realized by adding communication processing functions (various kind of conversion, mail box, and multi-media communication functions) and information processing functions (remote computing, transaction processing, data base access and applications for business transactions unique to industry) to basic transmission functions (including resale of leased lines). This is the generic concept of VAN service in Japan. Thus, the kinds of VAN services currently offered in the U.S. were conceived in Japan at an earlier date.

The size of the market for VAN services tends to be ambiguous due to the dynamic development of information network systems, the difficulty of differentiating the complexities of information processing into online and offline for measurement, and fluctuations in users' choice of applications (service utilization and software development).

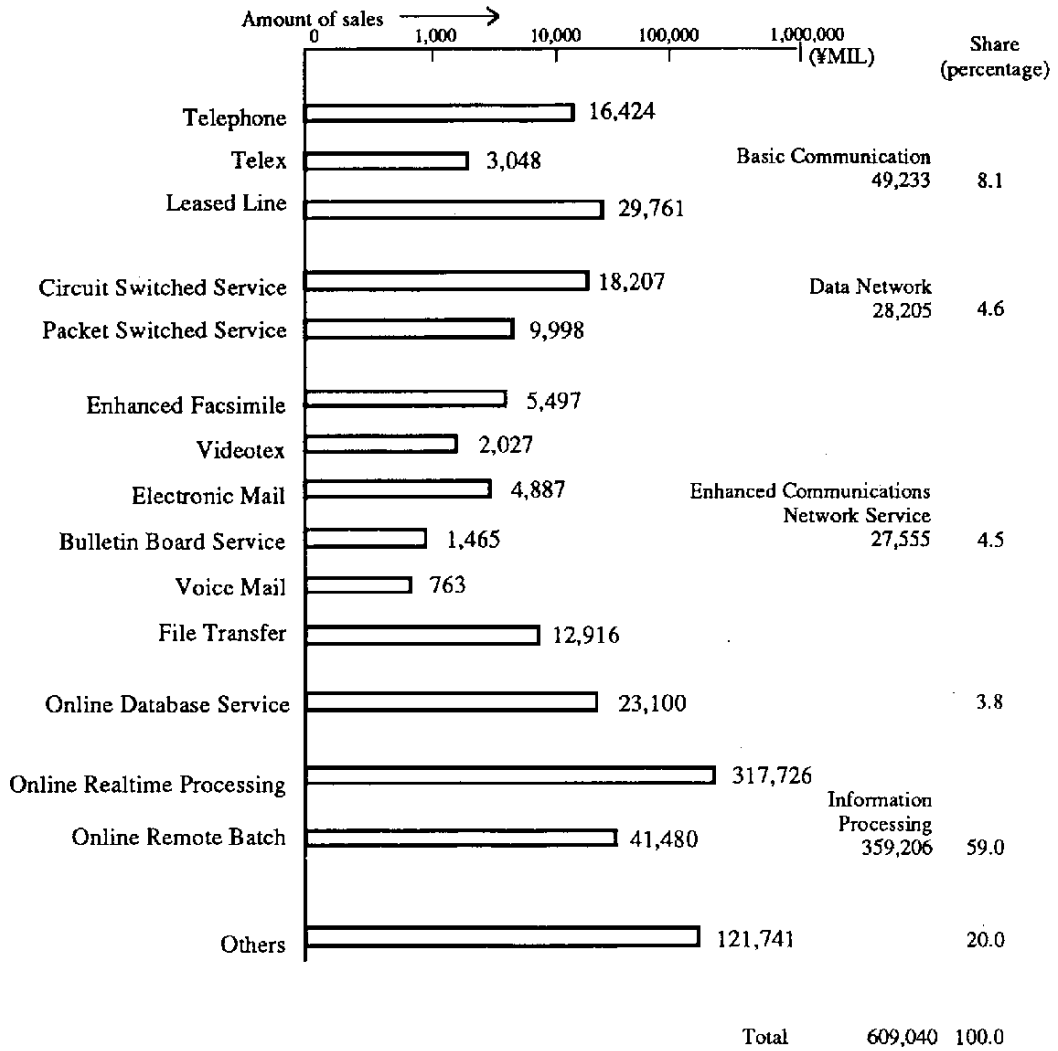
There have been two surveys which provide insight into the size of Japan's VAN service market; a survey of VAN services providers by the Ministry of Posts & Telecommunications (MPT) and a survey of information services industry by the Ministry of International Trade & Industry (MITI).

According to the MPT survey (conducted in November, 1989), the market size for VAN services is as shown in Figure 2, that is, approximately 105 billion yen for basic communications, data networks and enhanced communication network services, approximately 23 billion yen for online data bases and approximately 360 billion yen for online information processing, bringing the total to approximately 488 billion yen. (The survey covered 1,132 telecommunication carriers and unregulated network. The response rate was 55%.)

MITI also conducted a survey of the information service industry in the same November of 1989. Questionnaires were sent to 5,587 industry establishments. This was a Government statistical survey, so all the establishments were obliged to respond. According to the survey, the size of the VAN services market totaled approximately 554 billion yen, including approximately 141 billion yen for VANs, approximately 304 billion yen for online computing services and approximately 109 billion yen for online data base services. The results are shown in Figure 3.

Neither survey included the approximately 40 billion yen in sales of digital data exchange services (DDX) provided by NTT.

The MPT survey was only its third annual survey, while it was only lately that the MITI survey added survey items for online information services, even though the survey itself has a long history. Therefore, neither survey provides sufficient information to grasp the

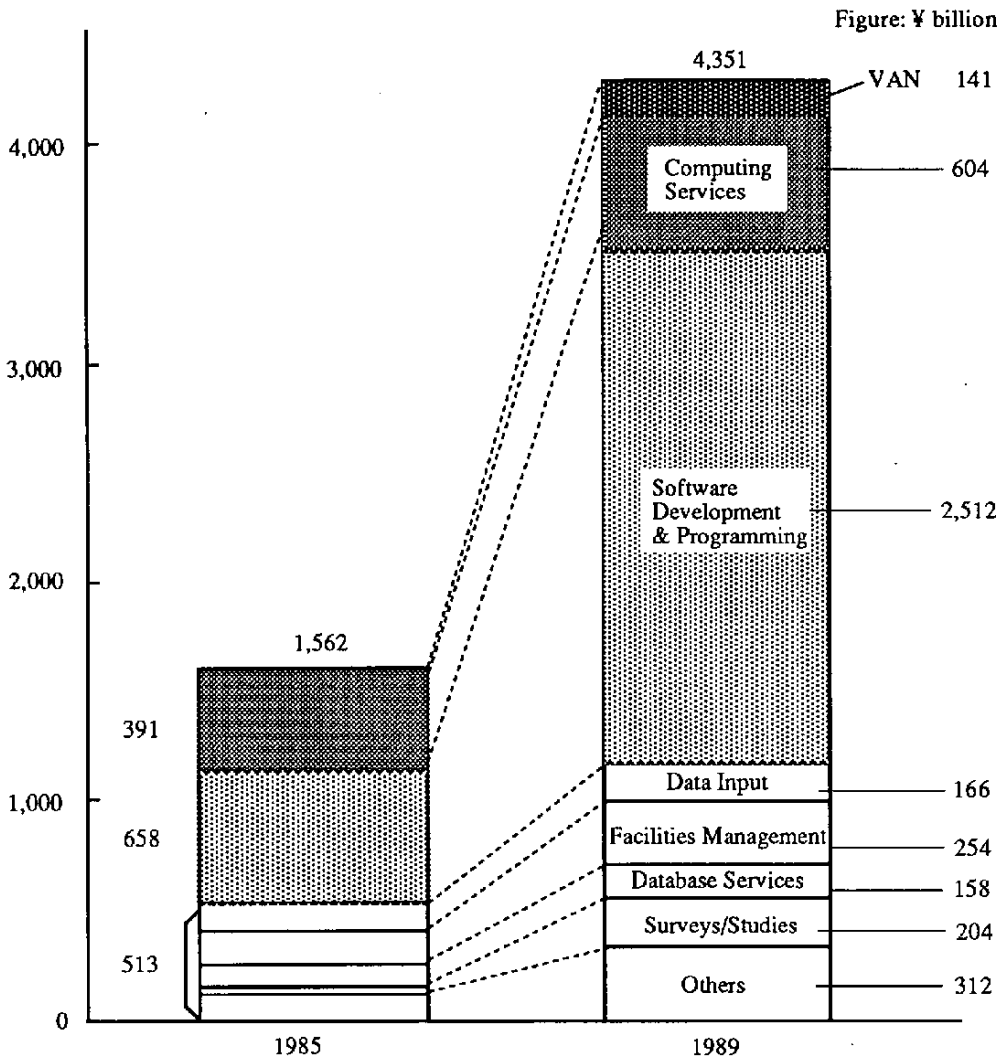


Source : MPT Survey

Notes : a. Figures are based upon the inquiry answers from 20 Special Type II carriers, 290 General Type II carriers and 69 other organizations.

b. In addition to the above mentioned figures, 36 Type I carriers reported the revenues of 123 billion yen in the inquiry answers.

Figure 2 VAN Services' Amount of Sales (1989)



Source : MITI Survey

Notes : a. Computing Services' amount of sales in 1989 is divided into two subcategories:
Online Computing Services : 304 billion yen
Offline Computing Services: 300 billion yen

b. Database Services' amount of sales in 1989 is divided into two subcategories:
Online Database Services : 109 billion yen
Offline Database Services : 49 billion yen

c. 1989 figures of VAN, Online Computing Services and Database Services are based upon the inquiry answers of services providing offices, amounting to 231, 725 and 202, respectively.

Figure 3 Information Services Market Growth (85-89CY)

market trends. However, if we take into account the number of computers installed and the growth rate of the information service industry as a whole, Japan's VAN service market is estimated to have been 500 billion yen as of 1989, and is expected to grow at compound growth rate averaged of 20% to rise above 1 trillion yen in 1993.

The MPT's "Illustrated Yearbook of Networks in Japan 1991" estimates that sales of VAN services for the 1989 fiscal year were 1,257 billion yen. This figure differs from the above-mentioned estimation, as it includes the sales of Type I long distance (except NTT & KDD), mobile communications carriers and pagers.

Status of VAN Services Providers

Japan's VAN services providers are generally Type 2 telecommunications carriers. As stated above, NTT and KDD, which are Type 1 telecommunication carriers, provide VAN services, but their services are usually not perceived as VAN services. (In the case of NTT, their data communication sector was divested as a wholly owned subsidiary in July, 1988, and the subsidiary has been registered as a Special Type 2 services providers. However, the NTT parent company continues to provide DDX services.)

There were 31 Special Type 2 telecommunications carriers as of March, 1991, as shown in Table 1, and there were 912 General Type 2 carriers, as shown in Figure 4-A.

Among the Special Type 2 carriers, there are 11 companies that provide only domestic services and 20 companies that provide domestic as well as international VAN services.

The 31 companies can be classified by industry they come from. The classification is as follows:

- Electronics industry (8 companies)
  Fujitsu, Hitachi Information Network, IBM Japan, Mitsubishi Electric Information Network, NEC, Oki Electric Industry, Toshiba, Nihon Unisys
- Information services industry (6 companies)
  Global VAN Japan, INES, Intec, Mitsui Knowledge Industry, Toyo Information Systems, United Net
- Foreign information & communications services industry (5 companies)
  AT&T JENS, Information Services International Dentsu, Network Information Service, Sprint Japan, VITEL Japan
- Financial services industry (3 companies)
  Daiwa Institute of Research, The Japan Research Institute, Nomura Research Institute (NRI & NCC)
- Media companies (3 companies)
  Nihon Keizai Shimbun, Recruit, Recruit International VAN
- Others (6 companies)
  K-Network International, Nippon Steel Information & Communication Systems, Nippon Information & Communication, NI +C International, NTT Data Communications Systems, NTT Internetwork

The Special Type 2 carriers are generally large corporations in the range of 1 billion to 10 billion yen in capital except for electronics manufacturers with a huge amount of capital (more than 100 to 200 billion yen), such as Fujitsu, NEC, IBM Japan and Toshiba and international VANs with a limited number of domestic nodes, such as Mitsui Knowledge Industry, Sprint Japan and VITEL JAPAN (which have less than 1 billion yen in capital).

Table 1 List of Special Type II Telecommunications Carriers

As of March 31, 1991

Name	Type of Service	Area
Intec Corp.	Voice, Image, Data	Japan
Oki Electric Industry Co., Ltd.	Voice, Image, Data	
NTT Internetwork Inc.	Data	
Nippon Information and Communication Corp. (NI+C)	Voice, Image, Data	
INES Corp.	Data	
NTT Data Communications Systems Corp.	Data, Complex	
Mitsubishi Electric Information Network Corp.	Voice, Image, Data, Complex	
Recruit Inc.	Voice, Image, Data, Complex	
Toshiba Corp.	Data, Complex	
Nihon Unisys, Ltd.	Image, Data, Complex	
Nippon Steel Information & Communication Systems, Inc.	Voice, Image, Data, Complex	
NEC Corp.	Voice, Image, Data, Complex	Japan, U.S., U.K., Hong Kong, Singapore
Network Information Service Co., Ltd.	Voice, Image, Data	Japan, U.S., U.K., Hong Kong, Singapore
Global VAN Japan Inc.	Image, Data	Japan, U.S., U.K., Hong Kong, Singapore
AT&T JENS Corp.	Voice, Image, Data	Japan, U.S., U.K., Hong Kong, Singapore
Hitachi Information Network Ltd.	Voice, Data, Complex	Japan, U.S., Hong Kong, Singapore
NRI & NCC Co., Ltd.	Data	U.S., U.K.
The Japan Research Institute Ltd.	Image, Data	Japan, U.S., U.K., Hong Kong, Singapore
Mitsui Knowledge Industry Co.	Data	U.S.
IBM Japan	Data	U.S., U.K., Germany, Canada

Name	Type of Service	Area
Nihon Keizai Shimbun Inc.	Image, Data	Japan, U.S.
NI+C International Corp.	Data	U.S., U.K., Hong Kong, Germany, Singapore
Information Services International-Dentsu Ltd.	Data	U.S.
K-Network International Inc.	Data	U.S., U.K., Hong Kong, Germany, Singapore
Vitel Japan Ltd.	Data	U.S.
Sprint Japan Inc.	Data	U.S., Hong Kong, Singapore
United Net Corp.	Voice, Image, Data, Complex	Japan, U.S., Hong Kong, Singapore
Toyo Information Systems Co., Ltd.	Image, Data, Complex	Japan, U.S., Hong Kong, Singapore
Fujitsu Ltd.	Voice, Image, Data, Complex	Japan, U.S., Hong Kong, Singapore
Recruit International VAN Co., Ltd.	Image, Data	U.S., U.K.
Daiwa Institute of Research Co., Ltd.	Data	Japan, U.S., U.K.

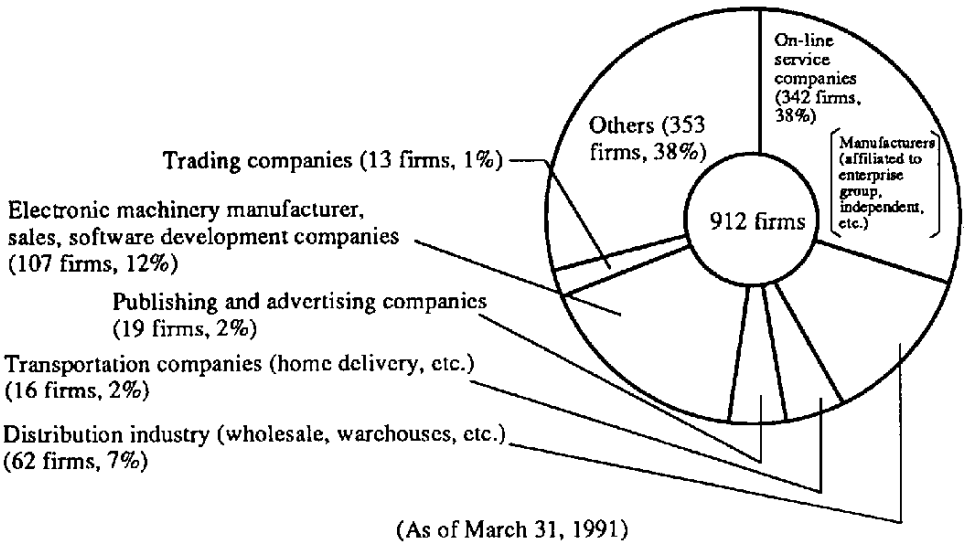
Independent information services companies such as INES, Intec and Toyo Information Systems are large corporations with more than 10 billion yen in capital.

This is because an initial investment of about 10 billion yen is necessary to construct a packet switched network with 30 to 60 access points throughout Japan (a so-called "trunk VAN") and to set up basic conversion functions and services of wide use such as electronic mail and enhanced facsimile transmissions. At the same time, a new company must hire able technical personnel to develop private network applications for each customer or for each industry.

"Trunk VAN" services such as Fujitsu's FENICS, NEC's C&C VAN and Intec's Ace Telenet have been founded in this way. However, VAN business departments or VAN companies have not been able to be independently profitable with VAN services (in broad terms). With the amount of sales on a similar scale of the two business lines of software development and equipment sales, they are able to break even or make a profit.

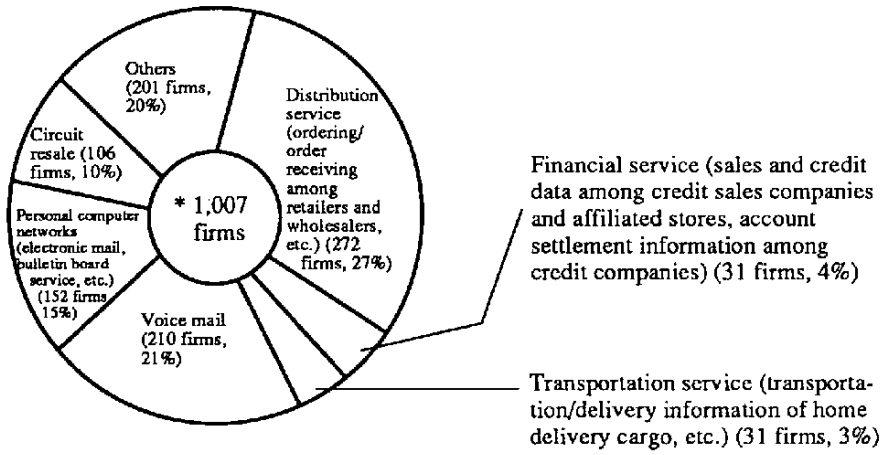
Among the Special Type 2 carriers, Fujitsu and NEC have been successful in expanding their PC communications services by establishing several industry VAN services. Nippon Information and Communication had to

A. Classification by Industry



(As of March 31, 1991)

B. Classification by Business



* Note : The total number does not equal to the number of firms in Classification by Industries because some firms offer more than one type of service.

Source: Based on MPT's materials

Figure 4 Current Status of General Type II Telecommunications Carrier

undergo restructuring because of depressed sales in June, 1991, and Oki Electric Industry transferred its VAN business from their VAN subsidiary to the parent company in March, 1991.

The common challenge facing Special Type 2 carriers in 1991 is to cope with NTT's INS-P, ISDN packet switched services. "Trunk VAN" carriers have been able to cope with NTT's DDX-P, the precursor of INS-P, by offering roughly the same monthly access charges and lower packet communication charges with distance-insensitive rating. (DDX-P's cost for distance over 100 km was 1.25 times higher than that for up to 100 km.) However, in April, 1988, the basic monthly charge for INS Net 64 service was set at a low level in the light of MPT's infrastructure policy. Two years later in July 1990, MPT approved the monthly surcharge for INS-P access in its similar consideration. Thus, the total monthly charges of INS-P were set significantly lower than those of Special Type 2 VANS (for instance, INS-P cost approximately one-fifth of those of VANs in the case of 9600 bps throughput). Furthermore, the number of INS service areas was increased to 1,286 in the spring of 1991. This is more than 10 times the number of access points of the Special Type 2 VANs. (Fujitsu's FENICS has 115 points, while C&C VAN has 108 points). Therefore 8 companies, Fujitsu, NEC, Toshiba, Intec, United Net, AT&TJENS, Network Information Service, and The Japan Research Institute, have conducted the expansion of services by connecting with INS-P (the so-called "INS-VAN Service"). Now the emerging point of view is that the future of the Special Type 2 VAN business lies solely in international VAN, PC communications and further emphasis on information processing.

In the meantime, half of the General Type 2 carriers have less than 100 million yen in capital, and amount of sales of the two-thirds are less than 100 million yen. Many are medium or small-sized companies. When the applications provided by the carriers in Figure 4-B are examined, the largest number of applications is for distribution. However, there are only a limited number of nation-wide " industry VAN" services set up through the initiative of manufacturers and wholesalers. Many of the distribution applications are for "local distribution VANs" supported by different types of industries in specific local areas, and "grass roots" VANs supported by retail store owners. The second most popular application is voice mail. Its popularity is largely due to the introduction of NTT's billing collection service, "Dial Q2" (which is equivalent to the "900 Number Service" in the U.S.). There are only a few transportation service VANs such as "home delivery services." However, attention is being drawn to these services from the standpoint of improvement in physical distribution efficiency, along with the "Just-In-Time" VANs for convenience store chains provided by Special Type 2 VANs and by NTT Services. General Type 2 carriers are, in general, application oriented, and their significance lies in their effects on living, the community and industry, rather than in their impact on information and communication businesses' growth.

Development of International VANs

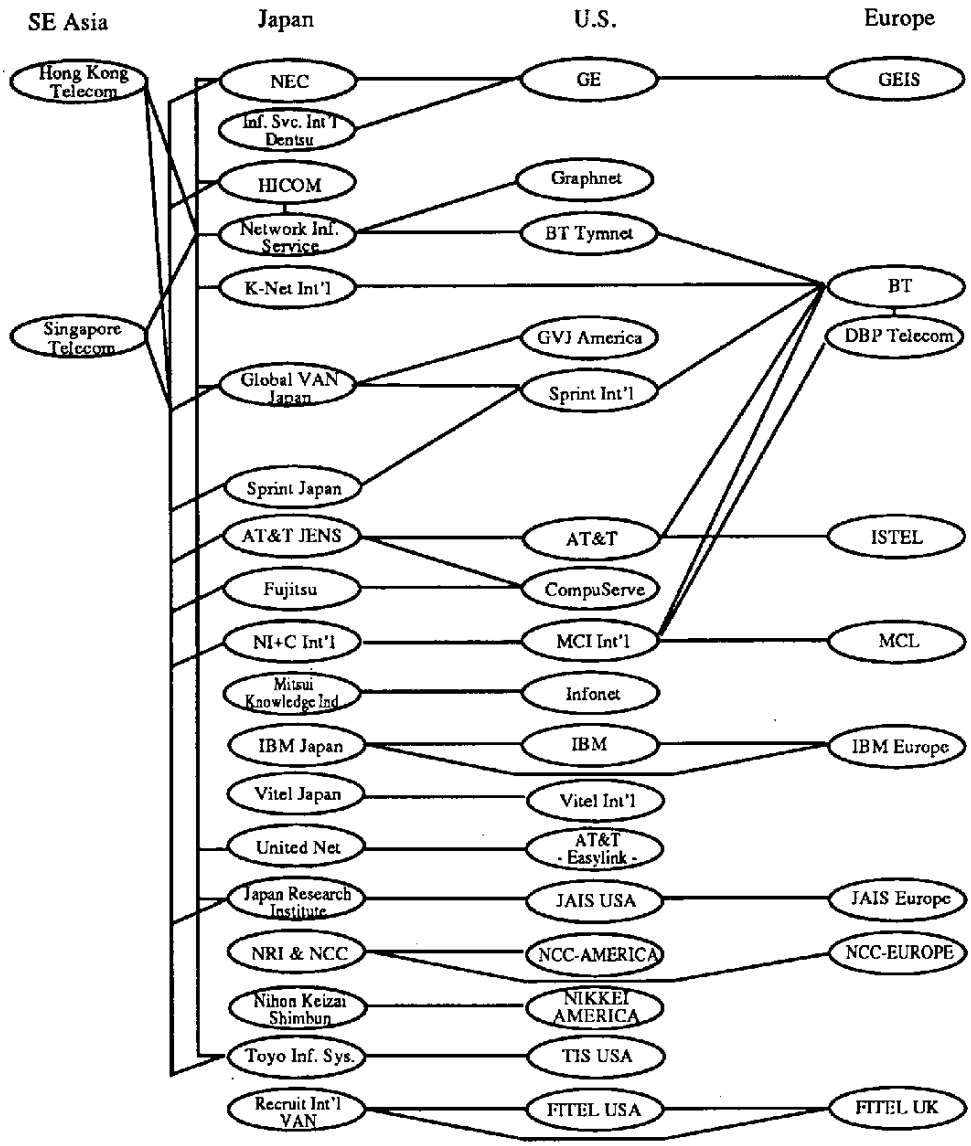
International communications can be defined as "telecommunications across national borders maintained by the interconnection of the domestic communication networks of various countries." Japan's telecommunications regime is rather exceptional, because its tel-

ecommunication business area is separated into domestic service and international service. The domestic market has been liberalized through the telecommunications reform explained earlier, but ITU rules for international communications have remained intact until recently. Accordingly, the interpretation of the D-1 Recommendation for international leased lines and the review of the recommendation have had a particularly significant impact on VANs. Early in the 1970s, there was friction between the U.S. and Japan with reference to the introduction of GE Mark II and CDC services. In the middle of the 1980s and in subsequent years, there were heated discussions about the restrictions on foreign capital in the Special Type 2 business area and about IBM's international VAN protocols. It is no exaggeration to say that Japan's international VAN market has been nurtured and established through international examination of communications liberalization and the U.S.-Japan relationship in the area of telecommunications, in addition to domestic efforts. In consideration of the then D-1 Recommendation of CCITT, the Telecommunications Business Law, short time after its enactment, was revised in June, 1987 in order to authorize resale based carriers, and non-tariff-basis services were introduced. (These services are the same as international leased lines, but they are to be provided only to Special Type 2 carriers for the construction of international VANs, and a 20% surcharge must be paid.) In August, 1990, Japan and the U.S. reached agreement on the expansion of the scope of international VAN service, relaxation of the restrictions on non-tariff-basis services (affiliates and trading partners can utilize), abolishment of the surcharge, liberalization of interconnections, public networks-to-leased line-to-public networks, based on the belief that the CCITT restrictions on leased line utilization would be eased.

With this improvement in the regulatory environment, a number of international VAN networks have been constructed. Figure 5 shows their status as of March, 1991. The interconnecting carriers were firstly in the U.S. and the U.K., both pioneers of telecommunications liberalization. The current focus is in East Asian and Southeast Asian countries. Twelve companies (NEC, Hitachi Information Network, Network Information Service, K-Network, Global VAN Japan, Sprint Japan, AT&T JENS, Fujitsu, NI+C International, United Net, The Japan Research Institute and Toyo Information Systems) have a joint operation for expansion into Hong Kong and Singapore, using Network Information Service (with BT Tymnet) and Global VAN (with Sprint International, formerly titled Telenet) as gateways. They started with a individual network, but the expansion of communications led to the use of a dual system. As a third method, they are contemplating extension into the packet switched network of KDD (VENUS-P).

International communications is, by nature, a world of cooperation and competition. Over the past two years, with the entrance of International Telecommunications Japan, Inc. (ITJ) and International Digital Communications, Inc. (IDC) Japan's international telecommunications has become an arena of fierce competition in terms of both outgoing and incoming international messages. As for the interconnecting partners of international VANs, BT has acquired McDonnel Douglas Tymnet, and AT&T has acquired ISTEL and Western Union (Easylink). These examples represent the situations where industry restructuring is taking place in world telecom-

As of March 1991



Note 1 : Daiwa Institute of Research, Ltd. is examining the connecting carrier.

Note 2 : IBM Europe is a generic name for its connecting national IBM companies such as IBM UK and IBM Deutchland.

Figure 5 Current Status of International VANs

munications.

Differentiation of rates and services is very important in these competitive environments. As mentioned earlier, services providers differ in terms of parent company types and motives for entering the business, but there are few differences in their service lineups. The service menu of an international VAN usually includes packet communications, PC communications, electronic mail, EDI, data base access and remote information processing.

Urgent Tasks for VAN Business

The following four points are the most important characteristics of the current telecommunications market in Japan.

(a) The break up of NTT has been postponed, and the prospects for the regulatory framework are still translucent.
(b) The introduction of diversified rate discount package plans has been delayed.
(c) While corporate private networks are spreading, the introduction of virtual private network services has not been realized.
(d) Nationwide ISDN development is making rapid progress.

At the same time, in terms of informatization in industry, the development of electronic networks has been progressing in a horizontal direction through a) data base development of market information, b) development of electronic systems for transactions, c) enhancement of information systems for product delivery, and d) electronic systems for transaction settlement. In addition, the four aspects of demand surveys, order placement/receipt control, physical distribution and settlement of account are being vertically connected. Moreover, financial information networks are also being enhanced.

In the midst of these trends, how will Japan's VAN businesses try to survive in the future? In terms of telecommunications traffic share, telephone communications have an overwhelmingly large share, followed by facsimile, data and image. However, as the liberalization of the simple resale of telephones will change the cost burden of users, it will not be easy for Japan to catch up with the U.S. and the U.K. liberalization. VAN business turn over is largely derived from data at present. Therefore, the core survival strategy for VANs should emphasize high-speed packet communications and ISDN plans. Provision of ISDN services can be implemented by VAN carrriers because the essentiality of N-ISDN is integration of services between node and user. In Japan, Intec has recently announced plans to start services in the fall of 1991 using the technology of Northern Telecom, and Toyo Information Systems will begin service in the spring of 1992 jointly with C&W.

Daily Necessities Dealers' VAN by Planet

Hiromasa Tamanyu
Executive Director
Planet, Inc.

An outline of the daily necessities business

The process of distributing consumer goods in Japan is performed by separate distribution system for each type of product, such as daily necessities, processed food, confectionery products, stationery goods, and household articles (such as thermos flasks, clothespins, and scrubbing brushes). Most of the businesses involved have inherited a wholesaling tradition that has continued in specific regions since the middle ages.

Among these distrbution systems, the most advanced inter-company communications network is operated by the daily necessities industry. The daily necesseties industry manufactures and sells a wide range of products including soap, detergent, tooth paste, tooth brushes, shampoo, rinse, sanitary goods, perfumes, tissue paper, shaving razors, and cosmetics. The All Japan Soap, Detergent, and Daily Necessities Industry Directory lists a total of 670 manufacturers as well as approximately 2,000 wholesalers and around 300,000 retailers throughout Japan.

A large number of data communications enterprises have appeared in Japan since the liberalization of data communications activities in 1985. A large number of private networks with a one-to-many connection configuration are likely to emerge if these data communications enterprises sign separate online contracts with individual manufacturers and wholesalers. This in its turn will lead to the crowding of many terminals into the manufacturers' and wholesalers' offices.

However, communications between manufacturers and wholesalers usually involve contacts with mostly the same parties and for the most part involve transmission and reception of identical types of data. Thus, it would be more advantageous for manufacturers and wholesalers if they could rely on a single data-communications enterprise and use just one terminal across one and the same network for all their business communications. However, the fact that enterprises in the same trade are usually market rivals has tended to obstruct the establishment of a common network of this kind.

Finally, however the daily necessities industry established a VAN operating company named Planet, Inc. through joint investment to create a value-added network for common use.

Organizing data communications needs

In its role as a VAN operator, Planet's first move was to explore the data communications needs of the manufacturers and wholesalers in the industry.

Both manufacturers and wholesalers have to transmit one and the same types of data to a large number of common customers. However, as already mentioned, competition between manufacturers and rivalry between wholesalers has been an obstacle to the establishment of a common network. Nevertheless, pulling all these divergent elements together in some way or other is one of the first tasks of a VAN operating company. Indeed, it is for this reason that a VAN operating company is referred to as an information organizer.

The following three factors account for Planet's success in this organizational effort.

In the first place, the company was organized in a way which guarantees users data security. As Fig. 1 shows, all the necessary processing for data communications is undertaken by Intec, a VAN company, and not by Planet. As a VAN supervisor, Planet manages the VAN from the outside and, therefore, does not handle the data itself. This arrangement assures total security of the information of rival enterprises. Planet was the first enterprise to manage a VAN in this way, but many other industries are following its example today. These include Finet in the food industry and JD Net in the pharmaceutical industry.

The second factor that favored Planet was that Lion, an industry leader, handed its Lion Circle Marketing Management System (LCMS) over to Planet. LCMS was a large network built up over a period of six years by Lion and Planet was able to open it for use to all the manufacturers and wholesalers in the trade. LCMS had been Lion's private online data gathering network system, with terminals installed at 146 wholesalers. Although Lion had enjoyed exclusive rights to this data gathering method, the company decided to entrust it to Planet as a way of contributing to the daily necessities trade. However, the transfer was advantageous to Lion as well, since Lion could save a great deal on the investments needed to enhance the functions of LCMS, which could handle only a limited range of data types at that time. However large its share of the wholesale distribution market, a company must spend substantial amounts of time and money to increase the number of terminals and widen the range of data its network can handle. Thus, sharing the network with the entire industry made it possible for Lion to distribute this burden.

A more important factor than this, however, was that with Lion's LCMS, Planet found it easier to establish its reliability with manufacturers and wholesalers during its start-up period. The network also helped Planet to take off smoothly in a reasonably short time.

The third factor which helped Planet was that shared use of LCMS obviously made it possible to cut costs. Contacting each customer separately and single-handedly takes time and patience. On the other hand, signing a contract with a VAN operating company helps a manufacturer set forth immediately and begin transactions with a large number of wholesalers.

In building an industry-wide VAN, establishing connections one by one with all the communications partners is what is the most costly and labor-intensive — more than building up the hardware and software resources. It involves a series of activities: negotiating with the persons in charge on the other side, making necessary basic arrangements, confirming system parameters, installing hardware, test-

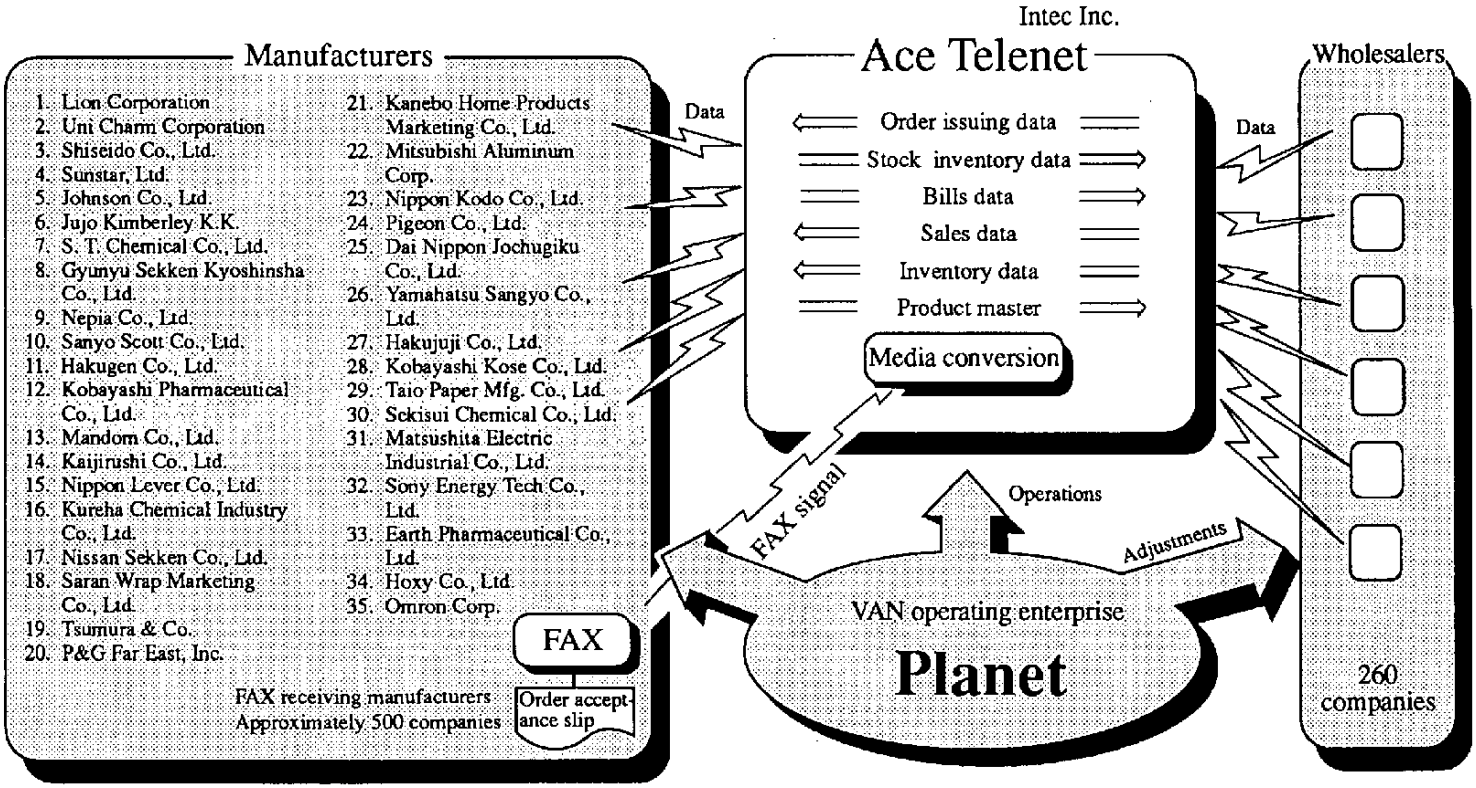


Fig. 1 Planet's VAN Configuration

ing the system, providing guidance to operators, and taking care of troubles in the initial start-up period. A data communications company simply cannot undertake all of these tasks. In the first place, the key persons on the other side, including persons with communications responsibilities, cannot be contacted easily. Nor is it easy to carry out discussions, since this involves using the terminology prevalent in the industry, and understanding its conventions.

The three factors mentioned above helped Planet to persuade rival companies to join the common VAN. As of June, 1991, its many-to-many network interconnected 40 manufacturers and 260 wholesalers. The number of participating companies is admittedly not large but Planet's sales already exceed half the total of the sales in the daily necessities market.

System outline

Communications through Planet cover six types of data: order issue, stock supply, bill collation, sales, inventory record, and product master file data. Order issue data is data concerning orders from wholesalers to manufacturers, while stock supply data involves the details of products shipped by manufacturers to wholesalers. This data is issued early on the day shipment is expected to reach the consignee. Bill collation data is issued once a month from manufacturer to wholesaler, and details the contents of the former's bill to the latter. All these are basic types of transaction-related data. Sales data contains statistical information about the supply of each individual product from the wholesalers to the respective retailers. This does not relate to transactions, and the wholesalers are not obligated to send this data to the manufacturers. To gain access to this data, a manufacturer must issue a request to the concerned wholesalers, and will only receive this data if the wholesalers give consent. As of today, 70% of the wholesalers cooperate with manufacturers who request data. Inventory data concerns the stock of products in the wholesalers' warehouses. This is also an item of information for which a manufacturer needs a wholesaler's consent. However, release of this data started only recently, and so far few users have asked for it.

Facsimile order issuing and reception system

Even if one side takes the initiative in developing inter-company communications and goes ahead with system implementation, it will not be able to streamline operations if the other side lags behind. Even if order issuing system development efforts are made by progressive wholesalers, it will have little effect if only a few manufacturers can receive orders.

Planet's offer of a facsimile-based order issuing and reception system (Fig. 1) is intended to resolve this problem. The system requires a wholesaler to use its own computer and transmit its orders to Planet's network. From there, the order signals will reach the manufacturer if the latter's computer is able to receive them. However, if the addressee's computer cannot receive the data, the system will convert the data into facsimile signals and transmit that data.

Normally, a wholesaler is engaged in transactions with some 200 to 300 supplying manufacturers, but only around 40 of the latter are hooked up to Planet's network. This is an

impediment to the automatic issuing of orders. However, the facsimile order issuing and reception system makes it possible to issue all orders by computer and completely automate the process. A wholesaler can place orders with the around 200 manufacturers by telephone or facsimile, but this involves substantial manpower. Sending 200 order slips by facsimile takes approximately four hours. The charges that must be paid, 10 yen every three minutes, are not high as long as the numbers dialed are to nearby areas, but a slight increase in distance raises the charges, and four hours of facsimile transmission will cost a substantial amount. Personnel expenses also tend to add up because of the time needed to dial the numbers and set up the papers. It is necessary to dial several times if the line is busy on the other side, and mis-dialings are quite possible. The facsimile order issuing and reception system makes it possible to have the computer send all the data, shortening the transmission time to 15-20 minutes.

The system, therefore, is of great advantage to wholesalers. That is why the running costs are borne by the wholesalers. As mentioned later, charges for use of Planet systems are primarily paid by the manufacturers. The facsimile order issuing and reception system is the first Planet service for which the wholesalers are charged.

Batch code management possibilities

Since 1985, Planet has been using standard formats. It also uses standard codes for products and customers. Moreover, a code management center within Planet looks after daily maintenance of codes, builds up a database with the related data items and offers users access to it. Wholesalers spend substantial time and energy on maintaining product codes, but this process can be automated and streamlined for the entire industry by having Planet undertake code management for all companies.

Planet has standardized the codes for all manufacturers, wholesalers, and retailers. There are a total of 300,000 standard retailer codes, which are used as sales data standards, as referred to earlier. There are still some unprepared sections in the retailer codes, but these codes will become a huge common asset for the entire industry in the future.

Planet sales and profits

Since it is incorporated as a joint stock company, Planet must earn profits. Here is how the company strives to increase sales and raise profits.

Planet installs terminals at wholesalers for use in communicating with the manufacturers who pay for its services. The Planet terminals already installed at a large number of wholesalers help in quickly executing order processing and issuing of order slips. As a result, demand for use of the Planet network is on the rise now among manufacturers in the trade. This is the reason Planet collects its fees from the manufacturers that use its terminals. Also, although the need for the company's system is high among both the daily necessities manufacturers and the wholesalers targeted by Planet, Planet decided to only bill manufacturers because it saw that the manufacturers could bear the cost of the terminals by themselves.

A manufacturer that wants to use Planet terminals must first sign a contract with Planet and pay the necessary connection fees (See Table

1). Connection fees differ according to data type. That is, the volume of data and communications related processing differs depending on the data type. The connection fees collected are pooled by Planet for use in online system development and to meet the expenses for installing the terminals at the wholesalers.

Following this, a manufacturer must pay a monthly fee to Planet for system use. This fee, which constitutes Planet's principal source of revenue, represents the manufacturer's share of terminal support expenses. There are specific costs involved in operating a terminal, inclusive of lease and maintenance fees. On the other hand, each terminal is connected to several manufacturers and a balance is left over after incidental costs are deducted from the fees paid by the manufacturers.

Suppose, for example, that ten manufacturers are connected to a given terminal, and that the monthly fees paid by these manufacturers average 10,000 yen each. The total fees collected per month by Planet will then total 100,000 yen. If maintenance of the terminal costs 70,000 yen, the result is a balance of 30,000 yen. This is where Planet's own operating costs and profits come from.

Planet installs terminals at the wholesalers free of charge, making up for most of the expenses incurred for this from the fees collected from the manufacturers. This is because Planet wants to develop a uniform network. Wholesalers have their own computers, and the Planet system may be connected to them also. However, their computers are a diversity of models from different manufacturers, and connecting to a single wholesaler could take several months. Thus, Planet prefers to install its own terminals at the wholesalers and develop a uniform network.

Table 1 Planet's charges

① Connection charges (per wholesaler, payable lump sum)

Basic connection charge*		150,000 yen
Additional charges	Order issuing data	30,000 yen
	Stock inventory data	10,000 yen
	Bills data	30,000 yen
	Sales data	60,000 yen

* Discounts offered on multiple connections

② Charges for system use (per wholesaler, payable monthly)

Basic charge for system use*		3,000–10,000 yen
Additional charges	Order issuing data	3,000 yen
	Stock inventory data	2,000 yen
	Bills data	3,000 yen
	Sales data	5,000 yen

* Varies between 3,000 yen and 10,000 yen according to the number of manufacuturers connected to a wholesaler.

③ Communications charges vary within a range of 1.0–2.2 yen/data, depending on type and speed.

The basic concept of Planet is that after the network is completed the burden on manufacturers will be decreased and balanced out, due to an increase in the number of manufacturers, thus spreading out the costs of terminal leases for the manufacturers, and due to making direct connections to the wholesalers' computers.

A third fee is for communications. This works out to 1.0–2.2 yen per data item, the difference stemming from differences in data types and transmission speeds. The fees charged are lower than the fees charged by general VAN companies, and are paid directly to Intec, which runs the network.

The network management expenses are basically shared by the manufacturers. The larger the number of manufacturers, therefore, the lower the fees are likely to become. Planet has pledged to lower its fees once profits at a fair level have been ensured. In fact, it has already cut its fees twice, the first time in August, 1986, and the second time in August, 1987, and is currently contemplating its third fee reduction.

Planet's future prospects

Planet has already achieved its initial targets and is carving out a steady path towards the future. However, it must now try to expand into closely related industries.

Wholesalers in daily necessities originally handled products such as soap, detergents, toothpaste, sanitary goods, tissues and other paper products for family use. More recently, however, the range of products they deal with has widened to include, for example, dry cells, lamps, cassettes, pet food, and stationery goods. This is because of the sharply rising sales of these products at convenience stores and mini-supermarkets, which are closely related to the business of the daily necessities wholesalers.

In 1990, Matsushita Electric Industrial Co. and Sony Energy Tech Co. joined Planet. They found the step to be an expedient way to expand their business with convenience stores and mini-supermarkets, which happen to be Japan's largest dry cell sellers.

Six market leaders in paper products, including Kleenex, Scott, and Nepia, have also joined the Planet, and their example may be followed by manufacturers of pet food and family medical supplies.

Planet has so far endeavored to develop a network connecting manufacturers and wholesalers, but has no definite plans as of today to expand this network to connect with retailers. As many as 46 retail networks are in operation across Japan today, including the EOS run by large supermarkets and wholesalers, and the regional VANs operated by local wholesalers in different trades. These regional VANs have various problems and have yet to develop fully. Whether or not Planet decides to start a retailer network will depend on how well these regional VANs progress.

Operation of JD-NET (Drug Industry Data Exchange System)

As a step towards modernization of the distribution system between pharmaceutical manufacturers and drug wholesalers, JD-NET (the Drug Industry Data Exchange System), was put into full-scale operation in June, 1988 with the goal of promoting the exchange of information (such as order issuing and receiving data and sales data) at the wholesaler level via an industry-wide on-line network.

The number of companies participating in the Japan Drug-NET Conference, the body which supports JD-NET, reached 319 as of April 1991; that is, 130 manufacturers and 189 wholesale houses.

This indicates how high interest is in the industry, and makes the JD-NET system one of the largest such industry-wide systems.

Across the board, all industries are currently experiencing their share of the powerful progress of the "information society" as well as rapidly advancing structural changes.

Start-up of a drug industry data exchange system at this juncture is a significant step for expediting modernization of distribution systems in the drug industry.

1. What prompted the birth of JD-NET?

Among the functions related to drug distribution, standardization, and in particular, that of the paper work involving both drug manufacturers and wholesalers, has long been dealt with, well in advance of such efforts in other industries.

The sales vouchers used between makers and wholesalers have been standardized, and uniform product coding has been established and put into practice using product bar codes which, with POS (Point of Sales) systems, are in very active use at drug stores and other retail outlets. Also the industry has been instrumental in determining unified computer formats and putting them into use by both manufacturers and wholesalers who use computers, thereby improving office productivity.

A series of such efforts to boost office productivity and promote standardization have been routinely discussed between the drug manufacturing and wholesale industries, put into practice and disseminated among the member companies.

The inauguration of this industry-wide common data exchange system was brought about based on a series of deliberations between the Japan Pharmaceutical Manufacturers Association and the Federation of Japan Pharmaceutical Wholesalers Association, and in addition to this, to further pursue greater efficiency and rationalization in "Information Distribution"

and to keep up with the emerging information revolution, we have decided to establish a network which can be used commonly throughout all drug related industries, with the aims of expediting the speed-up of information exchange and further raising the efficiency of office work.

2. Why do we need an industry-wide network?

Responses to questionnaires and the results of other types of research make it clear that business activities in drug related industries involving mutual exchanges of information about transactions between manufacturers and wholesalers have much in common.

The following points can be made about the need for an industry data exchange system:

1) Transactions observed between manufacturers and wholesalers follow highly similar patterns.

2) The condition in which many diverse customer systems are in use is not only cumbersome, it also creates sheer waste in the industry.

3) The industry needs to promote standardization.

4) The installation of an on-line system between companies is demanded by the times.

These points were taken into full consideration, and it was also apparent that individual approaches by individual companies would be far less effective than an industry-wide movement to form an on-line network. This recognition served as a starting point when the work was initiated.

3. Conditions for running an industry-wide system

Special care is needed in operating an industry-wide system in that under a free economic system a common system must have no power over the participating companies which is enforcing or binding.

1) Enrollment in the system must be done as a choice of the company.

2) Decisions about which data will be exchanged with which parties must rest with the parties concerned.

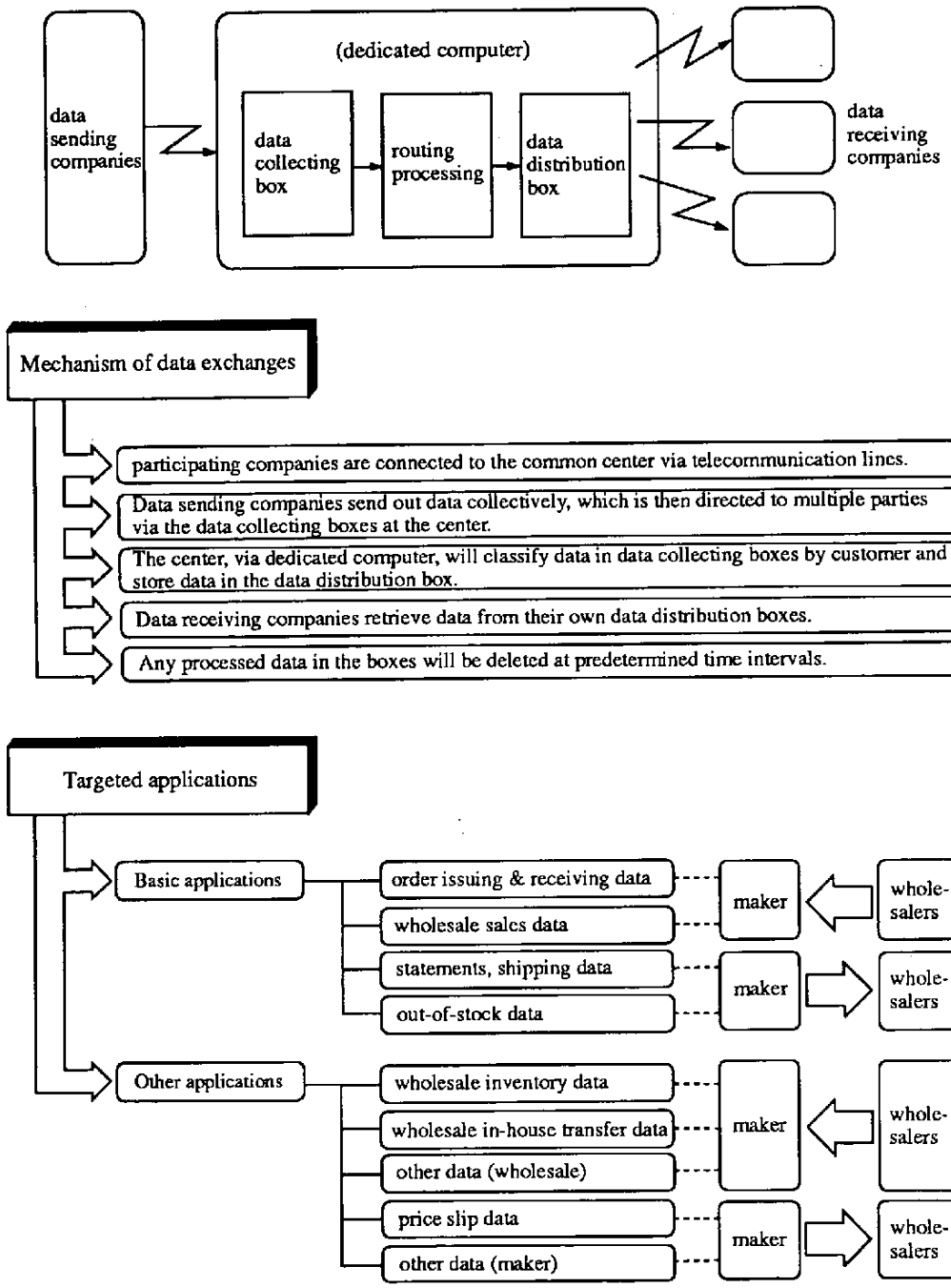
3) Partial use of data must be possible for the users.

In other words, the system needs to provide a highway on which the distribution of information can take place, but whether a truck, passenger car or a bus is to be used should be entirely up to the participating companies. That is, the system must create the means to send and receive data, but how to use which data at what times must be decided by the companies.

An industry-wide system will give participating companies opportunities to work with other companies, but they should be innovative, and come up with unique ways of using the system which reflect their own company characteristics.

4. Structure of JD-NET and its applications

JD-NET comprises a telecommunications network for common industry-wide use to which the terminals (or computers) of pharmaceutical manufacturers and wholesalers are con-



nb: data such as that discount compensating and others without standardized formats willl be dealt as other data.

Figure 1. Structure of data exchange system and applications Industry common center

nected. The system makes on-line data exchanges possible via a industry common center, which is consigned to NTT (see Figure 1).

To elaborate using the example of wholesale sales data;

1) Each wholesaler sends all its sales performance data, arranged by manufacturer, to the center.

2) The center routes the pertinent data to each manufacturer by use of a computer dedicated to the system, and sends the data to data receiving boxes set up for each company.

3) Each company can take the data out of its data receiving box whenever the company wishes to do so.

4) The data taken out of the box can be processed by the company in accordance with its own in-house procedures.

Data taken out of the boxes will be erased after a certain predetermined time interval, in order to protect the confidentiality of the companies involved.

5. On costs

Out of the costs associated with JD-NET, each participating company individually takes care of the hardware cost, such as for terminals, necessary for its operations, the cost of necessary software and the cost of maintaining its data receiving box for data reception. Expenses for use of the industry common center, telecommunication channel usage fees and other related costs will be prorated based on the data volume used by each company.

(Costs pertaining to order issuing and receiving data, purchasing data and wholesale sales data are borne by the manufacturers.)

6. Expected effects

Establishment of JD-NET and subsequent use of the system will bring about the benefits summarized below:

(1) Industry-wide benefits

The fact that the industry will have a common network enabling a monolithic approach to data processing within the industry means that costs will be lower than if individual companies were to make an independent investments in their own data processing capabilities. This means that the industry will have greater investment efficiency.

An industry-wide system will also mean that we won't have to live with having to deal with multiple systems within the industry. Hence, operations will be more economical industry-wide since duplication of similar systems will be avoided. The industry-wide standardization and sharing of the system will be promoted under the system, and various types business activities will be improved. And at the same time, the system will further promote rationalization of the industry distribution system.

(2) Corporate level benefits

The industry-wide network will provide low cost system access, and the same terminals can be used for both sending and receiving data. This will simplify system maintenance and operation.

Furthermore, such a great number of companies have subscribed to the system that the benefits in terms of improving operations will

be substantial, and the use of information through the system will have a large effect.

① Utilization of order receiving and issuing data as well as voucher making data through JD-NET will greatly improve the on-line inventory control and automatic reordering systems at drug wholesalers. The synchronization of various series of operations (such as product ordering, delivery, inspection, storing and purchasing) with information processing will guarantee the timely supply of products as well as the supply of related information to the parties involved, so that effects such as improvement in inventory turnover ratios and data input manpower savings will become possible.

② Utilization of drug wholesale sales data

This drug wholesale data system will eventually causes great changes in the area of information use. Being able to have a grasp of sales performance customer by customer on a daily basis will make it possible for drug manufacturers and drug wholesalers to conduct sales promotion analysis meetings with enhanced mutual trust in their marketing activities, backed up by the data. This will be a major improvement beneficial to both parties.

JD-NET became operative effective in June, 1988 in the full scale mode. From the beginning, however, many companies were eager to quickly get hands-on experience, and lost no time in connecting their terminals with the Center. Now there are more than 60 manufacturers and 100 wholesale companies using the system in their daily operations.

Generally speaking, this is an era when many companies are trying to set up their own networks as a part of corporate strategy. Our industry, however, has chosen to have an industry-wide system, with industry-wide expression of the spirit of cooperation, so that we can realize the benefits of a common system. We will compete with each other in the area of system usage and thereby prove the merits of our effort to increase rationalization and improve of productivity both as an industry and as individual companies.

The Paper and Paperboard Distribution VAN

Tatsuya Taniguchi
Kami Net Ltd.

1. Introduction

Expenditures for computer systems are increasing year after year in Japanese companies, reaching extremely high levels. Indeed, computer system strength is a secret of success in today's competitive market.

This was the background to the decision of 11 of Japan's paper Dairitens (primary wholesalers) to surmount their inter-company rivalries and build a common value- added network system for accepting and issuing orders, a system that would be run independently to allow each of the 11 enterprises to access it individually.

On the business front, the companies are engaged in fierce competition. However, the employees from the different companies involved in common VAN system discuss problems with their counterparts in rival companies as if they were members of a single company.

This "paper and paperboard distribution VAN" has been running for two and a half years since it was started in February, 1989. In this report, we will provide an overall picture of the system.

2. How the paper and paperboard distribution business works

(1) The Dairiten

In general, paper reaches users in Japan through the following channel:

Maker → Dairiten/trading company → Wholesaler → User

Large-lot users, however, get their supplies directly from Dairitens and trading companies. Also, the flow of distribution may be divided into a number of sub-channels for some varieties of paper, and these papers have a wide range of industrial and non-industrial uses (See Figure 1).

The word "Dairiten" is a generic term covering all traders specified by paper and paperboard manufacturers as direct transaction partners in contracts. The Dairitens, who function as primary suppliers in the paper distribution mechanism (in contrast to wholesalers, who operate as secondary suppliers), act as a valve to adjust the flow of demand-and-supply between makers (suppliers) and wholesalers or users. The major customers of the Dairitens are wholesalers, newspapers, and major publishing and printing houses.

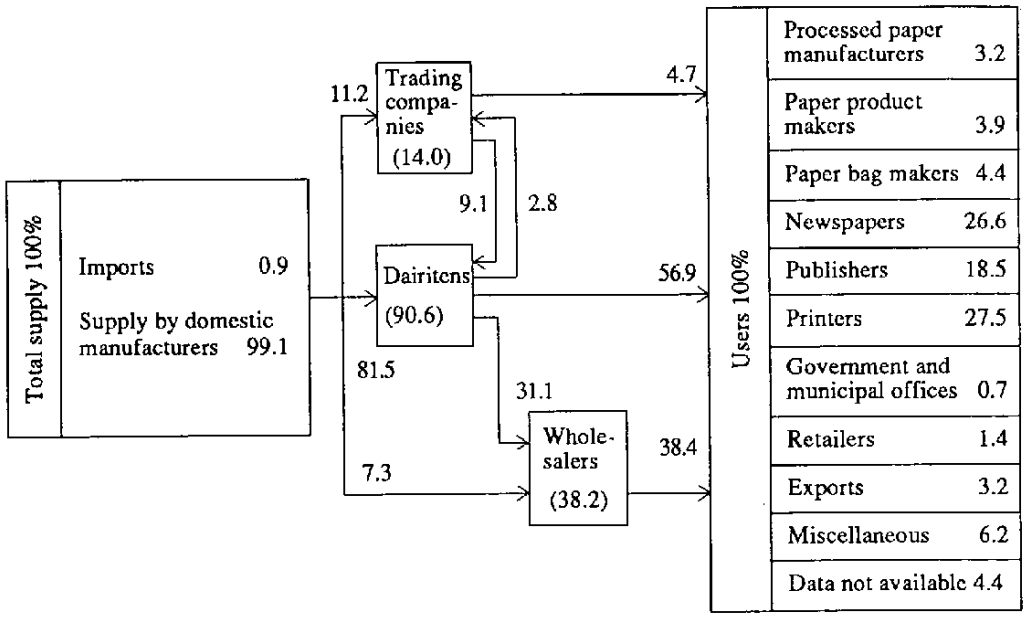
To expand their market share and boost sales, manufacturers normally use several Dairitens, while to raise sales and to better serve user requirements, Dairitens represent more than

one manufacturer. Furthermore, wholesalers quite often represent a maker as its Dairiten for specific products only. Specified Dairitens are wholesalers who sell specific manufacturers' products in large quantities or who represent these manufacturers in the sales of most of their products.

(2) Position of wholesalers

"Wholesalers" are a secondary outlet for stock received mainly from Dairitens. Some of these operate as Dairitens themselves. Most wholesalers are small-to-medium sized enterprises that supply paper to publishers, printers, and processing enterprises running small-to-intermediate scale operations.

In terms of function, there is little difference between Dairitens and wholesalers in the paper distribution business. However, while Dairitens are large-lot suppliers to wholesalers and major users, wholesalers take care of small-to-medium sized users. The latter answer to a variety of user needs, covering a wide range of products and providing small lot supply often on very short notice.



Notes:

1. Figures in parentheses indicate proportions received.
2. Errors of about 0.1% may result from trades among wholesalers.
3. All the figures indicate percentages (%).

Reference:

Paper and pulp statistics of 1986.

Figure 1. Receipts and shipments by paper distributors and percentages of users

3. Background of the development of "the paper and paperboard distribution VAN" system

"The paper and paperboard distribution VAN" was built to create online connections for transaction data between Dairitens and wholesalers. The idea was to provide a common data processing method throughout the entire distribution system.

Reducing lot sizes, diversifying the range of products, and shortening delivery times are some of the paper and paperboard industry's key priorities today, and until recently, this tended to raise information processing costs. Through discussion about streamlining operations in the industry, it became clear that streamlining could not be achieved singlehandedly by any specific group and that joint efforts for the entire industry were needed.

Vertical online systems between Dairitens and wholesalers had already been started in late 1984 by three Dairitens, Daiei Papers Ltd., Japan Pulp and Paper Co., Ltd., and Mitsubishi Paper Sales Co., Ltd. The wholesalers, however, tended to be skeptical about the benefits of such systems since they thought these vertical systems would eventually require the installation of different vendors' terminals and the use of different operations and different protocols for each Dairiten they had transactions with. Wholesaler requests that there be a solution to this problem before confusion actually arose was one of the motivating forces behind the creation of "the paper and paperboard distribution VAN" (See Figures 2 and 3).

Normally, the transactions along the paper and paperboard industry's distribution channel enable Dairitens and wholesalers to stock products and meet market demand without any intervention from groups of manufacturers. Therefore, the companies involved in distribution needed a network with horizontal functions matching the pattern of transactions they usually engage in.

Information processing expenditures were approximately 0.177% of gross sales for the 11 Dairitens participating in "the paper and paperboard distribution VAN". If they had their own individual networks, they would all have to make massive investments in system development. Besides, once built, such networks would create a formidable obstacle to the development of an integrated network later on.

Most value-added networks in other sectors of industry operate within a clearly delineated groups of companies. The purpose of these networks is often to create an edge over one's rivals or to increase one's ability to compete. In contrast, from the very beginning, "the paper and paperboard distribution VAN" has aimed at increasing cooperation.

The 11 paper and paperboard Dairitens that participated in the development of the system and equally shared the related costs are: Okura Pulp & Paper Co., Ltd., The Okamoto Co., Ltd., Sanko Company, Ltd., San-Mic Trading Co., Ltd., Daiei Papers Ltd., Japan Pulp and Paper Co., Ltd., Nichia Co., Ltd., Hattori Paper & Board Ltd., Marudai Shigyo Co., Ltd., Mantsune Co., Ltd., and Mitsubishi Paper Sales Co., Ltd.

The companies also decided to entrust the operations of the value-added network to a major VAN operator because they found that

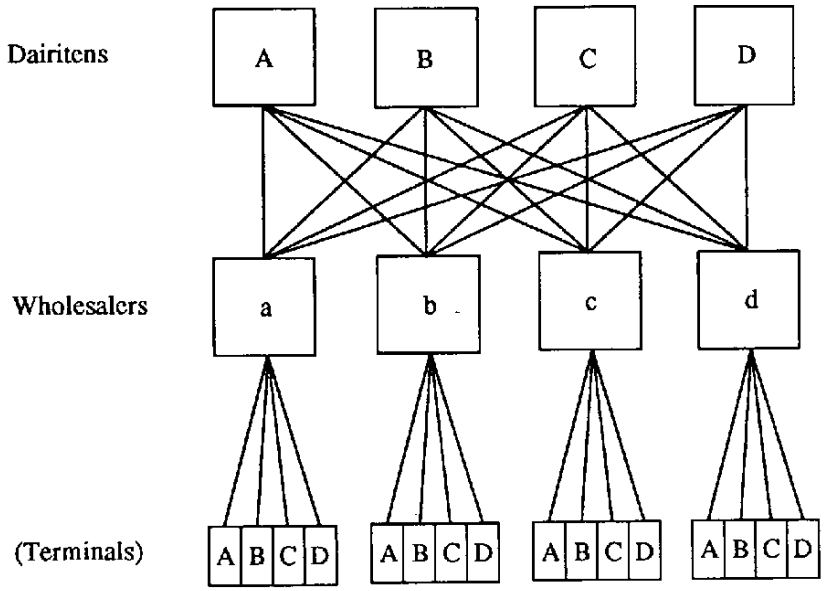


Figure 2. Original networks connecting Dairitens and wholesalers

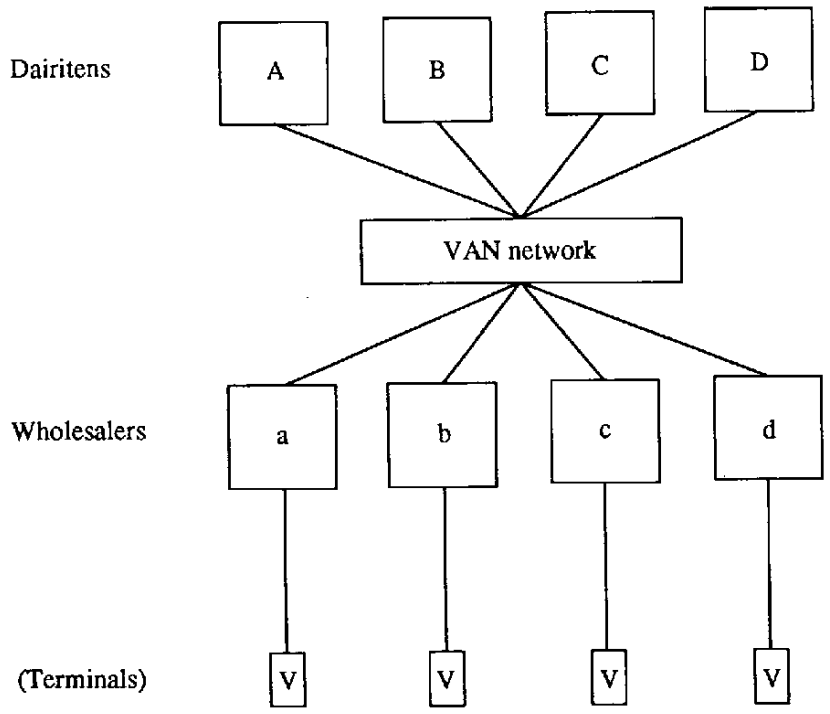


Figure 3. The completed value-added network

the cost of running it on their own would be too high. The computers used by the eleven Dairitens are made by seven different manufacturers and include 11 different models. So instead of seeking the help of computer manufacturers, they selected the Japan Research Institute, Ltd. a VAN operating company with a neutral position.

4. Basic concepts of "the paper and paperboard distribution VAN"

(1) Outline

Wholesalers use the network to make inventory inquiries of the Dairitens from VAN terminals (N5200-07 or S3050-30 terminals are recommended) via the VAN host to trigger shipment procedures, and to print out claim slips or issue orders. The same terminals output invoices and bills from the Dairitens. Using the mail box functions, various types of data can be stored in the host computers of the wholesalers.

(2) Targeted jobs

A. Order receiving and issuing (online realtime processing)

1) Inventory inquiries
2) Stock reservations
3) Output of claim slips
4) Checks of procedural details
5) Procedures for order issuing
6) Direct stock reservations
7) Master maintenance

B. Mail services (online batch processing)

1) Transmitting back reservation information
2) Exchanging invoice and bill data
3) Exchanging miscellaneous data items.

(3) User advantages

A. Advantages for wholesalers

1) Using the same screens and applying the same procedures, the same terminals can be used for making inventory inquiries of all member Dairitens
2) Shipment arrangements and order issuing for inventory maintained by Dairitens can be processed in realtime using the same procedures
3) The same terminal can be used to obtain invoices, bills, and lists of goods deposited in warehouses
4) The system can prevent errors which may be made in verbal communications
5) Promotes standardization of bills, invoices, and statements of consignments received
6) Input can be made using a company's own codes.

B. Advantages for Dairitens

1) Eliminates time wasted on telephone transactions
2) Decreases inventory inquiries and order taking and issuing related operations
3) By using the same data used by the wholesalers, the procedures following order taking can be speeded up
4) Reduction of network and development costs.

Here, "Dairitens" are those who open their inventories for inquiries, while "wholesalers"

are those entitled to make inquiries about these inventories and purchase them. Thus, the system looks upon an enterprise as a Dairiten as long as it performs the actions of a Dairiten, even if it is usually regarded as a wholesaler.

(4) The three connection modes of "the paper and paperboard distribution VAN"

The host computer of "the paper and paperboard distribution VAN" and the hosts at the Dairitens can be connected by following one of three modes, namely, the realtime, batch, and reverse realtime modes. A Dairiten can select any one of these for connection to the host computer of "the paper and paperboard distribution VAN" (See Figure 4).

5. Characteristics of the paper and paperboard distribution VAN

(1) Joint project between the 11 Dairitens and the Japan Research Institute, Ltd.

The 11 aforementioned Dairitens and the Japan Research Institute, Ltd. launched "the paper and paperboard distribution VAN" project in December, 1986. The network was switched on in February, 1989.

(2) Open membership and use

"The paper and paperboard distribution VAN" is not intended for the exclusive use of one Dairiten or business group. Instead, it is open to the entire paper distribution industry, and any company can join and use it freely.

(3) Online realtime processing connecting host computers from different manufacturers

The host computers used by the Dairitens are machines from seven different manufacturers, in 11 different models. Also, the inventory control systems of the different companies have been built up in different environments. The 11 different models of host computers are connected to the VAN host (IBM 3090) in the realtime mode. "The paper and paperboard distribution VAN" is the first general industry VAN in Japan outside of the financial industry to connect host computers of different makers and models for online realtime processing.

(4) Development of the paper and paperboard protocol

A protocol was developed to make realtime connection possible between the VAN host and the 11 models from seven different manufacturers. This is higher in hierarchical level than the BSC convention X.25 protocol, and was named the realtime paper and paperboard protocol.

Moreover, a subfile concept based on the Zengin protocol (Japan Bank Association protocol) was introduced to make it possible to transfer data files in an environment where model types and patterns of operations differ. This became the batch paper and paperboard protocol.

(5) Security based on registration of access authorization

A network relationship takes shape when two parties come to an agreement to communicate information. In this case, one of these parties is a specific Dairiten willing to transmit the details of its inventory and the other party is a buyer (wholesaler). The agreement be-

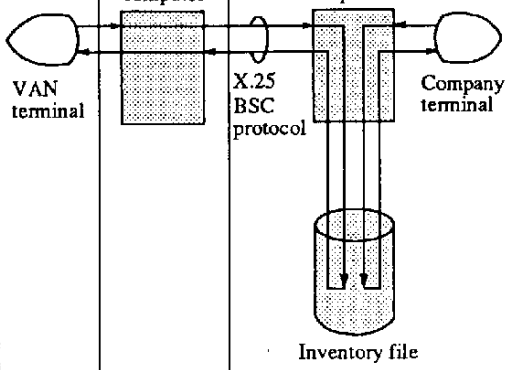
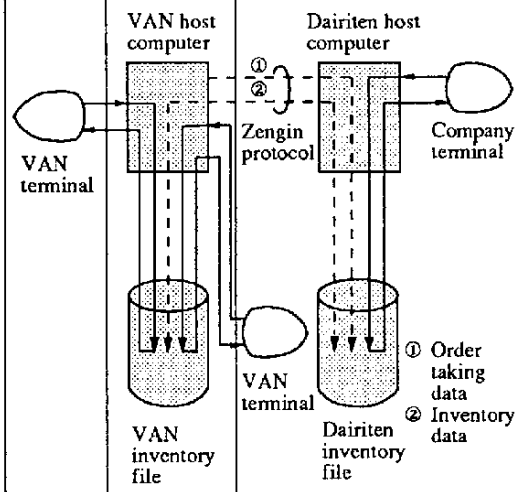
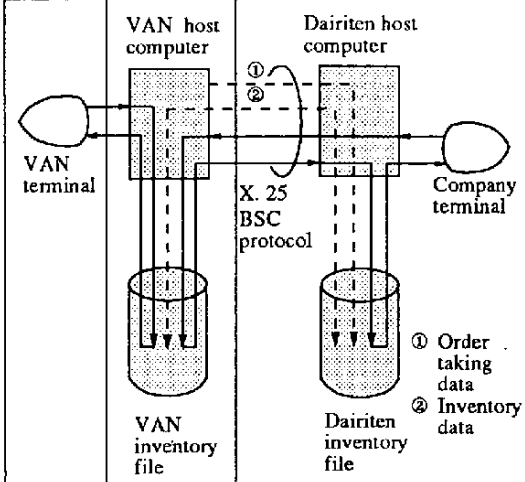
Whole-salers	VAN company	Dairitens	System configuration and features
			**Realtime connection** This is only for updating Dairiten inventory files. For this reason, there is no need to synchronize with the inventories. Wholesaler VAN terminals have relatively slow response. This is an easy-to-follow protocol.
			**Batch connection** Both the Dairitens and the VAN center maintain inventory files. Wholesaler VAN terminals have higher response speed with this protocol than with the two other protocols. A stock file in the VAN center is created by transfer of a Dairiten inventory file. The Zengin (Japan Bank Association) protocol is used for this. Since operations are carried out synchronously with inventory files, the inventory data transferred to the VAN center cannot be updated from independent company terminals. These terminals, however, can be used for checking. VAN terminals installed at the Dairitens must be used to update inventory files. Data updated from a VAN terminal (at a Dairiten or at a wholesaler) can be transferred to a batch file. In this way, a Dairiten's inventory data can be updated. This is a relatively difficult protocol.
			**Reverse realtime connection** Both the Dairiten and the VAN center maintain inventory files. Dairiten terminal response is slower than is usual within the company. This is how a VAN inventory file is created. First the Dairiten inventory file is transferred, then the file is updated in the realtime mode from the Dairiten terminal. Because it is possible to update a VAN center inventory file at any time from a Dairiten terminal, the sales department need not worry about inventory when making product arrangements. Updated data from a VAN terminal (from a wholesaler) is transferred by file to the Dairiten, and the Dairiten inventory file is updated.

Figure 4. Three system connection concepts of "the paper and paperboard distribution VAN"

tween the two sides is referred to as access authorization registration. Only companies with this kind of registered authorization are entitled to exchange information.

(6) Terminal input can be made using company codes

The product codes and customer codes used by "the paper and paperboard distribution VAN" are the standardized codes managed for the entire industry by the Code Center of Pulp & Paper established in 1971. The standard paper and paperboard product codes, however, run into 15 digits, and wholesalers sometimes tend to define their own private transaction-related codes. Such company codes can be used for input by registering the correspondences between the company codes and the standard industry codes.

6. Current status of "the paper and paperboard distribution VAN"

The 11 Dairitens jointly funded and established Kami Net Limited in October, 1988, to run "the paper and paperboard distribution VAN". This company looks after entry of new members, membership withdrawals, and the procedures associated with connection or reconnection of terminals, procedures that include signing of contracts, related official procedures, registering access authorization, billing users, bill collection, and payments. Proposals for adding new functions to the system or for enhancing the existing functions are examined and approved by two committees. One of these is the system management committee composed of the system managers of the respective Daritens, and the other is the technical committee with formed of technical persons in charge of systems.

Kami Net and the Dairiten employees in charge of the respective systems send reports to the wholesalers, and help the wholesalers with technical matters and public relations. They are responsible for a wide range of day-to-day operations. Thus they also attend to inquiries and pinpoint problems and, if necessary, send proposals to the technical committee for investigation.

As of June, 1991, "the paper and paperboard distribution VAN" was operative only in Tokyo and the surrounding region. Its members included 10 Dairitens and 36 wholesalers, the former allowing the latter access to inventory-related information. The number of member companies seems likely to increase hereafter. So far, no company has withdrawn its membership from the network.

"The paper and paperboard distribution VAN" is a value-added network open to Dairitens and wholesalers. Another distribution VAN that went into operation in July, 1990, and connected makers, Dairitens, and distribution companies is P-EDI, run by the Institute of Japan Pulp & Paper Information System. This online system attends to paper making orders, order sheet preparation, warehousing and shipment requests, and communication of warehousing/shipment information. In January, 1991, "the paper and paperboard distribution VAN" and P-EDI were linked together, extending the range of data communications to those between wholesalers and distribution companies (See Figure 5).

7. The paper and paperboard distribution network for the future

(1) Cross-country extension

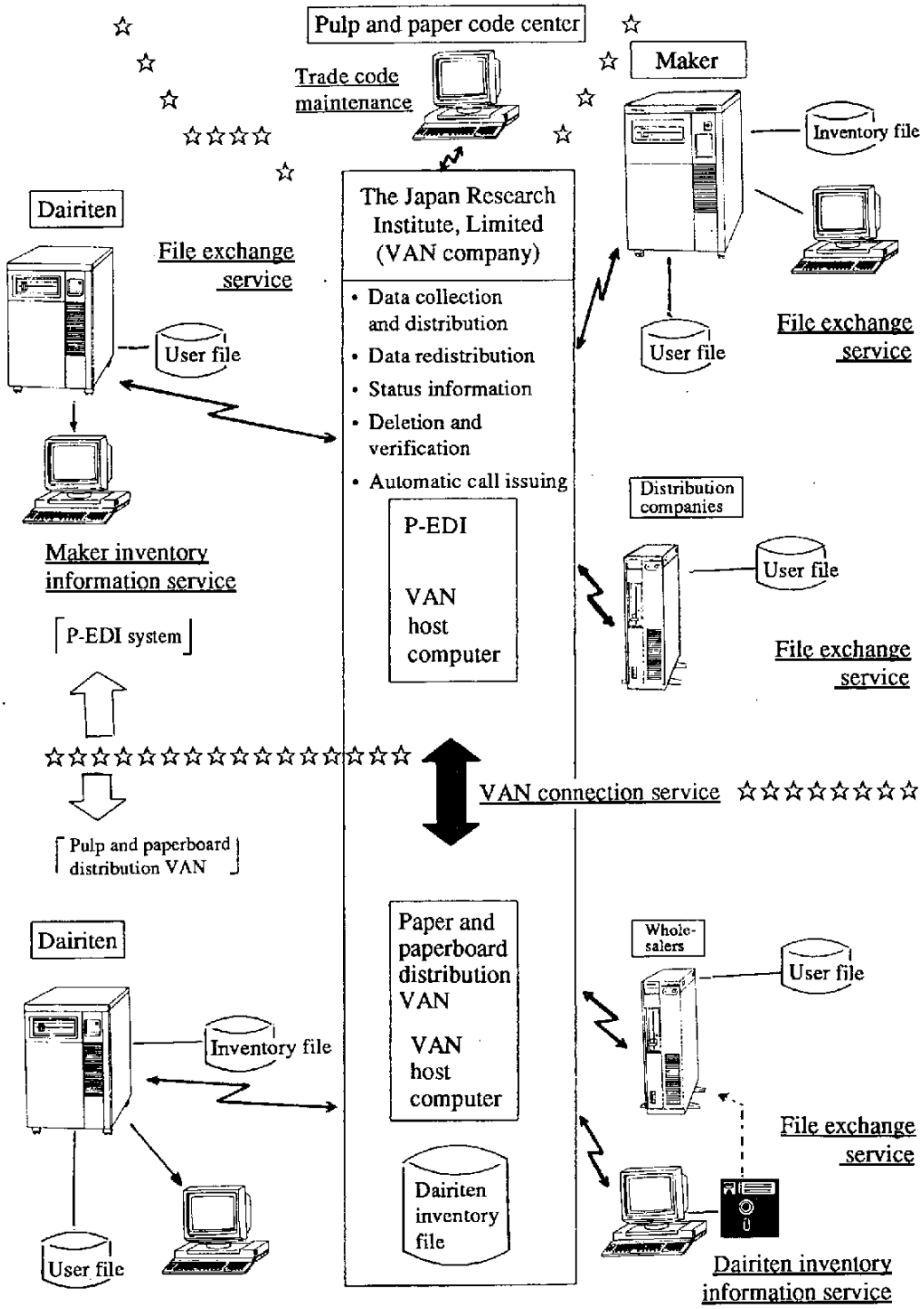


Figure 5. System configuration

"The paper and paperboard distribution VAN" has only operated in Tokyo and the surrounding region ever since it came into existence. However, the VAN is scheduled to start adjusting its system environment for cross-country extension in September, 1991. Once arrangements are complete in the respective regions, the network will be extended all over the country.

(2) Realtime connections between the VAN and wholesaler computers from different manufacturers

As of today, wholesalers rely on terminals to transmit information to "the paper and paperboard distribution VAN". Investigation is under way of a proposal to make possible communication through realtime connection between wholesaler hosts and the network host (in the same way as connections are made between Dairiten hosts and the network host).

If this is possible, wholesalers will be relieved of the burden of inputting the same information twice, once for their own systems and once again for transmission to the network. Information inputted into a company's own system will be simultaneously transmitted to the network.

(3) Network connection with other business fields

Network connections will certainly be necessary in the future between paper and paperboard companies and related enterprises, such as publishers, printers, and cardboard manufacturers and dealers. Both "the paper and paperboard distribution VAN" and P-EDI are trying to create standard industry systems open to shared use. So they must gear up their systems to simplify future connections with organizations engaged in other business activities.

The future range of possibilities open to these networks is limitless, but we do not intend to rush ahead heedlessly. We would like to stay one step ahead while keeping up with the information developments in industry.

Current News

*** NTT Develops Optical Transistor**

NTT has developed the world's first transistor that can be operated in optical form without converting optical signals into electrical signals. The size of this transistor is 100 microns in diameter and 10 microns in thickness. The transistor has a stacked structure composed of a special thin layer called a "multiple quantum well structure" that controls absorption of light, a mirror called a "semiconductor multilayer film reflection mirror", and a photo transistor layer whose voltage can be changed by light, etc. NTT has developed a chip with a 3-mm square substrate on which 64 photo transistors are mounted. The basic function of the transistor is control of signals such as amplification. It has been confirmed that with the newly developed optical transistor, if light is applied to one side of the optical transistor element, a light 4 times stronger will come out of the other side.

If information were to be handled in optical form, computer operations could be faster. However, up until now, light has had to be converted into electrical signals, because optical transistors were not available. If circuits are developed using the combination of a large number of the new optical transistor elements, it is believed that super high-speed optical computers with capability to execute more than 1 trillion instructions per second and optical switching systems with the capability to send more than 1 trillion bits of data per second will be realizable. In addition to super high-speed processing, optical transistors have the advantage of being resistant to fault electric waves because there is no need for the wiring used in electronic circuits.

Electronics technology has evolved from vacuum tubes to transistors, and then to ICs. This new optical transistor development by NTT may well be the technological innovation that will replace the electrical signals of transistors and ICs with light signals.

*** Four Companies including NTT Unconditionally Provide Patents for Digital Portable Telephones**

NTT, KDD, NEC and Motorola Japan will unconditionally provide domestic patents for the key technologies necessary for the digitalization of the automobile and portable telephones used in mobile communications, to be introduced beginning in 1992. There are a total of 27 patents, and all of them are important technologies indispensable for implementation of the domestic standard specifications. The four companies have agreed to the unconditional offering of these patents in order to accelerate the practicalization of products and the propagation of services. With this agreement, both Japanese and foreign

manufacturers of electrical equipment and communications equipment can incorporate the technologies into their digital equipment to be sold in the Japanese market free of charge. Manufacturers will be able to develop, produce and sell handier, smaller and lighter portable telephones and high-performance radio system facilities at low cost.

20 patents out of the 27 belong to NTT. These include the technology to double the life of the batteries used for portable telephones by stopping the transmission of voice signals during silent periods in phone conversations. While maintaining only short control signals, and the technology to locate which radio base station a automobile or portable telephone is in by utilizing limited send/receive information between the telephone and the base station. There are also 2 KDD patents, 2 NEC patents and 3 Motorola Japan patents included in the offer.

* **NEC and AT&T Subsidiary Jointly Develop Next-next Generation Semiconductors**

NEC and AT&T Microelectronics, a semiconductor subsidiary of AT&T, announced that the two companies have signed a joint development agreement for production technologies for next-next generation semiconductors. They will jointly develop super-microscopic processing technologies to realize the 0.35 micron line width circuits necessary for 64 M-bit dynamic RAMs, etc. Technologies related to lithography (exposure technology) and clean rooms, etc. will be promoted through exchange of engineers from the two companies for each technological area, and the results will be jointly shared by both companies. The term of the contract will extend to January 1, 1993.

In the area of semiconductor production technology, at present 0.8 micron circuits are used for 4 M-bit DRAMs, the representative memory for this generation, and 0.5 to 0.6 micron line design is used for next generation 16 M-bit DRAMs. NEC believes that 0.35 micron line design super-microscopic processing technology is necessary for the production of next-next generation 64 M-bit DRAMs. The AT&T side, which does not produce DRAMs, plans to apply jointly developed technologies for static RAMs, etc.

For the technological development of the most leading-edge semiconductors, an undertaking that requires a huge amount of funds, alliances between Japanese and US makers have become increasingly common. In this new alliance, the two companies aim at reducing the costs and increasing the efficiency of technological development. They are investigating the future possibilities of joint production of semiconductors using the newly developed technologies.

* **In-house International Communications Service Starts in Japan and the US**

KDD and AT&T will jointly start a new in-house international communications service between Japan and the United States. This service is called "international VPN", and can utilize international switched lines for in-house communications by enhancement of the data base software of switching systems. It is used in the same way as leased lines. Service charges will be higher than with international leased lines, but if the number of telephone calls is not large enough to lease lines, the new service will be more advantageous to customers. Furthermore, the charges are lower than

international telephone calls. Therefore, internal networks can be extended to locations with a low communications volume that could not support leased line service. Medium-sized companies will also be able to create international communications networks.

KDD and AT&T will incorporate a common data base for the software of the international switching systems of the two companies. The data base contains identification numbers of user companies, telephone extension numbers, etc. The two companies will also jointly maintain and control VPN. KDD has already completed development of software to implement this service, and is currently negotiating with common carriers in each country.

VPN service has not been authorized in Japan. However, the Ministry of Posts & Telecommunications believes that early realization is desirable as long as fair competition among common carriers can be maintained. The ministry is prepared to grant approval as soon as KDD applies for service approval. International common carriers other than KDD (the NCCs) have already started feasibility studies to implement similar services.

* ICOT Announces Results of Research on 5th Generation Computers

ICOT has announced the results of its R&D on "Fifth Generation Computers". ICOT demonstrated experimental applied systems for analysis of protein, LSI design, etc. using the prototype machine which will be the final version of "PIM", the parallel-processing fifth generation computer. In PIM, a large number of computers share responsibility to solve complex problems. The prototype machine demonstrated this time is a parallel-processing computer called "Multi PSI" that connects 64 processor units.

High-precision analysis of protein used to be a difficult job because it was dependent on the intuition of the researcher. ICOT has developed a prototype program to handle this using "Multi PSI". The analysis makes analogical inferences of functions and structures of proteins by comparing the sequences of amino-acids in the proteins with the sequences of proteins whose functions and structures are already known. This will be useful in the study of genetics, etc.

In the example of applied LSI design, the complex wiring connecting semiconductor elements is designed. Multi PSI performs at the same level as a super large-scale computer, and it is estimated that PIM will be able to perform 10 to 12 times faster. Moreover, in the design of how to arrange cells (composed of semiconductor elements) on a substrate in a way which eliminates unnecessary wiring, a processing method to reach the optimum answer has been computerized.

Furthermore, ICOT has announced an inference system based on legal provisions and past judicial precedents and a system to diagnose failures in electronic equipment. The fifth generation computer project is a 10-year program, and the 1991 fiscal year is its final year. ICOT now plans to develop a PIM connecting 512 computers and other systems and evaluate their performance.

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