The Challenges for Value-Added Services in Korea

Dong Wook Lee

Program on Information Resources Policy

Harvard University

Center for Information Policy Research

Cambridge, Massachusetts

A publication of the Program on Information Resources Policy.

The Challenges for Value-Added Services in Korea

Dong Wook Lee
May 1989, P-89-3

Dong Wook Lee is director of the Database Development Division, Data Communications Corporation of Korea. He prepared this report as a research fellow with the Program.

Printing 5 4 3 2 1

May 1989

PROGRAM ON INFORMATION RESOURCES POLICY

Harvard University **Center for Information Resources Policy**

Affiliates

Action for Children's Television
American Telephone & Telegraph Co.
Ameritech Publishing
Anderson, Benjamin, Read & Haney, Inc.
Apple Computer, Inc.
Arthur D. Little, Inc.
Auerbach Publishers Inc.
Bell Atlantic
Bell Canada
BellSouth Corporation
Booz-Allen & Hamilton, Inc.
Bull, S.A. (France)
Centel Corporation
CMC Limited (India)
Commission of the European Communities
Communications Workers of America
Computer & Communications Industry Assoc.
Computer Intelligence
Continental Graphics Corp.
Coopers and Lybrand
Copley Newspapers
Data Communications Corp. of Korea
Department of Communication (Australia)
Dialog Information Services, Inc.
Dow Jones & Co., Inc.
Dun & Bradstreet
France Telecom
Gannett Co., Inc.
Gartner Group, Inc.
GTE Corporation
Hitachi Research Institute (Japan)
Honeywell, Inc.
IBM Corp.
Information Gatekeepers, Inc.
Information Industry Association
Interconsult
International Data Corp.
International Resource Development, Inc.
Invoco AB Gunnar Bergvall (Sweden)
Knowledge Industry Publications, Inc.
Korean Information Society Development Institute
Lee Enterprises, Inc.
John and Mary R. Markle Foundation
MCI Telecommunications, Inc.
Mead Data Central
MITRE Corp.
National Telephone Cooperative Assoc.
The New York Times Co.
NEC Corp. (Japan)
Nippon Telegraph & Telephone Corp. (Japan)
Northern Telecom Ltd. (Canada)
Nova Systems Inc.
NYNEX
The Overseas Telecommunications Commission (Australia)
Pacific Telesis Group
Pitney Bowes, Inc.
Public Agenda Foundation
Research Institute of Telecommunications and Economics (Japan)
RESEAU (Italy)
Rizzoli Corriere della Sera (Italy)
Saint Phalle International Group
Salomon Brothers
Scaife Family Charitable Trusts
SEAT S.P.A. (Italy)
Southern New England Telecommunications Corp.
State of California Public Utilities Commission
State of Minnesota Funding
TEKNIBANK S.p.A. (Italy)
Telecommunications Research Action Center (TRAC)
Tele/Scope Networks, Inc.
Third Class Mail Association
Times Mirror Co.
United States Government:
- Department of Commerce
  - National Telecommunications and Information Administration
- Department of Defense
  - National Defense University
- Department of Health and Human Services
  - National Library of Medicine
- Department of State
  - Office of Communications
- Federal Communications Commission
- General Services Administration
- National Aeronautics and Space Administration
- National Security Agency
- U.S. General Accounting Office
- United States Postal Rate Commission

United Telecommunications, Inc.
US West

Acknowledgments

Special thanks are due to the following persons who reviewed and commented critically on drafts of this report:

Guy R. Arrigoni
Parker W. Borg
Larry G. Forrester
Seisuke Komatsuzaki
Oh Bok Kwon
Herbert E. Marks
William M. Ohnsorg
R. J. Priddle
Martyn F. Roetter
Satoshi Shinoda
Keuk Je Sung
K. B. Whang
G. B. Won

These reviewers and the Program's affiliates are not, however, responsible for or necessarily in agreement with the views expressed herein, nor should they be blamed for any errors of fact or interpretation.

Executive Summary

- In an international environment in which the definitions of related value-added services (VAS) are continually changing and in which regulatory frameworks differ, there is keen competition between and within nations, as well as between international organizations, for supplying VAS. To ensure "fair competition," advanced common carrier networks and their services are highly regulated in advanced countries. At the same time, VAS providers (VASPs) are preparing domestic as well as international VAS. Each country faces the challenge to develop standards and to deal with interconnection, especially in anticipation of the possibility of an integrated services digital network (ISDN) in the future.

- Korea's policymakers face a challenge in their efforts to formulate a development policy for VAS and for the communications industry. The challenge: to establish a degree of openness and steps toward it that are consistent with a government policy of balancing between private interests represented by large private companies and the public interest represented by the common carrier, and that would also cope with pressure from foreign companies.

- Factors that need to be considered during deliberation on liberalization of Korea's communications market include national security and protection of the domestic industries, public interest and economic benefit, centralization of the economy in large private companies and advanced countries, the overlapping of capital investment, the potential to guarantee the reliability and stability of the network, and standardization of business protocols, to name a few. Furthermore, the communications industries may not be under government control forever.

- A rapid development cycle spawning diverse technologies, products, and new media services has brought about a range of interconnection problems in the marketplace worldwide. The "electronic data interchange" (EDI) system can be examined as a model transaction standard for VAS interconnection because it is not limited by differences among computers, networks, and companies.

- Alternatives for balancing development of public and private value-added networks (VANs) in Korea can take into account strengths and weaknesses in common carrier and private company emphases. While an earlier starting date for private VANs may be indicated by cost-effectiveness for users, installation may have to wait for attainment of such priority conditions as extension of the group VAN concept and construction of versatile databases. To serve the public interest, common carriers may be able to guarantee universal service to the public and to small and medium-sized firms. In the long term, full competition among common carriers, private com-

panies, and foreign companies may be necessary for maximum benefits.

- "Open network architecture" (ONA) in the U.S. and "open network provision" (ONP) in the European Community were introduced during the 1980s and remain a vague mandate, with details of implementation still under debate. Both have been touted as able to support the best possible conditions for innovative development of VAS by competitive providers in the communications sector. The likelihood that ONA and ONP will be adopted in Korea is small, but potential changes could increase this likelihood. In particular, competition among the dominant carriers and VASPs over VAS development could increase pressure for establishment of conditions for fair competition.

- The choices facing policymakers for VAS in Korea can be summarized as: Option I, to continue the present policy as established in 1987; Option II, immediate full competition and open policies; and Option III, phased changes, beginning with removal of constraints on group VANs, followed by steps toward competition, and finally, full competition.

- An amendment on shared use of leased circuits for computer communications took effect December 1, 1988, initiating the third stage in the opening of VAS in Korea. The changes are part of Korea's efforts to improve its international competitiveness through promotion of computerization of private user companies and through preparation of a domestic business environment supportive of Korea's computer communications industry.

Table of Contents

List of Figures and Tables

Figures

Tables

INTRODUCTION

1. Objective and background

In the 1980s Korea finds itself drawn into an international environment of industrial and regulatory upheavals and economic change in the information and communication industries. In the advanced countries, rapid economic development has spurred an increasing and diversifying demand for communications services. In turn the technology has become remarkably well developed -- so much so, in fact, that it has undermined the traditional justification for monopoly. The industrial structure and the regulatory framework for communications are changing: In response to pressure from varying market sectors, monopoly has given way to increasing competition, and plans have been adopted to invigorate the information and communication industries.

In the 1980s, the U.S. and Japan have adopted policies that have re-regulated but not deregulated telecommunications services. France and West Germany are considering similar changes in telecommunications. However, even though advanced countries in such international forums as the International Telecommunication Union (ITU) have advocated that developing countries adopt open policies,[1] the fit is problematic because regulatory processes and content differ from country to country as much as nations' economic and political environments differ.[2] Open policies are an international trend although types of regulation differ depending on the tradeoff reached between monopoly and competition, the development of private enterprise, and needs for universal service.

---

[1]The terms "open policies," "open door policies," "liberalization," and "privatization" all refer to developments surrounding the introduction or expansion of competition or the ending of monopoly control in information communication services. However, each term reflects a different emphasis. Open policies, a focus of this paper, are wide in scope, involving not only liberalization and altered patterns of regulation but also what for Korea and other developing countries is a central issue: the opening of information and communication markets to foreign as well as domestic competition. The term "deregulation" is a misnomer for these phenomena, however.

[2]M. Horibe, "A Proposal for the Harmonization of Global Telecommunications," Telecom '87, Oct. 1987 (abstract).

In an international environment in which the definitions of related value-added services (VAS)[3] are continually changing and in which regulatory frameworks differ, there is keen competition between and within nations, as well as between international organizations, for supplying VAS. To ensure "fair competition," advanced common carrier networks and their services are highly regulated in advanced countries. At the same time, VAS providers (VASPs) are preparing domestic as well as international value-added services. Each country faces the challenge to develop standards and to deal with interconnection, especially in anticipation of the possibility of an integrated services digital network (ISDN) in the future.

It is in this context of international complexity and change that the Korean government in 1988 set its three-stage goal to establish an ISDN by the year 2000. The purpose is to realize, as soon as possible, "the enhanced information age" and an "enhanced information network society."[4]

To encourage the development of new media and to help users become more competitive in international markets, the Korean government has gradually liberalized provision of information services and value-added services. In 1985, at the first stage, information service providers (ISPs) were authorized to provide data processing and database retrieval services through leased circuits for third-party use. In 1987, further opening of the door in the second stage brought system integration in the form of "group VANs," (group value-added networks) in which

---

[3]In this paper, VAS will include those services defined as "enhanced services" in the U.S., as well as value-added network services (VANS) in Great Britain, and Type II carrier services in Japan. VAN refers to value-added network; VANs, value-added networks. The author is indebted to Tatsushiro Shukunami for this conceptual framework. See T. Shukunami, The Race for Value-Added Services: Challenges and Opportunities in the U.S., Japan, and the U.K. Cambridge, MA: Program on Information Resources Policy, 1988, p.1.

[4]The Maeil Kyungje Shinmun, Korea, March 2, 1988.

VASPs are authorized to share use of leased circuits among subsidiaries of the same group company.[5]

The third stage, initiated by the Ministry of Communications as of December 1988, extended shared use and third-party use of leased circuits under specified circumstances.[6]

Thus VANs and VAN-related services are in their infancy in Korea while advanced countries as well as large domestic private companies have already increased pressure on the government to adopt more open policies. As a result, policymakers in Korea face a number of problems:

1) The opening of Korea's VAS market brings with it questions about how best to serve the public interest and to maximize the development of economic efficiency in the private sector, especially through government policies.
2) Problems involve interconnection and standardization, how to constitute a VAS network, and how to develop effective VAS.
3) Policymakers face challenges brought about by the internationalization of VAS, including questions about how to develop progressive policies, such as an international standardization policy, and how to deal with changing definitions, international VAN development, and regulatory and policy issues of advanced countries.

There is much practical knowledge to be gained from advanced countries and much to examine. Policymakers in government and business face difficult questions, problems, and issues in their efforts to create effective policies for value-added services development in Korea.

The purposes of this study are:

---

[5]"Group company" is an informal term used to describe some of the large Korean corporations, similar to conglomerates, such as Lucky Goldstar, Hyundai, and Samsung. During the second stage of liberalization, group companies could set up VANs among their varied subsidiaries, but not across industries or among different group companies. The third stage, described in Appendix A, expanded the scope of access to the group network.

[6]Appendix A summarizes this legal amendment on leased circuit use for computer communications. Because the amendment was announced after publication of the draft of this paper, it is added here to help readers understand changes in Korea up to April 1989.

- To explore those questions, problems, and issues related to changing regulation, interconnection, and VAS development in Korea, and to look at policy issues in advanced countries;
- To convey factors for consideration by decision makers who may be just beginning their examination of the complexities of VAS development;
- To explore technical alternatives involved in VAS policy development in Korea;
- To help policymakers in their efforts to determine a further direction for open policies and to develop VAS in Korea in a way that is consistent with government policy to serve public interests in universal service and private industry interests in economic efficiency and competitiveness -- and to do so with an awareness of the international environment.

This study looks at data communications services, especially VAS, to develop policy alternatives for competition and VAS development in Korea. Trends suggest that VAS are critical to Korea's open policy as a way to maximize users' economic efficiency and creativity and to strengthen the competitive potential of domestic VASPs.

The first four chapters in this report examine changing patterns of regulation, interconnection, VAS development, and policy issues in advanced countries. Chapter Five presents a summary and analyzes three policy options for VAS in Korea.

2. Overview of major questions, problems, and issues: Liberalization, interconnection, VAS development, and policy issues in advanced countries

a. Liberalization

Problems

Conflict between countries has increased with increasing international competition to provide VAS. Specifically, the U.S. government is pressuring the Korean government to allow U.S. companies to offer VAS in Korean markets. The Korean government, however, is trying to

open VAS markets gradually to protect national security, its own VAS industry, and other national interests.

The domestic private sector in Korea is also asking the government to open Korean markets to VASPs to expand their VAS business and to benefit users by giving them a choice among suppliers. The private sector also favors liberalization of leased circuit use. Accordingly the government is considering gradual opening of Korean markets to balance between the public interest, as served by the common carrier,[7] and economic efficiency, as provided by private VASPs.

Issues and questions

- How open an open policy, and by what steps, can the Korean government balance between economic efficiency as pursued by private domestic companies and the public interest as served by the common carrier?
- How far should the role and liberalization of VAS be extended to increase economic efficiency? With what effect on whom?
- In the VAS area, will liberalization of leased circuit use allow other players to make inroads into the business area of the common carrier? What effects are expected?
- What are the potential effects of an open policy on the relationship between VASPs and the single public network of the common carrier?

b. Interconnection

Problem

Communications and computer technologies have developed rapidly worldwide, and their industries and markets have developed differently, based on differing technologies, products, and services. With differing strategies and market positions, the communications and computer industries may see more conflict in the future.

---

[7]In this paper, in the context of value-added service provision in Korea, "the common carrier" refers to the Data Communications Corporation of Korea (DACOM), which has responsibility for VAS. The Korea Telecommunications Authority (KTA) has common carrier status for voice service.

Korea is no exception. Customers have difficulty exchanging information because they have different, dedicated systems provided by different computer vendors. Interconnection technology is of critical importance to the implementation of VAS. While large private companies in Korea already have intracompany networks, intercompany network users will also need VAS. Interconnection and interoperability problems also trouble the emergence of new communication networks, such as the National Administration Information System (NAIS) and VAS network.

Issues and questions

- Can the new international standard compete with the installed, de facto standard? What alternatives are available to policymakers in the public and private sectors for dealing with competition in standardization efforts?
- Considering electronic data interchange (EDI) as a model for an enhanced service application that encourages industries to adopt a transaction standard:
    - Can an EDI system solve interconnection problems in intercompany network service and create communication service opportunities?
    - Who will make the preparations for interconnection?
    - In what direction is EDI development heading?

c. Development

Problem

VAS development, like socioeconomic and technological development, differs from country to country as much as the environments differ. The computer industry in Japan, for instance, has been developed for specific users. In the U.S., VAS make use of packet-switching network techniques. The computer industry in Korea is more than 10 years behind those of the U.S. and Japan. Korea's communications and information industry, still in its infancy, simultaneously has seen the increasing popularity of VAS and has taken a first step toward developing value-added networks in the form of "group VANs."

Under current Korean policy, VASPs may only provide VAS among subsidiaries within the same group company.[8] Thus group VANs are considered intracompany VANs, not intercompany. Predictably, there are problems, and there are conflicts over how the group VAN system should be established.

The government has recommended that value-added services providers adopt the X.25 protocol and the Hangul standard when the public-switched data network (PSDN) is connected to the group VAN system.

The VASPs hold varying opinions of these government recommendations. The common carrier and VASPs also have different ideas about how to develop VAS -- whether through business applicants, management trusts, joint ventures with the common carrier, or divided roles in developing a public VAN and private VANs.

Issues and questions

- Which technical factors affect efforts to establish VAS?
- What direction might group VANs take to develop as VASPs?
- What conditions does the development of VAS require?
- What policy alternatives would further promote VAS in the near future?

d. Policy issues in advanced countries: open network architecture in the U.S. and open network provision in the European Community

In advanced countries, discussions have introduced the concepts of open network architecture and open network provision. Although ONA and ONP remain a vague mandate (see section 4.3), both concepts have been touted as able to support the best possible conditions for innovative development of VAS in a competitive environment. For this reason they are likely to be examined in other countries concerned about introducing regulation for fair competition and about maximizing efficiency between competitive providers. Their relevance to Korea will be considered in Chapter Four.

---

[8]See note 5, above.

Issues and questions

- What is the likelihood of ONA or ONP adoption in Korea?
- What are the implications of ONA and ONP development in Korea?

CHAPTER ONE

LIBERALIZATION

1.1 Introduction

Rapid economic development and accelerated technological development have stimulated structural change in the telecommunications industry that has in turn undermined traditional justifications for monopoly.

In advanced countries, where combined computer and communications technologies have made varied services available, demand has diversified, and the public has sought higher quality services. Conventional monopolies, however, cannot cope successfully with such changing demand, and users have demanded conversion from monopoly to competitive systems.

In response, many countries have tried to invigorate their communications industries by moving toward market-based economies. In the 1980s, advanced countries such as the U.S. have opened their communications markets to increasing competition.

On the other hand, under Korea's regulatory framework as of 1987, the communications industry is based on a monopoly policy; limited competition is allowed only in certain instances. Advanced countries want the Korean government to open communications markets to them. Similarly private value-added services providers (VASPs) in Korea have also asked the government to adopt open policies to boost their competitiveness in the international market.[1]

Accordingly, this chapter is a broad examination of issues raised by the liberalization of VAS in major industrialized countries and in Korea. These issues, as faced by the Korean government, include:

- How to balance between public responsibilities to provide service to small companies and to the general public and economic benefits from the development of value-added service providers or VAS users;

---

[1]See Appendix A for developments during late 1988.

- How to establish competition and its legal limitations while protecting both the public interest and the vitality of private industry in Korea.
- How to develop a structure for competition in response to pressure from foreign countries to open Korean markets.

Especially for those decision makers who may not be familiar with policy alternatives for VAS in Korea's computer communication industry, this chapter looks at markets and regulatory changes in the major advanced countries and discusses the current environment for VAS in Korea. Finally, this discussion analyzes international and domestic conflicts over liberalization and competition and considers alternatives for a gradual open policy.

1.2 Market analysis and regulation in major advanced countries

1.2.1 Environmental factors behind liberalization in advanced countries

Major environmental changes have influenced the adoption of open policies in the developed countries:

- Acceleration of technological evolution has increased the flexibility and efficiency of the data communications system. These changes in turn can overcome the limiting factor of supply that had required "economy of scale."
- Socioeconomic development led to diversified demand and user requests -- especially by private companies.
- Inflexible business structures and limited choices for users under monopoly systems could not cope effectively with changing demand.[2]
- As economies have become international and pressure has increased for the internationalization of the data communications industry, open policies have been expanded to the

---

[2]Youichi Ito, "Enhanced Communication," Telecom '87, International Telecommunication Union, Forum Part III, Session 3, Case 1-5.

international arena.[3] With such expansion has come conflict and international discussions to resolve it.

1.2.2 Open policies in data communications industries: Basic content

Figure 1-1 outlines the basic content shared by the open policies discussed in the following sections. Figure 1-2 is a schematic diagram of the liberalization process in advanced countries.

Government Roles	Business Classification	Types of Liberalization Policies
• Separation of supervisory functions and business operation • Laws on supervisory role	Enhanced/VAN service	• Lifting of restrictions on circuit use to introduce competition in service provision
	Network and the basic services related to the network	• Approval of new network providers • Changes in business administration of the existing data communications industries
	Computer and communications equipment	• Interconnection system • Equipment certification system

Figure 1-1

Basic Content of Open Policies

---

[3]U.S. National Telecommunications and Information Administration (NTIA), Report on U.S. Long-Range International Telecommunications and Information Goals, Feb. 25, 1983, quoted in Keuk Je Sung, Study on International Trend of Service and Telecommunication Industry, Korea: Institute for Communications Research, Dec. 1987, p. 13.

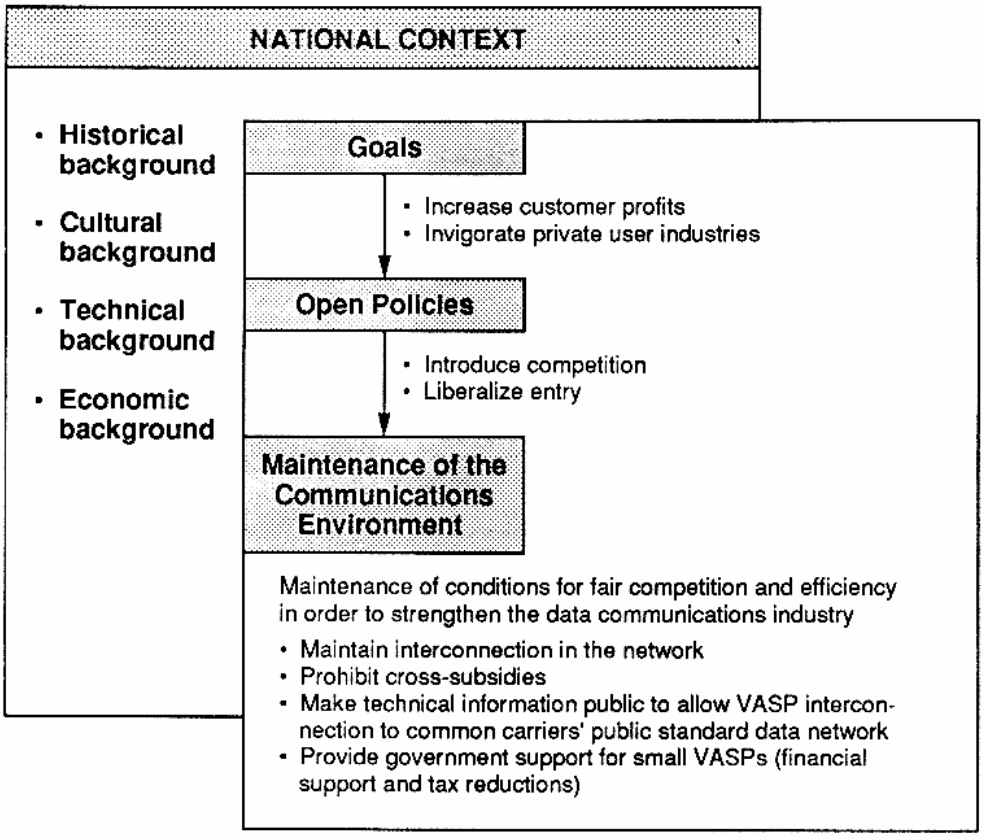


Figure 1-2

Open Policy Process in Data Communications

1.2.3 Open policy systems and trends: Country-by-country analysis

As mentioned above, changing environmental factors related to VAS may inevitably induce modifications in regulatory systems, but the impacts of such changes differ from country to country as much as socioeconomic and political factors differ. In response, each country's strategy for coping with change may have to differ. This section compares policy content and process among the advanced countries, where changes in open policy environments and in data communications industry status and regulation are expanding to the international arena.

1.2.3-1 U.S.

Traditionally, the private sector operated the data communications industry; thus, while the government controlled the activities of AT&T and the Bell operating companies (BOCs), other players were free from government intervention. Numerous parties have implemented complex regulations, and liberalization of VAS has increased gradually over a long period of time in a market-based economy.

- **Categorization of business areas**

In telecommunications regulation, categorization of business arenas has been controversial. The FCC polled the industry three times in Computer Inquiries I, II, and III, with results as summarized in Table 1-1.

Table 1-1

FCC Computer Inquiries I, II, and III

Computer Inquiry I (1971)

Data processing is not restricted, but basic services are. Hybrid service, when classified as hybrid communications service, is to be regulated as a basic service of common carriers under Title II of the Communication Act of 1934.[1] Telenet and Tymnet were the first to provide a public packet-switching network in the value-added market.

Computer Inquiry II (1980)

The final decision was to allow free competition in enhanced services and to regulate basic communications service, adopting the basic/enhanced service dichotomy for the boundary definition.[2]

Basic service is defined as common carriers' offering of transmission capacity for the movement of information.

Enhanced service is defined as the combination of basic service with "computer applications that act on the format, content, code, protocol, or similar aspects of the subscriber's transmitted information; provide the subscriber additional, different or restructured information, or involve subscriber interaction with stored information."[3]

Computer Inquiry II included stricter structural separation requirements for AT&T, although Telenet was later exempted from them.[4] Under CI-II, other common carriers were allowed to provide long-distance telephone network services because these competing services were excluded from the restrictions.

[1] Shukunami, pp. 21-22. See also: Communication Act of 1934, tit.2 (47 U.S.C. §201).

[2] FCC, Supplemental Notice of Proposed Rulemaking, CC Docket No. 85-229. Released: June 16, 1986, pp. 10-11.

[3] FCC, In re Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry), Docket No. 20828 [hereafter cited as Computer Inquiry II], Final Decision, 77 F.C.C.2d 384 at 387 (adopted Apr. 7, 1980, released May 2, 1980).

[4] Ibid., Memorandum Opinion and Order, 84 F.C.D. 2d 50 (released Dec. 30, 1980).

Table 1-1 (continued)

Computer Inquiry III (1985)

In response to disputes between the telecommunications and information industries, Computer Inquiry III "is designed to introduce a regulatory structure whereby the RBOCs can offer so-called enhanced services while at the same time providing facilities that permit others to market a wide array of enhanced and information services."[5]

Computer Inquiry III focused on eliminating the requirement that certain dominant carriers (the BOCs and AT&T) offer enhanced services only through a structurally separated subsidiary. It permits them to colocate or integrate enhanced services with basic services provided that they meet certain nonstructural safeguards.

Computer Inquiry III treats the communication network itself as a kind of intelligence, with basic services providing enhanced services. Therefore, questions about social costs and user convenience arose in the business arena, because restrictions on competition could hurt the growth of the industry.

For this reason, the FCC since June 1986 has continued a broad investigation and discussions with related players about such individual service categories as packet-switching service, protocol processing, and voice message services.

[5] "Computer III and MFJ Update: FCC Unhappy After Initial Look at RBOC's ONA Plans, but Judge Greene Finally Relents -- RBOCs can Offer Messaging Services," Telecom Insider, International Data Corporation, Vol. 8, No. 5, April 1988, p. 1.

- **Leased-circuit use**

The FCC unconditionally approved resale and shared use of leased circuits, which are fundamental for VANs and resellers, in the July 1986 decision.

- **Trends in classification of computer and communications services**

Figure 1-3 summarizes service classifications emerging from the FCC decisions described above.

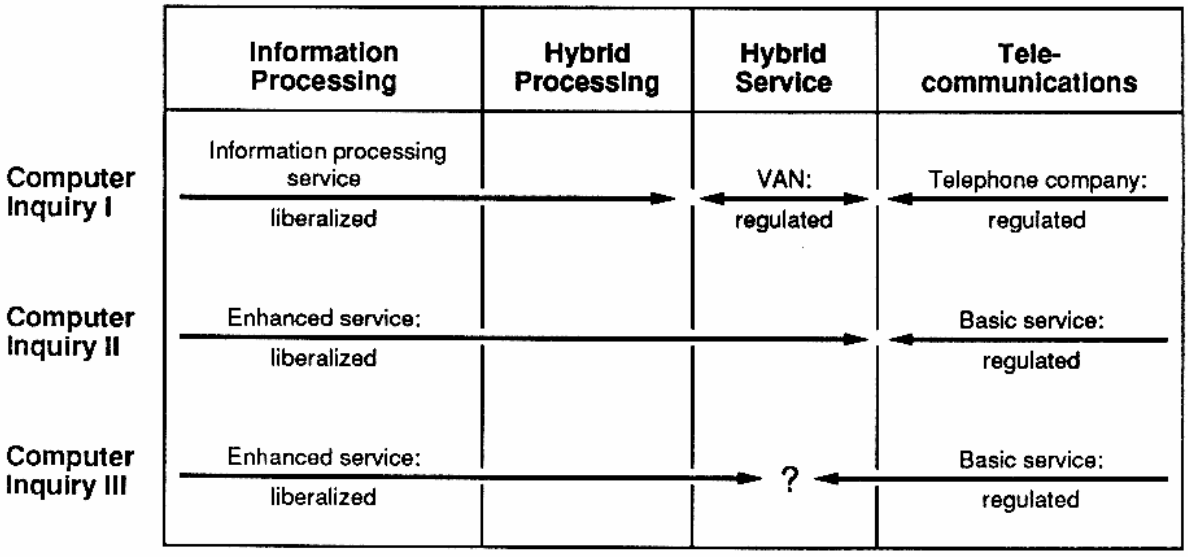


Figure 1-3

Computer Communications Service Classifications

- **Structural Separation Requirement**

In 1983, the FCC expanded the range of competition for other communications companies, but AT&T and the BOCs as dominant common carriers remained under the structural separation requirements of Computer Inquiry II and under FCC and public utility commission (PUC) control on rates.

In the Computer Inquiry III order, the FCC abolished the structural separation requirements placed on AT&T and the BOCs for enhanced

service provision and replaced them with several non-structural safeguards. These safeguards are separate accounting, comparably efficient interconnection (CEI), open network architecture (ONA), network information disclosure, and customer proprietary network information (CPNI).

AT&T and the BOCs wanted competition to be increased especially in value-added services because IBM and GTE, which are competitors, had expanded their business through large-scale networks and had strengthened themselves through mergers with other players in the computer communications industry.

- **Separation of the three powers**

Strict decentralization of authority has resulted in a complex implementation of regulations by the FCC, the PUCs, some federal government departments, the courts, and Congress, as outlined in Table 1-2.

Table 1-2

Separation of Powers in U.S. Communications Policies

Judicial Branch (Courts) The courts have authority over telecommunications policy and are responsible for supervising industry structure. The courts were active in the AT&T and IBM antitrust issue.

In 1982, the U.S. government dropped its antitrust suit against IBM and agreed to modification of AT&T's 1956 consent decree. But in the Modification of Final Judgment (MFJ) Judge Green imposed other restrictions on the BOCs, most notably prohibiting manufacturing and the offering of information services and interLATA communications services. The MFJ also includes a settlement agreement between the government and AT&T.

In September 1987, the court permitted the BOCs to provide data transmission but prohibited enhanced and long-distance calling services, as well as equipment manufacturing.

In a 66-page opinion and order issued March 7, 1988, Judge Greene said that the "RBOCs should be given broad flexibility to provide transmission facilities for information services" and that they "should offer five so-called gateway functions:" data transmission, address transmission, protocol conversion, billing management, and introductory information content ("menu pages").

He also said that the RBOCs may offer voice messaging, voice storage and retrieval, and electronic mail services. However, the judge maintained restrictions on three other types of information services -- information and access services (business credit, information, and advertising service), and transaction services (banking, shopping, and database access).[1]

Legislative Branch (Congress) Congress has authority over telecommunications lawmaking through the budgeting process and enactment of laws.

Executive Branch The president appoints FCC commissioners and recommends the FCC's budget.

FCC The Federal Communications Commission has the authority to regulate interstate and international telecommunications at the federal level.

[1]"Computer III and MFJ Update," pp. 2-3.

Table 1-2 (continued)

DOJ The Department of Justice (DOJ) reported to Judge Greene on general market conditions in early 1987. Based on the Huber report,[2] the DOJ recommended removal of some BOC restrictions, such as those on provision of information services. The DOJ is charged with enforcing the antitrust laws. All communications entities engaged in interstate commerce are subject to the federal antitrust laws.

DOC In the Department of Commerce (DOC), the National Telecommunications and Information Administration (NTIA) may also recommend policies.[3]

Other executive branch agencies also have important roles. For international communications, the Department of State has a major role. Other executive branch agencies with a say in communications policy include the Department of Defense.

State level

PUCs The state public utility commissions regulate telecommunications at the state level. As of 1987, "almost all states with more than one local access and transport area (LATA) had allowed competitive delivery of long-distance services between the LATAs within the state."[4] According to Henry Geller of the Washington Center for Public Policy, "Only about one-third of states have allowed intraLATA competition, and the competition is not fair because of lack of equal access."[5]

State legislatures, the state courts, and state executive branches also have important roles with responsibilities divided in ways similar to those at the federal level.

[2]Peter W. Huber, 1987 Report on Competition in the Telephone Industry, The Geodesic Network, U.S. Dept. of Justice, Jan. 1987.

[3]U.S. Dept. of Commerce, Issues in Domestic Telecommunications: Directions for National Policy, NTIA 85-16, July 1985.

[4]Paul Teske, "State Telecommunications Regulations: Assessing Issues and Options in the Midst of Changing Circumstances," Communications and Society Forum Report. New York: Aspen Institute, 1987, p. 13.

[5]Henry Geller quoted in Teske, ibid.

- **The Problem of Access Charges**

Following the divestiture of AT&T in 1984, a major controversy arose over the division of interLATA network expenses. Because the deficits of the regional Bell operating companies (RBOCs) are no longer offset by profits from AT&T long-distance calls, in 1984 the FCC issued its plan for access charges.[4] It drew steep criticism from the states and Congress.

The Consumer Federation of America said that increases in local calling rates and reduction of long-distance rates for major businesses had been accomplished, but that most users would not benefit from the new policy. In fact, the burden on consumers would increase. New pressures to realize profits and to maintain the common carrier organization thus were seen as detracting from universal service.

The FCC had proposed assessing enhanced service providers the same carrier common line charges (CCLC) as are imposed on interexchange common carriers. This change could significantly raise the access charges paid by enhanced service providers. While the FCC withdrew its latest direct approach, this issue is still pending in the proceeding addressing private network CCLCs and in BOC proposals regarding the ONA plans.

- **Growth through the versatility and internationalization of the information communication industry**

The versatility and internationalization of the information communication industry is suggested by the roster of players in Table 1-3. With the opening of international VAN business among such countries as the U.S., Japan, and the U.K., the trend toward liberalization and competition in the international computer communications market has increased dramatically.[5] International business appears to be essential for enhanced service providers.

---

[4]For an extensive discussion, see Mark L. Lemler, The Access Charge Plan: The Debates Continue, Cambridge, MA: Program on Information Resources Policy, Harvard Univ., Sept. 1987.

[5]Sung, p. 28.

Table 1-3

Diversification and Internationalization of the Information Communication Industries

AT&T and IBM	Started a VAN business in foreign countries
AT&T	AT&T International was established for foreign business in 15 countries in 1980 Established a joint venture in 1982 with Phillips, which is one of the strongest communications companies in Europe Since 1985 has established eight joint venture companies in Japan to sell NET 1000 Established a joint venture company with Gold Star in Korea
IBM	A giant in the information processing industry with business relations in 132 countries, conducts business such as VAN, software development, and communications equipment manufacturing through joint ventures with European companies in order to expand its existing computer business Also established a joint venture company with ICL of Europe for VAN service
GEISCO	Established a joint venture company with BT (British Telecom) of the U.K. for VAN service
Enhanced-service providers	Several companies, including CSC and GEISCO, provide remote computing service. VANs have been developing their networks, especially to Europe and Asia, including Telenet, Tymnet, and Graphnet, as RPOAs (recognized private operating agencies). Database providers, such as Dialog and CompuServe, are likely to expand their international markets.

1.2.3-2 Japan

Before liberalization in 1985, two common carriers provided basic telecommunications services, which were controlled by the Japanese Diet, the Ministry of Posts and Telecommunications (MPT), and the Ministry of Finance (MOF).

- **Liberalization of Leased Circuit Use**

First step (1971)

The 1971 revision of the public law on circuit utilization prohibited shared use of the system, use of the system by third parties, and intercompany communication.

This revision also enabled computer bureaus to provide remote data processing and information retrieval services. Leased circuit customers were still prohibited from such services as message switching and simple resale.[6]

Second step (1982)

This revision of the law removed restrictions on leased circuit use for data communications, with restrictions remaining on:

- provision of simple message-switching services (transmission without computer data processing);
- transmission of third-party messages for commercial purposes;
- interconnection of leased circuits with public switched networks; and
- simple resale.[7]

However, "the revised law authorized computer bureaus registered with the . . . MPT to provide enhanced data communications services to small- and medium-sized businesses with enhanced data communications services, called 'VAN services for small- and medium-sized businesses',

---

[6]Kageo Nakano, "Development of Enhanced Business Communications Networks in the Pro-Competitive Regulatory Environment," Telecom '87, Forum, p. 2.

[7]Ibid.

using leased circuits and public switched networks." Traditionally, such services were offered only by common carriers.[8]

Third step (1985)

In April 1985, the Telecommunications Business Law replaced the Public Telecommunication Law, removing most domestic restrictions on data communication circuit use, such as those on intercompany communication, data processing and message switching by shared or third-party use, and simple resale. Thus the TB Law introduced free competition into the VAN market.[9] Carriers were classified as Type I, who own telecommunication line facilities, and Type II, who do not own the facilities.[10] Type I and Type II carriers can provide telecommunications transport and value-added services. Several Type I and more Type II start-up firms have emerged. Under the NTT Law, NTT has such major obligations as operating properly and efficiently, providing universal service, and promoting and disseminating R&D.[11]

- **The structural framework under the new laws (as of 1985)**

The new industrial scheme that came into force in April 1985 was designed to promote competition among carriers. Among the regulatory measures, those applicable to Type I carriers are the strictest:

A permit is required for Type I carriers' entry and exit, and pricing and other conditions for provision are regulated. Evaluations of entry and exit applications give special consideration to preventing excessive competition, and different regulations govern Type I and Type II carriers' conditions for providing service.

Type II carriers are divided into Special Type II and General Type II; Special Type II provide international and large-scale service

---

[8]Ibid.

[9]Ibid.

[10]Telecommunications Business Law, art. 6, quoted in Telecommunications Market of Japan, The Ministry of Posts and Telecommunications, Japan, Revised Edition, March 1988, p. 15.

[11]Shukunami, p. 32.

(Table 1-4). The MPT has authority to mandate interconnection between Type I carriers.[12]

For Japanese and foreign markets, Type I and Special Type II carriers both provide vertically integrated services, including hardware, application software, interconnection with databases, and communication.[13] Type I and Special Type II carriers in addition to Kokusai Denshin Denwa Co. (KDD) may enter international VAN service.

Despite the privatization of NTT, it remains at least for the time being the single largest telecommunications service corporation that owns and operates a nationwide network. Competition between NTT and Type II carriers will develop in VAS and in the sale and resale of Type I carriers' circuits. There are no fundamental service boundaries such as those between basic and enhanced in the U.S.

Table 1-4 summarizes Type I and Type II carrier regulation in Japan today.

- **VAN business**

Competition in the international communications market has not yet fully materialized, although the New Telecommunication Business Law of 1985 permits new entries such as international carriers and service providers.

Of Type I carriers, for example, KDD has long been a monopoly carrier in the international communications market in Japan. KDD provides basic services, VAS, and data processing services. International Telecom of Japan Inc. (ITJ) and International Digital Communications, Inc. (IDC), also Type I carriers, were new entries in 1986. IDC established an international joint venture company among Japan, the U.K., and the U.S., to begin service in 1988 by installing its own submarine cables and utilizing C&W's (Cable & Wireless') facilities.

---

[12]TB Law, art. 39, in Telecommunications Market of Japan.

[13]Shukunami, p. 60.

Table 1-4

Telecommunications Carrier Regulation in Japan, by Type of Carrier

	Type I Carriers	Type II Carriers	
		Special Type II Carriers	General Type II Carriers
Government involvement	Permission by MPT	Registration	Notification
Scope of service	Unlimited (telephone, specific VAN, data communications, and so on)	Unlimited	Unlimited
Obligation to government	Must apply for permission to enter or withdraw	None	None
Conditions for rates	MPT approval; guidelines set by law	MPT declaration; written contract required	None
Technical conditions for quality and facilities	Technical guidelines for suitability; provide high-level technical support	Technical guidelines for suitability; provide high-level technical support	None
Guidelines for carrier involvement	Supply and demand; basic accounting; technical ability; foreign capital investment limited to 1/3	None	None
Interconnection: common carriers must obtain MPT approval for interconnection between:			
• Type 1 carriers	Approval required	Approval required	Approval not required
• Special Type II carriers	Approval required	Approval required if both are international Special Type II	Approval not required
• General Type II carriers	Approval not required	Approval not required	Approval not required
Competition	Regulated	← Unrestricted →	
Classification of business provider	Facility owner	← Lease facilities from Type I carrier →	
		Nationwide; unlimited	Related to a specific group
Type of market	Private, competitive	← Private, competitive →	
International VAN business	Available; however, the NTT Law limits NTT to domestic service provision	Available	Not available

Following the January 1986 MOSS (Market-Oriented Sector Selectives) negotiations for an open market policy in telecommunications between Japan and the U.S., several joint companies were established as Type II carriers, including Intec-Telenet, Network Service-Tymnet, and NEC-GEISCO, which also provide E-mail, protocol conversion, and database access.[14]

International VAN businesses have gained permission to use international circuits, and service is now available between the U.S. and Japan.

Specific companies within enterprise groups, such as hardware manufacturers, account for 77% of VAN system use.[15] This emphasis indicates an invigoration of existing business and utilization of excess network capacity rather than efforts to profit from VAS business.

Type II carrier management is still a weakness. Type II carriers, still competing with Type I carriers, are surveying several alternatives for increasing their strength. In 1986, total sales for Type I carriers were 980 billion yen, while Type II carrier sales totalled 640 billion yen.[16] By the end of 1987, there were approximately 495 VAN service companies,[17] 12 providing basic service, 17 special VANs, and 466 general VANs. Approximately 80% of VAN businesses have less than 1 billion yen in VAN sales. The MPT has predicted that the market for Type II business will grow at a rate of approximately 20% per year.[18]

The MPT has also reported that

> 24% of all companies are using VAN service from Type II telecommunications carriers . . . . [and that] user companies are not really satisfied with the functions provided by VAN carriers, such as connection between different types. There is

---

[14]Shukunami, p. 113.

[15]Sung, p. 52.

[16]Sung, p. 53.

[17]The Ministry of Posts and Telecommunications, Telecommunications Market of Japan, OPEN. rev. ed., Japan, March 1988, pp. 16-20.

[18]Ibid., p. 7.

strong demand for more highly integrated functions.[19]

In order to ban cross-subsidies among Type I carrier companies, the government has discussed separate accounting, although such controls are actually difficult to implement. As a result, other methods are under discussion, including financial support, tax reductions, and technical support.

1.2.3-3 Regulation: Similarities and differences among the U.S., U.K., and Japan

- **Liberalization**

U.S. In this market-based economy, liberalization has been gradual. With three branches of government concerned about this industry and a law suit over monopoly triggering regulatory upheavals, many court cases have been involved.

Great Britain and Japan. In Great Britain, the government began to increase competition in the industry based on a current policy under Mrs. Thacher that encourages competition in the economy as a whole.

In Japan, the liberalization process consisted of compromises among many industry partners who had an interest in this field. (As the U.S. pressed for an open market in Japan, such government bodies as the trade department and the communication department had conflicts, and NTT and other businesses pressed the government to liberalize.)

- **Monopoly vs. competition**

The basic similarity between the U.K. and Japan is that although BT and NTT had monopoly structures and functioned under a universal service obligation, the government introduced competition into every market segment.

The basic difference between the U.K. and Japan in this area is that there are many competitors in Japan but duopoly in the U.K. Great Britain prohibited simple resale of leased circuits while Japan does not have this restriction.

---

[19]Ibid.

In the U.S., further regulatory change could introduce BOC competition into the enhanced services market.

- **Regulatory agencies**

While the U.K. and Japan have a centralized regulatory body, the FCC has broader power. All, however, are challenged by new technologies and changing markets.

- **Definitions of VAS (value-added services)**

U.S. VAS include protocol processing but not simple resale of circuits.

Japan VAS are defined as services by Type II carriers, including simple resale of circuits.

U.K. VAS include significant protocol processing, but simple resale by VAS providers is prohibited.

- **Classification of computer and communication service business**

U.S. Basic service and competitive services are entirely separate, reflecting a distinction between public and economic responsibilities. Policies attempt to maximize innovation through a competitive service market. With increases in technological innovations, the FCC in Computer Inquiry III has suggested re-classification of services.

Japan. Service is classified according to whether the service provider owns the communication facilities. Not limiting the provider's business area avoids the complex problem of classifying business areas that accompanies technological development. This policy purportedly achieves its economic goal by maximizing the effects of innovation and competition.

U.K. Policies distinguish between the communication network and communication service and again classify service into basic and VAN service. Thus Great Britain's telecommunications policy is a hybrid of those of Japan and the U.S. and can be seen as a transition from a monopoly to a competitive system.

All three countries encourage competition in enhanced or value-added network service, but only the U.K restricts the range of resale.

- **The relationship between supervising authorities and service providers**

U.S. Service providers operate under the direct control of the FCC, a federal authority, and state government, in a system that divides authority between the federal government and the states, as well as among the three branches of the federal government.

Some policymakers initially believed that the market would become self-regulating. Currently, while AT&T and the BOCs are regulated, all other service providers compete under minimal regulation, with supervisory authorities expected to perform primarily a coordinating function to ensure conditions for fair competition.

Japan. The Ministry of Posts and Telecommunications (MPT) has comprehensive regulatory power over telecommunications and directly controls the competitive environment. Structurally it seems as though full competition is allowed; however, in reality government intervention limits competition. For example, Type I carrier business is regulated to adjust demand and supply, and all Type I companies must provide service-by-service accounting. Under the NTT Law, NTT is obligated to maintain universal telephone service.

- **Other comparisons**

Each country is interested in the development and economic efficiency of its own data communication industry, as well as its own public interest and economic development. Thus, although VAS are becoming increasingly international, countries continue to act out of national self-interest as they formulate data communications industry policies.

The United States and Japan have adopted open policies but in the wake of keen competition are reviewing these policies in terms of the dual objectives of serving the public interest and supporting economic development. Specifically, the United States liberalized information services in 1970 and circuit use for high technology services, or VAS, in 1980.

Japan adopted an open policy toward VAS for small and medium-

sized business, including third-party communication, in 1982. In 1985 Japan moved to a fully open policy for most parts of this industry.

In France and West Germany, the data communications industry is under the exclusive monopoly control of the government. These nations are, however, seriously considering plans for more open policies.

Many companies are trying to take advantage of opportunities in data communications industry markets and are trying to diversify and advance to the international market. Thus IBM is moving into communications while AT&T is interested in the computer industries.

U.S., Japanese, and British businesses, already operating under open policies, are trying to gain ground in foreign markets and open businesses in foreign countries. They are pushing foreign governments in Europe and Asia to open their markets to them. In response, the governments and private business sectors in these regions are trying to figure out how to cope with the pressure and how to internationalize their own industries through cooperation.

1.3 The VAS regulatory system and market in Korea

1.3.1 The liberalization process in the communications industry

In January 1982, the inauguration of the Korea Telecommunications Authority (KTA) by the Ministry of Communications (MOC) separated policymaking from operation in the telecommunications industry, with KTA under MOC control.[20]

In March 1982, to facilitate the growth of data communications in Korea in response to rapidly increasing demand, the Data Communication Corporation of Korea was inaugurated as a private business and is operating as RPOA in data communications.[21]

Consequently, in 1983 the Telecommunication Basic Law (TBL) and

---

[20]Jong-Soon Lee, "The Enhanced Communications and Legal System in Korea," Telecom '87 Forum, Oct. 1987, p. 4.

[21]Ibid., p. 3. See also: Data Communications Corp. of Korea, 1987 Annual Report.

the Public Communication Business Law (PCBL) established the dual management system for voice and data communications.

Technological development and socioeconomic change in Korea have led to some changes in the regulatory environment. Although the industry remains a monopoly of the common carriers, in 1985 the government began to allow private information service providers (ISPs) to handle information service, such as data processing and database retrieval,[22] and eased restrictions on leased circuit use to improve VAS for private businesses. In 1987, the government allowed[23] private businesses shared use of specially designated circuits, known as group VANs, for system integration. The government limited its approval of this special case to information exchange, thus enabling private businesses to establish what are called group VANs. At the same time, the government is working toward adopting an open policy to allow foreign companies or foreign individuals to invest in information service industries in Korea. (The right of management belongs to the Korean citizens, and foreign capital investment is limited to less than 50% of the total investment.)

1.3.2 Regulatory framework for communications

In Korea, the MOC holds monopoly control of the communication industry. At present, according to the TBL, KTA is in charge of the operation of the telecommunication industry. When the MOC deems it necessary, however, its minister may designate a private business other than KTA to handle a part of the business.[24]

Voice service is operated by KTA as determined by the KTA law. Data service is provided by DACOM, designated as a common carrier by the minister of the MOC in September 1984. With the approval of the minister of communication, private business providers are allowed to

---

[22]Lee, p. 3.

[23]Supplemental Notice of Approval Guideline on Computer and Communication Service Provision, Korea, May 26, 1987, pp. 1-2.

[24]TBL, clause 7, quoted in Sung, p. 81.

participate in data processing and information retrieval services.[25] (See Figure 1-4.)

Because it is stipulated that private businesses be allowed to provide communication service to the extent that it does not interfere with the common carrier's performance of its business, circuit use is highly restricted.[26] In other words, the government's primary objective is to meet the demand for basic communication. For this reason, it has protected the common carrier, who has enjoyed a privileged monopoly status in the industry.

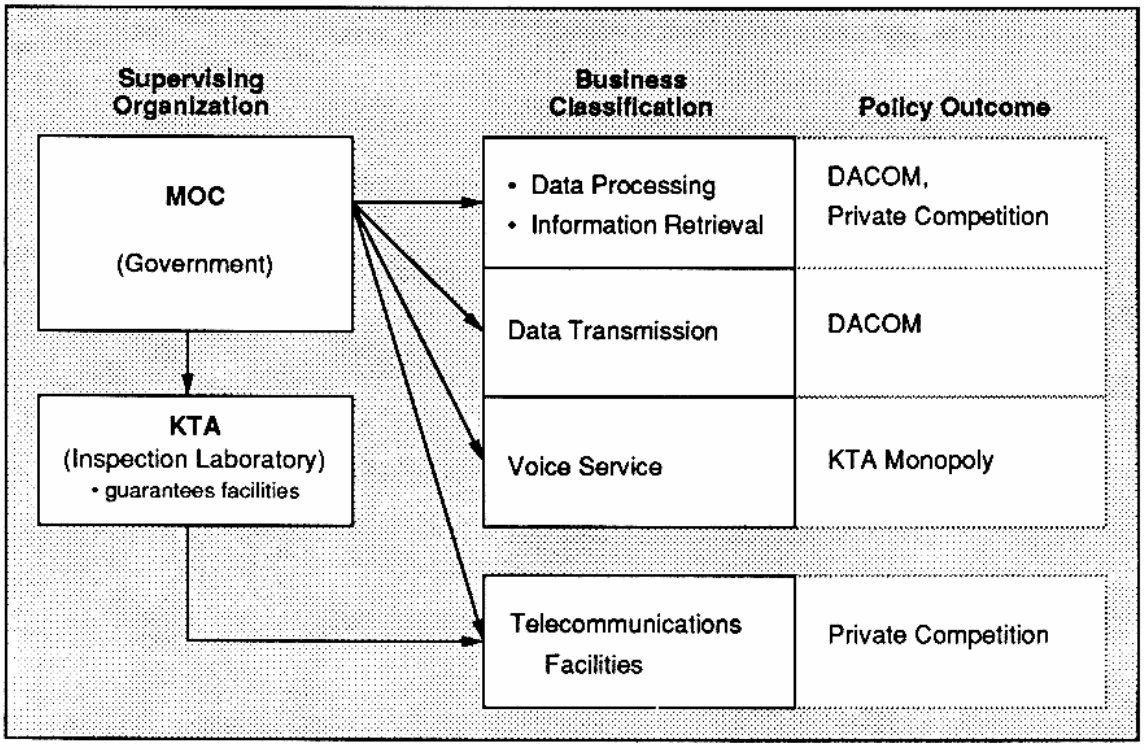


Figure 1-4

Regulation of Communications in Korea

---

[25]PCBL, clause 42; rule, clause 75, quoted in Sung, p. 82.

[26]Enforcement ordinance of PCBL, clause 72, quoted in Sung, p. 82.

In Korea, the concept of VAN service, or highly technical services (enhanced services, or VAS), which is used in foreign countries, has not been clearly defined.

Further, the data communications service industry in Korea is far behind that of advanced countries. As of the end of 1987, common carriers participating in DACOM reported the following statistics:

Approximately 25,543 leased circuit lines had been installed for customers. Approximately 1495 lines had been installed for customers of the public switched data network (PSDN).[27] Use of the PSDN is not popular. In 1987, gross sales were 10 billion won (equivalent to $15 million U.S.) or approximately 1% of gross sales of telegram and telephone. (In the developed countries, the proportion of non-data-communications revenues has been approximately 10% that of data communications revenues. As of 1987, there were 70 VASPs and seven approved group VAN companies in Korea.

By comparison, in Japan as of 1987, there were 483 Type II companies and the market was valued at 750 billion yen.

At this time in Korea, 1646 computers (minicomputers and main-frame) were available. The ratio of computers in use in Korea to those in Japan and the U.S. was 1 to 109 to 900.[28]

The comparative scale of the data communications industries of these countries is also dramatic. In Korea as of 1987, sales revenues in the data processing industry were 30 billion won (approximately $0.4 billion U.S.). The ratio of data processing industry sales revenues in Korea, Japan, and the U.S. was 1 to 246 to 1147.[29]

In Korea, development of an open policy is seven or eight years behind that of the U.S. and Japan, and the general level of the industry is approximately a decade behind those of the U.S. and Japan. Compared to the policy environment of the developed countries, Korea's is still underdeveloped. In fact, the developed countries made forays

---

[27]Data Communications Corp. of Korea, 1987 Annual Report, p. 2.

[28]Joint Seminar Report on Development Direction of Computer Communications Network and for Activation Alternative of Private VAN, [trans.] Korea: Computer and Communications Promotion Assoc. Dec. 8-9, 1987, p. 121.

[29]Ibid.

into VAS as early as the 1960s, and they have been active in this field throughout the 1980s.

Table 1-5 outlines the data communications regulatory systems and policy trends in advanced countries and Korea.

Table 1-5

Politics and Regulation of Data Communications in Advanced Countries and Korea

Country	Scope of Business	Circuit Utilization
U.S.A.	Categorized by Service Basic Service – Limited Competition Enhanced Service – Competition	Unlimited
Japan	Categorized by Line Ownership Type I – Limited Competition Type II – Competition	Unlimited International VAN: – Basic Service and Simple Resale prohibited
U.K.	Combination Owned Line + Basic Service Limited Competition Value-Added Network – Competition	Public Connection: – Limited Simple Resale: – Prohibited
France	Categorized by Line Ownership Type I – Monopoly? – Competition? Type II – Competition	Public Connection: – Limited Resale of Lines and Shared Use: – Prohibited Standard: OSI
Germany	Combination Owned Line + Monopoly Service Monopoly Obligatory Service + Unlimited Service Competition	Public Connection: – Prohibited Public Network: – Government Priority Leased Line: – Controlled
Korea	Owned Line + Basic Service Monopoly Value-Added Network – Limited Competition – Monopoly	Public Connection: – Limited Resale of Lines: – Prohibited Public Network: – Priority

1.4 Conflicts and progress toward an open policy

1.4.1 Conflict among interest groups

As a matter of international trade policy, the U.S. government has asked the Korean government, through official and unofficial channels, to open its communications market, and since 1986 to extend the opening of the VAN service market and promptly liberalize entry into various services, including circuit use, even in the private sector areas of large domestic VASPs.

Related organizations take different positions on this matter. The lineup of players with stakes in open policy questions includes government, common carriers, large and small companies, and the general public in Korea, as well as foreign governments and companies. These groups and their interests are briefly described below.

1.4.1-1 KTA (Korea Telecommunications Authority), a common carrier

This government agency, as a common carrier, holds monopoly control of voice service according to the KTA regulation. Its sharing of data communication service provision with DACOM has come under debate, however. Conflicts have arisen between KTA and both MOC and DACOM.

Conflict with MOC. While MOC wants to introduce competition, KTA wants to maintain the current systems in telecommunications, such as in the telephone business, where independent companies and subsidiaries can operate only in highly specialized technical fields.

Conflict with DACOM. The KTA has formulated a basic plan to construct a PC network using existing telephone networks. They also have plans to engage in a VAN project.[30] DACOM may take issue with KTA involvement in the same new media fields, such as MHS (message handling system) and VAS.[31]

---

[30]Korea Telecommunication Authority (KTA), Basic Plan for PC Communication Network Development by use of Telephone Network, Nov. 1987, p. 6.

[31]"Privatization deadline 1 year . . . KTA," The Maeil Kyungje Shinmun, Korea, June 30, 1988, series 3.

1.4.1-2 DACOM (Data Communication Corp. of Korea), a common carrier

1.4.1-2 DACOM (Data Communication Corp. of Korea), a common carrier

DACOM follows a policy of giving priority to the public network provided by DACOM-NET rather than to private VANs because the demand for basic data communications service, which is DACOM's responsibility, has not been met to date in Korea. However, considering the vulnerability of the present domestic environment and the demand and need for private VANs, DACOM holds that gradual opening of leased circuits to third-party providers is required. DACOM can operate and market leased data circuit service, for which it leases circuits from KTA. However, third-party providers may not lease these circuits. DACOM owns its packet network. (See Chapter Three, sec. 3.1.2-2.)

Conflict with group companies. On the timing and extent of opening of leased circuit use, conflict has arisen between DACOM and group companies. Group companies want leased circuit use opened as soon as possible to boost their international competitiveness and to improve the cost-effectiveness and quality of service provision. But DACOM wants gradual opening of leased circuit use. Its major reasons are:

- The relative differences in accessibility to information result from the concentration of information resources among large companies and the concentration of services in large cities;
- It is a matter of great concern that any domestic conglomerate or the U.S., with capital or advanced technology, could establish private VANs using a tree network (1-to-N);
- If regulations change to allow private companies to provide third-party service to other users, the government could no longer guarantee the priority of the public network;
- Compared to the environment for standardization in the advanced countries when they liberalized circuit use, the Korean environment has not yet matured;

- Early opening of private VANs may make it difficult to organize a mesh network, or common use of multi-networks, (N-to-N) in the future.[32]

DACOM holds that a policy gradually opening VAN business to competition would need to distinguish three business sectors:

- First, private companies need to be allowed gradually to organize and operate a network for information services, data processing, and a closed VAN, supported with funds and management skills. Private sector businesses are demanding these changes for vitality and competition in the industry.
- Second, VAN business, which is a national mainstay and of benefit to the public in such applications as EFTS, needs to be pursued as a joint venture between DACOM and private companies.
- Third, in areas such as the PSDN, videotex, and message handling, which require fairness in communication or long-term disinvestment by the government and the common carrier, a government-initiated policy needs to be applied.[33]

Thus DACOM insists on step-by-step leased circuit opening, first, by liberalizing private networks, that is, approving closed VANs and multiplexer use, and secondly, by liberalizing leased circuit use in general.

1.4.1-3 Group companies, or conglomerates

Group companies object to the common carrier and government policy legally limiting[34] the establishment of private VANs. The policy responds to government concerns that large private industries could comprise an "information block" that could monopolize important information, that information significant to national security could be

---

[32]Computer and Communication Promotion Association, "Computer Network Development Direction and Facilitation Alternative of Private VAN, Information Age Society, Korea, Jan. 1988, pp. 54-55.

[33]Ibid., p. 55.

[34]Ibid., p. 52.

drained from the network, and that economy of scale could be difficult to achieve.

According to the CCPA, group companies want:

- legalization of shared use of multiplexers, including relay computer centers;
- extension of the range of shared use of leased circuits to include not only the members of the group company but also related dealers.[35]

The second demand has especially caused conflict between the common carrier and private VASPs.

In addition, the group companies strongly oppose DACOM, contending that it has sought to monopolize not only common carrier services in leasing leased circuits but also private VAN business.

1.4.1-4 MOC (Ministry of Communications)

The MOC supervises the country's data communications industry, and partially lifted the ban on private company use of the communication circuit in May 1987. The results have been a mixture of growth and conflict. In principle, MOC is considering a gradual changeover to competition in the VAS sector[36] to support cost effectiveness for users and expansion of the domestic VAS market, as well as to respond to pressure from advanced countries. However, they have encountered problems and face a number of tradeoffs.

Problems with foreign countries. The Korean government believes it must protect its domestic data communications industry and the public interest, and deal with a difficult national security situation.[37] Complicating these problems is the immaturity of domestic information communications and of the general economic environment.

The Korean economy depends heavily on foreign countries, and the Korean government believes it has to develop an information system

---

[35]CCPA, "In what direction is the VAN moving? Current perspective of domestic VAN business," Information Age Society, Korea, March 1988, p. 31.

[36]Information Age Society, Jan. 1988, p. 10.

[37]"VAN Booming: Declaration of Domestic Open Policy," The Maeil Kyungje Shinmun, Korea, series 4, June 11, 1987.

equivalent to that of the developed countries in order to compete with them. Accordingly, the government has asked for proposals for more efficient development of a national network project and for coping with the pressure from foreign countries.

Problems with private companies. The MOC worries about maintaining the priority of the public network (PSDN) and the public interests it serves. Accordingly, conflicts have arisen over opening use of leased circuits, over the common carrier's protection of small and medium-sized companies against the formation of an information block, over its efforts to avoid imbalances among regions, and over business communication standardization -- in sum, over efforts to balance public interest and economic efficiency.

MOC and KTA take different positions on the direction for privatization.[38] MOC's position is to introduce competitive business systems, such as separation of companies from KTA by service areas to stimulate competition, and hence management efficiency and economic efficiency. But KTA does not like the MOC's suggestion; KTA, as mentioned in section 1.4.1-1, wants to maintain the current systems in telecommunications whereby independent companies or subsidiaries can operate only in technically specialized fields.

1.4.1-5 Small companies

In Japan, provision of VAS was opened first to small and medium-sized enterprises to induce balanced development and competition with the large companies.[39]

In Korea, small companies are concerned that approval of group VAN installation for public use could result in large companies forming an "information block." In the public interest, small companies have requested implementation of a public VAN.

---

[38]"Privatization deadline 1 year . . . KTA" (series 8), The Maeil Shinmun, Korea, July 13, 1988, p. 7.

[39]New Industry Management Institute, "New Market -- VAN Competition," The New Media, Korea, Aug. 1987, p. 34.

1.4.1-6 Korean society

There has been a general trend toward decentralization in Korea in response to pressures for increasing democracy in the society.[40] There is also public pressure for equal access to information and for guarantees of universal service.

In response, the government plans to introduce a public VAN in several stages beginning in 1988. By reducing the gap in access to information between urban and rural areas, the public VAN is intended to undo any information block and any disproportion in access to information services between these two areas.

The political environment has changed from one of the-majority-ins-and-the-minority-outs to the-minority-ins-and-the-majority-outs.[41] The previously sole leading ruling party operation system now needs to be managed in conjunction with the non-government parties, which will make the conversion into an open policy toward foreign countries more difficult. Moreover, the influence of non-government parties may become even greater in the congress which represents the people.

1.4.1-7 Foreign governments and companies

The major advanced countries are trying to raise the quality of and expand their communications networks. Thus the governments of these countries have encouraged private companies to increase the level of competition in the international market for industrial information. In their own companies' interests, the governments of the advanced countries have pressed other governments to open their markets. This pressure expedited the first stage in the opening of the VAN market in May 1987.

This first stage included approval of a data communications service standard because foreign corporations were otherwise not able to use Korea's data communications circuits. U.S. banks, such as

---

[40]"The Decentralization is Opening New Ages," The Maeil Kyungje Shinmun, Jan. 1, 1988.

[41]"According to U.S. newspaper: End of Sweet Relations Between U.S. and Korean Government," The Chosun Ilbo, Korea, April 30, 1988.

Citibank and Chase Manhattan, sought this standard to improve their services for their customers in Korea.[42]

During the Korean-American Working-Level Trade Conference_in 1987, the American delegate requested the opening electronic communications in Korea.[43] In addition, EDS and IBM, who have participated in joint ventures with local firms, exerted corporate pressure for the opening of the VAN market.

U.S. requests have included:

- Total opening of the data communications network market;
- Abolition of the complicated approval process for communications equipment;
- Opening of VAN service markets to American companies in Korea. In fact, the largest U.S. VAN companies -- Telenet, GEISCO, and AT&T -- have come to Korea where they are considering promoting their own VAN businesses.[44]

A U.S. representative at the Korea-U.S. trade conference, Peter Algaier, has even stated "that Korea has no other choice than to open and expand its market; that Korea will only lose the U.S. market if it delays in an effort to protect its domestic industry."[45]

- **The dilemma for Korea**

Foreign ambitions in Korea's VAS markets raise the possibility that private networks could become larger than the PSDN, which would run counter to the intention of current government policy. Hence the challenge is to establish a degree of openness and steps toward it that would balance between the large private company VASPs and the public interest represented by the common carriers and that would also cope with the pressure from foreign countries.

---

[42]"VAN Booming," June 11, 1987.

[43]"Pressure into Open Policy in Telecommunications Market," The Maeil Kyungje Shinmun, Korea, Nov. 1987.

[44]"VAN Booming."

[45]Peter Algaier, World Development Journal, 1988, quoted in The Maeil Kyungje Shinmun, Korea, April 30, 1988, p. 3.

The eventual Korean decision on VAS is likely to reflect external pressures on the Korean government in trade talks, particularly with the U.S.

A range of factors affects the resolution of these issues: An early opening of Korean markets to developed countries could endanger national security and the growth of the domestic industries (see sec. 1.4.1-4), because the technology and capital capacity of the developed countries are far superior to those of Korea. The developed countries could control the Korean market and could establish data communication networks before the domestic industries could. On the other hand, competition could have positive effects on domestic industries, such as improving international trade relations and stimulating technological innovation.

Regarding the balancing of public interest and economic benefit, open policies are an international trend although types of regulation differ depending on the tradeoff reached between monopoly and competition, the development of private enterprise, and needs for universal service.

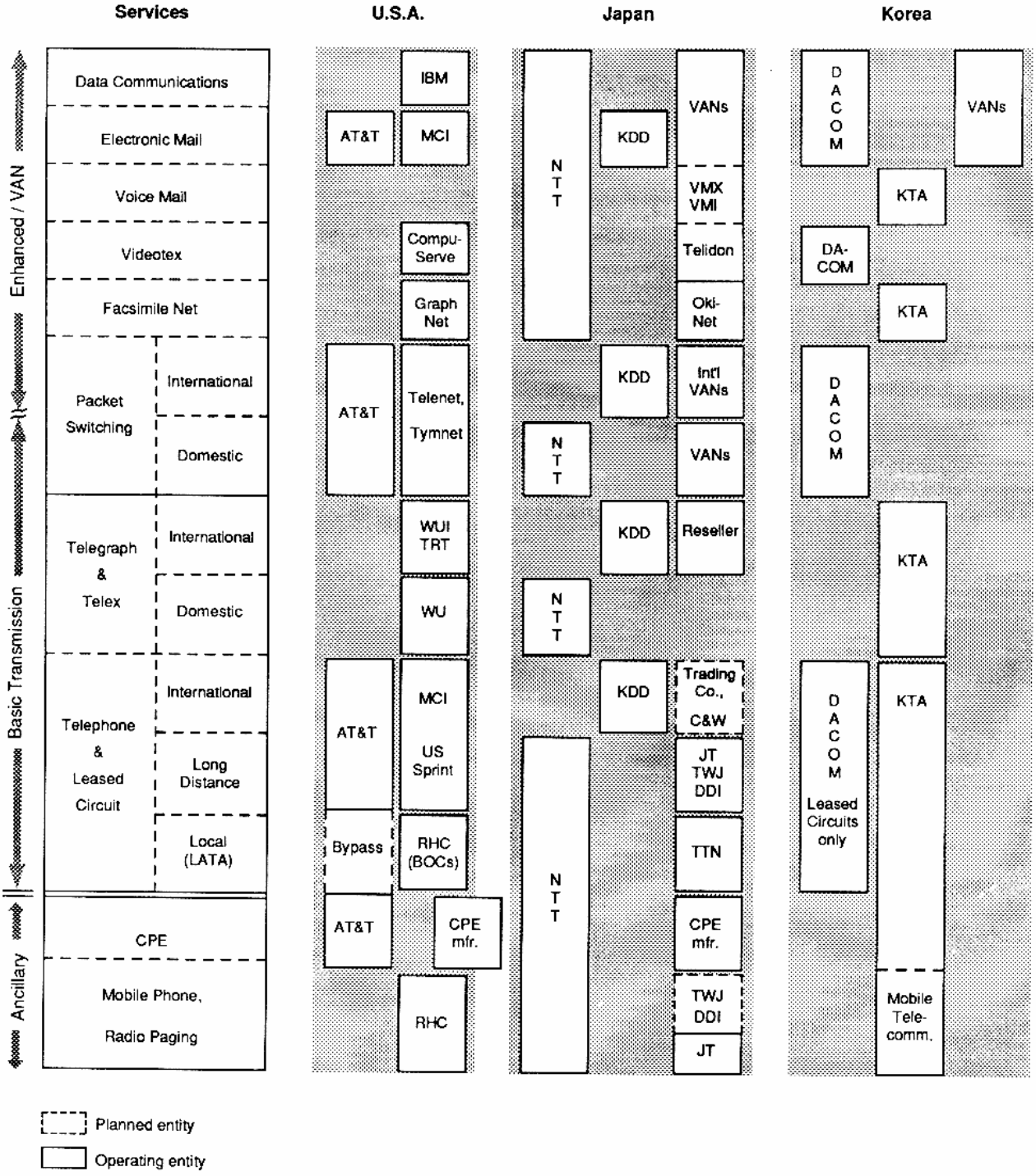
Accelerated economic centralization in large private companies and in the companies of advanced countries could concentrate access to information among these players, bringing problems for small companies and underdeveloped regions (see sec. 1.4.1-4). Policymakers face an increasing challenge to devise ways to protect public interests as data communications increases its power and influence on society.

Indiscriminate establishment of value-added networks can result in the overlapping of capital investment, waste of resources, and market monopoly by the major industry groups.

In terms of technology development, the reliability and stability of the network currently fall below the levels needed for national security and for the protection of privacy.

One way to strengthen information transactions and dedicated information networks would be to standardize business protocols.

To summarize the stakeholders and their stakes, Figure 1-5 maps the market structures of the U.S., Japan, and Korea.



Adapted from T. Shukunami, The Race for Value-Added Services. Cambridge: Program on Information Resources Policy. Harvard Univ., 1988. p. 17.

Figure 1-5

Market Structures of the U.S., Japan, and Korea

1.4.2 Finding a direction for an open policy

1.4.2-1 VAS growth and liberalization: Will it increase economic efficiency?

Advanced countries are increasing domestic economic efficiency by establishing industrial information networks, which are based on communication industry growth and which reinforce competitive power in the international arena.[46]

In Korea, the technology and the infrastructure for bringing advances in information to industry are far behind those of advanced countries. Therefore stakeholders in all sectors of the Korean economy depend on efficient management as critical for dealing with the nation's disadvantages, including heavy dependence on foreign countries, lack of resources, and overpopulation.

Undoubtedly as VAS are liberalized the question could arise whether VAS are indispensable for people's lives, or an essential raw material for industry. International trends would suggest the latter:

- Advanced countries have pursued liberalization;
- VAS have become an important medium for industrial communication in the form of electronic transactions among industries;
- System integration through shared use of leased circuits and of line service of related dealers is indispensable for increasing economic efficiency. It optimizes resources and brings information advances to industry, expands markets, and reinforces international competitiveness.

However, even if liberalization of VAS is a national goal, getting there remains problematic in countries where competitive environments are just emerging.

---

[46]Kuk Jae Sung, Study on International Trend of Service and Telecommunications Industry, Korea: Telecommunications Policy Institute, Dec. 1987, p. 85.

1.4.2-2 In the VAS arena, will liberalization of leased circuit use make inroads into the business area of the common carrier?[47] What effects might be expected?

The government has raised these questions because competitive activities remain limited at a time when demand for service in each type of business or industry has diversified. Moreover, advanced countries are pressing for internationalization, for assurances on the reliability of the communications network, and for free competition in VAS provision (see sec. 1.2).

Obviously the situations in the U.S., U.K., and Japan are quite different both from each other and from that in Korea; however, they provide the only available examples. Overall, it would appear that the markets for data communications services can sustain several competitors. In the U.S., few dare to compete with the basic (voice) service providers, while VAS providers tend to seek new markets. (See Chapter Three.) Tymnet and Telenet, which were common carriers before 1980, dominate the packet-switched network market. In Japan, the number of VAN providers, the market size, and the ratio of utilization of VANs are increasing every year.[48]

Expanding VAS competition through liberalization of leased circuit use thus appears not necessarily to cut into the existing common carrier's business base. Rather, it may prove to bring opportunities for example, to satisfy demands for the "informationization" of industry, to facilitate economic mobility, and to advance internationalization.

1.4.2-3 Public network limitations and an open policy for VASPs

In Korea today VASPs see the current communications regulatory system as an obstacle to their business development while users see it as an obstacle to their ability to increase their economic efficiency. In particular, both object to restrictions on competition for service

---

[47]As previously stated, "the common carrier" in the context of existing VAS provision refers to the Data Communications Corp. of Korea.

[48]"Industry Trend: Moving Trends and Perspective of VANs," Data Communications, April 1987, series 1, pp. 12-22.

provision, to the use of a single public network, and to restrictions on circuit use. VASPs also have raised as a problem that development of service business through the public network is limited.[49]

Each country has taken a different approach to these problems, with arguments for:

- the expansion of a competitive system in the belief that, based on the experience of advanced countries, only this will ensure economic efficiency for users and for most suppliers;
- the preferential pursuit of the public network based on public interests, including meeting the demand for basic communication;
- fair international competition.

Advanced countries have been altering the patterns of regulation to expand competition in keeping with goals of balancing public interests and economic efficiency. Each advanced country has adopted different policies, including:

- competition according to service classification, based on a market-based or free enterprise economy and regulation;
- competition according to service provider classification and regulation through governmental intervention;
- monopoly, public service obligation, and competition depending on the characteristics of the business.

In Korea, the government and the common carrier could benefit from a role-sharing policy that divides responsibility between the common carrier and VASPs for a balanced pursuit of public interests and economic efficiency. As discussed in Chapter Three, the common carrier is responsible for public interests, including meeting the demand for basic national communication and developing the public network through the integration of private provider computer networks.

On the other hand, VASPs could benefit from being allowed to deal with all other business, supported by liberalization of leased circuit use and an open policy that would include expansion of VAS business and promotion of a VAS environment. VASPs oppose foreign company expansion

---

[49]Sung, p. 85.

into VAS in Korea, and hold that with this limitation the positive impact of their own expansion would be significant.

Some options and their implications, player-by-player, include the following:

Foreign companies. A completely open policy toward foreign companies raises questions, in the view of Korean policymakers, about national security and the protection of domestic industry. The Korean government realizes, however, that restricting foreign companies could bring about loss and conflict, and would not necessarily benefit Korea's development of advancing technologies. For Korea, considered an export-led country, results of tradeoffs between international competition, cooperation, and regulation may have serious implications.

VASPs. A completely open policy toward circuit use by domestic private VAS companies (VASPs) could allow them to establish a network broader than the public network; similarly, rapid growth of networks among companies could concentrate resources in the hands of a few large companies. Such formation of an "information block" and increases in regional differences in access to information could work against government policy directed to maintaining equity by protecting and supporting small and middle-sized firms, balancing development, and preferentially supporting the public network.

However, VAS are a basic resource for industry and for competitiveness in the international arena, as well as for maximizing users' interests through the "informationization" of industry. Accordingly, the sooner open policies come to VAS, the more cost effective the VAS become. Moreover, if VAS are liberalized, it does not necessarily follow that VASPs would infringe on the common carrier's market.

The common carrier and the public network. The common carrier's management of the monopoly system through a single public network, by restricting the range of competitive (VASP) business, is limited by its inability to cope efficiently with industrial development, with users' varied demands, and with technological development. On the other hand, those who contend that the public network must remain the first priority point to public interests (including minimizing duplication of investment and respecting the principle of equity required for the advancement of democracy), as well as citing the immaturity of the

environment especially in terms of preconditions for VAS, and the need for early development of the communication infrastructure for competitiveness with advanced countries.

1.4.2-4 Finding a direction for an open policy: Overview of considerations

The communications industries may not be under government control forever. If participation by the private sector is in Korea's future, all players may wish to examine the potential scope and development of an open policy. Those who argue for an open policy see it as a way for the nation to develop both its economy and its communications technologies, and as a way to attract a diversified user base and to facilitate higher quality services. This growth, in turn, could help the nation cope with challenges from developed countries coming on the wave of internationalization. Yet under the broad heading of an open policy are different options with different implications for the stakeholders.

Foreign companies. Exclusion of foreign companies from public communications and significant communications business for the near future may give Korea time to construct key data communications networks and revise the regulations and laws governing the system.

On the other hand, if the government adopts an open policy, foreign companies will be participating in the market. At this time the question of developing a highly technical VAN (permitting third-party use of VAS) is likely to need attention.

PSDN. Some policymakers in Korea believe that ownership of the PSDN should be put under permanent government control. National security plays a role: the nation is small and confrontation between the south and the north enters into most policy issues. A range of models is available. Policymakers may wish to watch France and West Germany, where the government owns the public network.

DP and VAN.

- Liberalization. Data processing and data communications services may benefit from being liberalized; similarly, the VAN and VAS field could use the vitality and creativity of the private sector.

Furthermore, introducing competition may make the economy more efficient.

- **Government protection**. On the other hand, as long as the objective of universal service has not been reached, the communication business remains under government control, according to the view that the common carrier and those whom it serves still require protection, and that the network still needs ongoing development.

By contrast, in the developed countries, the demand for basic communications services has been fulfilled and the industry is economically developed. The communications business is open to the public and has spread to the international arena.

Development of the VAN business, which can serve the public interest and is an important national industry, could be accomplished as a public works effort, as could development of related fields. Even in the U.S. VAS were not immediately a financially profitable business; U.S. investment in the VAN field was unable to make a profit for approximately 10 years.

In Korea, government development of VANs may prevent centralization of the economy and subordination of small and medium businesses to large business groups. Rapid government establishment of a VAN could prevent unnecessary growth of other networks, and the government would be better able to cope with forthcoming challenges from the developed countries.

In Singapore and the Scandinavian countries, electronic data interchange (EDI) businesses are developed as national public projects.[50] In West Germany, there are three different categories of major businesses: some are government monopolies, some are regulated, and some are open to the private sector.

Korea may find the greatest similarities with the policy directions followed in Great Britain and West Germany.

---

[50]DACOM, VAN Report from DACOM (unpublished), Korea, Sept. 30, 1987, p. 2.

1.4.3 How open an open policy, and by what steps? Alternatives for timing and strategy

Thus the experiences of countries around the world suggest that development of the data communications industry has required modification of traditional systems and an effective government strategy for coping with the internationalization of the industry.

Three options will be compared in Chapter Five, taking into consideration the factors discussed throughout this paper. Briefly stated, the options are:

Option I: Continue the present policy as established in 1987 (see section 1.3);

Option II: Immediate full competition and open policies, including domestic and foreign service in the internal VAN; shared use and third-party use of leased circuits, including data processing and message switching and interconnection of leased circuits with the public switched network; and simple resale; and

Option III: Phased change, proceeding from removal of constraints on group VANs, to further steps toward competition, and finally, to full competition (see Table 5-1).

Each option is likely to have positive and negative impacts on the stakes of the players, as the following chapters will discuss. This chapter's review of VAS liberalization in other countries suggests a number of considerations for the long-term and short-term policy environments.

1.4.3-1 In the long term

Even under a monopoly system, the range of cases considered in this chapter suggests that bringing the VAN field to life will require a policy of full competition in that area. Encouraging private business participation in VAS may expand the service market, increase efficiency, and maximize international competitiveness by increasing the industrial information base. An international VAN would aid such an effort.

However, a government monopoly of the communication network could prevent the overlapping of capital investment in this small country, could increase national security, and could help fill the demand for basic competition.

To maintain fair competition between VASPs and common carriers, the common carriers may have to establish structural separation, such as subsidiary companies, separation of accounting, and coordination of fares.

Models for a combination of monopoly and competition can be seen in other countries. The communication business can be categorized into Type I and Type II businesses, as in Japan, or basic and enhanced services, as in the U.S. Type I companies and basic services can be under government control.

In the long term, the important arena of a national VAN may benefit from the participation of foreign companies.

1.4.3-2 In the short term

Several laws affecting telecommunications regulation are under consideration. The following relate to some of the changes they could bring:

Until the demand for basic communications services is met, common carrier monopoly of the PSDN may be essential for concentrating enough resources to establish the communications network.

However, the industry could be divided into competitive and public-supported business arenas. Free competition and liberalization could benefit some areas: information services, circuit use for closed VANs, and connection of the public network with private networks. Public-supported businesses may best serve public communication needs and major national projects. Establishment of the national data communications network will require the joint efforts of the common carrier and VASPs. There is some sentiment that foreign companies should be excluded from this project, but the current law on joint venture companies allows foreign companies to contribute capital investment to domestic private companies. Examination of this issue may be warranted.

The common carriers or the government itself may need to establish a VAN for small- to medium-sized businesses as well as other VANs that require special government support.

CHAPTER TWO

INTERCONNECTION

2.1 Introduction

This chapter examines factors critical to maintaining interconnection in Korea. Advanced countries around the world are struggling with the challenge to interconnect different networks, different systems, different hardware, and different software. For developing countries such as Korea, the need for interconnection is especially critical.

Accordingly, Chapter Two begins with background on interconnection in advanced countries and in Korea. The themes explored in this chapter include suppliers' and users' expectations and needs in Korea today, and conflicts over government attempts at facilitating interconnection. Issues focus on competition between new international standards and established de facto standards; the potential of computer-to-computer business communications, or electronic data interchange (EDI);[1] and factors affecting interconnection in Korea.

The challenge to maintain interconnection in advanced countries originates in basic differences between technological and market development. A rapid development cycle spawning diverse technologies, products, and new media services especially in the U.S. and other advanced countries has brought a range of problems in the marketplace.

Korea is also vulnerable to these problems. Consumers have purchased computer systems and related services that are so dedicated and sophisticated that exchanging information among different systems and companies is very difficult. And there is little the user can do about the situation, especially if the user is a small firm.

On the supply side, public organizations and vendors are devising various approaches to the need for networks and standardization in expectation of the emergence of what in Korea is called "the colorful information network," meaning a network or combination of networks

---

[1]The author appreciates background provided by The Yankee Group for the discussions of EDI in this chapter.

offering services of many different kinds. For example, planning has been underway since 1985 for the National Administration Information System (NAIS), a national computer network for shared access to data. In addition, large private companies want to develop private intercompany information networks, and VASPs want to develop new media services.

In the current computer market, users' requests indicate needs for:

- Interoperability among systems dependent on protocols;
- Vendor responsibility for interoperability;
- Communications solutions determined by user applications requirements rather than by vendor preferences.[2]

As a result of these needs, users want suppliers to reduce the size of the standard set and to move toward standardization in technology development.

In response to changing domestic and international environments, the Korean government is in fact emphasizing the standardization of technology and equipment. Accordingly, the Ministry of Communications (MOC) drafted a ruling to establish technical guidelines for computer communication networks,[3] which was to have taken effect in May 1988 if industry had not objected.

The purpose of the draft ruling was to establish obligatory guidelines for technology, equipment, and facilities for the operation and construction of the computer communications network (CCN). For example, some standardization is required of CCN providers for interconnection among CCNs, including the ITU's OSI and standardization of two-byte completion types in Hangul (Korean) code.[4]

In response to the proposed CCN rules, the computer communication industry asked for modifications to take its situation into considera-

---

[2]The Yankee Group, The Standards Battle. Boston: The Yankee Group, October 1986, p. 40.

[3]Computer World, Korea, April 1988, p. 249.

[4]Completion types are one of two ways of representing Korean characters. Although the government designated this Hangul code in 1982, its use was not obligatory. See discussion of standardization in Chapter Three.

tion. In particular, the industry wanted the rules to be divided into two categories, defining basic aspects as obligatory but leaving as recommendations those parts covering changing technology. Industry wants flexibility in its efforts to deal with a rapidly changing technological environment. For example, it wants to make its own decisions on adoption of international standards, and accordingly wants the MOC rule on this to be only a recommendation. Industry also wants limited responsibility for interconnection between the public switched data network (PSDN) and industry computer communication networks.[5]

Thus the unstable computer communication environment has meant that standardization efforts tend to introduce competition between new international and installed de facto standards. One approach to this dilemma has been a type of enhanced service known as electronic data interchange, or EDI, which is the computer-to-computer exchange of intercompany business documents in a public standard format.[6] Because EDI can support message-switching store-and-forward mailbox service and can translate varied industry standard protocols, EDI allows communication among companies or industries using otherwise incompatible systems.[7] As a result, the EDI system suggests a model for dealing with interconnection and standardization problems encountered in attempts to provide enhanced service among different systems, networks, or companies, especially in Korea where enhanced service is at an early stage of development.

For Korea, the EDI model raises several questions. First, could EDI service create opportunities for communications services and help solve interconnection problems? Second, who will make the possibly costly preparations for interconnection among networks, terminals, code and protocol conversion, and the like? Third, in what direction is EDI development heading?

---

[5]Ibid., pp. 249-257.

[6]As will be discussed later in this chapter, a number of companies offer EDI products and services. However, in this paper, "EDI," "the EDI system," or "the EDI approach" -- used without a product name -- refer to the generic intercompany network service that transfers business documents from one company's computers to another's.

[7]McDonnell Douglas EDI*Net Implementation Guide 1986, p. 1.

In conclusion, what factors should policymakers consider for interconnection in Korea? These questions are timely for several reasons. New information communication networks in Korea will need to be provided for, such as VASPs' value-added services and the National Infrastructure Computer Network that is planned to operate in addition to the PSDN. Dealing with interconnection problems is critical both for facilitating interoperability among different computer and business protocols and for maximizing user efficiency through vigorous information exchange.

2.2 Technological development and interconnection

2.2.1 Changing communications networks

Innovations in network technology and diverse customer demand have spawned various dedicated and other sophisticated networks, including digital data networks. Similarly, various types of terminals have been developed for different applications. Communications technologies have made possible new types of information transactions,[8] such as sending data to multiple locations, storage functions for timed sending and receiving of messages, and translator functions to match communications speeds and protocols.

Because of the development of communications technologies and the diversification of user demand, the common carrier may want to develop interconnection among terminals and networks in order to realize an economy of scale. The goal would be to maximize the utility of the basic functions and to satisfy basic demand by networking among the different environments created by different products and services.

Network users are also likely to want improved interconnection between different computers, different terminals, different documents, different networks, and so on.

---

[8]Shukunami, p. 44.

Various techniques for interconnection are available.

- Facilities can provide PAD (packet assembly and disassembly) between a telephone network and a packet-switched network.[9]
- For choices between real-time and store and forward interconnection: A packet-switched network is close to real time but involves a slight delay. Common carrier ISDNs could facilitate network interface, while VASPs' and users' terminals could also compete in this area.
- Third, storage functions such as electronic mailboxes (E-mail and EDI) can provide interconnection even if hardware and software are incompatible.
- Fourth, functional differences among types of interconnection include lower-level interconnection, which supports information transmission between terminals and networks, and higher-level interconnection, which supports several functions, such as code, protocol, media, speed, and format conversion, and so on.

2.2.2 Changing computer systems

Communication between computers (EDI) has been the major means of communication for business operations that depend on increasing numbers of host computers and PCs for the control and treatment of changing information. At the same time, vendors have manufactured many different kinds of computers, PCs, intelligent terminals, and transaction documents or formats. Even within the same company, incompatibility problems are legion.

There is a range of major vendor communications standards: de facto standards (IBM's proprietary SNA); proprietary networking standards (DEC's DNA); all-inclusive industry standards (TCP/IP); de jure standards (the ISO's OSI); and business document standards (the American National Standard Institute's X12 standard for interindustry EDI.)[10]

---

[9]Datapro Research Corp., "An Overview of Value Added Networks," Datapro, 1986-1987, p. C32-010-105.

[10]The Standards Battle, Executive Summary, pp. i-ii.

Communication among different systems can be achieved in several ways:

Incorporation of a de facto standard. This could be the approach when non-IBM-compatible communications need to be interconnected with the computer system of one or more other major computers. EFTS (electronic fund transfer system) is an example.[11]

Establishment of an interconnection system. This is a method for parties starting with different protocols to be able to communicate at the same level by sharing a neutral communication arrangement in a central terminal or by both using the protocol of one specific system. For example, interconnection between intra- or intercompany systems can be provided by a third-party switch as in an EDI (electronic data interchange) system.

Standardization of interconnection. This refers to the standardization of network architecture, as through a business protocol or software engineering. For EDI to work as a standardization function, the ISO and the United Nations Economic Committee (UNEC) have been developing open system interconnection (OSI).

2.3 Conflict within the supplier industries

Because of changing computers and communications systems and because of the variety of standards, there is very little, if any, interoperability among systems from different vendors. This situation is untenable for customers who need various types of systems to solve problems: The user needs to have these systems exchange useful information.

As a result, users want vendors to settle on a small set of standards so that they will have systems that interoperate. An example would be the ability of one system's application to communicate usefully, perhaps even transparently, with an application on another system. This could be a common file system access method known as a distributed data system, which is a peer-to-peer communications service of IBM, the CCITT's X.400. (The CCITT is the International Telegraph

---

[11]Data Communications Corp. of Korea, Today and Tomorrow of Computer Communication, Korea, April 30, 1987.

and Telephone Consultative Committee of the International Telecommunication Union, or ITU. Its X.400 protocol is the standard protocol for message handling systems).

Because of the complexities of networking, the marketplace is changing. How should interconnection be maintained? Common carriers and VASPs answer this question differently. Despite the ISO requirement that de facto standards cooperate with the new international standard, heavy competition continues.

2.3.1 Communications industry players

Common carriers and VASPs hold different positions on the maintenance of interconnection.

2.3.1-1 Common carriers

Common carriers provide basic communications and auxiliary functions. They want to develop and incorporate technology that takes into consideration public service and universal service aspects.

They want to develop interconnection technology for several reasons:

First, they contend that meeting the basic demand for a basic network and maximizing efficiency can reduce costs. Value-added interconnection networks that have protocol translator and storage functions can increase communications traffic.[12]

Second, a public network can provide more service to consumers, especially to small companies and households.[13]

Third, if interconnection is some day provided by an ISDN, the communications system can be easily expanded and effectively maintained. In the future, complex multi-vendor, multi-switch, and multinational ISDN networks are likely to be able to interconnect among many

---

[12]Mark S. Fowler et al., "'Back to the Future': A Model for Telecommunications," Federal Communications Law Journal, Vol. 38, No. 2, p. 167, quoted in Shukunami, p. 47.

[13]FCC, In re Communications Protocol under Section 64.702 of the Commission's Rules and Regulations, Gen. Docket No. 80-756, Memorandum Opinion, Order, and Statement of Principles, 95 F.C.C.2d 584 (adopted Nov. 8, 1983, released Nov. 21, 1983).

media,[14] ideally to overcome the subtle timing errors that currently cause shutdowns of the multi-node T-1 network, and simple parity errors that freeze packet-switched data streams.

And finally, users want vendors to solve all of the users' data communications problems. Users might at some point want one-stop service even for complicated networking. Now such service is possible only up to certain levels.

2.3.1-2 VASPs

Customers frequently seek dedicated interconnection functions to increase their competitiveness. They want more timely, specific, and high-quality service than is provided by the common carrier's generalized nationwide services.

Accordingly, in such countries as Great Britain and the U.S., VASPs resell common carrier basic services with certain added value or enhancements.

VASPs, in turn, fear that common carriers can cross-subsidize their own services while asking VASPs to pay dearly for enhanced services.[15]

2.3.2 Computer industry players

To support networking among their own systems, IBM and DEC, primarily, have been quite successful in promulgating their own system architectures. In addition to vendor-generated network architecture, TCP/IP and OSI have sprung up. Many vendors are now starting to pay attention to the ISO protocol. Thus a standards battle has preceded efforts to provide interconnection in response to customer needs. Figure 2-1 compares three competing standards.

---

[14]J.M. Thorlton, "Envision the Opportunities/ The TriVista Project," ISDN User, Vol. 2, No. 2, March-April 1988, pp. 5-6.

[15]Shukunami, p. 47.

<table>
<tr><th>ISO[1] OSI[2]</th><th>IBM SNA[3]</th><th>Digital Equipment Corp. DNA[4]</th></tr>
<tr><td rowspan="2">Application</td><td rowspan="2">Application</td><td>User</td></tr>
<tr><td>Network Management</td></tr>
<tr><td>Presentation</td><td>NAU[5] Services Manager</td><td>Network Application</td></tr>
<tr><td rowspan="2">Session</td><td>Function Management Data Services</td><td rowspan="2">Session Control</td></tr>
<tr><td>Data Flow</td></tr>
<tr><td rowspan="2">Transport</td><td>Control Services</td><td rowspan="2">End-to-End Communications</td></tr>
<tr><td>Transmission Control Services</td></tr>
<tr><td>Network</td><td>Path Control</td><td>Routing</td></tr>
<tr><td>Data Link</td><td>Data Link</td><td>Data Link</td></tr>
<tr><td>Physical Link</td><td>Physical Link</td><td>Physical Link</td></tr>
</table>

[1] International Standards Organization
[2] Open Systems Interconnect
[3] Systems Network Architecture
[4] Digital Network Architecture
[5] Network Addressable Unit

Source: Rebecca Hurst, "Selecting a Network Standard," Computerworld Focus, Sept. 17, 1986, p. 40. © 1987 CW Communications/Inc., Framingham, MA 01701. Chart by Jeff Babineau adapted with permission.

Figure 2-1

ISO, IBM, DEC:
A Comparison of Network Architecture Layers

2.3.2-1 IBM

SNA is IBM's network architecture, marketing program, and product, all combined as a de facto standard.

SNA has moved into peer-to-peer communication relatively recently in the form of Lu 6.2 (logical unit 6.2, high-level protocol sets for interoperability) and other advanced program-to-program communication linking IBM's mainframe and supermini computers. But these systems are

not universally accepted. In local area networks (LANs), SNA has already initiated interconnection with non-IBM computers.

The Yankee Group has stated its belief that IBM would incorporate "ISO standards reluctantly in order to mollify, first, its customers, particularly those who want MAP" (manufacturing automation protocol); second, the European Community (the EC), which is oriented more toward OSI; and third, the U.S. government.[16] The Yankee Group report continues:

> Although SNA is proprietary and associated, released products are never on the leading edge of networking technology, IBM's installed base is so huge that a plethora of communications hardware and software vendors offer SNA connectivity, from terminal connections to document interchanges.[17]

In fact, "65% of all mainframe computer vendors have an SNA implementation . . . ."[18]

IBM joined Cooperation for Open Systems (COS), a consortium for OSI in the U.S., after the European Computer Manufacturers' Association (ECMA) rejected the SNA protocol.[19] However, SNA is likely to remain IBM's strategic direction for some time, whether or not CCITT standards are integrated into the SNA architecture.

IBM networks are based on SNA protocols rather than on the packet-switching protocols used by many of its competitors.[20] To improve its packet-switching functions for interconnection with other systems, IBM's 1988 version of SNA improves two SNA-to-packet switching

---

[16]The Standards Battle, p. 20.

[17]Ibid.

[18]Ibid., p. 78.

[19]Shukunami, p. 49.

[20]The Yankee Group, Electronic Data Interchange (draft) Boston: The Yankee Group, 1988.

interfaces as well as other SNA communications support, according to an industry newsletter.[21]

To further control entry into its existing markets, IBM is also expected to adopt other standard protocols for some products, such OSI products for ancillary interconnection with non-SNA systems.[22]

2.3.2-2 DEC

DEC enjoys a good reputation for product compatibility and networking facilitation.[23] DecNet also provides gateways to an SNA-based system, its own DNA, probably providing better connections to dissimilar IBM systems than IBM itself can provide. Finally, DEC is moving cautiously into support of ISO protocols with its VAX OSI Transport Service (VOTS).[24] VOTS is strategically important because it allows DEC to show current and potential customers that it is serious about ISO. DEC will likely emphasize OSI in Europe more than in the U.S. The company is expected to "continue to be an industry leader even with its proprietary protocols, because they provide so many more functions -- and more efficiently -- than approved international standards, let alone the ones in draft status or lower."[25]

2.3.2-3 TCP/IP

TCP/IP (transport control protocol/internetwork protocol) are protocols developed in the Advanced Research Projects Agency (ARPA), supported by the U.S. Department of Defense. The TCP/IP environment

---

[21]With these improvements, IBM's XI protocol can be used to link two separate X.25 (international packet-switching protocol) networks, such as a public packet-switched network and a private packet-switched network, with the existing SNA backbone. IBM's NCP Packet-Switched interface (NPSI) is now capable of linking two separate SNA networks via an X.25 backbone network. Electronic Mail & Micro Systems, Vol. 12, No. 3, February 1, 1988, pp. 10-12.

[22]The Standards Battle, p. 7.

[23]"Digital Equipment: A step ahead in linking computers," Business Week, April 21, 1986, p. 64, quoted in Shukunami, p. 49.

[24]Nikkei Communications, June 16, 1986, quoted in Shukunami, ibid.

[25]The Standards Battle, p. 23.

uses the UNIX operating system (primarily BSD 4.2 or 4.3).[26] A protocol suite that has become very attractive to independent vendors of communications hardware and software, TCP/IP has been described as "a de facto industry standard for operation over Ethernet/IEEE 802.3 connections"[27] In fact, the spread of UNIX-based work stations could mean an expanded market for interconnecting with TCP/IP-based systems.[28] For TCP/IP networks running ISO protocols to interoperate with "standard" ISO networks, gateways will have to be built that convert TCP to ISO Transport and IP to ISO networking protocol.

2.3.2-4 ISO and supporting organizations

The International Standardization Organization, an international agency concerned with devising international standards for computer systems,[29] has been working on OSI since 1977. It has approved primarily the non-application-specific protocols.

Europeans have viewed the ISO protocols as the way they want computer networking service provided -- X.25 networks as the transmission mechanism owned by the various governments outside the U.S. Cooperation for Open Systems (COS) includes important users, such as GM and Boeing, corporations who developed the OSI-compatible manufacturing automation protocol (MAP) and technical office protocol (TOP). COS' purpose is to expedite the definition and adoption of data communication standards through existing standards groups.

If SNA standards had been acceptable to COS, IBM would have had an instantaneous market advantage, one that certainly would not sit well with those vendors who are trying to compete. Instead, IBM has promised to promote standards; like DEC, however, IBM is selectively implementing only the most profitable and controlling its own customer base while easing its customers out of their 10-year-old technology.

---

[26]Ibid., p. 27.

[27]Ibid.

[28]Ibid., p. 28.

[29]Shukunami, p. 49.

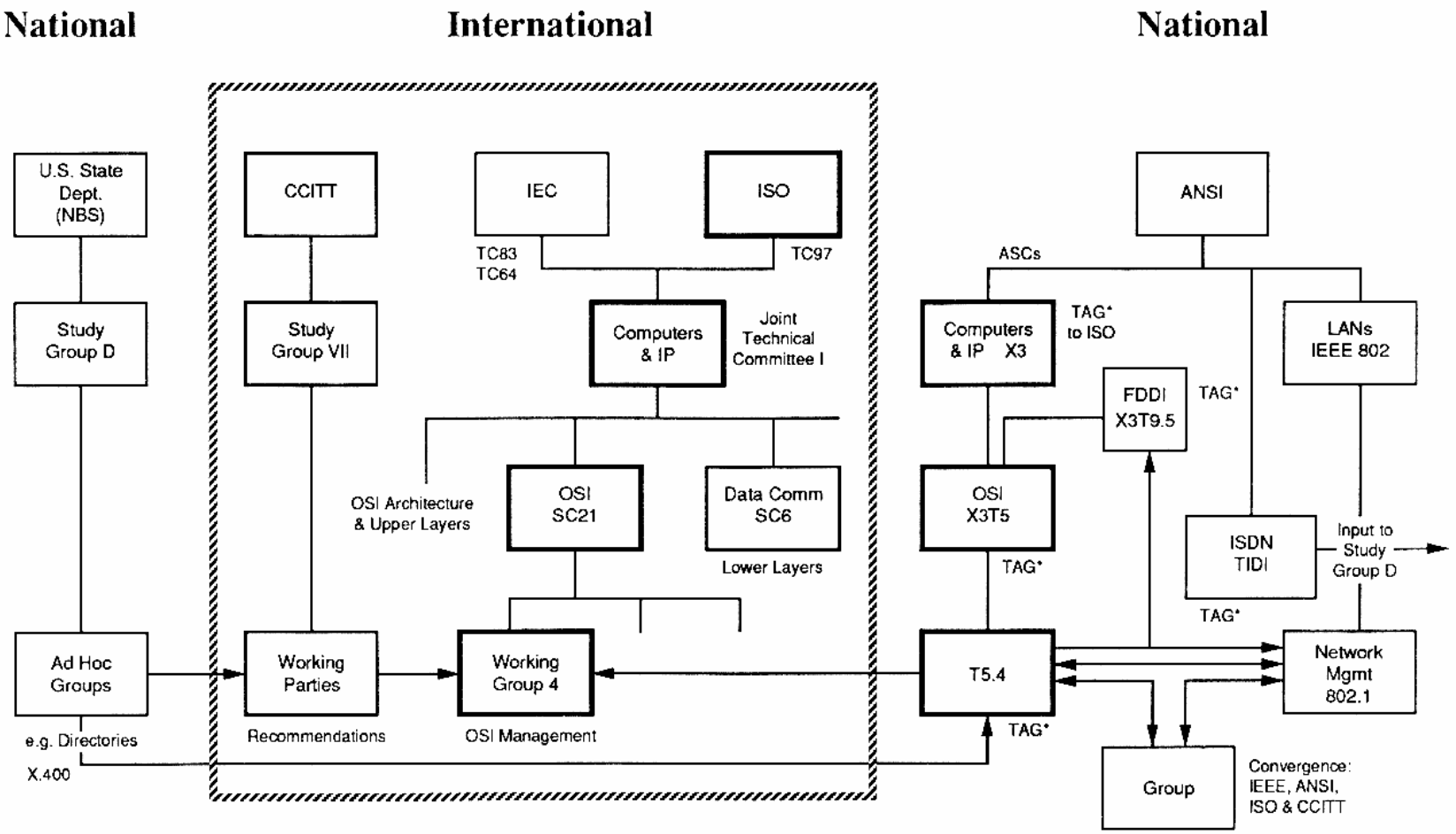
Despite all the fanfare, ISO does not by any means dominate the computer networking industry. Although many vendors claim to be embracing ISO protocols in one form or another, they are also adopting a wait-and-see attitude before making commitments.

The American National Standards Institute (ANSI) in the U.S., the Japanese Industrial Standards Committee (JISC) in Japan, and the Comité Européen de Normalization (CEN) in Europe have also been involved in ISO activities toward a universal communications environment.[30]

Figure 2-2 suggests the complexity of the standards development effort in the U.S. alone. Internationally, the number of groups multiplies.

---

[30]Ibid., p. 51.



TAG* – Technical Advisory Group

Figure 2-2

U.S. Standards Development Committees

2.4 Interconnection Issues

1) Can the new international standard compete with the installed, de facto standard? What alternatives are available to policymakers in the public and private sectors for dealing with competition in standardization efforts?

2) Considering EDI as a model for an enhanced service application that encourages industries to adopt a transaction standard:

- Can an EDI system solve interconnection problems in intercompany network service and create communication service opportunities?
- Who will make the preparations for interconnection?
- In what direction is EDI development heading?

2.4.1 International standardization

Whether standards have affected the emergence or advancement of new services is difficult to tell. However, despite possible risks of locking in obsolete technology, standardization was called "vital" at the 1987 ITU conference:

> If, for industrialized countries the adoption of compatible standards is convenient, for developing countries compatibility of networks and services and continuation of the work of the CCITT and CCIR [International Radio Consultative Committee of the ITU] is vital. Adherence to the CCITT and CCIR basic standards guarantee[s] the desired compatibility and avoids the inconveniences and costs of future adaptations which may be required to allow for interconnection of different pieces of equipment.[31]

Enforcement of international standardization efforts is so weak that political conflicts among nations and companies might be expected. There could be as much conflict over adherence to incompatible multiple standards as there is over efforts to establish a single standard.

It is not easy to determine the proper timing for standardization. Premature standardization may create "excess momentum" that may in turn

---

[31]Joao Carlos Fagundes Albernaz, "Enhanced Communications: Regulatory Challenges," Telecom '87, Forum Part III, Oct. 1987, sec. 3.3.

hinder market growth and technological development. Late standardization may produce "excess inertia" and hinder competition between companies adhering to a de facto standard and those eager for a new standard.[32]

Thus the timing, efforts toward, and scope of standardization pose difficult problems among nations and companies because each has its own interests to protect.

2.4.2 Can the new international standard compete with installed de facto standards? What alternatives are available to policymakers in the public and private sectors for dealing with competition in standardization efforts?

According to The Yankee Group, "Because of growing interest in MAP and TOP in the U.S., and continuing interest in ISO in Europe, computer vendors must provide enough of an OSI implementation to show that they are serious about the marketplace."[33] New international standards, such as ISDN and OSI, may not at first be able to penetrate the large installed base of analog networks, terminals, and SNA-compatible systems. However, some believe that by the mid-1990s the new standards may have taken over de facto standard markets.

2.4.2-1 Perspectives on ISDNs

There is much room for improvement before users would have access to ISDNs. In some circles, ISDNs are expected to change the data- and voice-related markets dramatically. If ISDNs are ever installed widely:

- ISDN vendors could be positioned to provide VAS such as E-mail, videotex, and interoperability.
- Computer vendors could lose ground in the market and telephone companies could gain. Telephone companies and telecommunications equipment manufacturers place a great deal of

---

[32]Joseph Farrell, et al., "Economic Issues in Standardization," Working Paper, No. 339, Massachusetts Institute of Technology, Dept. of Economics, Oct. 1985, p. 10, quoted in Shukunami, p. 52.

[33]The Standards Battle, p. 104.

hope in the ISDN concept; computer vendors view it at best as a threat to their hegemony over their own installed base of computer systems.

In the present market environment in advanced countries, service is being provided by high-speed multi-node T-1 networks and 56K bps circuit switches, which are similar to an ISDN. The technology is available for providing ISDN-type interconnection for central office exchange facilities.

An ISDN can accommodate both voice and data, and can control the combined network because of its speed. This capacity could enhance marketability. However, the technology has not been standardized; the future could see different products treated as standards by different companies.

ISDN development seems to be slow: Achieving the compatibility necessary to connect ISDNs to different switches is difficult, and prices are high because of unsolved technological problems. At early stages in its development, the ISDN has been seen as having relatively little possibility for success in data networking. If it can be interconnected and connected to other data networks, and if its potential for combining diverse services into a single network is realized, then some analysts believe an ISDN system could be popular in the market worldwide in the mid-1990s.[34]

2.4.2-2 OSI

Governments and computer manufacturers, especially in Europe, have put their support behind the OSI system. Yet SNA and other proprietary network architectures represent extensive development efforts, which OSI does not.

The SNA protocol is the industry front runner because IBM continues to develop functions that are more efficient than those in the internationally approved standard protocol. Recently, IBM has announced that it has been increasing its connectivity functions in file transfer capabilities between mainframe and super-mini computers.[35]

---

[34]The Yankee Group, ISDN, May 1987, pp. 95-96.

[35]IBM advertisement, Telephony, Feb. 15, 1988. pp. 26-27.

Over half of all computer vendors support SNA. IBM is selectively implementing only those international standards that promise to be more profitable and is continuing to control its customer base while easing customers out of their 10-year-old technology.

OSI's major inroad in the U.S. may be limited to the horizontal niche markets, such as MAP and TOP. Despite all the fanfare, OSI is nothing like a dominant force in the computer networking industry.[36] In addition, the international standardization process may not progress rapidly because of insufficient effort and because of politics between companies and nations.

As a result, competition between OSI, SNA, and other de facto standards could continue until equivalent protocols based on ISO standards can provide better service and value-added functions. The Yankee Group expects IBM's SNA to be the predominant protocol within any vertical market in which IBM controls the dominant market share.

2.4.2-3 Which players will be hardest hit by development of new standards?

Development of OSI products may be an especially difficult direction for non-IBM manufacturers if they have to maintain compatibilities with both SNA and OSI, which is just emerging. That is, non-IBM manufacturers could be maintaining three kinds of systems -- their own architectures, their connections into SNA networks, and OSI. Striking the proper balance among these products could be critical to their success or failure.

2.4.2-4 Which computer system vendors will be winners in the short term?

In the absence of international standards and in the presence of competing proprietary networking architectures and protocol suites, most computer manufacturers have been quite successful in promulgating their architectures by using a de facto standard to support networking on their own systems.

---

[36]The Yankee Group, Electronic Data Interchange (draft), part II.

The Yankee Group has predicted that the winners among computer vendors will be those who have solid installed bases that use their proprietary networking products, whose systems connect well with SNA, who are moving toward ISO protocols, who provide network management service for their customers, and who provide the best overall solutions to their customers' application problems.[37] Examples are IBM and DEC.

2.4.3 Intercompany network service and EDI as a model application for enhanced service

In advanced countries, end users in private industry are requesting a standard for intercompany network service to improve their own international competitiveness. They also are requesting several application solutions:

- Interoperability among systems that require commonality of protocols;
- Economically sound solutions that return the burden of interoperability to supplier and remove it from the customers;
- Communication solutions that are the best fit for their application requirements rather than being limited to a single vendor's product line.[38]

The remaining sections of this chapter examine the EDI system as a model transaction standard for interconnection. The chapter discusses EDI service and interconnection and EDI as creating an opportunity for a communication service and at the same time solving interconnection problems. Final sections ask who will provide interconnection and what the direction of future development might be.

2.4.3-1 EDI service and interconnection

EDI (electronic data interchange) has been defined as "the computer-to-computer exchange of intercompany business documents in a public, standard format."[39]

---

[37] The Standards Battle, pp. 103-104.

[38] Ibid., p. 40.

[39] McDonnell Douglas EDI*NET Implementation Guide 1986, p. I-1.

A key attribute is that

> Electronic data interchange is not limited by differences in computer hardware or software, or by differences in data processing cycles or other time frames. With translation and store-and-forward services, a sender's transmission is converted into speeds, codes, protocols, and document formats compatible with a receiver's environment.[40]

The emergence of industry document standards has stimulated increased use of EDI, also increasing its attractiveness to network services, turnkey systems, software services, and hardware vendors.

EDI networks and EDI translation services support a range of industry standards:

- ANSI X12 -- a generic format chartered by the American National Standards Institute for inter-industry EDI;
- TDCC -- basic data standards, formats, and codes for EDI published by the Transportation Data Coordinating Committee;
- WINS -- the Warehouse Information Network Standard, standards for the warehousing industry based on the TDCC standards; and
- other industry standards.[41]

The transaction standard developed by TDCC and ANSI followed the same general rules and upon publication in 1975 was the first inter-industry EDI standard.[42] According to some EDI vendors, the development of EDI standards

> is not unique to the United States. The United Nations has recently adopted the EDIFACT (Electronic Data Interchange for Administration Commerce and Transport) syntax as a UN standard for International EDI. This syntax was also approved as an ISO . . . standard . . . .[43]

---

[40]Ibid.

[41]Intercompany Networks, pp. 6-9.

[42]Dan Petrosky, McDonnell Douglas EDI Systems Co., "The EDI History," VAN's International Seminar on Automotive Industries, Data Communications Corp. of Korea, October 28, 1987, pp. 7-9.

[43]Ibid., p. 9.

EDIFACT could be "in wide use near the end of 1988 or beginning of 1989."[44]

2.4.3-2 Can an EDI system create opportunities for communications services and solve interconnection problems in intercompany network service?

For the answer to be affirmative, a range of primary conditions would need to be met. They are:

- A customer's systems would need to be interoperable, including computers, terminals, networks, formats, and procedures;
- The solution would need to be an economical one for the customer;
- The approach would have to be a communications solution for the customer;
- The service would have to consider the markets of related industries, such as common carriers, VASPs, and software and hardware vendors;
- The service would require some standardization at the application level and therefore would need participation and concurrence by user industries.

Discussion

EDI is based on a translator element and a data communications element. Thus for interoperability EDI can accommodate a standard such as that developed by ANSI and TDCC or can enable conversion by a translator, and EDI can on a timely basis transmit, retrieve, store, and forward information to multiple locations.

EDI service may cut customer expenses because it can provide services among related industries which may even continue to use different computer systems. An EDI strategy requires only that those who wish to communicate first agree on standard document formats to allow many parties to exchange documents efficiently over a network.

---

[44]Ralph W. Noto, EDI, Inc., "The Role of EDI Standards," VAN's International Seminar on Automotive Industries, Data Communications Corp. of Korea, Oct. 28, 1987, p. 26.

This is why common carriers and large computer vendors are developing EDI systems as a way to use network information services to meet communications needs. (See sec. 2.4.3-1.)

For users, EDI can support what has been termed

> a larger, more all-encompassing strategy known as "orthogonal" marketing. These markets are defined by the pairing of departments in large enterprises (horizontal markets) with their functionally similar counterparts in other firms (vertical markets) with whom they do business on a regular basis.[45]

EDI is used for communications of this type between legal departments of large businesses and external law firms, and between credit or collection departments of large businesses and credit agencies, for example.

According to the Quantum Science Corp., expenditures for EDI are expected to grow at an average annual rate of 28.8%, reaching $1.064 billion in the U.S. in 1989, with a major share being spent on transmission service and value-added networks.[46]

Additional market opportunities may lie in turnkey system installations and hardware and software maintenance. EDI software applications could become a primary opportunity for marketing to small companies that use personal computers.

Opportunities for network information service (NIS) firms reach beyond network support. According to a Quantum Science Corporation report:

> The majority of NIS suppliers active in the EDI marketplace are providing their network as a public network service are prepared to offer a range of EDI services beginning with transmission facilities, which can be upgraded to include:
> - Value added network support services
> - Computer protocol conversions
> - Speed conversions
> - Communications compatibility features
> - Data storage

---

[45]Quantum Science Corp., "Electronic Data Interchange Will Create Communications Services Opportunities," MAPTEK USA, Vol. 85, No. 484, p. 3.

[46]Ibid., p. 1.

- Host processing capabilities
- Network management and programming
- Electronic mail.

The level of expenditures for transmission facilities, including value added network capabilities, comprise the largest component of end user EDI expenditures overall.[47]

Major participants in the EDI market include McDonnell Douglas, GEISCO, AT&T, and IBM. While many companies are developing in-house or proprietary EDI networks, these companies and others are already meeting standards being developed by industry organizations to bring EDI into industry-wide use. Table 2-1 suggests the range of EDI products and services.

---

[47]Quantum Science Corp., "Strategy Brief," MAPTEK USA, Vol. 85, No. 484, pp. 8-9.

Table 2-1

Supplier Profiles: Electronic Data Interchange Products and Network Information Services

Service Features	Supplier					
	Informatic General	McDonnell Douglas, EDI Co.	GEISCO	AT&T	AT&T, Control Data	IBM Information Network
Translation	✔	✔	✔	✔	✔	✔
Document Store and Forward	✔	✔	✔	✔	✔	✔
Document Storage/ Retrieval	✔	✔	✔	✔	✔	✔
Audit Trailing	✔	✔	✔	✔	✔	✔
Transaction Acctg/ Reporting	✔	✔	✔	✔	✔	✔
Interactive Applications	✔	✔	✔	✔	✔	✔
24-Hour Availability		✔	✔	✔	✔	✔
Network Backup	✔	✔	✔	✔	✔	✔
Speed Conversion	✔	✔	✔	✔	✔	✔
Document Standards Supported*						
UCS	✔	✔	✔	✔		
WINS	✔	✔		✔		
CARDIS		✔		✔		
ANSI X12	✔	✔	✔	✔	✔	✔
TDCC Carrier Standards	✔	✔	✔	✔		
Turnkey System Sales		✔	✔	✔	✔	
Number of Installations	400	70	3000	NA	NA	NA

NA: not available

*See Acronyms, Appendix B.

- **International activities**

In 1985, British Telecom and McDonnell Douglas Information Systems formed EDI-Net Ltd., a joint venture with ambitions in the U.K. and European markets for EDI. EDI-Net Ltd. will run on BT's packet-switched stream public data service. In the U.K., EDI-Net's principal competitors will be Istel and ICL, and GEISCO in the U.S.

There are some problems in Europe such as differences between the regulatory environments of related companies. Nonetheless, ownership of a network with nodes in every major European country and beyond may be fundamental to the provision of EDI services in the long term.

Even with such potential stumbling blocks, EDI service has become one attempt to solve interconnection problems and may offer a new communication services opportunity.

2.4.3-3 Who will prepare for interconnection?

In the U.S., users have four alternative EDI interconnection methods for transferring information:

- Via magnetic tape or diskette sent by mail or courier service;
- Via a point-to-point connection between partners, both of whom use the same standard and communication protocols;
- Via a value-added network that provides mail-boxing, with both partners using the same standard;
- Via a third-party service that provides mail-boxing and protocol translation.[48]

- **Interconnection and EDI**

Eventually, EDI service vendors may attempt to interconnect their networks for the convenience of their end users; interconnection might also reduce per-transaction fees.[49] For example, on the communication side, common carriers or VASPs could offer interconnection between networks or terminals; on the computer or terminal side, computer

---

[48]The Yankee Group, The Network Resource Report, Vol. 3, 1984, pp. 13, 17.

[49]The Yankee Group, Electronic Data Interchange, 1988, Executive Summary.

network software providers and terminal or PC providers could offer interconnection. The few connections that already exist tend to use non-standard protocol; it is possible that by the 1990s, third-party service vendors could turn to industry standard protocols.

These could be the CCITT's X.400 protocol, the likely choice according to The Yankee Group,[50] and the ISO's file transfer and access management (FTAM) protocol (ISO 8571).

- **Organizations for standardization**

Internationally, standards are developed and provided by ANSI and ISO. In the U.S., ANSI and TDCC have been preparing basic standards for related industries, and are also running Cooperation for Open Systems (COS), for end users and computer vendors who want to develop support for their own existing data communications systems. For standardization and communication among related industries, each industry association provides formats, procedures, rules, and so on. As The Yankee Group has put it,

> Implementors of EDI need not worry about matching communications speeds and protocols, nor do they need to coordinate methods of sending to multiple locations, and times for sending and receiving messages.[51]

EDI network service ranges from simple transport facilities, such as AT&T's communications concept, to complete network information services (NIS) and value-added network support on a transaction basis. Network service can be provided by VASPs, such as GEISCO, McDonnell Douglas, and AT&T; computer network software; and PC terminals.[52]

Turnkey systems offer on-site installation of EDI support such as microcomputer systems. For example, access between front-end processors of large companies and personal computers may be supported by

---

[50]The Yankee Group, Electronic Data Interchange (draft), 1988, part II.

[51]Intercompany Networks, p. 28.

[52]Quantum Science Corp., MAPTEK USA, Vol. 85, No. 484, p. 3.

hardware vendors, VASPs, or software companies.[53] Private network management and wide-area interconnection of a host computer and terminals can be provided by a hardware vendor or special software vendor.

Software service -- professional programming -- can integrate EDI activity into the existing manufacturing and financial systems of the corporation.

There are many ways of providing media conversion functions; for example, real-time interconnection service could involve voice-to-computer confirmation of a bank account balance, or, for EDI, network information service providers (NISPs) are adopting remote batch processing.

EDI service can be affected by conflicts between government agencies and battles between the computer and communication industries. Yet cooperation between competitors has brought mutual benefit: In the U.S., interconnection between the BOC (Bell operating company) network and VANs has increased traffic for both parties. EDI providers have requested cooperation for efficient service between users and related industries and have also asked for translator services between common carriers and VASPs.

2.4.3-4 In what direction is EDI development heading?

There are a range of efforts to develop EDI systems for computer-to-computer intercompany exchange of business documents in a public standard format.

Enhancements to current systems: Third-party vendors want to offer service that is as low-cost and as low-risk for customers as possible.

Increased product code standardization: Industries lacking such codes as the grocery industry's UPC (uniform product code) have more difficulty developing EDI systems and standards.

Development of multi-industry standards: Multi-industry standards development will be a key factor in EDI growth because the lack of

---

[53] Ibid.

multi-company, multi-industry standards is responsible for many overhead costs, including software maintenance.

Increased third-party support: "By utilizing a third party, a large corporation can . . . realize economies of communicating at speeds higher than those a smaller trading partner might be able to accept directly,"[54] as The Yankee Group stated.

Expanded EDI service: In the late 1980s, EDI service is still provided to limited business areas. Expanding the service areas and the on-line processing of existing systems would allow end users to take advantage of EDI service as a one-stop solution to communications needs and would provide service more cost effectively to common carriers and suppliers.

Increased international activity: The market for international EDI services has barely been tapped. Those players with experience in providing EDI on a domestic basis and those with worldwide networking capabilities are likely be the winners.

2.5 Key factors for maintaining effective interconnection in Korea

2.5.1 Why is interconnection required?

As discussed above, the variety of standards and the perpetual changes in computer systems and communications networks have precluded interoperability among systems produced by different vendors.

Especially in Korea, the question of interconnection has become critical for a number of reasons: First, a national computerized information network, the National Administration Information Services (NAIS), is planned. Further, as leasing of circuits is eased, private companies are trying to establish group VAN systems. At the same time, agencies are reviewing a program to strengthen PC communications by using the existing public-switched telephone network (PSTN). Private industry players are asking for use of private and public networks for VAN service.

In addition, as of 1988, DACOM, the common carrier, operates the PSDN and is expected to produce a large-scale information communication

---

[54] Intercompany Networks, p. 28.

network, to include the NAIS, private VANs, public VANS, and other networks. High quality technology will be necessary for reliability and for large-volume transfers.

2.5.2 Key factors for maintaining effective interconnection in Korea

Standardization and interconnection contribute to efficient management of communication resources as well as benefiting end users and helping domestic industries increase their competitiveness.

Accordingly, factors warranting consideration include:

- Domestic and international standardization programs for codes and formats to strengthen international competitiveness of industries that could thereby organize and share information;
- Development of suppliers' roles in interconnection;
- Determination of the most desirable methods of interconnection.

2.5.2-1 Domestic standardization

Policymakers deciding what to do about EDI standards may wish to consider potential advantages of standardization in a number of arenas. Overall, standardization of computer communications facilities and software could bolster the international competitiveness of the domestic information communication industry.

Standardization would allow different networks offering domestic information communication services to interoperate, and would increase the compatibility between different computers. Standardization could also maximize the efficiency of computer communication facility installation, operation, maintenance, and expansion.

Standardization of formats and codes can also help improve industrial information use. Specifically, standardization of Hangul (the Korean alphabet) code and terminal facility technologies could strengthen domestic information exchange.

2.5.2-2 International standardization

Concern about realizing a fair share of profits has been a major impetus behind international standardization efforts.[55] Governments participate in international organizations in pursuit of fair profits more than for mutual interest. The context is one of political conflicts among companies and nations. Accordingly the ISO's OSI may result in long-delayed, incompatible multiple standards.

Whether standards have affected the emergence or advancement of new services is difficult to tell. For Korea, however, the emerging domestic industry itself may be at stake. The strength of the developed countries to internationalize VAS and to support trends toward liberalization could threaten the development and profit share of this developing country's domestic industries.

There are cooperative efforts toward international standardization. International technical standardization groups (ISO, CCITT, and others) are reviewing and modifying technology standardization recommendations. Similarly, domestic standardization groups (the OSI committee in Korea, for example) carry out the standardization effort through cooperation with foreign standardization groups such as SPAG (Standards Promotion and Application Group), COS (Cooperation for Open Systems), and others.

2.5.2-3 Selection of new standard OSI and de facto standard

- **For the long term in Korea:**

New standards for interconnection are more important than in the U.S. because in Korea no single company dominates the computer market. In this situation OSI is likely to decrease unnecessary software costs and to benefit customers.

- **For the short term in Korea:**

The OSI standard cannot be developed as rapidly as de facto standards can. De facto standards such as SNA and DEC's DNA will be

---

[55]See Albernaz, above, section 2.4.1.

selectively accepting ISO standards in order to meet government and user demand and to improve interconnection.

If the Korean government decides to encourage use of OSI, it may have to figure out a way to require companies to use the OSI standard for VANs when a new general licence is issued.[56] This method is used in Great Britain.

2.5.2-4 Timing of standardization

Early standardization invites excess momentum and might obstruct market growth and technology development. Late standardization and the resulting excess inertia may hinder the rejuvenation of the information industry and the adoption of new standards, such as OSI or others. Weakening of Korea's international competitiveness and increasing of user costs could result.

Thus the timing of installation warrants careful consideration if standardization is to protect the interests of the industry and user benefits, and if the fairest process is to be found.

2.5.2-5 Development of ISDN program

In the developed countries, ISDN services are expected to be available in 1990 and to be adequate in 1995. The development of ISDN brings possibilities for better data communication, easy combination of control functions, and greater speed -- factors that might promote marketability. However, there are also technical problems because of complicated interconnection in the network system and price considerations, both of which could delay development. If ISDN interconnection, connection with existing data networks, and development of a single networking environment are improved and guaranteed, some expect this system to control the market by 1995.

For this reason, the Korean government plans to develop ISDN technology by 1991. The technical problems of the developed countries

---

[56]For example, for receiving messages through the public network, computers can use KSC5601, which is a standard Korean language code. For communication, protocol X.25 may be adopted, and for interconnection between computers, whether different or the same, use of X.25 could be recommended.

may be instructive regarding marketability, strengthening of information services, and economic benefits. Ultimately competing with the developed countries, such as the U.S., Korea will continuously need to monitor their progress.

2.5.2-6 Electronic data interchange between companies

EDI could be used in Korea as it is in the U.S. for electronic data exchange between companies and company VANs.

Third-party packet-switching service has proved particularly cost effective. One-stop service may solve communications problems deriving from network complexity.

Organization and standardization efforts are essential for EDI services. A long-term plan for EDI service would require the cooperation of industries and computer- and communication-related agencies and associations. Information network services based on computer makers' network architecture and common carrier packet-switching services needs to be evaluated in terms of economic effectiveness and accessibility to foreign countries.

2.5.2-7 Maintenance of interconnection

Interconnection by a packet-switching network, such as DACOM-NET, is viable. Two methods for this type of computer interconnection are non-symmetrical communication (a subordinate communication method used in EFTS) and symmetrical communication, which uses a neutral protocol. This latter method could be promising in the long term because it would be more supportive of fair competition. However, even if vendors can develop the technology, changing their systems would be a difficult way to satisfy users who want the most cost-effective solutions.

Accordingly, interconnection for communication between different systems may differ depending on the purpose of the service. However, any approach is subject to considerations of public interest, universal service, and economic efficiency.

Initially interconnection of a national infrastructure computer network such as NAIS may be only within individual unit networks; later, integration among other networks would be feasible. Implementation of basic standards, such as Hangul as the major code, terminal

standards, and communication standards, will add cost and time considerations.

Effective interconnection calls for joint efforts by related industries, such as common carriers and VASPs. Considerations of public interest and fairness, prevention of monopoly, and protection of small companies and shareholders raise questions about competitiveness, mutuality, and the risks and benefits of a single integrated service. Carriers may be the best candidates for government-provided services and public VAN services, while VASPs or both common carriers with VASPs may be more effective for developing and advancing specific VANs.

2.5.2-8 Organizing for standardization

Standardization is a legal process involving technology; suppliers and users have direct interests in its outcome.

Parties related to standardization include operators of information communications facilities, users of services, technology providers, and government agencies mandated for government policymaking.

The organization and management of the standardization process attract a spectrum of user opinions and will affect relationships with foreign countries and the fate of computer production in Korea.

CHAPTER THREE

DEVELOPMENT OF VALUE-ADDED SERVICES

The advanced countries, such as the U.S. and Japan, have led the development of enhanced or value-added services (VAS). In Korea the development of VAS and VAS businesses, which is still in its infancy, began with the lifting in May 1987 of some of the restrictions on private companies.

Yet even this first step has raised questions concerning which technical factors are critical for efforts to establish VAS, and what policy alternatives would promote VAS in the near future. These types of issues will gradually increase because of further technical and network design development, an array of sophisticated user demands for VAS to support a more competitive position in international markets, expanded VASP requirements for their VAN business, and questions about the common carrier's public service role.

The purpose of this chapter is to provide policymakers with information on VAS development. VAS development in Korea and the U.S. and conflicts among the players will be described, and the issues related to technical development and policy alternatives will be discussed.

3.1 Service provider development in the U.S. and Korea: Status and differences

Different regulatory, technical, and competitive environments set the stage for different policy alternatives, different markets, and different development methods. Accordingly this chapter begins with brief comparative sketches of the status of VAS development in the U.S. and Korea.

3.1.1 U.S.

3.1.1-1 Computer Inquiry I

In the U.S., the FCC defined characteristics of VAN services as

early as 1973 in the Packet Communications Inc. (PCI) decision[1] in which "value-added" services were seen as error-free data communications provided through the resale of common carriers' leased circuits using packet-switching technology. However, enhanced-service providers (ESPs) were prohibited from providing basic services, such as telephone, telex, or "hybrid communication" services, defined in Computer Inquiry I as services that include some data processing functions.

VANs. Telenet was the first U.S. public data network to implement X.25 and packet-switched data services and has offered such services commercially since 1975.[2] In 1977, Tymnet entered the value-added market as a public-switched data network service. Before the Computer Inquiry II decision in 1980, Telenet and Tymnet were defined as common carriers.

3.1.1-2 Computer Inquiry II

Computer Inquiry II defined these VANs as unregulated enhanced-service providers, based on the "contamination theory"[3] which claims that packet switching itself is basic but protocol conversion "contaminates" this basic nature. The FCC defined enhanced services (see Table 1-1) as including protocol processing services as well as the more conventional data processing and information retrieval services.

Deciding that it would be in the public interest, the FCC approved, conditional on nondiscriminatory provision, the collocated offering by the BOCs and AT&T of certain protocol conversion functions,

---

[1]Shukunami, p. 57. See also FCC, In re the Application of Packet Communications Inc. for Authority under Section 214(a) of the Communications Act, as Amended, and Pursuant to Section 63.01 of the Commission Rules and Regulations to Institute and Operate a Packet-Switching Communications Network in the Contiguous United States by Leasing Inter-Exchange Lines from Established Communications Common Carriers, File No. P-C-8533, Memorandum Opinion, Order, and Certificate, 43 F.C.C.2d 922 at para. 3 (adopted Nov. 14, 1973, released Nov. 16, 1973), at para. 3.

[2]"An Overview of Value Added Networks (VANs)," p. C32-010-110.

[3]FCC, Supplemental Notice of Proposed Rulemaking, FCC 86-253, CC Docket No. 85-229, Phase II, Changes in the treatment of protocol processing functions, at para. 4-3, p. 22.

such as asynchronous/X.25 for interconnection between non-packet-interface terminals and packet-switched networks using packet PADs.[4] The FCC also approved X.25/X.75 for internetworking conversion between packet-switched networks, to be priced separately as protocol conversion.[5]

VANs and ESPs. Needs for funds to invest in facilities and to provide nationwide service, as well as regulatory limits, led to mergers between McDonnell Douglas and Tymnet in 1984[6] and GTE with Telenet in 1986.[7] The resulting companies provided packet-switched networks supporting such protocols as asynchronous, SNA/SDLC, BSC, HDLC, and IBM's 3270 protocol.[8]

- **GTE Telenet**, which has been called "a pioneer in packet switched data services" is the leading supplier of packet-switched services and currently services approximately 45% of the U.S. VAN market.[9] The network provides both speed and protocol conversion as enhanced services of GTE Telenet. GTE Telenet offers two types of network interfaces: a hardware interface, a Telenet processor (TP), and a software interface, a package that runs in a communications controller or mainframe computer. This interface uses the CCITT X.25 protocol.

GTE Telenet services are available in more than 300 U.S. cities and more than 50 foreign countries.

---

[4]FCC, Report and Order, CC Docket No. 85-229, FCC 86-252 36693, Released June 16, 1986, p. 24. See also: Petition for Waiver of Section 64.702 of the Commission's Rules, Memorandum Opinion and Order, FCC 85-101, 100 FCC 2d 1057 (1985) (Asynchronous/X.25 Waiver Order).

[5]Ibid., p. 23. See also: Petitions for Waiver of Section 64.702 of the Commission's Rules and Regulations to Provide Certain Types of Protocol Conversion with Their Basic Network, Memorandum Opinion and Order, FCC 84-561 (released Nov. 28, 1984) (X.25/X.75 Waiver Order).

[6]Aoi Gooya, What is VAN? VAN situation of U.S., Japan. Japan: Japan Economic Newspaper Co., 1984, p. 59.

[7]Datapro Research Corp., "Telenet Packet Switched Data Services," Datapro, 1986-1987, p. C32-835-101.

[8]Datapro Research Corp., "Tymnet Public Data Network Services," Datapro, 1986-87, p. C32-868-101.

[9]"An Overview of VANs," p. C32-010-110.

GTE Telenet information services focus on three industrial areas: the EDI*Express system (similar to EDI-Net) for intercompany exchange of business documents, the Trade*Express system for international trade documents, and the EMC*Express system for healthcare claims between providers and insurers.

Like other EDI service vendors, GTE Telenet supports interconnection among the various EDI services and with such services as E-mail and database retrieval has exchanged documents among Ford, GM, and the clients of McDonnell Douglas EDI-Net.

- **Tymnet**, a wholly owned subsidiary of McDonnell Douglas, operates a packet-switched data communications network that serves more than 600 U.S. locations for nationwide access and approximately 68 offshore locations, as well as 2600 intelligent nodes. Tymnet is one of the largest packet-switched networks in existence, with a market share of approximately 34%.[10] The network provides code, speed, and protocol conversion, error correction, and security features.

EDI-Net, which is built around the Tymnet network and was acquired from Tymshare along with the Tymnet public data network in 1984, will play an important role in Tymnet's strategy. The EDI system services two areas -- EDI-Net for message switching store-and-forward mailbox service and EDI-translator for universal translation, such as for formats. Sixty-five percent of EDI service customers require translation services.

EDI-Net supports asynchronous, bisynchronous, and X.25 communication protocols, with speeds ranging from 300 to 9600 baud, and supports such EDI standards as TDCC, ANSI X12, and AIAG (Automotive Industry Action Group) protocols, among others.

EDI-Net interconnects with the networks of GEISCO and Informatics and was expected to grow over 250% in 1986.[11]

- **ADP Autonet** offers a packet-switched network that links 300 U.S. cities and interconnects with other public networks, serving more than 55 countries. It presently "supports more than 9500 domestic access ports linked by 275 intelligent communication nodes to more than

---

[10] Ibid., p. C32-010-111.

[11] The Yankee Group, Intercompany Networks, February 1987, p. 47.

200 host computers," according to Datapro Research Corp.[12] Value-added services include error control and automatic answer dial backup facilities.

- **CompuServe Network Service** provides computing and information delivery service for business and home computer users. Value-added services include E-mail, protocol conversion, and error correction, especially intracompany E-mail serving the U.S. and international locations.[13]

- **GEISCO**, a major computing services supplier, offers shared applications, micro integration, office communications, and interactive time-sharing, among other services. Based on GEISCO's worldwide packet-switched network, GEISCO's MARK*NET is a VAN service that "provides error-free, reliable communications links through dual-line logic between network nodes . . . . MARK*NET was commercially introduced in April 1984" and has a market share of less than 1%.[14]

- **IBM Information Network (IN)**, introduced in 1982, is an enhanced data communication network and remote time-sharing facility. Users access the network through switched or leased-line connections, using SNA/SDLC, BSC, or asynchronous terminals.[15] IN's market share is approximately 1.5% in the U.S.[16]

IN is available to all customers and offers private network management as well as wide-area interconnection of host computers and terminals. IVANS (Insurance Value-Added Network Services), which is available only to insurance companies and agents, offers batch, store and forward messaging (called Information Exchange), broadcast communications, and wide-area interconnection, as well as access to an insurance databank.

---

[12]Datapro Research Corp., "ADP Autonet," Datapro, 1986-87, p. C32-178-101.

[13]Datapro Research Corp., "CompuServe Network Services," Datapro, 1986-87, p. C32-178-101.

[14]"An Overview of VANs," p. C32-010-110.

[15]Datapro Research Corp., "IBM Information Network," Datapro, 1986-1987, p. C32-491-101.

[16] "An Overview of VANs," p. C32-010-111.

Like its competition in GE Information Services and McDonnell Douglas, IBM has found that its largest customers generally do not require translation services, but it plans to provide support for standards other than X12 in the near future. Although the bulk of its current EDI users transmit their EDI documents via IBM PCs, IBM believes that in the long term they will prefer host-to-host communications.

Although IBM's IN is considered a fairly solid product and is aimed at a growing market, IN may have difficulty securing a market niche because it is limited compared to VANs servicing all host computers. Yet a service of a company that boasts 60% of the world's computer market cannot be ignored.

- **Computer Sciences Corp.'s INFONET Network** provides packet-switched data communication services for terminal-host transmission between dissimilar devices. Enhanced communication service includes electronic mail, telex delivery, and file transfer. INFONET serves more than 150 metropolitan areas in the U.S., and provides local access in 20 countries.[17]

- **Graphnet, Inc.** since 1974 has offered several message transmission services including a packet-switched service called the Freedom Network, a store-and-forward service called Freedom Forward, and an electronic mail service called Freedom Express.[18]

- **Common carriers: AT&T and the BOCs.** AT&T has been in unregulated areas such as VANs and information processing since 1984. Although AT&T provides the Accunet Packet Service (APS) and some BOCs provide local area data transport service (LADT), common carriers do not dominate the enhanced-service market or the packet-switched network, primarily because of judicial restrictions and because of the strict definition of basic service in the FCC's Computer Inquiries I, II, and III. Telenet and Tymnet have dominated packet-switched network service.

---

[17]Datapro Research Corp., "Computer Sciences Corporation INFONET," Datapro, 1986-87, p. C32-176-101.

[18]Datapro Research Corp., "Graphnet, Inc. Freedom Services," Datapro, 1986-87, p. C32-459-101.

AT&T's market performance suffered when it withdrew from its advanced information system or "super VAN," NET 1000, in early 1986.[19] NET 1000 was not a public value-added network like Tymnet or GEISCO's Mark*Net, but an applications network on top of a packet network.[20] Packet-switching service nodes can provide other communications processing services, such as information storage and protocol conversion.

Nonetheless, the common carriers could consider several factors as promising: Computer Inquiry III's favorable treatment of the CEI/ONA environment, the Huber Report, and conceptual development of ISDNs could make common carriers key players in this field.

- **MCI's terrestrial microwave network** provides the transmission backbone for its VAN, Data-transport. Data-transport provides direct access to **MCImail** and to MCI's international E-mail services.
- **RCA Cylix** provides dedicated service using packet-switching technology over point-to-point and multipoint leased telephone lines and satellite data links.

Although the value-added network market in the U.S. (Table 3-1) grew during the 1980s, its growth rate slowed to 18% in 1986, according to the International Data Corporation. VANs have been trying to acquire their own communications facilities, such as satellite earth stations and digital termination systems (DTSs) to bypass the local BOCs.

---

[19]Shukunami, p. 59. See also: "The AT&T IS Failure: Making the Wrong Sale?" Trends in Communications Management, Dec. 1986, pp. 1-5.

[20]The Yankee Group, The Network Resource Report, Vol. 3, 1984, p. 54.

Table 3-1

A Comparison of Value-Added Networks

Network	Access Type	Maximum Line Speed (bps)	Value-Added Features	Protocols Supported	Network Type	Local Dial Availability	Gateways to Foreign Networks
AT&T ACCUNET Packet Service	Dial-in via REDI-ACCESS* Dedicated (point-to-point)	Dial—2400 Dedicated—56K	Not applicable	X.25	Data Terrestrial Satellite	100 U.S. cities	Yes
ADP Autonet	Public dial Private dial Dedicated (point-to-point)	Dial—2400 Dedicated—4800	Electronic mail Dial backup Error correction PC support	X.25, Async	Data Terrestrial Satellite	320 U.S. cities	Yes
CNCP Infoswitch	Public dial Private dial Dedicated	Dial—2400 Dedicated—9600	Electronic mail Dial backup	X.21, X.25, Async, BSC, HDLC, SDLC	Data	79 Canadian cities	Yes
CompuServe Network Services	Public dial Private dial Dedicated (point-to-point)	Dial—2400 Dedicated—14.4K	Electronic mail Dial backup Error correction	Async, X.25, 3270	Data Terrestrial Satellite	300 U.S. cities	Yes
Computer Sciences INFONET	Public dial Dedicated (point-to-point)	Dial—4800 Private dial 14.4K	Dial backup Dedicated—Error correction PC support	X.25, Async, X780, 3270	Data IBM SDLC, BSC	150 U.S. Terrestrial	Yes cities
Cylix Communications Corporation	Dedicated (point-to-point) or multipoint)	Host—56K Remote—9600	Dial backup	3270 BSC, SDLC, 3270 SNA, Burroughs Sync Poll Select	Data Satellite Terrestrial	Not applicable	No
General Electric Information Service Co MARK*NET	Public dial Private dial Dedicated (point-to-point)	Dial—4800 Dedicated—19.2K	Electronic mail Facsimile Dial backup Databases	Async, 3270 BSC, X.25, MNP	Data Terrestrial	600 U.S. cities	Yes
Graphnet Freedom Network	Public dial Dedicated (point-to-point)	Dial—1200 Dedicated—9600	Electronic mail Facsimile	ASCII, 3780, Bisync, Async, Baudot	Data Terrestrial	48 U.S. cities	Yes
IBM Information Network	Dial Dedicated	Dial—9600 Dedicated—9600	Electronic data interchange Application Programs Information Services	Async, BSC, SNA/SDLC, 2780/3780	Data Terrestrial Satellite	100 U.S. cities	No
Telecom Canada Datapac	Public dial Private dial Dedicated	Dial—2400 Dedicated—9600	Info. not available	X.25, Async, ISO poll/select, IBM 27XX/37XX, BSC	Data	92 Canadian cities	Yes
Telenet	Public dial Dedicated (point-to-point)	Dial—1200 Private dial 9600	Electronic mail Dedicated—Dial backup Error correction PC support Databases	X.25, Async, Facsimile IBM 3270, X780 MNP, BSC, HDLC	Data Terrestrial	400 U.S. cities	Yes
Tymnet	Public dial Private dial Dedicated (point-to-point)	Dial—2400 Dedicated—9600	Electronic mail Facsimile Dial backup Error Correction PC support Databases	Async, X.25, SDLC,3270,BSC, RJE/HASP, 2946, VIP 7700, polled Async, X.PC	Data Terrestrial Satellite	600 U.S. cities	Yes
WangPac	Public dial Dedicated (point-to-point)	Dial—2400 Dedicated—9600	Dial backup Error correction PC support Document conversion & storage system Application services Databases	Async, X.25, Bisync, SNA	Data Terrestrial Satellite	80 U.S. cities	Yes

**REDI-ACCESS is a shared PAD service provided by AT&T and Control Data Corporation.*

3.1.1-3 Computer Inquiry III

Computer Inquiry III can be interpreted as an inevitable consequence of changing technological environments and as being brought about by the changing market structure after divestiture.

In response to disputes between the telecommunications and information industries, Computer Inquiry III

> is designed to introduce a regulatory structure whereby the RBOCs can offer so-called enhanced services while at the same time providing facilities that permit others to market a wide array of enhanced and information services.[21]

Protocol processing deals with the blurring boundary between computer service and communication, and the FCC's position could use further clarification. The commission offered these alternatives in the Computer III notice:

1) protocol processing could be offered as part of basic services with "neutral functional characteristics";
2) it could be offered initially as an enhanced service, subject to any future definitional change by the FCC; and
3) it could be offered as enhanced service with regulatory treatment based on its competitive aspects.[22]

The first two alternatives could change the definition of basic and enhanced services. According to The Yankee Group, "The BOCs have wanted to offer internetworking conversions and generic protocol conversion capabilities as basic network services but, until recently, were not permitted to do so by the Federal Communications Commission."[23]

---

[21] Telecom Insider, International Data Corp., Vol. 8, No. 5, April 1988, p. 1; see also: Table 1-1.

[22] Amendment of Section 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), Notice of Proposed Rulemaking, CC Docket No. 85-229, FCC 85-397, 50 Fed. Reg. 33581 (Aug. 20, 1985).

[23] The Yankee Group, The Network Resource Report, Boston: The Yankee Group, Vol. 4, 1984, p. 65.

3.1.2 Korea

As Jong-Soon Lee of the Korean MOC stated at the ITU 1987 conference:

> With the establishment of the Korea Telecommunications Authority in 1982, the structure of the telecommunications laws changed drastically. The new laws contained provisions regulating the carrier's services, such as governmental approval of the service agreement with the users, cooperation between the carriers, authorization of the network services, regulation of line usage for data communications, and technology development.[24]

In telecommunications business and service, the new laws authorized private operating agencies. The operation of the public telecommunications business became in principle the responsibility of the KTA as established in the KTA Act of 1982. As an exception, the MOC can appoint other organizations as recognized private operating agencies (RPOAs) to manage telecommunications services efficiently and to foster and distribute new services quickly. Currently, the Data Communications Corp. of Korea (DACOM) is operating as RPOA in data communications services.

In 1984, with the construction of the public packet-switched network,[25] DACOM started dial-up service and leased data circuit service. Now videotex and E-mail services are being offered to the public.

In 1985, the Public Telecommunications Business Act was passed to encourage use of computer and value-added services through the communications networks of the common carriers. Thus private companies were allowed to offer information services, providing business opportunities in, for example, data processing and database services. Service providers were prohibited, however, from acting as third-party providers (mediating the communications of other persons by use of private telecommunications circuits) and were prohibited from message exchange.

---

[24]Jong-Soon Lee, "The Enhanced Communications and Legal System in Korea," Telecom '87 Forum.

[25]DACOM, 1987 Annual Report, p. 33.

In 1987, subsidiaries (closely related businesses or members of a group company)[26] gained permission to share use of the leased circuit. These "group VANs" are thus intracompany VANs -- a starting point for private company participation in VAS. The aim of the change was to get domestic enterprises involved in preparation toward the internationalization of information communications.

Intercompany message-switching services via computer were permitted for public interest communications -- that is, services operated by the common carrier or service between public organizations. However, shared use of the multiplex (MUX) equipment is restricted to private VANs within conglomerates, the group VANs described above. However, KTA and DACOM, as common carriers, are excused from these restrictions.

In 1987, 72 companies were classified as information service providers (ISPs). Although the number of companies in this classification has been increasing at a rate of 40% a year, 80% of them had sales of below 1 billion won ($130,000 U.S.) as of 1987. Consumers did not use private computer communications services because of the drop in hardware prices; database service sales were slow because of lack of development of domestic databases and a lack of understanding of the services.

As of 1988, eight VASPs were registered as private companies,[27] and planning was underway for group VANs.

Although there is no legal definition of VAS in Korea, service is often referred to as VAN or VAS if it includes value-added functions among services provided by the common carrier or by a joint venture company with the common carrier, as well as by a VASP for a group VAN.

3.1.2-1 VASPs and group VANs

While VASPs as of 1987 and 1988 have been working to establish domestic group VANs during the second stage of liberalization, they also have been preparing to cope with the active VAS business they

---

[26]See definition, Introduction, section c.

[27]Computer and Communications Promotion Association, Information Age Society, Korea, May 1988, p. 31.

expect to be forthcoming during the next stage of liberalization. Each VASP is accelerating its planning and support of integrated systems for intercompany networks, based on the already established intracompany networks.

Initial work for the group VAN is based primarily on use of SNA,[28] the IBM communications architecture; with many of the group VAN companies already in possession of IBM facilities, installation will thus be easier and less expensive.

Joint ventures are increasing with demands from domestic companies for technical assistance and from advanced countries for opening of Korea's telecommunications markets. Joint ventures include Samsung Data Systems (SDS) with IBM, and System Technology Management (STM) with EDS (Electronic Data Systems) of the U.S.[29]

3.1.2-2 Joint ventures with the common carrier

New carriers. In 1988, DACOM, the common carrier, and Korean Airlines (KAL) formed the Korea Travel Information Service (KOTIS)[30], a joint venture among VANs. The Ministry of Communications (MOC) always welcomes and approves this kind of VAN venture. KOTIS primarily takes care of airline ticketing and reservations and is already in operation in 1988, using the DACOM-NET, which is a packet-switched data network.

DACOM. DACOM is Korea's primary common carrier for domestic and international service in data communications. DACOM provides value-added services such as packet network service, data communications, E-mail, videotex, and leased line.

DACOM-NET, a nationwide packet network, since 1984 has provided public data communication services with protocol conversion and basic transmission service. Two services, leased line and dial-up lines, comply with the procedures set out in CCITT Recommendation X.25 and X.28.

DACOM has obtained the right to operate and market leased data

---

[28] Hightec, Korea, September 1987, p. 17.

[29] Maeil Kyungje Shinmun, Korea, Nov. 11, 1987, p. 6.

[30] DACOM, 1987 Annual Report, p. 16.

circuit service, leasing lines for this service from KTA. Transmission speed was 56kbps as of 1987. (DACOM owns its packet network.)

DACOM provides and has been developing VAS since 1986,[31] including its credit card information system (CCIC), reservation information system (RIS), KOTIS, as described above, and a VAN for the steel industry developed jointly by Pahang Iron & Steel Co. and DACOM through DACOM-NET.

KTA. In the VAS field, KTA first offered its telephone mailbox service on the occasion of the 1986 Asian games and again made it available for the 1988 Seoul Olympic Games.

---

[31] Ibid.

Table 3-2 summarizes the development and dissemination of value-added services in Korea.

Table 3-2

Value-Added Services in Korea
(as of March 30, 1987)

Service	Service definition	Users	Provider
Packet network service	Dial-up, 300 to 960 bps	1136	DACOM
E-mail	Notice, Dialcom	252	DACOM
Videotex	Test service	38	DACOM
Leased line	50-9600 bps	21,976	DACOM
On-line computing	Timesharing	248	DACOM
Voice mail	Message transfer through telephone	582	KTA

Adapted from Jong-Soon Lee, Ministry of Communications, Korea, "The Enhanced Communications and Legal System in Korea," Telecom '87, IIIB.

3.1.3 Differences between the U.S. and Korea

Table 3-3 summarizes basic differences between the U.S. and Korea in value-added service provision.

Table 3-3

U.S.-Korea: Basic Differences in VAS Provision

VAS definition	Definitions of VANs and enhanced or value-added services differ.
VAS market	In Korea, the common carrier DACOM has dominated the VAS market or packet-switched network. In the U.S., the common carriers are not as strong in this area in comparison to such third-party providers as Tymnet or Telenet.
Regulatory focus	In Korea, regulation of private company provision of VAS is more restrictive, while in the U.S. regulation of common carrier VAS provision is more restrictive.
VAS standardization	In the U.S. VAS have been operational since standardization was developed on an industry-association basis, but in Korea such efforts are in their initial stages.
Experience	In the U.S. VAS began 10 years earlier than in Korea and has accumulated that much more expertise.
Database use	In the U.S., databases (DB) have been developed along with VANs. In Korea, however, consumers are not accustomed to database use and its development is delayed accordingly.
International	In the U.S., private companies can be involved in international VANs, but Korean private companies cannot. In the U.S., private companies are moving into the international arena and large-scale VANs, but Korean private companies cannot do so.
Common carriers	In the U.S., AT&T can provide enhanced and telephone services. Under the FCC's decision in Computer Inquiry III, BOCs can provide all enhanced services. (Certain BOC enhanced services are barred by the MFJ.) In Korea, common carrier service is divided into data communications and other business. Under certain circumstances, KTA can provide VAS. DACOM still owns and operates a nationwide packet network serving all across Korea, while AT&T was divested of the local network operations with the separation of the BOCs. (DACOM leases lines from KTA for leased-line service.)

3.2 Problems and conflicts between players

The inauguration of VAS calls for the balancing of regulatory, technological, and developmental efforts toward growth and market formation. But Korea's initial stage lacks such balance.

3.2.1 Group VAN

3.2.1-1 What has hampered progress toward construction of group VANs?

Technology transfer from foreign companies. SDS and SDM, domestic companies, are establishing companies through joint ventures with IBM and EDS of the U.S. for technology transfer especially for VAS development. Progress depends largely on how much technology the foreign companies are willing to sell. The domestic companies desperately want to acquire the technology, but they have had problems doing so.[32]

Business considerations beyond group VANs. VASPs are very interested in being involved in third-party business beyond group VANs. They are preparing to gain ground by copying their competition in the near future, especially for general-purpose VAN business as in the advanced countries.[33]

Standardization of communication protocol. Korea still lacks interconnection of systems using Hangul code, interoperability among different computers, and standardization of business protocol.[34]

Lack of computer culture. Decision makers at the management level do not understand how to measure the impact of investments in computer technology and systems.[35]

---

[32]Hightec, Sept. 2987, p. 19.

[33]Ibid., p. 16.

[34]DACOM, Computer and Communications, Korea, Vol. 2-3, March 15, 1988, p. 15.

[35]Ibid.

Existing regulatory system. The regulatory system prohibits shared use of multiplexer equipment among group companies and limits expansion of service between closely related organizations.[36]

High-speed digital leased circuits. Safety features may be lacking at present but may be installed by the end of 1988.

3.2.1-2 Conflicts between players

- **Regulatory agency: Ministry of Communications (MOC)**

The MOC has asked VASPs to implement group VANs because the service would provide telecommunications impartially to the public, would upgrade the technical quality of telecommunications, would limit overlapping investment, and would standardize equipment to use communications resources effectively.

The MOC is planning to actively support the formation of VAN enterprises through utilization of multiplexer equipment, development of continuity in circuit utilization, and government investment in standardization specification, but specifics remain undecided.[37]

There are conflicts between the MOC and VASPs over adoption of a standard. VASPs must adopt the X.25 communication protocol when connecting their systems with the public switched data network (PSDN). When VASPs connect their system to different or similar systems, they are also supposed to adopt the X.25 protocol. When VASPs connect their system with the public system, the MOC also recommended that they adopt KSC5601, a code for processing Hangul as an information exchange code.

These recommendations may be made into amendments to the laws because of lack of voluntary compliance. In order not to hinder technological innovation and service, the government may consider an adoption period for standardization.

---

[36]Maeil Kyungje Shinmun, Korea, Feb. 13, 1988.

[37]Computer and Communications Promotion Association, Information Age Society, Korea, Jan. 1988, p. 14.

- **Value-added service providers (VASPs)**

VASPs in joint ventures with SDS and STM hold different opinions on use of the Hangul standard code. SDS wants to use the Hangul standard code only for connecting the system with different computer systems, including connection with DACOM-NET, because of SDS' relationship with IBM. On the other hand, STM wants to adopt the Hangul standard code only on the data-sending side, no matter what the systems are, because they are more interested in the market for information communication services than for hardware.

VASPs also take a position different from the MOC on the timing of standardization, both for adopting X.25 protocol to connect different systems and for adopting Hangul code.

VASPs want to expand their service to function as third-party providers. VASPs also want to expand the scope of their shared use of leased circuits, and the MOC is looking into this request.

VASPs are making many kinds of proposals to the MOC and DACOM to increase their (VASPs') cost effectiveness.[38] These include:

- use of multiplexer equipment to improve group VAN performance;
- ending of separate network installations in favor of shared use and networking among information service providers to avoid overlapping service and waste of equipment;
- improvement of DACOM-NET quality to improve customer service;
- less restricted shared use of DACOM-NET between domestic headquarters and branches abroad.

- **Common carrier: DACOM**

VASPs and the Computer and Communication Promotion Association (CCPA) have expressed to DACOM their concern about the quality of DACOM-NET in the installation of group VANs. Accordingly, as of mid-1989, DACOM is testing a new digital leased circuit network in a limited area to increase DACOM-NET's speed to approximately 64kbps.[39]

---

[38] Information Age Society, Jan. 1988, pp. 12-15.

[39] New Industry Management Institute, "21 Century Forum," The New Media, Korea, April 1988, p. 10.

This installation is expected to improve circuit quality and reduce expenses.

VASPs and DACOM take different positions on how a communication network should be designed. VASPs want to design an exclusive network, but DACOM wants any system to connect at the PSDN using the X.12 protocol, as recommended by the MOC.

- **Computer and Communication Promotion Association (CCPA)**

This is a private association supported by the MOC. CCPA makes recommendations to the MOC, DACOM, KTA, and companies developing VANs. These recommendations include:

- **Dissolution of current regulatory systems.** CCPA recommended that the MOC and related agencies adopt standards applicable to multiple computer and communication facilities and approve special regulation for shared use of facilities; modify the plan to establish a special network for data processing (DP) and database (DB) services; and expand the scope of shared use of leased circuits.

- **Improvement of common carriers' circuits and communications network.** CCPA requested that related agencies improve quality control on communications circuits to improve the quality of DACOM-NET and to reduce the fee for use.

- **Development of communications systems.** CCPA asked VAN companies to develop information communications systems and to pioneer the effort to help related industries develop communications systems.

- **Cooperation among the MOC and related agencies and participating companies.**[40]

3.2.2 Initiating value-added service operations in Korea

Since 1987, several approaches have been available for setting up VAS operations in Korea.

---

[40]Information Age Society, Feb. 1988, pp. 44-47.

3.2.2-1 Nomination of service providers and consignment operations

According to Korea's Basic Telecommunication Act (clause 7),[41] to accelerate the growth of new telecommunications services and to increase the efficiency of public communications business management, MOC can nominate, as a new service carrier, any corporation in which the common carrier holds one-third interest. Or, as set out in the Telecommunication Business Act (clause 5), the operation can be consigned to a specific company in accordance with the utility guide stipulated by the common carrier if the consignment is deemed necessary for the operation of the public telecommunications business.[42] Each of these methods has different implications, and the choice between them is not an easy one for DACOM or for the government.

If a new service provider is nominated, the burden of facilities investment for DACOM is reduced and specialized services are more likely to be developed and initiated. However, this procedure does require that an independent organization oversees standardization.

With a consignment operation, the burden of DACOM's facilities investment increases without a guarantee of specialization, while standardization and management of the operation are easier than with the nomination of service providers. (These two methods are further compared in sec. 3.3.2-2, which evaluates alternative implementation plans.)

3.2.2-2 Joint ventures between DACOM and user companies within the same industry

For joint ventures, which are the MOC's preferred arrangements for value-added service provision,[43] DACOM has to invest more than one-third of the capital for the new carrier company. But if DACOM's capacity cannot cope with heavy increases in user needs, other parties (potential users, VASPs, or third parties) could doubt DACOM's ability

---

[41]Telecommunication Policy Institute, Study on International Trend of Service of Telecommunication Industry, Korea, Dec. 1987, p. 81.

[42]The New Media, Aug. 1987, p. 36.

[43]Information Age Society, Jan. 1988, p. 14.

to handle the new ventures and DACOM's participation could cause decreases in the VAN market.

This arrangement can also invite conflicts among competitors in the same industry. This was the case when the Korea Travel Information Service (KOTIS) Co., a joint venture with DACOM, rejected a request of the Asiana Airlines, a competitor, to launch a common operation. At present, the Basic Telecommunication Act (see section 3.2.2-1) requires any operation involving VAN service to be conducted as a joint venture with DACOM.[44]

3.2.2-3 Public VAN and private VAN

The CCPA and the MOC are investigating alternatives for VAN development to improve public service as well as to encourage small and medium enterprises through joint ventures between DACOM and private user companies. (Because the existing VASPs tend to be large private enterprises, there is concern about how to develop the competitiveness of the small and medium-sized companies.) CCPA and MOC would also like to guarantee autonomy for the management of these enterprises and to minimize technical standardization requirements.

They may also suggest other types of ventures to be run by VASPs competing freely for private VAN business.

However, some participants advocate an approach whereby the small and medium enterprises and DACOM try to exploit the benefits of private VANs and at the same form a public VAN for balanced service.

3.2.2-4 Emerging KTA and DACOM VAN business

The duties of the common carriers used to be divided in such a way that DACOM operated in the data communications field and KTA operated in the non-data field, providing voice service, for example.

However, innovations in communications techniques have brought about a diversification in the common carriers' technologies, a corresponding diversification of duties, and conflicts as a result. In particular, KTA's privatization, expected during 1989, as well as the

---

[44] Cho Chun Ilbo, June 13, 1988. (Korean newspaper published in the U.S.)

anticipated future hegemony of new media business through an ISDN, are already causing conflict between KTA and DACOM over new media and VAS business.[45] The formation of a corporation that would compete especially for VAS provision will be required to avoid overlapping investment (that is, to optimize economic efficiency), to ensure fair competition between the common carriers, and to stimulate the VAS market. Of course, the common carriers are in this market; in fact, the efficiency of common carrier involvement in VANs has made their participation a trend in the advanced countries.

3.3 Issues

Efforts to develop VASPs now and enhanced or value-added services in the near future face a range of issues.

3.3.1 Which technical factors are critical for efforts to establish VAS?

3.3.1-1 VANs and packet-switched networks for public data networks (PDNs)

In recent years, public data networks have come to be termed value-added networks because VANs enhance or provide an added value to the communications services offered to the customer.[46] VANs provide such extras as packet assembly/disassembly and protocol, speed, and code conversions. The data stream is changed in some way upon its entry to and/or exit from the network.

Because of the store-and-forward technique in the network node, "all VANs take node-to-node responsibility for transmitted data, and a few take end-to-end (modem-to-modem) responsibility."[47]

Packet-switched networks are cost effective for long-distance, low-volume, DB-access, value-added communication, and public data service. But a circuit-switched connection can be more cost effective

---

[45]"Privatization Limitation's 1 Year," The Maeil Kyungje Shinmun, Korea, June 30, 1988.

[46]"An Overview of VANs," p. C32-010-101.

[47]Ibid., p. C32-010-104.

for batch data and high-speed transmission. In addition, leased lines are more economical over short distances when traffic volume is high.

As a result, if packet-switched networks increase their speed, they could become an international standard for complex networks, and would as such become more widespread. According to claims of optical fiber and packet-switching technologies, a VAN using packet switching could be developed as an ISDN (integrated services digital network).

With use of packet-switched systems by the major public data networks, including VANs in the U.S., DATAPAC, EURONET (Europe Network), TRANSPAC, IPSS, and DDX-P (digital data exchange-packet), packet switching could be the major information network technology of the future.[48]

From the point of view of the common carrier in Korea, VAS for the public may be provided more cost effectively by a packet-switched network, called DACOM-NET in Korea, than by a circuit-switched network or computer network architecture, except in special cases.

3.3.1-2 Protocol and its conversion for different networks and computers

An important function of VANs is to provide communication between different information networks and different host computers.

The CCITT has recommended that each country adopt a communications protocol as a national standard. However, the procedure is not mandatory and may encounter resistance by domestic VASPs and computer vendors concerned that standardization and the legal process involved will lag behind the rapid cycle of technical innovation.

Business protocols adopted by industry groups may prove more effective than national standards. For example, Japan has adopted some industry groups' standards, including, for protocol, those of the distribution association (the JCA, Japan Chain Store Association) and those of ANSI, EDCC, and AIAG from the U.S. However, protocol conversion may be required for combining networks; multi-industry networks may have difficulty trying to communicate using industry-specific standards.

---

[48]Gooya, p. 48.

Most VANs offer three types of protocol "conversion": terminal protocol-to-network protocol, host protocol-to-network protocol, and terminal protocol-to-dissimilar host protocol. Table 3-4 summarizes major trends and characteristics of VAN protocol conversion.

Table 3-4

Protocol Conversion in the U.S.

- Primary access to VANs: Asynchronous terminals, 3270s, 2780/3780s, PCs;
- Unique conversion services are offered for vertical markets;
- Most VANs have SNA interfaces;
- VANs offer international standard access (X.25) and gateways (X.75);
- Unique network nodal hardware and software;
- Unique network architectures (OSI and ISDN are only distant guiding lights);
- Pricing of protocol conversion is bundled with services;
- Protocol conversion is becoming an integral part of network operations as anything-to-anything service expands;
- Protocol conversion is both a necessary part of VAN business and a competitive opportunity.

Source: The Yankee Group, The Network Resource Report, Boston: The Yankee Group, Vol. 4, 1984, p. 5.

For Korea at the initial stage of VAS development, adoption of a business protocol as a standard may offer a viable option for intercompany network service and for cost reduction. In addition, these U.S. developments suggest that VAN protocol conversion may become cost-effective for interconnection between different networks and computers.

3.3.1-3 Intracompany networking for cross-industry communications

Since the beginning of the 1980s in the U.S. and Japan, most large corporations have been moving from their own internal data networks into cross-industry communications. In the case of McDonnell Douglas in the U.S., 65% of EDI service among enhanced-service customers requires translation services. In addition, approximately 50% of EDI-Net's customers use microcomputers to access the service, and 46% use large mainframe computers.[49]

Over time, users may find it increasingly necessary to use VASPs to cope with the dynamics of modern business operations, such as response time constraints, the costs of manual operations, and increasing complexity in general. As a study of Japanese intercompany networks has noted, in advanced countries,

> intercompany networking is a major trend today, as corporations become aware that the effective use of intercompany information networks is a crucial factor in competing successfully in the marketplace.[50]

(Intercompany networks, called "horizontal networks," are networks for corporations belonging to the same industry, while those among different industry groups are "vertical networks.")

As a result, users have encouraged computer system and service providers and communication carriers to adjust their traditional closed-system design or service principles, that is, specific or

---

[49] Intercompany Networks, p. 39.

[50] Japan, MITI, Industrial Policy Bureau, Information networks in business, quoted in Takashi Yokokura, Emerging Corporate Information Networks: Regulatory and Industrial Policy in Japan. Cambridge, MA: Program on Information Resources Policy, July 1987, p. 45. According to MITI statistics, "32% of firms in Japan are constructing intracompany information networks; 20%, intercompany networks. . . . The growth rate in circuits used for intercompany information networks (33% per year) was larger than that for intercompany information networks (14% per year) from 1980 to 1983." (Yokokura, p. 22.)

limited service, to a more open-ended approach that would be more responsive to market demand for value-added service.[51]

In Korea, value-added service may be considered a translation service, or a system whereby micro-computers communicate with large mainframes for cross-industry communication using a public VAN, except for especially sophisticated information services.

3.3.1-4 Public packet-switched network and private networks

In general, most private information networks find it difficult to exchange data efficiently; under the current regulatory system in mid-1989, they are usually equipped only with leased circuits and multiplexers.

For distribution processing, use of circuits in private networks is even more complex and inefficient. And if the system needs to be changed, the complexity of the network makes overcoming each obstacle expensive.

Under such circumstances, private networks tend to form their own private packet-switching networks to make effective use of communication circuits. It is also possible to make use of third-party private networks, but these are limited under current regulations in Korea.

As mentioned above, among the advantages of a public packet-switched network are that "the network takes total responsibility for [its own] maintenance and operation . . . and for the integrity of the transmitted data. It provides flexible switching that permits users to communicate with multiple locations, and requires little or no capital outlay."[52] However, security can become an issue to users transmitting sensitive data.

Private packet networks may be more cost-effective, especially if services can be resold during off-peak time, and especially for user-specific technical capabilities that might not be available from the public network. Private networks also offer total data security and

---

[51] Intercompany Networks, p. 8.

[52] "An Overview of VANs," p. C32-010-107.

high-volume traffic capacity, as well as reliability, quality, and cost savings.[53]

In the future, the choice between public packet-switched and private networks may be a critical one for increasing the generalization, or versatility, of the network and for stimulating information flow between related industries and the public VAN. Such development may require the joint efforts of government and private industry.

3.3.2 What policy alternatives could promote VAS in the near future?

The methods and business style for developing value-added services differ depending on the technology techniques involved, current regulations, and environmental conditions in each country. In Korea, development of VAS is behind that of the advanced countries. Judging from the experience of the advanced countries and considering the environment in Korea, better VAS at lower cost for users and stimulation of business use may depend on more timely liberalization of service provision.

But in the advanced countries, development of an infrastructure for services has taken more than 10 years. This period has included standardization of technologies, improvements to the environment, including the maturing of the system within enterprises, and supplementing of the regulatory system to cover, for example, circuit formation and circuit limitations.

The following sections will attempt to articulate policy alternatives for building an environment in which VAS can develop in a way that balances between rapid expansion of private VANs and concerns about the public VAN.

---

[53]Ibid., p. C32-010-107.

3.3.2-1 Priorities for VAS in Korea

1) Establishment of a standardization management organization

If the government wants to see standardization take place, initially it may have to take the initiative through the regulatory route. Standardization between related organizations and systems may help avoid the user expenses and difficulties in transferring into competitive systems that could result from delaying this task.

Standardization concerns both communication protocols and of business protocols. (See Chapter Two.) Therefore, the CCPA is expected to play a key role in technical standardization, but VAS within the same industry would have to cooperate with both the CCPA and related associations to apply common rules and procedures. Government guidelines for protocol standardization could formulate basic principles, model proposals, and implementation procedures in anticipation of likely conflicts between domestic and foreign interest groups. (Again, see Chapter Two.)

Korea may be able to benefit from the experience of advanced countries, such as the U.S. and Japan, which completed basic business protocol standardization around 1980. The Korean government may also have to consider financial support for protocol conversion and standardization for implementing intercompany information networks.

If the government wants to ensure fair competition in network access for value-added service providers, guaranteeing interoperability to decrease network exclusivity would be critical in the near future.

2) Construction of versatile databases

Under current communications regulation in Korea, third-party providers can offer database information retrieval services. But information service providers have traditionally resisted the construction and opening of databases because of the slow growth and formation of the database market.[54] In addition, differences among database retrieval procedures have made it difficult for different types of

---

[54]DACOM, Information Age Society and New Media Service, Nov. 1987, p. 13.

computers to access each other. Fortunately VAN host computers can now translate instructions and provide standardization, providing important added value as networks for database retrieval.

If personal computers continue to spread as they have, the population could view diversified DB construction as a democratic right and as appropriately supported on a policy level with legislation on access to information.

For databases, packet-switched networks may have advantages over circuit switching because prices for the former are based on communication volume.

3) Extension of group VANs

Although group VAN business has been permitted on a limited basis since May 1987, it has not been pursued aggressively because of regulatory, technical, and environmental limitations. Given this situation, two options that could extend the scope of service of group VANs in Korea might be:

Step 1: Minimum system integration and preparation for standardization. Choice of a network construction method could take into consideration computer architectures, DACOM-NET, and private packet-switched networks. At present, connection of similar systems is most feasible; connection of dissimilar systems could follow. Installation of the basic network would be a prerequisite for flexibility in coping with changing systems and networks.

Standardization efforts can consider Hangul code and X.25 for public service. Standardization could be accomplished by the government with joint efforts by related private sector groups. Setting up principles and changing the protocols, especially to establish a standard business protocol (including format, code, and other elements discussed in Chapter Two) will be important to this effort.

Also critical will be a continuous supply of good-quality, error-free packet switching, and installation of high-speed digital leased circuits. In particular, high-speed digital leased circuits need to be installed for a trunk line at major cities nationwide with T1 circuits and optical fiber. In Japan, NTT started providing high-speed digital

leased circuit service at the end of 1984,[55] and since 1985 orders for circuits, at more than 3000 circuits, have exceeded the number of circuits available (more than 2000). T1 circuit bit rates can be very high speed -- 64 kbps, 192 kbps, 384 kbps, 768 kbps, 1.5 Mbps, 3 Mbps, and 6 Mbps, depending on data volumes.[56]

Maximum use of foreign techniques, including EDI standardization and interconnection techniques, could greatly benefit the Korean effort. The need for acculturation to VAN and computer use -- development of a computer mindset -- suggests public educational requirements.

Revision of the rules on shared use of multiplexers would help develop the group VAN system.

Step 2: Extension of group VAN business through third-party providers. The objective would be for third-party providers to extend group VAN business. In advanced countries, VAS have been developed to integrate existing systems and for extending service to other parties. Thus in Korea VAN business will actually begin when the scope of shared use of leased circuits is extended, and when private packet switching is installed within group VANs to solve technical problems.

4) Assistance policies and aggressive introduction of advanced technologies

As briefly mentioned earlier in this chapter, balanced development of public and private VANs, a smooth flow of intercompany network service, and provision of a varied menu for PC users would seem to require government assistance, such as low-cost financing and tax deductions. Targets for this assistance would be standardization, database building, and purchase of equipment from small and medium-sized firms.

Joint ventures may also provide assistance.[57] Even advanced

---

[55]Nakano, Telecom '87, Session 3, para. 2.2.

[56]Ibid.

[57]Joint ventures have come about in the telecommunications industry because of:

> "(1) the convergence of computers and telecommunications;
> (2) shorter product lives driven by rapid technological improvements;

countries, such as Japan and the U.K., are introducing advanced technologies through joint ventures with the U.S. Joint ventures for VAS may also help Korea introduce advanced technology, avoid trade friction between countries, and bring about an earlier installation of a VAS system and of an infrastructure for international VAS business, including the technologies for interconnection, conversion, and business protocol development. If the technologies are proprietary, that may represent another problem.

3.3.2-2 Alternatives for balancing development of public and private VANs

With the rapid growth of VAS and VANs internationally, communications policymaking in many countries faces critical uncertainties. For Korea, the following analysis compares development of VAS through a public value-added network to development through private VANs, taking into account positive and negative impacts on common carriers and VASPs.

1) Public VAN

A public VAN provides universal service and serves public interests as part of the national infrastructure. It might not offer a specific service nor serve a specific area as private VANs do.

Strengths in common carrier VAS provision and positive impacts on common carrier and government stakes. Common carriers could participate at a public service level as early stages proceed, and could protect small and medium-sized firms as well as areas considered public interests. Thus common carrier VAS provision would continue to support public interests.

---

(3) huge R&D expenditures made by ongoing and new competitors;
(4) intensification of global competition;
(5) deregulation of telecommunications;
(6) potential breakdown of trade barriers as a result of technological changes and political activities."

K.R. Harrigan, Strategies for Joint Ventures, Lexington, MA: D.C. Heath and Co., 1985, quoted in Yokokura, p. 71.

In the advanced countries, common carriers first established nationwide networks through the public switched data network, providing universal public service. Then private VANs were permitted.

The public VAN can serve as an infrastructure for working toward the establishment of an ISDN in the future, as well as for providing a stable supply to meet demand. A public VAN can cope with increasing demand for databases as personal computer use increases nationwide.

The public data networks of most countries are using packet-switched networks, which are replacing circuit switching for the information networks of the future. Of course, if communication speed can be increased, packet switching will be even more widespread.

As it involves the common carrier, the network takes total responsibility for its own maintenance and operation and for the integrity of the transmitted data. It also provides flexible switching.

In addition, the public VAN may cope most effectively with pressure from advanced countries for open markets in Korea because under present law public VAN service can be provided as a joint venture, combining common carrier resources with those of a private company, whether domestic or foreign, to form a new service provider, or "new carrier." (See Table 3-5 and the discussion following it.) Such a carrier could operate at a level equal to that of domestic private or foreign companies.

Under current regulations, there is unfair competition between the common carrier and VASPs, as in advanced countries before liberalization.

Weaknesses in common carrier VAS provision and negative impacts on common carrier and government stakes. If demand for public VAN service increases gradually, DACOM itself may find it difficult to proceed in developing VAN business. Alternative methods of communications business management may be needed to keep up with demand for VAN business.

The common carrier may find it difficult to install the public VAN because of problems meeting demand for highly diverse services and shortages of equipment especially in the case of small firms. It may

also be a long time before any profits are seen. In addition, public VANs require more standardization than private VANs.

Users of the public VAN may encounter security problems, especially in transmission of sensitive data.

Implementation plan for further development of the public VAN.

- Joint venture by DACOM and private companies. VAN business conducted by the national infrastructure and that concerned with public interests are defined as a public VAN and therefore can be installed as a joint venture of the common carrier with a private company. Earlier in this chapter, section 3.2.2-1 described two approaches to joint ventures with DACOM -- nomination of a service provider and consignment operation. Table 3-5 compares these two approaches.

Table 3-5

Comparison of Joint Venture Implementation Alternatives for a Public VAN

Nomination of Service Provider (New Carrier)	Consignment Operation
Decreases DACOM's equipment investment	Increases DACOM's equipment investment
Profitability guarantees the autonomy of the business	Depends on DACOM's business
Good for specialization in development and implementation	Does not guarantee specialized development
Could deal with pressure from foreign countries to open markets	Could not handle such pressure
Independent standardization organization would be necessary	Standardization would be easily accomplished
Difficult to manage effectively as service provision increases	Management is less problematic

Implementation may place other demands on national policy, especially for maintenance of fairness in communication and for support for the PSDN, videotex, and MHS (message handling systems) during a possible time lag before profits are realized. In addition, high-speed, large-volume intercompany information networks or a nationwide public VAN will require installation of high-speed digital leased circuits.

Other considerations for public VAN implementation of VAS include:

- Depending on the level of information, the security problem may be dealt with by checking access qualifications and by data encryption. Data encryption responsibilities usually lie with the user.
- Assistance in facility investment is likely to need upgrading, and a profitable rate system would benefit participating organizations.
- Top priority for VAN development by small and medium-sized firms would help ensure competition with large private companies.
- Effective shared use of private VANs and provision of universal service will require nationwide extension of the packet-switched network, which is currently inadequate. In particular, a public VAN in the public data network would require value-added capabilities, such as PAD (packet assembly/disassembly) and protocol, speed and code conversions, for networking among private VANs and combined public-private VANs.
- Introduction of open network architecture (ONA) and structural separation may warrant consideration. ONA, now a requirement for competitive business providers (VASPs) in the U.S. (see Chapter Four, following), may be necessary to ensure competition with common carriers. Although structural separation can be studied as an alternative approach to securing fair competition, caution may be warranted about the effects on efficient provision of public service.

2) Private VAN

Private VAN refers to VAN service provided by private companies; for example, inter- or intracompany networks and private service not provided by the public VAN.

Strengths of private VANs and positive impacts on private VASPs. Private VANs may be a feasible way to implement VAS. System formation could be based on private initiative and extension of existing facilities to meet demand for specialization and for speedy answers to evolving, sophisticated user needs.

Earlier introduction of competition could help bring about better services at lower cost to users.

Private VANs can guarantee "total data security" more easily than can a public VAN, because private providers can offer specific services, such as sophisticated data security designs. In contrast, the public VAN provides universal service not geared to sophisticated requirements of specific organizations.

Early introduction of competition in the domestic VAN business could enhance their competitive strength in international VAN business. This business may be growing as advanced countries pursue a basic trend toward open policies in VAS provision.

Vertically integrated services may have competitive advantages. In particular, large-scale VANs can penetrate the market partly because of their vertically integrated service offerings.

Incompatibility among terminals and among software may increase, as described in Chapter Two, a problem which private VASPs may be better able to solve.

Weaknesses in private VANs and negative impacts on private VASPs.

- Problems in installation. An essential condition for value-added service provision is not yet established, namely, installation of a business protocol for private companies and computerization of the sales environment within companies. Although value-added services have been developed with installation of intercompany network systems in advanced countries, few large private companies in Korea have even installed intracompany network systems.

A private VAN system may be difficult to install because of lack of experience with development. Misunderstandings about communica-

tions, business protocols, and security between members of the same industry may also bring about delay.

- Competitive problems for VASPs. Common carrier networks may increase their intelligence. Common carriers can provide protocol processing as an adjunct to basic service, which could threaten the VASP market.

Private VASPs would have difficulty achieving economies of scale and scope because common carriers, with their many customers, may control the market. In addition, large user companies may also consider establishing their own private networks, thereby limiting VAN business opportunities.

VASP business may also decrease if incompatibility among systems decreases. Standardization efforts in international and national organizations may minimize interconnection problems.

Implementation plan for VAS through private VANs.

In areas other than the public VAN, the introduction of competition could help increase the cost-effectiveness of VASP service for users and could increase competitiveness in the international VAN business.

3) Summary of alternatives

The common carrier cannot by itself meet the requirements of users and of domestic and foreign businesses.

Although common carrier and VASP value-added service provision have both positive and negative impacts for the stakeholders, implementation of VAS and maintenance of a balance between public and private VANs may require the common carrier and VASPs to have separate areas of service. An earlier starting date may be indicated by the level of cost effectiveness for users, but installation may have to wait for attainment of the priority conditions described in section 3.3.2-1.

To guarantee universal service to the public, the common carrier could service a major VAN for public interests and for use by small and medium-sized firms. To cope with demand for VAS, DACOM could nominate a service provider for joint ventures and, in addition, could participate in joint development with private user companies.

VASPs could service all areas with the exception of the public VAN, because introduction of competition and early liberalization of leased circuit use may be a way to provide cost-effective service to users and to increase international competitiveness. Accordingly extension of the scope of group VAN service by allowing third-party shared use of leased circuits could put VAS on a business footing.

If KTA provides ISDN service -- that is, both data communications and voice services -- and if KTA's and DACOM's investments thus overlap, then KTA and DACOM will be competing in the data communications sector. Although maximum participation may be beneficial to VAS development, the government policy is to avoid overlapping investment in order to optimize facility use and development. In the long term, full competition with the common carrier may be necessary, as in advanced countries.

Installation of high-speed digital leased circuits may be required to service high-speed, large-volume intercompany information networks or a nationwide public VAN.

3.3.3 Requirements for VAN growth

Responsibility for VAN business. VANs involve the communication of data belonging to third parties; the security of secrets in very important. Users rely on the VAN as their own network, and the operators have to be prepared for natural disasters, such as fire, earthquakes, and floods if they are to reduce the risk of communication failures.

In Japan, the MPT ruled on this area in October of 1982.[58] With Korea's technology far behind that of the U.S. and Japan, the agencies concerned face needs for improvement.

Strengthening of competitive conditions. Modification of the conditions for competition with the common carrier could contribute to sound development of value-added services. To maximize profits, private businesses tend to be involved in large cities where they are also in competition with the common carrier, while the private busi-

---

[58]Gooya, p. 177.

nesses have minimized their investments in nationwide business. Similarly, in the U.S., the introduction of competition brought with it lowering of AT&T's telephone and leased circuit rates.[59]

Can conditions for competition be equal? If the common carrier competes with private VANs by using the money made in VAS provision, conditions for private VAN competition will be undermined. Therefore government regulation may be needed in areas sensitive to competition between the common carrier, private VANs, and data processing.

Fees for communications circuits. For VAN businesses that lease specific communications circuits from the common carrier and provide services to users, the common carrier's fee for the circuits has a tremendous impact on the users' fee for VAN services. In other words, the fee for VAN service is determined largely by the fee for specific common carrier circuits. If the fee for DACOM-NET is lowered, the competitive conditions between the common carrier and the VASP for VAN services is shaken.

The need for a VAN support policy. Establishment of a VAN requires vast amounts of money and high technology, and it takes a long time for VANs to realize profits, as seen in the cases of Tymnet and Telenet in the U.S. Therefore a government-supported VAN development program may be a key factor for achieving the potential development of domestic industries and of the domestic economy that a vigorous VAS industry could bring.

---

[59]Ibid., p. 179.

CHAPTER FOUR

POLICY ISSUES IN ADVANCED COUNTRIES: OPEN NETWORK ARCHITECTURE IN THE U.S. AND OPEN NETWORK PROVISION IN THE EUROPEAN COMMUNITY

The concepts of open network architecture (ONA) and open network provision (ONP) were introduced in the advanced countries during the 1980s and remain a vague mandate, with details of implementation still under debate. Although the concepts and their backgrounds differ somewhat, they both have been touted as able to support the best possible conditions for innovative development of value-added services by competitive providers in the communications sector.

This chapter describes the concepts, aims, and different viewpoints among the major players, as well as similarities and differences between the ONA and ONP concepts. These analyses are intended to be helpful to government policymakers, common carriers, VASPs, users, and all those whose efforts are related to VAS. The concepts may suggest alternatives for promoting maximum efficiency and availability of VAS; in fact, the emerging regulatory system in Korea may require the common carriers, DACOM and KTA, and VASPs to meet ONA and ONP requirements for fair competition in the future.

4.1 Toward ONA in the U.S.

The FCC established a new regulatory framework to govern the participation of AT&T and the BOCs in the enhanced services marketplace, implementing nonstructural safeguards in the Notice of Proposed Rulemaking (released August 16, 1985) of Computer Inquiry III.[1]

ONA is one of these safeguards. Others are the interim concept of comparably efficient interconnection (CEI), allocation of joint and common costs, disclosure of network information, and access to customer proprietary network information.[2]

---

[1]Computer Inquiry III, Report and Order, 51 Fed. Reg. 24410 (July 3, 1986).

[2]Ibid., p. 109.

- **Aims of ONA requirements**

ONA and other nonstructural safeguards are designed to improve the efficiency of the telecommunications network and to protect competition in the enhanced services market.[3] Under ONA, dominant carriers have to make features as available and as efficient for other enhanced service providers as they have for themselves.

- **ONA general principles**

Under CEI requirements, dominant carriers must provide interconnection opportunities to others on an "equal access" basis and must unbundle basic services.

ONA plans must meet such CEI parameters[4] as interface functionality and unbundling of basic services. The other CEI requirements deal primarily with pricing.

- **Viewpoint of RBOCs and AT&T**

The regional BOCs accept ONA as a new concept because it allows enhanced service provision, stimulates the new market and provides market opportunities, and could increase profits by maximizing use of the basic network infrastructure and minimizing bypass.

However, AT&T argued that the CEI and ONA requirements are unnecessary and inappropriate, and that the costs will outweigh the benefits of being allowed to integrate enhanced services.

4.2 Toward ONP in the EC's Green Paper

On June 30, 1987, the Commission of the European Communities (EC) issued a Green Paper entitled, "Towards a Dynamic European Economy: Green Paper on the Development of the Common Market for Telecommunica-

---

[3]M. Warr and C. Mason, eds., "News of the Week: AT&T says ONA Elements Are Already Available," Telephony, Vol. 214, No. 6, Feb. 8, 1988, p. 12.

[4]Ibid., pp. 80-81.

tions Service and Equipment."[5] The purpose was to "promot[e] a harmonious development of economic activities and a competitive market throughout the Community and for achieving the completion of the Community-wide market for goods and services by 1992."[6] ONP was deemed especially important for the transition toward a more competitive terminal equipment market and for VAS in a competitive EC-wide market environment.[7]

- **Background of these major changes**

First, political attitudes in the West have undergone a variety of changes in recent years, witnessing the birth of "Reagonomics" in the U.S. and of privatization and free markets in the U.K. Second, corporate users have pressured for lower tariffs and lower-cost equipment. Third, suppliers need a larger base market to cover the costs of production, a condition known as economy of scale.[8]

- **European Community market goals**

As trade barriers break down between member states and a single European market emerges, two goals could be achieved. First, the European nations could be so interlinked that the economic consequences of yet another European war would be unthinkable. Second, a trading block would be created that could rival the might of the U.S.[9]

- **Green Paper recommendations**

More specifically, the Green Paper calls for:

---

[5]Commission of the European Communities, "Toward a Dynamic European Economy: Green Paper on the Development of the Common Market for Telecommunications Services and Equipment," reference COM (87) 290 final, Brussels, June 30, 1987. (Hereafter referred to as the Green Paper.)

[6]Ibid., Summary Report, May 26, 1987, p. 2.

[7]Ibid., p. 22.

[8]John Watkinson and Alan Horne, "New Standards bring New Opportunities for European Telecommunications," Telephony, Vol. 214, No. 4, Jan. 25, 1988, p. 46.

[9]Ibid., p. 48.

- full liberalization of the terminal equipment market and of VAS;
- the separation of regulatory and operational responsibilities of the telecommunication administrations;
- establishment of tariffs that follow overall cost trends;
- introduction of the ONP concept; and
- a strict requirement regarding standards for the network infrastructure and services.[10]

On the subject of ONP, the Green Paper states that

> . . . the European Community will have to develop common principles regarding the general conditions for the provision of a network infrastructure by the telecommunications administrations to users and competitive services providers, in particular for trans-frontier service provision."[11]

ONP is primarily aimed at serving the needs of private service operators (PSOs) offering VAS to third parties. In other words, ONP calls for the definition of common interface arrangements for provision of the network infrastructure. These include interfaces to non-switched transport services and to switched service.[12]

- **Different viewpoints**

Officials of the EC have stated that "'if our partners want to take advantage of our integration and profit from the dynamism it will create, they will have to open their own markets on equivalent terms.'"[13]

---

[10]Green Paper, Summary Report, p. 23.

[11]Green Paper, chap. VI, sec 4.2.3, p. 69.

[12]Analysis and Forecasting Group, Report by the "Analysis and Forecasting Group" (GAP) on Open Network Provision (ONP) in the Community, Brussels, Jan. 20, 1988, p. 7.

[13]"Single European Market, The Economist, Apr. 3, 1988, pp. 52-54, and Mark M. Nelson, "Protectionism Looms as Europeans Unify," The Wall Street Journal, May 10, 1988, p. 34, quoted in Morris H. Crawford, EC '92: The Making of a Common Market in Telecommunications, Cambridge: Program on Information Resources Policy, Harvard Univ., 1988, p. 24.

The non-European countries basically welcome the broad liberalizing objectives of the Green Paper and its pro-competition thrust. But they have suggested that anything less than truly fair international competition would prevent European industry from taking full advantage of the rapidly evolving innovations in telecommunications equipment and service.

European industries generally support the objective of the Green Paper -- to promote fair and open competition in the telecommunications market throughout the Community, so as to provide an appropriate environment for the development of strong, internationally competitive European enterprises.

4.3 Similarities and differences between the ONA and ONP concepts

The concepts of ONA and ONP have much in common. The most important similarity is that both concepts, according to their proponents, aim at creating the best possible conditions for innovative development of VAS in a competitive environment. These "principles" include technical, regulatory, and economic aspects.[14]

The major differences are:

- Whereas in the U.S., interexchange services and intra-LATA services are structurally separated, generally in Europe both local and trunk networks are nationally provided by the Telecommunication Administrations. . . .
- Whereas in the U.S. there is no historical separation between provision of voice services and the provision of text and data transmission and switching services, there is no such separation in the Community.
- Whereas AT&T and the BOCs can not enter the value-added services market except under non-structural separation, the Telecommunications Administrations within the Community are more or less already involved in value-added services offerings.[15]

---

[14]Analysis and Forecasting Group (GAP), p. 17.

[15]Ibid.

4.4 Applying ONA/ONP development in Korea: Likelihood and impacts

4.4.1 ONA/ONP likelihood

Under current laws and in the current environment in Korea, the possibility of ONA/ONP adoption is small, but potential changes could increase this possibility.

For example, as mentioned in section 4.3, ONA and ONP aim at creating the best possible conditions for innovative development of VAS in a competitive environment. However, the Korean environment lacks the conditions for common business as described by the Green Paper and is not prepared to change from the structural separation of Computer Inquiry II to the non-structural separation requirement of Computer Inquiry III. In addition, the regulatory infrastructure for full competition in VAS is not mature.

Gradually, however, the likelihood of ONA and/or ONP implementation in Korea may increase, for several reasons. First, competition may develop between DACOM and KTA, as mentioned in Chapter Three. Second, there are pressures and trends toward open policies in the advanced countries, which could expand into a competitive VAS sector in Korea. Third, the spread of domestic terminals and expansion of the domestic communications network will increase open network offerings.

4.4.2 Impacts

If ONA/ONP is introduced, service offerings could potentially differ from existing offerings in terms of technical interfaces, usage conditions, and/or tariff principles. Under ONA/ONP, common carriers could gradually extend their offerings on the basis of technical progress, regulatory evolution, market demand, and technical operational and commercial viability.

Initially, ONA/ONP would only be applied to certain reserved services provided by the common carriers. Non-reserved applications would include competitive services such as VAS. "Fair competition" in the VAS markets would only be expressed through non-technical means; for example, tariffs and usage conditions.

ONA/ONP implementation would likely be a continuous process strongly influenced by technical development in the existing networks, such as development toward an ISDN. ONA/ONP would need a network foundation (that is, layers 1-3) on which to base OSI service, to offer addressability and interconnection for both local and global networks.

The availability to users of this choice between open network offerings and existing offerings would have an impact on the size and planning of the network and on the common carrier's marketing approach.

Uniformity in usage conditions, tariff principles, and technical interfaces would help stimulate the development of VAS. These conditions would permit VASPs to provide their services in a way that allows free and fair competition between all competing providers. It is by this means that ONA/ONP could stimulate VAS development.

On the other hand, all VASPs in all circumstances will not find open network offerings attractive, depending on the usage conditions and tariff arrangements. In addition, many users will continue to use the existing common network.

DACOM and KTA may conflict over limited service areas. Thus pressure may increase for introduction of ONA/ONP, liberalization of service provision, and establishment of conditions for fair competition for VASPs in VAS.

To identify resources and appropriate scheduling for ONA/ONP development in Korea, a step-by-step approach as in the U.S. and consideration of all players' priorities will be key factors.

CHAPTER FIVE

MEETING THE CHALLENGE: SUMMARY, POLICY OPTIONS, AND IMPLICATIONS

In this chapter, summaries of the four preceding chapters serve as a basis for three alternative VAS policy models for Korea. Following the chapter summaries, these options are considered in terms of regulatory and technical environments and impacts on the players' stakes, as well as in terms of the policy challenge to balance between the public interest in universal service and the private interest in economic efficiency.

5.1 Summary

Liberalization

The regulatory framework for VAS in Korea has changed dramatically toward liberalization and competition in the 1980s. In 1982, with the separation of KTA from the MOC, DACOM was incorporated to integrate expansion through cooperation between the telecommunications and computer industries. In 1985, the category of information processing was designated to promote competition among private company information service providers (ISPs) offering data processing and database services. In 1987, although the communications industry continued to function under a monopoly policy, the influence of foreign companies and large private domestic companies brought about limited competition in VAS through group VANs.

The regulatory frameworks in such advanced countries as the U.S., Japan, and the U.K. have been affected by evolving technologies and user requirements, as well as by foreign influence. During the 1980s, these countries have adopted policies that have changed regulations but have not deregulated communications services. In addition, France and West Germany are considering moves toward liberalization. Overall, the versatility and internationalization of the information communication industry has spurred the trend toward liberalization and competition in the market arenas and has at times brought about conflict between nations.

As a result, open policies are an international trend, although their adoption can be problematic because regulatory processes and content differ from country to country as much as socioeconomic and political environments differ.

Korea's policymakers face a challenge in their efforts to deal with VAS development in government policy and in the communications industry. The challenge: to establish a degree of openness and steps toward it that are consistent with a government policy of balancing between private interests represented by the large private company VASPs and the public interest represented by the common carrier, and that would also cope with pressure from foreign companies.

Factors that need to be considered during deliberations on liberalization include national security and protection of the domestic industries, public interest and economic benefit, centralization of the economy in large private companies and advanced countries, the overlapping of capital investment, the potential to guarantee the reliability and stability of the network, and standardization of business protocols, to name a few.

Furthermore, the communications industries may not be under government control forever. The histories of VAS liberalization in other countries suggest a number of considerations for the long-term and short-term policy environments in Korea.

In the long term, a policy of full competition may be critical for VAS provision, excepting basic communication network service. There is disagreement over the timing and scope of competition in Korea. (See Options I, II, and III, below, and tables 5-1 through 5-4.)

In the short term, until the demand for basic communications service is met, those concerned with the public interest hold that common carrier monopoly of the PSDN may be essential for concentrating enough resources to establish the communication network. However, in order to maintain a balance between the public interest and economic efficiency for users, short-term changes could include (see Option III and Table 5-1, below):

- removal of constraints on group VANs;
- division of the industry into competitive and publicly supported business arenas;

- equal treatment of foreign companies in joint ventures with domestic enterprises in order to foster international trade cooperation.

Interconnection

A rapid development cycle spawning diverse technologies, products, and new media services has brought about a range of interconnection problems in the marketplace worldwide.

Korea is also vulnerable to these problems, especially in its efforts to install the National Infrastructure Computer Network, in pressures from domestic and foreign companies for open policies, and in its efforts to expand intercompany networks or networks among closely related industries.

Innovations in network technology may support the common carrier's and VASPs' ability to provide such service as PAD, store and forward, E-mail, and protocol and format conversion. Changing computer communications technologies may also support networking among IBM, DEC, TCP/IP, and ISO systems.

Enforcement of international standardization efforts is so weak that political conflicts among nations and companies might be expected. Competition among ISO, SNA, and other de facto standards is likely to remain until equivalent protocols based on ISO standards can provide better service and value-added functions. IBM's SNA can be expected to dominate any vertical market in which IBM controls the dominant market share.

The EDI system can be examined as a model transaction standard for VAS interconnection because it is not limited by differences among computers, among networks, and among companies. For transaction and store-and-forward services, the sender's transaction is converted into speeds, codes, protocols, and document formats compatible with the receiver's environment. If there are interconnection problems, an EDI service provider can interconnect the networks for the end users' convenience.

Internationally ISO and ANSI are developing and providing standardization guidelines.

The standardization process, scope, and content are critical for stakeholders in domestic and foreign markets. Early standardization invites excess momentum and might obstruct market growth and technology development. Late standardization and the resulting excess inertia may hinder the invigoration of the information industry and the adoption of new standards. The result could be a weakening of Korea's international competitiveness and increases in user costs.

Timely standardization of business protocol may be helpful in this regard. In fact, all parties concerned with standardization, including international organizations and users and providers in Korea, are in favor of the standardization process.

With the exception of basic and common communication, service providers may best serve many user requirements.

Development of VAS

In Korea, the development of value-added services and of the VAS industry is still in its infancy. Under current regulations, DACOM is actually the dominant carrier.

In the U.S., Telenet was the first public data network to implement X.25 and packet-switched data services and has offered such services commercially (as unregulated private company services) since 1985. Following Computer Inquiry III, the RBOCs can offer enhanced services while at the same time providing facilities that permit others to market a wide array of enhanced and information services.

Thus the differences between the U.S. and Korea are extensive, from differences in VAS definition, VAS markets, and the regulatory structure, to differences in the standardization process, development experience, the role of the common carrier, and database use.

In Korea, problems and conflicts over group VAN development focus on a range of factors:

- Progress in group VAN construction has been hampered by limitations on third-party use and other business considerations, lack of standardization of communication protocol, limitations in the existing regulatory system, and lack of high-speed digital data circuits.

- Several (sometimes competing) approaches can be taken to the problem of initiating VAS operations: nomination of service providers and consignment operation, public VAN and private VAN, and KTA and DACOM business as common carriers.

Different regulatory, technical, and competitive environments set the stage for different policy alternatives, different markets, and different development methods.

Technological progress has supported the establishment of VAS. In recent years "value-added network" has become the more popular terminology for public data network because VANs enhance, or provide an added value, to the communications services offered to the customer. In addition, the major public data networks use packet-switched systems, including VANs in the U.S., DATAPAC, EURONET, TRANSPAC, and DDX-P.

Alternatives for balancing development of public and private VANs can take into account strengths and weaknesses in common carrier and private company emphases.

While an earlier starting date for private VANs may be indicated by the level of cost-effectiveness for users, installation may have to wait for attainment of such priority conditions as extension of the group VAN concept and construction of versatile databases, among others. Value-added service and a national computer network may require installation of high-speed digital data circuits.

To service and develop VAS in Korea, both common carrier and VASP roles are critical. To serve the public interest, common carriers may be able to guarantee universal service to the public and to small- and medium-sized firms.

If KTA provides ISDN service -- that is, both data communications and voice services -- and if, accordingly, KTA's and DACOM's investments overlap, then KTA and DACOM will be competing in the data communications sector. Although maximum participation may be beneficial to VAS development, the government policy is to avoid overlapping investment in order to optimize facility use and development. In the long term, full competition with the common carrier may be necessary for maximum efficiency, as in advanced countries.

Policy issues in advanced countries: ONA and ONP

ONA in the U.S. and ONP in the European Community were introduced during the 1980s and remain a vague mandate, with details of implementation still under debate. Although the concepts and their backgrounds differ somewhat, they both have been touted as able to support the best possible conditions for innovative development of VAS by competitive providers in the communications sector.

The likelihood that ONA or ONP will be adopted in Korea is small, but potential changes could increase this likelihood. In particular, competition between the dominant carriers over VAS development could increase pressure for establishment of conditions for fair competition.

5.2 Policy options for VAS development

This paper has weighed many choices facing policymakers in Korea. To summarize these choices in the context of their implications, this section outlines three options and their positive and negative impacts on the stakes involved.

Option I Continue the present policy as established in 1987 (see Table 5-2.)

Option II Immediate full competition and open policies (see Table 5-1, third stage, and Table 5.3.):

- domestic and foreign participation in the service area (international VAN);
- shared and third-party use of leased circuits, computer communications (data processing and message switching) and interconnection of leased circuits with the public switched network;
- simple resale.

Option III Phased change (see tables 5-1, 5-2, and 5-4):

- first stage: removal of constraints on group VANs;

- second stage: toward competition;
- third stage: full competition.

Table 5-1 and Figure 5-1 together comprise a model for gradual VAS development in Korea as described in Option III. Figure 5-1 consists of three sample network configurations that could evolve as VAS mature in Korea. These configurations suggest possible technical implications of the changing regulatory environments outlined in Table 5-1. Part (a.), an intercompany network or new group VAN, is the user side as it begins to evolve during the first stage of liberalization outlined in Table 5-1. Part (b.) shows a supplier network consisting of joint ventures between new carriers and VASPs that would evolve beginning in the first stage. Part (c.) diagrams the public common carrier network or public VAN as it also begins to evolve.

Tables 5-2, 5-3, and 5-4 summarize the impacts of each option on the stakes involved.

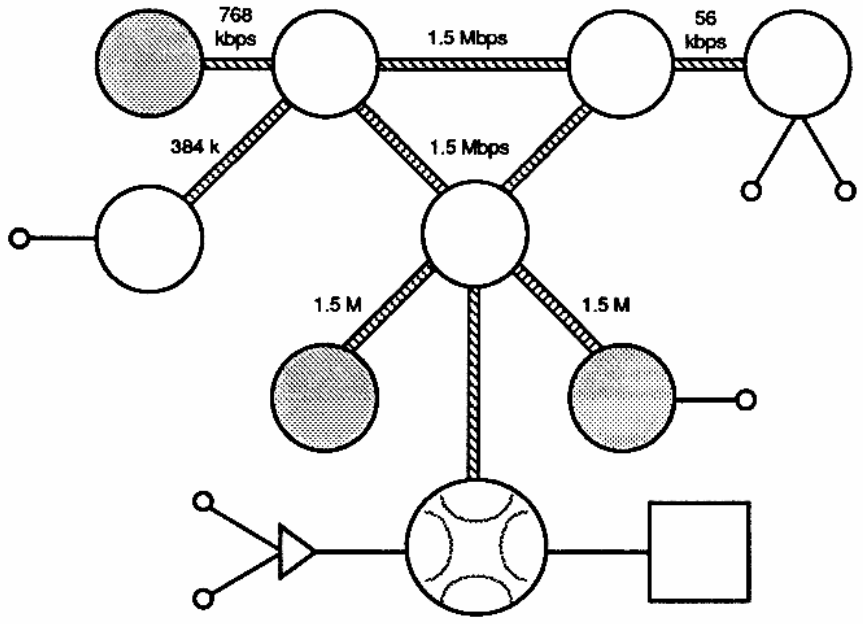
Table 5-1

Model for Phased VAS Development in Korea

Stages	Policy Implementation	How Plan Implements the Policy	Rationale and Comments
First stage (1988 -)	**1. Private VANs**	Establishment of long-term plan for VAS	Fostering of environments in all fields (see sec. 3.3.2-1)
Fostering the environment	– Removal of constraints on group VANs, in particular, multiplexer access for shared use of leased circuits	Removal of regulatory restrictions (on VASPs, users, foreign companies)	Fostering of environment for VAS for economic efficiency and for promotion of international competitiveness
	– Shared use by closely related businesses only within closed VAN of group company. Scope of "close business relations" expanded to include companies doing more than 10% of their business with group company	Introduction of advanced technologies (through joint ventures)	
	– Interconnection of leased circuits with the PSDN		
	2. Priority extension of public VANs	Priority development of public VAN	Sec. 3.3.2-2
	– Construction of network for • national basic network projects • small and medium-size firms • non-profit puposes		Public interests and sufficiency of basic communications infrastructure
	– Public service provided by joint development and new carriers		
	3. Implementation of environment	Development and introduction of advanced network	Sec. 3.3.2-1
	– Step-by-step implementation of high-speed leased digital data circuit network		Improvement of speed and quality of leased circuits
	– Business protocol standardization	Policies for investment assistance	Reduced costs, ease of development, activation of information flow
	– Construction of versatile databases		Ease of interconnection
	– Development of protocol conversion; interconnection of different systems and business protocols		
	– Extension of PC use over stages 1-3; development of terminals for public service	Spread and development of public terminals (equipment)	Home banking, shopping
	– Implementation of high-speed PC network (stages 1 and 2)	Development of PC network	Spread of many services (see 1.4.1-1)
	– Legal amendment of business law	Preparation by MOC	For pre-competition
	4. Privatization of KTA in 1989	Amendment from MOC	Sec. 1.4.1-4

Table 5-1 (continued)

Second stage (1990 -) **Toward competition**	**1. Competitive system through role separation in 1990** – Public service by common carrier – Other service by VASPs (except in the public service sector) • All DB/DP liberalized • Domestic VASPs may serve as third-party providers	Reform of related regulations (activation of service markets) Regulatory reform Development of interconnection network and high-speed network	Transition toward full competition (see 3.3.2-2) Maintenance of balance between public and private interests Preparation for promotion of competitiveness (see 1.4.3-1)
	2. Domestic market access for foreign VASPs in 1991	Negotiation between U.S. and Korea Regulatory reform	Sec. 1.4.3-1
	3. Implementation of environment – Reform management systems of telecommunications industry in 1991 – Development of both telephone network and packet-switched network interconnection – Development of super high-speed packet-switched network	Approval by Congress	Preparation for full competition For subscribers of dial-up service To lead communications into the ISDN age of the future
Third stage (1992 -) **Full competition**	**1. Full competition** – Domestic and international VAN – Full liberalization of private networks (CSDN, PSDN) – Removal of restrictions by application or service	– Regulatory reform for free and fair competition – Activation of international businesses and relations	Cost effectiveness for users Sec. 1.4.3 – For activation of domestic and foreign user/service provider relationships – To avoid international trade friction
	2. Implementation of environment – Introduction of open network architecture – Development of ISDN (stages 1-3)	Introduction of new regulatory system Common development of ISDN	Sec. 4.4.2 Fair competition between competitive providers Sec. 2.5.2-5 For interconnection of all communications networks



High-speed leased digital data circuit network

Leased circuit

Parent company/processing node

PSDN

Branch office terminal

Affiliated company/processing node

International gateway

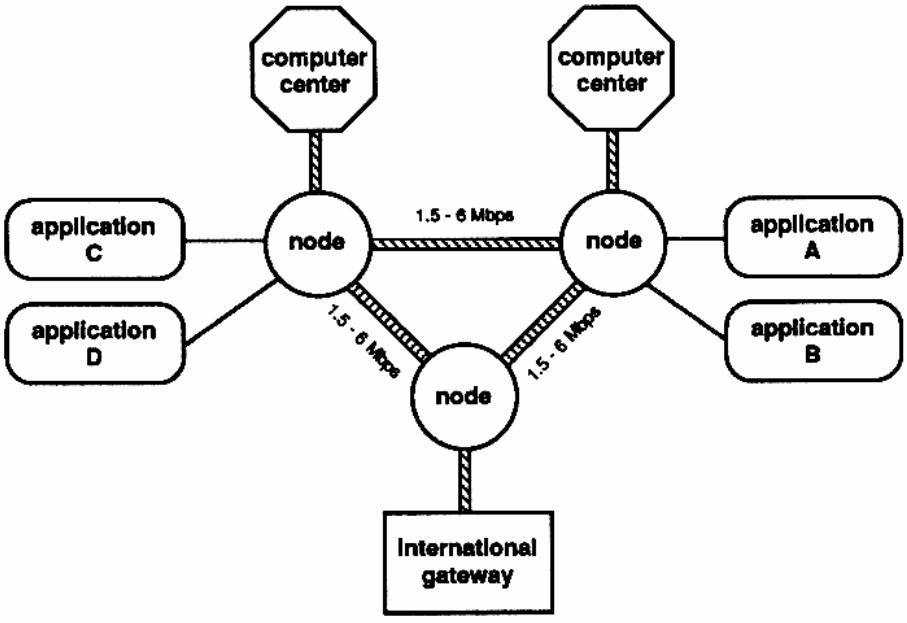
Multiplexer

– The trunk network services both the parent company and affiliated companies with high-speed digital data circuits leased from the common carrier; for example, 56 kbps to 768 kbps and 1.5 Mbps to 6 Mbps.

– The public switched data network (PSDN) or leased circuits may be used for communications between a parent company and branch offices, depending on the volume of traffic and the nature of the business activities, with a guarantee of 48kbps, for example.

Figure 5-1(a)

Sample Network Configurations:
Intercompany Network (New Group VAN)



Node may use packet switching or front-end processing.

Figure 5-1(b)

Sample Network Configurations:
New Carriers and VASP Network

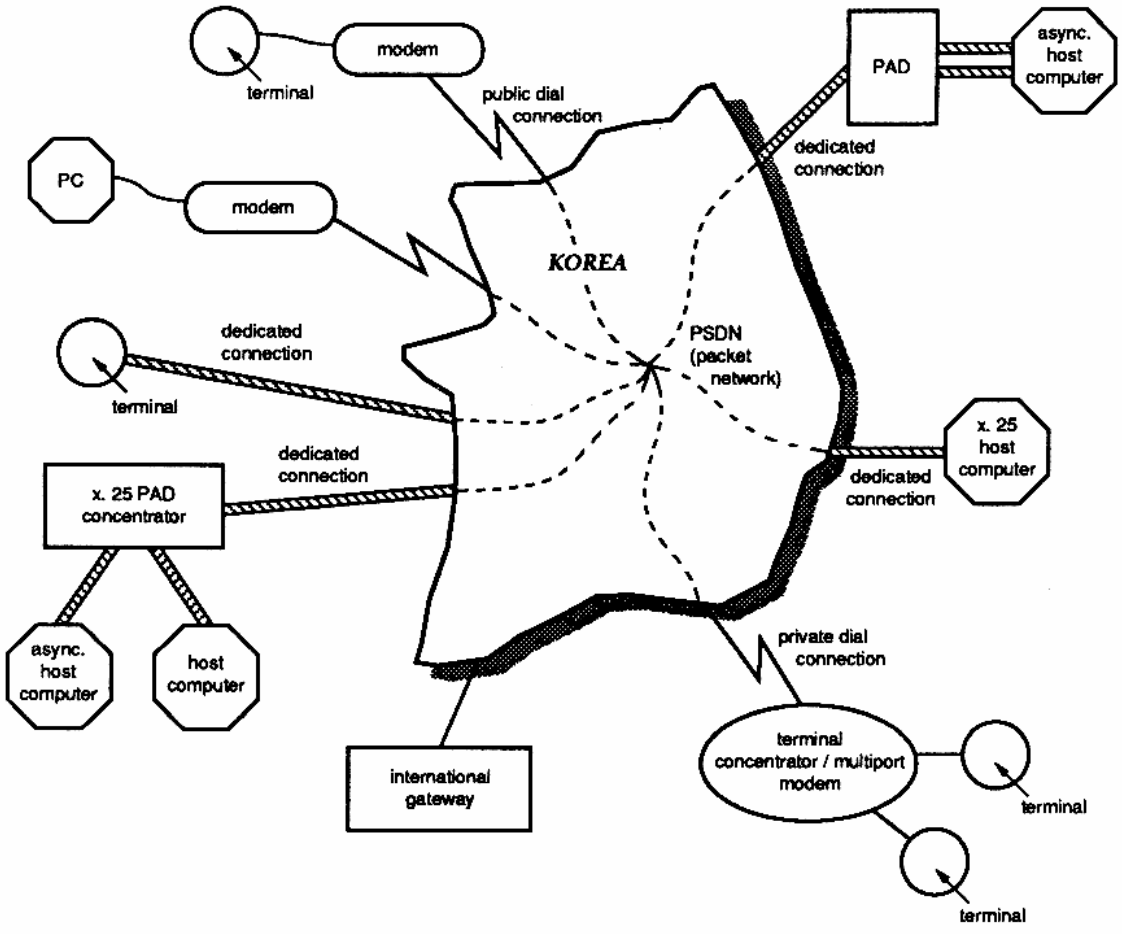


Figure 5-1(c)

Sample Network Configurations:
Public VAN

Table 5-2

Option I: Impacts on Stakes

Option I Continue present policy as established in 1987 (see sec. 1.3).		
Stake-holders	**Positive Impacts on Stakes (Advantages)**	**Negative Impacts on Stakes (Disadvantages)**
Regulat-ory agency	Protects domestic industry; protects national security; encourages universal service.	Accelerates pressure from advanced countries to open markets; reduces national competitiveness.
KTA	Encourages universal service.	Reduces innovation and efficiency.
DACOM	Encourages universal service; priority of public VAN expands scale of business.	Involvement of competitor impacts on business; reduces innovation and efficiency.
New carriers	Expands existing groundwork; minimizes trial and error.	Increases in service provision make effective management more difficult (see Table 3-5).
VASPs	Offers opportunities for involvement in VAS development; gain know-how through joint ventures; sets up basic groundwork.	Supports unfair competition; limits service expansion and efficiency.
Foreign companies	Gain same opportunities for business involvement as private domestic VASPs; gain opportunity to expand existing computer facilities and understanding of Korean culture through joint ventures.	Same disadvantages as for VASPs; joint venture arrangement limits management control.
Large users	Maximizes computer resources (budget and information use); encourages open policy direction.	Limits access among closely related organizations.
Small-medium users	Protects monopoly service consumers.	Have additional burden of buying terminals, facilities.

Table 5-3

Option II: Impacts on Stakes

Option II Immediate full competition and open policies (see Table 5-1, third stage, and Table 5.3.):

- domestic and foreign participation in the service area (international VAN);
- shared and third-party use of leased circuits, including computer communications (data processing and message switching) and interconnection of leased circuits with the public switched network;
- simple resale.

Stakeholders	Positive Impacts on Stakes (Advantages)	Negative Impacts on Stakes (Disadvantages)
Regulatory agency	Smoothes relationships with foreign stakeholders; simplifies regulatory administration and reduces costs; encourages innovation and efficiency.	Opposes positive impacts of Option I for regulators; maintains service gap suffered by rural areas.
KTA	Encourages efficiency and innovation; enhances global competitiveness; protects consumers from potential monopoly abuses.	Raises concerns about less universal service; traditional regulation is effective only without competition.
DACOM	Same as KTA.	Same as KTA; introduces fears of service competition by VASP, KTA, and foreign companies; limited by weakness of network infrastructure.
New carriers	None.	Reduces priority of existing groundwork in the industry.
VASPs	Opposes disadvantages of Option I.	Competition results in excess investment; lack of experience and of standardization result in trial and error approach.
Foreign companies	Opposes disadvantages of Option I.	May raise fears of small companies and common carriers.
Large users	Choice among service providers supports cost effectiveness; encourages service competition.	Management may have difficulty adapting to the impacts of rapid computerization.
Small-medium users	None.	Competition with large companies brings greater expenses.

Table 5-4

Option III: Impacts on Stakes

Option III Phased change (see Table 5-1 and secs. 3.2, 3.3.2-1, 3.3.2-2.):
- Removal of constraints on group VANs;
- Toward competition;
- Full competition.

Stake-holders	Positive impacts on stakes (Advantages)	Negative impacts on stakes (Disadvantages)
Regulat-ory agency	Balances between public and private interests; same advantages as for regulatory agency in Option I; improves relations with foreign stakeholders.	Retains some conflict with foreign stakeholders.
KTA	Prepares infrastructure for competitive strength; minimizes friction between common carriers by reducing overlapping investment.	Reduces resource efficiency; reduces expansion of service until total service is provided by an ISDN.
DACOM	Same advantages as in Options I and II; maintains stability and reliability required to move toward information age society.	Requires too great an investment for small and medium-sized companies; requires building network infrastructure; fear of KTA role in ISDN.
New carriers	Supports expanded markets and quality service; encourages services development.	Limits competition against common carrier and VASPs.
VASPs	Counteracts disadvantages of Option II; supports possibility of increasing international competitiveness, step by step.	Common carrier reduces potential VASP market; reduces innovation.
Foreign companies	Introduces opportunities to expand market by providing stable service; if user requirements expand, markets will expand because of technological capabilities and availability of capital.	Reduces business market for a few years.
Large users	Counteracts disadvantages of Option II.	Reduces cost effectiveness because international service is too slow.
Small-medium users	Includes possibility of universal service support; counteracts disadvantages of Option II.	None.

APPENDIX A

SUMMARY OF LEGAL AMENDMENT ON LEASED CIRCUIT USE FOR COMPUTER COMMUNICATIONS IN KOREA

This appendix summarizes the legal amendment on leased circuit use that took effect on December 1, 1988,[1] after publication of the draft of this report.

The amendment is part of Korea's efforts to improve its international competitiveness through promotion of computerization of private user companies and through preparation of a domestic business environment supportive of Korea's computer-communications industry. This amendment extends the scope of "close business relations" (conditions for shared use of leased circuits) and permits use of multiplexers (facilitating third-party use of leased circuits under certain circumstances, described below).

MOC Notification No. 116

This notice amends the criteria for close business relations for shared use of leased circuits and for approval of exceptions. The Provisions of Enforcement Ordinance Nos. 72 and 73 of the Public Communication Business Law were amended and released as follows:

- Approval of academic and research networks such as BITNET, SDN, and others.
- Extension of scope of "close business relations" for access to group networks of private companies: If a related company, such as a supplier, agent, or other vendor, relies on a group company for more than 10% of the related company's revenue or transaction quantity, that company may access the group network.

MOC Notification No. 117

In this notice, the MOC sets forth the scope and process for approval of exceptions to limitations on third-party use of leased circuits for computer communications, as specified under the Provisions

---

[1]MOC Notification Nos. 116 and 117, December 1988.

of Enforcement Ordinance No. 74-3 of the Public Communication Business Law:

- Approval of exceptions to limitations on third-party use of leased circuits for computer communications, including:
  - Construction of networks for small and medium-sized enterprises;
  - Construction of networks for national basic network projects;
  - Construction of networks for nonprofit purposes.
- The application process for approval of exceptions, requiring application to the minister of MOC by way of the Public Communication Business Organization, with the following documents:
  - Business plan;
  - Outline of computer communications facilities;
  - Types of services, contents, and conditions for use;
  - Others.

Permission for use of multiplexers

This covers organizations approved as exceptions to limitations on shared-use leased circuits, that is, exceptions to limitations on group VAN providers and on computer communications service providers. The permission applies to leased circuits with speeds of less than 9600 bps and covers equipment approved formally after a formal testing procedure. Approved uses are provision of information processing services and information retrieval.

APPENDIX B

ACRONYMS

AIAG	Automotive Industry Action Group
ANSI	American National Standards Institute
APS	Accunet Packet Service
ARPA	Advanced Research Projects Agency
BOC	Bell operating company
C&W	Cable & Wireless
CCITT	International Telegraph and Telephone Consultative Committee
CCN	computer-communications network
CCPA	Computer and Communication Promotion Association
CEI	comparably efficient interconnection
CEN	Comité Européen de Normalization
COS	Cooperation for Open Systems
CPNI	customer proprietary network information
DACOM	Data Communications Corp. of Korea
DB	database
DDX-P	digital data exchange-packet
DOC	U.S. Department of Commerce
DOJ	U.S. Department of Justice
DP	data processing
DTS	digital termination system
EC	European Community
ECMA	European Computer Manufacturers' Association
EDIFACT	Electronic Data Interchange for Administration Commerce and Transport
EDS	Electronic Data Systems

EFTS	electronic fund transfer system
ESP	enhanced-service provider
group VANs	group value-added networks
IDC	International Digital Communications, Inc.
IN	IBM Information Network
ISDN	integrated services digital network
ISPs	information service providers
ITJ	International Telecom of Japan Inc.
ITU	International Telecommunication Union
IVANS	Insurance Value-Added Network Services
JISC	Japanese Industrial Standards Committee
KDD	Kokusai Denshin Denwa Co.
KOTIS	Korea Travel Information Service
KTA	Korea Telecommunications Authority
LADT	local area data transport service
LAN	local area network
Lu 6.2	logical unit 6.2
MAP	manufacturing automation protocol
MFJ	Modification of Final Judgment
MOC	Ministry of Communications
MOF	Ministry of Finance
MOSS	Market-Oriented Sector Selectives
MPT	Ministry of Posts and Telecommunications
NAIS	National Administration Information System
NIS	network information service
NTIA	National Telecommunications and Information Administration

NTNS	non-reserved telecommunications network-based services
ONA	open network architecture
ONP	open network provision
PAD	packet assembly and disassembly
PCBL	Public Communication Business Law
PCI	Packet Communications Inc.
PSDN	public switched data network
PSO	private service operator
PSTN	public-switched telephone network
PUC	public utility commission
RBOC	regional Bell operating company
RPOA	recognized private operating agency
SDS	Samsung Data Systems
STM	System Technology Management
TBL	Telecommunication Basic Law
TCP/IP	transport control protocol/internetwork protocol
TDCC	Transportation Data Coordinating Committee
TP	Telenet processor
VAS	value-added services
VASPs	VAS providers
VOTS	VAX OSI Transport Service
WINS	Warehouse Information Network Standard