THESIS

MICHIGAN STATE UNIVERSITY LIBRARIES
3 1293 01559 2706

LIBRARY
Michigan State
University

This is to certify that the

thesis entitled

Telecommunication Policy and Service Development

- The Cases of the USA, the UK, and Japan -

presented by

Shingo Kimata

has been accepted towards fulfillment
of the requirements for

M.A. degree in Telecommunication

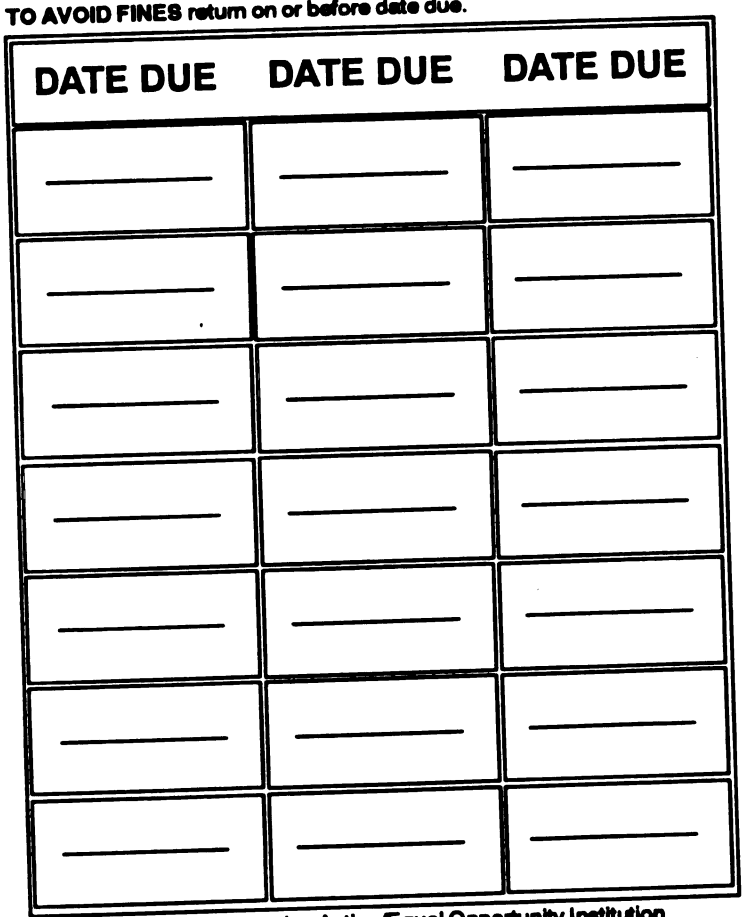
Major professor

Date April 25, 1996

O-7639

MSU is an Affirmative Action/Equal Opportunity Institution

PLACE IN RETURN BOX to remove this checkout from your record.
TO AVOID FINES return on or before date due.



MSU is An Affirmative Action/Equal Opportunity Institution
c:\circ\datedue.pm3-p.1

TELECOMMUNICATION POLICY AND SERVICE DEVELOPMENT -THE CASES OF THE USA, THE UK, AND JAPAN-

By

Shingo Kimata

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Telecommunication

1996

ABSTRACT

TELECOMMUNICATION POLICY AND SERVICE DEVELOPMENT -THE CASES OF THE USA, THE UK, AND JAPAN-

By

Shingo Kimata

The USA, the UK, and Japan have one of the most advanced telecommunication services and networks in the world. At the same time, however, the service development of each country shows some of the characteristics unique to each one. This thesis examines their telecommunication policies in the 1980s and early 1990s, as well as their telecommunication service development, and analyzes how policy factors are related to the service development. Policy is analyzed in terms of structure and price policy. Also, four service categories, such as basic telephone service, ISDN, Videotex, and Data and Valued Added Service development are examined. This thesis uses a case study method, referring mainly to existing secondary sources. In the general findings, the policy differences among the countries and several policy factors which influenced the service development are clarified.

Copyrig
SHING
1996

Copyright by
SHINGO KIMATA
1996

To Chi

To Chizuru and Sakura

ACKNOWLEDGMENTS

The completion of this master thesis would not have been possible without the guidance, cooperation, and encouragement of many.

My gratitude goes especially to the three members of my thesis committee- Dr. Thomas Muth, Dr. Johannes Bauer, and Professor Ronald Choura. Dr. Muth guided me through the telecommunication policy field, oversaw the administrative procedures, and gave me encouragement. Dr. Bauer introduced me the theoretical framework of telecommunication policy analysis. Professor Choura provided me with the latest information concerning telecommunication policy and the service world.

Also, I would like to thank Dr. Helen Draper. She has assisted me in improving my academic English skills during my study for the master degree.

Finally, I thank my partner-in-life, Chizuru, for her ceaseless encouragement and understanding.

List o

List o

Chapt

Introd

1.1 In

1.2 R

1.3 L

1.4 R

Chap

Telec

2.1 H

2.2 S

2.3 P

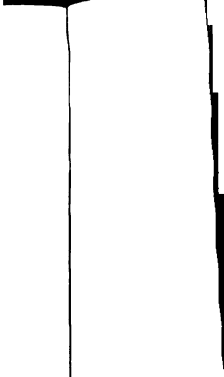
Chap

Telec

3.1 H

TABLE OF CONTENTS

LIST OF TABLES



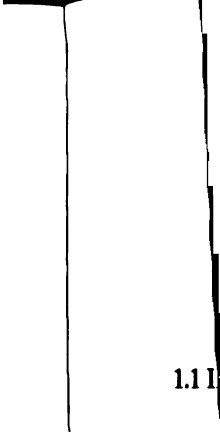
Figu

Figu

Fig

Fig

LIST OF FIGURES



1.1 I

dere

tele

cha

198

an

(B

th

m

a

h

c

Chapter 1

Introduction & Framework of the Study

1.1 Introduction

The USA, the UK, and Japan are the countries which introduced telecommunication deregulation policy in the 1980s. The US, which had already gradually opened its telecommunication market in the advanced form, experienced further drastic structural change within the telecommunication industry in the Modified Final Judgment. Also, in the 1980s, both the UK and Japan introduced liberalization in the telecommunications market and, as a result, privatized their national Public Telephone Operators, British Telecom (BT) and Nippon Telegraph and Telephone (NTT). Thus, through these policies, these three countries changed their telecommunication industry structure and made the market more competitive. Now these countries have competitive telecommunication markets and advanced telecommunication networks and services. Telephone users in these countries have experienced drastic decreases in telephone rates and also have enjoyed more diversified services.

However, the development of telecommunication service markets in those countries also show differences. For example, in the business market, the USA has more diversified data communication services such as SMDS (Switched Multimegabit Digital Service) than the other countries, but ISDN in the US has been less successful than in the UK and

Japan. Also, in the residential market, the USA has enjoyed more diversified services than Japan, such as Customer Local Access Signaling Services (CLASS).[1]

Although those differences may come from several factors, such as economic factors, technological forces, or the cultural background, policy, which define the legal and institutional framework of the industry and market have had a significant influence on service development. Therefore, in this thesis, I will attempt to investigate the relationship between policy and service development.

Thus, part of this investigation will be an examination of the telecommunication policy in the 1980s and early 1990s, and telecommunication service development within the three countries mentioned, the USA, the UK and Japan. As a result of such examination, this thesis has significance in the following three points: (1) comparative analyses of the performance of the telecommunication sector usually rely on aggregate numbers such as penetration rates, and telephone rates. However, in order to examine the effect of policy, we need to analyze more specific services since the relationship between policy and service development has not been investigated in detail, yet; (2) even if a great deal of study about the telecommunication reform policy in the 1980s among the three nations exists, not much is available about the comparison of the performance of these reforms[2] ; (3) because, now, policy makers in those countries are working on a new telecommunication policy for a more competitive and broadband network era, it is meaningful to review the relationship between the past policies and service development.

---

[1] Selective calling, caller ID, automatic callback, etc are the examples of CLASS.

[2] Some international organizations, such as OECD and ITU, study the international telecommunication policy and development.

1.2 Research Questions

Telecommunication service development is influenced by several factors such as technical improvements, the regulatory policy scheme, the strategies of telecommunication companies, user demand and social background, etc. Bouwman and Latzer (1994) grouped these factors into four categories to explain the diffusion pattern of telecommunication network based services[3]: technological factors, economic factors, political factors, and social and cultural factors. These four factors not only influence the form of service development but also co-relate with each other.

In this thesis, the role of political factors, especially policy factors, in service development is the main focus. Among these four factors, policy factors make the framework of the service market and shape the players behavior and performance. Even if it is difficult to isolate the effect of a policy from the effects of the other factors, some significant relationship can be seen in service development.

Although the term "policy factors" has several aspects such as regulatory policy, industrial policy, etc., Noll, R. (1989) pointed out two categories of regulation as the enduring issue of telecommunication policy. They refer to the two classes of policy instruments: prices and structure. By price regulation, regulatory agencies examine and decide the price setting and scheme. For example, the Ministry of Posts and Telecommunication (MPT) in Japan strictly regulates the prices of telecommunication

---

[3] Network-based services (TNS) is defined as all services that combine information production, manipulation, storage and/or distribution, with the use of telecommunication facilities and software functions (Bouwman & Latzer, 1994). For more detailed information about TNS, refer to OECD (1989) and Mansell (1988).

services through the rate of return regulation. Also, Structure policy is a regulatory scheme which designs the market structure of regulated industry (Okuno & Suzumura, 1993). For example, the MFJ decided upon the separation between the local market and the long distance market by breaking up AT&T. Also, after 1984, the UK government chose a duopoly structure by giving licenses only to BT and Mercury. These are the examples of structure regulation. Thus, the main focus of the paper is to investigate how these price and structure policies have been formed in the 1980s and early 1990s and how they related to telecommunication service development.

Also, the term "service development" can include a variety of telecommunication services, ranging from basic PSTN (public switched telephone network) services to broadband multimedia typed services. Although it is desirable to investigate as many services as possible because the services have their own technical and social context, it is still valuable to examine selected services. Thus, this thesis will focus mainly on the case of four services: basic telephone service, Integrated Services Digital Networks (ISDN), Videotex, and Data and Value Added Services.

Consequently, this thesis addresses the following specified research questions: 1-a) how has structural policy in these three countries been formed in the 1980s and early 1990s? 1-b) what structural differences exist among the three countries? 1-c) how has structural policy been related to telecommunication service development among the three countries? 2-a) how has price regulation in these countries been formed in the 1980s and early 1990s? 2-b) what differences in price regulation may exist among the three

countries? 2-c) how has price regulation been related to telecommunication service development? 3) What are the future policy implications?

1.3 Literature Review

Little comprehensive research has been done yet regarding the relationship between telecommunication policy and service development. Mansell (1988) introduced the concept of telecommunication network-based service (TNS) and suggested the importance of policy aspect for TNS development. OECD (1988) presents more detail examination of policy framework for TNS development by using the international comparative method. Recently, Mansell (1993) explored the consequences of policy decisions and design choices in the creation of intelligent networks with the international perspectives.

Also, this thesis will use international comparative framework. Snow's (1986) introductory chapter sets forth the conceptual and methodological background for the international comparative approach. Jussawalla (1993) also discusses the impact of telecommunication reforms in the 1980s on national and international markets in industrialized countries. Bernt & Weiss (1993) clearly explain the comparative framework of international telecommunication although the book was written mainly for professional use. In addition, the OECD publishes annually statistics about the telecommunication environment in OECD countries, and it provides valuable information for the comparison.

Although this thesis does not intend to investigate the theory of regulation itself, it is important to initially understand the theory of regulation. Since the telecommunication

industry has been regulated historically, a great number of economics and public policy studies about regulation, in addition to pure economic theory of regulation, are available. In terms of the economic theory of regulation, Spulber (1990) and Joskow and Noll, R., (1977) provide a clear framework of regulation and market. Nowotny et al (1989) provide overall framework of the public utility regulation. Also, in the field of telecommunication regulation, Noam (1983) collected a volume of essays concerning the telecommunication regulation.

Since the thesis will focus more on application of regulation and regulatory activity, the regulatory schemes and activities among the three countries need to be examined. Concerning the US telecommunication policy, a great deal of research has been done. Among them, Bolter et al (1990) provide a basic framework of analyzing the US telecommunication policy. Also, Brock (1994) argues about the transformation of the US telecommunication policy which moves toward alternatives to the Divestiture model.

Also, literature regarding the UK telecommunication regulation can be found in some amount. Vickers and Yarrow (1988) present basic framework of the UK policy. Beesley and Laidlaw (1989) review and assess role of competition in the UK Policy. In addition, Joscher (1986) and Wigglesworth and Barnes (1992) overview telecommunication liberalization and regulation in the UK.

Although some research concerning Japanese telecommunication regulation had been conducted, the theoretical research was not investigated enough until around 1990 (Hayashi,K. 1994). The discussion tended to focus on management issues of NTT such as management inefficiency. Few in-depth discussions from a theoretical perspective such as

economics and public policy were done.[4] However, recently some significant research has been conducted mainly by economics scholars. Okuno et al (1993), Hayashi,T & Matsuura (1992), and Hayashi,T. (1994) present an in-depth analysis about Japanese telecommunication regulation from economics perspectives. Basically, while they evaluate the results of Japanese telecommunication reform policy positively, they point out the lack of a clear policy standard in the MPT's telecommunication policy.

Compared with policy literature, not much theoretical analysis about the service development exists. Because some basic but important data are occupied by the industry, it is difficult to get access data. We need to depend on either public data, which are published by the government or trade magazines such as "Telephony" and "Telecommunications".

Concerning the US service market, Cole (1991) and Crandall (1991) presented an examination of the effect of AT&T divestitures on service markets. Basically, they evaluated its effects positively. Noll, M., A. did various researches on the impact of the divestiture on R&D activities and long distance telephone rates (1987, 1991, 1994). He emphasizes less the impact of divestiture and emphasizes more the forces of productivity and market demand.

The data of the UK market is especially hard to obtain for both geographical and material reasons. Some information only can be gained from the secondary sources such as Beesley and Laidlaw (1989) and Ide (1994a).

---

[4] Only exception is Nambu (1985). He firstly introduced the economics analysis of telecommunication industry in Japan.

The literature concerning the Japanese telecommunication market also is limited. Among academic literature, Nagai (1994b) only overviewed the service market. Japan's MPT published the "White Paper" annually, which is the only and most reliable data source of the Japanese telecommunications market. Also, a biweekly trade press "Nikkei Communications" presents useful market information.

1.4 Research Method and Procedure

Overall, this thesis is a case study regarding telecommunication policy, service development, and their relationship, using mainly existing secondary sources (Majchrzak, 1984). By an empirical analysis of telecommunication policy and the development of telecommunication services, this thesis will make clear the relationship between telecommunication regulation and services development. It will proceed in its analysis using the following steps:

Following the introduction chapter, chapter 2, 3, and 4 reviewed the regulation policy in the 1980s and early 1990s in the USA, the UK, and Japan, selectively. The discussion focuses on the regulatory schemes in terms of structural and price regulation. Here, each country's characteristics of the regulatory scheme design and the differences among the countries will be investigated.

In chapter 5, 6, 7 and 8, the development of service market in the three countries will be examined. The development of basic telephone services, ISDN, Videotex, and Data and Value Added services will be studied empirically. In terms of basic telephone services, the rates, service quality and traffic will be used as the indicators for analysis. ISDN and

Videotex development will be investigated by deployment rates. Also, data and value added services are examined in terms of service diversity and rates.

In chapter 9, the conclusion chapter, the results of the research will be summarized, first. Following that, the answers to the research questions are presented. Furthermore, the policy implications for future service development will be explored.

Finally, chapter 10 presents recommendations for future research.

Chapter 2

Telecommunication Policy in the United States

In this section, the telecommunication policy in the US in the 1980s and early 1990s are examined. First, the policy since 1980s is reviewed, and then, structure and price policies are overviewed.

2.1 Historical Review

The US has a unique policy history as one of a few nations which has a private telephone system. The telephone companies have been regulated by both state and federal agencies. At the state level, public service (utilities) commissions regulate intra-state telephone service, and have granted local telephone companies a monopoly franchise in a geographically defined area of operation. At the federal level, the Federal Communication Commission (FCC) regulates inter-state telephone service, which for years dominated by the American Telephone and Telegraph (AT&T) company. AT&T had a monopoly on long distance service and controlled 80% of the local access line through Bell Operating Companies. The remaining access lines are provided by about one thousand three hundred independent companies (Bernt & Weiss, 1993).

In the history of US telecommunication policy, the consent decree in 1982 and the resulting AT&T's divestiture in 1984 are regarded as the big turning points, although some deregulation policy in the field of Customer Premise Equipment (CPE) and private lines, etc. had already begun in the US before the consent decree.

In 1982, the US. Department of Justice reached an agreement with AT&T on the terms of modification of the 1956 AT&T consent decree. After the modification of the agreement by Judge Harold H. Greene of the U.S. District Court for the District of Columbia, the Modification of Final Judgment (MFJ) was accepted by the parties and the antitrust suit was subsequently dismissed in 1982.

The MFJ broke up the Bell system on January 1, 1984, and it created seven Regional Bell Operating Companies (RBOCs) and a smaller AT&T. AT&T was freed from the restrains of the 1956 consent decree. In addition, the RBOCs were allowed to operate subject to the line of business restrictions on the markets in which they could lawfully operate. Bell companies were permitted by the MFJ decree to offer only exchange or other basic services, such as information access, yellow pages directories, and provision of Customer Premise Equipment (Bolter et al, 1990). The divested AT&T is approximately one-fifth its original size, but RBOCs continue to provide local telephone services to 80% of the nation's telephone access lines.

The FCC proceeded its pro-competitive policy further, after the divestiture. Through several so-called computer inquiry decisions, AT&T and the RBOCs were permitted to enter new and unregulated markets, such as data processing and computer fields.

Also, FCC rules require that AT&T and the RBOCs provide open network architecture or comparably efficient interconnection to ensure that competitive services vendors have access to a bottleneck facility (Crandall, 1991).

Further, FCC decided to change the way regulated companies can earn profits from the rate of return regulation to one of price caps. In 1989, the FCC ratified a price cap regulation for AT&T, and is proposing similar regulation for local telecos (Brock, 1994).

At the state level, rapid policy change also occurred after the divestiture (Bolter et al, 1990). Many states have begun to move toward a more competitive market approach. For example, although most intrastate toll and local exchange service remained tightly regulated, some states have even begun to experiment with new regulatory approaches, such as price caps.

In summary, the US telecommunication policy in the 1980s and early 1990s are in a transition period from regulated industry to a more competitive liberalized market. Also, currently discussed new telecommunication bill will be a corner stone of telecommunication reform in the US.[5] In the next two sections, more detailed policy issues, price and structure, are explained.

2.2 Structure Policy

In terms of the US telecommunication service development, the MFJ and FCC's computer inquires, which were mentioned briefly in the previous section, have played an important role.

The consent decree created a line of business restriction on seven new Regional Bell Operating Companies (RBOCs). First, the RBOCs were allowed to operate in the markets in which they could lawfully operate. Bell companies were permitted by the MFJ decree to

[5] This bill was enacted in February, 1996.

offer only exchange or other basic services (Bolter et al, 1990). Local exchange services were defined as that portion of a call that remains within geographical regions called Local Access Transport Areas (LATAs). RBOCs are only permitted to carry traffic within LATAs, and must hand off any inter-LATA traffic to long distance carriers such as AT&T, MCI, and SPRINT.

The first issue of the MFJ is geographical restriction on telecommunication service market. Because this restriction permitted the RBOCs do business only in their business area, the network development in the national level might not work well. Telecommunication is valuable only when the transmission is available from end to end. Future service which does not have a precise technical standard will only be available in the same RBOC service area. Also, the service provision would depend on the area. Because the US has such large geographical coverage, in the future asymmetrical development of telecommunication service between the heavy populated region and rural oriented region would be possible.

The second restriction on RBOCs is the line of business restriction. The MFJ prohibited the RBOCs from 1) entering into long distance services, 2) engaging in any manufacturing activities, and 3) offering any information services in which they would function as content providers. Among them, the restriction on information business could have an effect on the telecommunication service development.

Since the divestiture, the RBOCs have sought to weaken the restrictions placed upon activities by assurers of wavier requests and appeals. Also, the Justice Department changed its initial standing to loosen the restrictions more (Brock, 1994). In 1988, Judge

Greene permitted the RBOCs to offer gateway services although they could not offer their own content. Then, after a federal court of appeals questioned Greene's maintenance of the information services restriction on the RBOCs, he lifted the restriction in the summer of 1991.

Another framework of structure of telecommunication market is the FCC's computer inquires. In three major inquires, the FCC has attempted to define the conditions under which regulated common carriers could provide unregulated, "enhanced' services (Steinfield, 1992). In computer inquiry I (1971), the FCC decided that common carriers desiring to provide data processing services to persons could do so only through completely its separate affiliates (DataPro, 1993a, 1020).

In computer inquiry II (1980), the FCC attempted to establish two classes of service: "basic" and "enhanced" (Datapro, 1993a). "Basic services" were defined as those services providing only for movement of information, by whatever means. These included computer-controlled transport, such as packet switching. Basic services would remain subject to regulation by the FCC. "Enhanced services" were those services providing anything beyond basic transportation, such that the information reaching its destination would be different, additional, or restructured, in comparison to the information sent by the source. The FCC ruled that AT&T, and the divided RBOCs could only offer enhanced service by a structurally separate subsidiary and that all existing enhanced services were detariffed.

In the third computer inquiry, the FCC decided to eliminate the structural safeguards approach, and proposed Open Network Architecture (ONA) and cost allocation rules.

Especially, ONA is important because it required carriers unbundle their network services and offer basic service elements to information providers on a tariffed basis.

These policies play an significant role in the development of enhanced telecommunications services such as VANs and data communications, etc.

In summary, the removal of the MFJ information services restriction and the implementation of the FCC's Computer III framework eliminated the "MFJ model" of structural separation between competitive and monopoly services (Brock, 1994).

2.3 Price Policy

The growth of telecommunication service is strongly influenced by price structures. Pricing policies can encourage or discourage competitive entry. They can create incentives or disincentives for service provider to offer the telecommunication service (OECD, 1989).

Traditionally, the rate of return regulation was used for pricing telecommunication service. However, because the rate of return regulation method was developed for monopoly public utilities, it does not fit in the competitive environment. Thus, the alternatives have been designed and applied since the late 1980s.

At the intrastate level, a number of major alternatives to the rate of return regulation have been developed since the late 1980s. Among them, price cap methods, price stabilization schemes, and earning sharing schemes are examples (Greenstein et als, 1995).

Under the price cap plan, local exchange rates may only be changed on a predetermined index. A ceiling on an overall rate of return established under traditional

regulation would be abandoned. Also the plan usually includes requirements for high service quality, and public access to a complement mechanism at the regulatory commissions.

Under the price stabilization schemes, the carrier is required to keep the prices of its noncompetitive services capped at a certain level for a certain period of time (Greenstein et als, 1995). These plans usually are called "social contract" because they are arrangements between the state commission and the regulated company. By 1993, approximately 20 states had adopted price regulation, which includes both price cap regulation and price stability regulation, (Greenstein et al, 1995).

The earning sharing scheme requires that commissions continue to establish rates of return for regulated carriers, but permits the latter to share earnings that exceed authorized levels with rate payers. Therefore, earning sharing schemes are profit regulation, and require regulators to monitor the company's profitability on a continuous basis (Greenstein et al, 1995). The similar schemes are combination of price regulation and earning sharing schemes. By 1993, almost 30 states had introduced earning sharing schemes (Greenstein et al, 1995).[6]

At the interstate level, price cap regulation was introduced in 1989 for AT&T, instead of the traditional rate of return regulation. AT&T's services are divided into three "baskets"; each basket index is to be individually capped. Each basket index level is permitted to increase by an inflation index less 3% for the expected productivity improvement (Einhorn, 1991, p7). Price caps allow telephone companies to earn higher

[6] Many states implemented their regulatory schemes on a firm-by-firm basis. Only a small number of states have taken a statewide approach (Greenstein, 1995).

rates of return as long as tariffs stay within price cap boundaries, lessening the amount of regulation to which dominant carriers are subjected. FCC believes that price caps will allow telcos to realize significant savings, which it turn will be passed on to users.

Several influences of the pricing scheme on telecommunication service development are possible. The particular problem of the traditional rate of return regulation is the so-called Averch-Johnson effect. The rate of return regulation has the incentives to overbuild capital because that increases the allowed total profit (Brock, 1994). If this theory is correct, the rate of return regulation might give telecommunication service providers the incentive to develop more services.[7] Price caps also can provide carriers the incentives to cut costs and innovate. Price caps provide the regulated firm with some amount of pricing flexibility and "such pricing flexibility would allow the firm to rebalance its prices to increase the usage of price sensitive service segments, to appropriately price and introduce new products" (Greenstein et al, 1995, 191).

The implication of incentive regulation (profit sharing scheme) for service market is not clear because it depends on the underlying economic conditions facing the company, the nature of the rate of return bands, the actual sharing arrangements, and the periodicity of the profit computation (Greenstein et al, 1995).

Also, the rate stabilization scheme has some disadvantages, compared with a price cap scheme. Rate stabilization scheme does not have the flexibility of pricing, while the price cap scheme can change its price in a flexible way. Thus, the implication of rate stabilization schemes for service market is not clear, either.

---

[7] Some scholar maintain Averch-Jonson approach is not correct (Greenstein, S et al, 1995).

Chapter 3

Telecommunication Policy in the United Kingdom

3.1 Historical Review

The liberalization of the UK telecommunication has taken place under conservative governments, initially led by Margaret Thatcher, and now by John Major. The liberalization of telecommunication began with the British Telecommunication Act of 1981. This act has significant meanings in these two aspects (Vickers et al, 1988). First, until 1981, telecommunications in Britain were the responsibility of the Post Office, a state-owned monopoly, but the act established British Telecommunications (BT) as a public corporation separate from the Post Office. Second, competition in the Customer Premise Equipment (CPE) market, network operation, and the provision of services were granted. It also established new responsibilities for the British standard institute (BSI), and set up a subsidiary of the British electrotechnical approvals board, the British approval board for telecommunication (BABT). The 1981 act, therefore, opened the way to competition even if it was to a limited degree.

In 1982, the Mercury consortium received a license to build and operate an independent network. Mercury was established as a joint venture of Cable and Wireless, British petroleum and Barclay Bank (Joscher, 1986).

In 1983, duopoly policy was designed by the government. The government announced an intention not to license further competitors at least until 1990. (A third public telecommunications operator, the Kingston upon Hill City Council runs its local

network. However, it does not have significant influence.) The reasons that this duopoly policy was adopted were: 1) to protect Mercury from the other competitive operators in order to keep effective competition between Mercury and BT, 2) to promote interconnection with Mercury (Ide, 1994a).

A second bill which was introduced in 1982 received Royal Assent in 1984 (Bernt & Weiss, 1994). This Telecommunications Act 1984 established a basic framework of the UK telecommunication. The importance of this act can be summarized in the following four points. First, it initiated privatization of British Telecom. BT privatization occurred in 1984 through a public stock offering in which 51 percent of the company was sold for about 4 billion pounds. BT was split from the PTT and was granted a license to operate. Second, it established a licensing system. The act allows any person or company with a license to operate telecommunication in the UK. Third, the government created the office of telecommunications (Oftel). Oftel is a non-ministerial government department that has the authority to make recommendations regarding rates. Oftel also ensures that licenses meet their obligations and works to promote competition and consumer interests. Oftel is headed by the Director General of Telecommunications. Finally, as part of the 1984 restructuring of British telecommunications, British policy makers adopted an incentive regulatory scheme known as price caps.

From 1985 through 1990, policies of further liberalization were introduced: BT-Mercury interconnection was determined by Department of Trade and Industry (DTI) in 1985, the government provided licensing for value added data services and resale of international leased capacity (1987), the new BSGL (Branch System General License)

permits business users to resell leased capacity on their private networks for telephony (1987), and simple resell was permitted (1989) (Datapro, 1993b).

The duopoly policy was slated for review in 1990. The advisory document called "Competition for choice: Telecommunications Policy for the 1990s" called for discussion regarding broad-based changes to regulatory environment. It also called for the end of the duopoly policy and replacement of that approach with the extensive liberalization, which would introduce competition into all areas of the network: local, long distance, and international (Bernt & Weiss, 1994).

Currently, the UK enjoys one of the most competitive telecommunications market. Public telephone operator (PTO) licenses are given to 23 operators. Also, 125 broadband cable TV licenses are issued and among them, 64 operators are offering telephony service (Datapro, 1993b).

3.2 Structure Policy

In terms of the UK telecommunication market structure, duopoly policy played an important role.

From 1983 to 1991, the UK government took the duopoly policy. Concern over how a privatized telecommunications company would be constrained to act in the public interest produced rapid changes in regulation. The duopoly policy was one of the results (Beesley et al, 1989). The UK government decided not to license any more network competitors at least until 1990, and further entry into the voice telephony market has been severely restricted. Voice telephony services must be provided in conjunction with BT or

Mercury. The dominant position inherited by BT means that Mercury and BT operate in a highly asymmetric duopoly that is immune to entry for time being (Vickers et al, 1988).

Beesley et al (1989) point out the reasons of restricting entry to create duopoly market structure. First, it allowed Mercury to reap rewards from the considerable investment in a national public telecommunication network that will be required of it under a license very similar to that proposed for BT. Second, it gave BT time to adjust its organization and services towards a competitive future. Third, it husbanded scare radio resources. Finally, it prevented disruption of the environment by having a number of operators installing cables in the same area.

However, the purpose of duopoly did not work as the policy makers intended. The prospects for the competition in the longer run are not so clear. Vickers et al (1988, 230) maintained that conditions in the regulated duopoly are very favorable to peaceful coexistence. No more entrants would be licensed at least until the 1990s, and there would be some lag after that before any licensed new entrant could become fully operational. The two companies would be in a long-running relationship that would be protected from entry at least for some years. As Vickers et al (1988) point out, "they have much to gain from peaceful coexistence. If and when entry is allowed, new firms will face an entrenched duopoly" (230).

The UK government reviewed its duopoly policy in 1990 and decided to change its policy to more competitive liberalization. It licenses new fixed network operators without formal limit. It has also licensed the unlimited self provision of circuits for private networks (Weigglesworth & Barnes, 1992). The UK are "moving away from the previous

state of highly managed network competition, with regulatory decisions deciding the rate of entry for new competitors, toward a more open form of competition- when the general conditions are set and anyone can enter the market on these terms" (Weigglesworth & Barnes, 1992, p.723).

The questions in terms of telecommunication service development is how the structural regulation affected the service development. Did duopoly structure increase competition and lead to better service quality? Did duopoly policy encourage the development of new network services like ISDN? These questions are examined in a later chapter.

3.3 Price Policy

In the UK, after a hot discussion of new pricing scheme, price cap regulation was introduced in 1984 when DTI issued a license to BT (Vickers et al, 1988). Under the price cap regulation, regulated firms can set any price which is less than what the formula decides. The formula is given as "RPI (Retail Price Index)-X". The idea that price control should be confined to restructuring the overall level of prices of services supplied by BT under monopoly conditions.

The BT license deals with the price controls on certain of BT's services. For a five year-period the price of an index of BT's services must not increase in any year by more than the rate of retail price inflation minus 3 percent (Vickers et al, 1988).

The price cap regulation is expected to have several advantages for both regulators and regulated firms (Beesley et al, 1989). First, by setting an overall limit on the rate of

increase of tariffs for voice telephony services, the need for detailed intervention on prices and profits was removed. Second, by avoiding controls on individual prices, tariff rebalancing could continue without resulting in a net increase in the real cost of using the telephone. Third, by linking the price control regime to major extensions of competition, substantial incentives were set up for BT to adopt a more commercial approach to the provision of services.

However, a price cap regulation also has some shortcomings. Those are that 1) it might create incentives for the regulated firm to reduce the quality of service and, thus, require additional measures of quality regulation; 2) price caps do not provide strong incentives to reduce prices in non-competitive markets; 3) price discrimination or cross subsidization within or between markets, especially at prices below the established ceiling, is still possible, etc.

Actually, since the UK introduced the price cap scheme, its formula has been progressively tightened. The change was about: (i) to what services should the formula apply? (ii) what should X be? (Ide, 1994b). Regarding the first criteria, the services included this formula have continued to expand. At first, local calls, business and residential rentals, and national trunk calls were included, but public phones, leased lines, VANS, and international calls were not included. However, gradually the several services were included the formula, such as operator assisted call (1988) and leased lines (1989) (OECD, 1995b). In 1993, about 70 percent of BT's services are subject to price control (OECD, 1995c). This means the regulation becomes more complicated and the profit of the operator is decreasing.

Also, in terms of the second citron, the X has continuously increased against BT. In 1984, X was set at 3%. However, it was raised to 4.5% (1989), 6.25(1991), and 7.5% (1994). The change of X is decided through evaluating the turnover of each service basket. This method makes unclear the difference between price cap and rate of return regulation because it considers the ROR in each services (Ide, 1994a). Further, the scheme showed that Oftel regulation become bigger and more severe to BT.

In terms of the relationship to the service development, two issues can be raised. The first issue is, as the theory shows, whether the price cap leads the reduction of the service quality or not? The second is whether the price cap encourages the development of new network services like ISDN or not? These questions are examined in later chapters.

Chapter 4

Telecommunication Policy in Japan

4.1 Historical Review

Until 1985, Japan had a monopoly telecommunication system like many other countries. Nippon Telegraph and Telephone Public Corporation (NTT-PC) supplied the domestic telecommunication services and Kokusai Denshin Denwa (KDD) provided the international telecommunication services. NTT and KDD were the sole legal providers of telecommunications, under the regulation of the Ministry of Posts and Telecommunications (MPT), which is the regulatory body responsible for the development of the country's postal and telecommunications services, as well as radio and television broadcasting services.

Although minor liberalization policies had begun in the 1970s (for example, connection of computers, information-receiving equipment, and facsimile equipment are permitted to connect to NTT's telephone lines.), the major change did not occur until the drastic telecommunication reform in 1985.[8] Japan's telecommunications climate was beginning to change since the late 1970s due to technological progress, the movement of administrative reform by the Japanese government, and the influence from the liberalization policy in the other developed countries, such as the USA and the UK (Mastuura, 1992). These environments lead to the restructuring of the Japanese telecommunication industry in the 1980s.

[8] For further information about Japanese telecommunication policy before 1984, see Tomita (1984).

In 1980, discussions about the reform of Japanese telecommunications had taken place. As a result, two important legislative acts were passed in 1984, the Telecommunications Business Act and the NTT Corporation Act. The Telecommunications Business Act decided the Japanese telecommunications market structure in general, and the NTT Corporation Act dealt with the privatization of NTT. By the NTT Corporation Act, NTT became a private, shareholder-owned company. However, because of its status as a dominant carrier, NTT is obligated to provide universal service and must submit an annual business plan to the MPT. The MPT can then order to fulfill the terms of this business plan (Bernt et al, 1993).

The summary of the 1985 telecommunication reform is as follows (Koshiro & Nambu, 1993, p52): 1) NTT was privatized with the provision that the government would hold one-third of shares. 2) NTT is obligated to provide universal service and must submit an annual business plan to the MPT. The MPT can oversee the approval of its business plan, and approval of board members etc. 3) All kinds of telecommunication services, including local service, were open to competition. 4) The Act designed the two types of carriers, type I carriers that own facilities and Type II carriers that do not and must lease circuits from Type 1 carriers.[9] The MPT's regulation to the type I carriers is very strict and requires both fitness and necessity approvals to obtain operating permission. The operators have to obtain permission from the MPT to operate and gain approval for its tariff and service provisions. The regulation to Type II carrier is less strict. The providers

[9] Two kinds of Type II carriers were created, depending on the size of the services offered: Type II general and Type II special.

only need to notify the MPT when they initiate their business. No regulation exists in terms of tariff and new service provisions.

After the telecommunication reform in 1985, many new entrants (New Common Carriers: NCCs) emerged in both Type I carriers and Type II carriers. By 1991, three long distance companies such as Daini Denden Inc. (DDI), Nihon Kousoku Tsusin (Teleway Japan Corp.: TJC), and Nippon Telecom (Japan Telecom Co., Ltd.: JT), seven local network companies and two international carriers entered the market. Also, more than 990 Type II carriers entered the market (Nagai, 1994b, p466). Especially, in the domestic long distance market, serious competition was promoted. Although the revenue share of the three NCCs in 1990 was approximately 3.8 percent in the entire domestic market, their share of long distance market of Japan's business district, which covers from Tokyo area to Osaka area, rose to 40 percent (Oniki, 1993). [10]

Among the issues which existed after 1985, the biggest for the MPT was how conditions of fair market competition could be achieved (Tomita, 1992). At the initial stage of competition between the long distance NCCs and NTT, several conflicts occurred between them in terms of interconnection: interconnection charge issue, point of presence issues, and deployment of NTT's local switch which has identification number function. Therefore, in 1988, the MPT reviewed the deregulation process up until then and proposed the necessity of breaking up NTT into several companies to promote more competition. The MPT explained the competition was not substantial yet and was not occurring on an equal footing -specifically referring to NTT's network information (Nagai,

[10] Currently, NCC's share between Tokyo area and Osaka area is over 50% and they are big threat to NTT.

1994b). The MPT filed a final report in 1990, which stated NTT should be divested into three companies, such as a mobile telecommunication company, a long distance company, and a local company. Since this proposal was opposed by the cabinet, the other ministry such as Ministry of Finance and Business Circle, the MPT gave up the idea to divide NTT in 1990 and postponed its final decision to 1995 (Oniki, 1993). However, the MPT ordered NTT to improve business and technical practices that had prevented NCCs from competition with NTT on equal ground.

4.2 Structure Policy

The Telecommunication Business Law (TBL) plays a significant role in designing the structure of the Japanese telecommunication market.

First, as mentioned in the previous section, TBL designed the two types of carriers, Type I carriers that own facilities and Type II carriers that do not and must lease circuits from Type 1 carriers. Since Type I carriers provide basic telecommunication infrastructure and need large investments in equipment, they are under severe regulation. Type I carriers have to obtain MPT's permission regarding market entry, tariff, investment plan, service area, and market exit, etc. Thus, the TBL states simply that anyone can enter the telecommunication market, and the entry (and exit) for Type I carrier is controlled by the MPT. Regarding Type II carriers, no control in the form of the fee approval and market entry restriction is present even though the type II carriers need notification to the MPT for initiating their business. Generally, this structure is evaluated positively because of its clear definition of type carriers (Matsuura, 1994).

Second, TBL, NTT corporation law, and KDD law separate the telecommunication markets into several submarkets, such as the long distance market, the local telecommunication market, the mobile communication market, the satellite communication market, and the international communication market. Operators are required to obtain permission from the MPT to operate each market. NTT is limited to providing "internal" telecommunications services and KDD is permitted to operate only in the international telecommunication market. Also, NCCs provide services in each specialized market. Compared with the USA and the UK, it is unique to divide the markets into several markets (Matsuura, 1994). In the USA, even though local and long distance markets are separated by the Modified Final Judgment, AT&T provides both domestic long distance and international services. In the UK, BT offers local, long distance and international services.

Finally, the big issue in the structural regulation is the divestiture of NTT (Okuno & Suzumura, 1993). Since NTT's market power is still dominant, how to regulate NTT has been a continuing issue for policy makers. The MPT thinks the break up of NTT is an essential policy in order to make the Japanese telecommunication market more competitive. The MPT failed to complete NTT divestiture plan in 1991, but began the discussion in 1995 with the review of NTT corporation law.

Overall, the current Japanese telecommunication policy has several structural regulation schemes even though the telecommunication market is open on the surface. This thesis will assess later how these structures affect the development of telecommunication services in Japan.

4.3 Price Policy

When the new Telecommunication Business Law (TBL) was introduced in 1985, the MPT set new pricing rules. First, the law decided that prices of services which are offered by the Type I carrier need approval by the MPT, while the price of services offered by the type II carrier just need notification to the MPT. Compared with the FCC and Oftel, the MPT has strong overseeing power over the telecommunication operators. The FCC only has the right to be notified the new tariff. Oftel gave free pricing power to the operators within the range of a price cap. The power of approval gives the MPT strong regulatory power over the Type I carriers. Through this power, the MPT can give unofficial guidance to the operators and manage the competition.

Also, at the same time, the rate of return regulation, which basically followed the same models of the FCC's price regulation was adopted as a pricing procedure. The TBA decides the pricing methods in Article 31: 1) the price is based on the cost which is calculated by a fair cost plus a fair rate of return; 2) the method of calculating the price has to be defined clearly and properly; 3) no discriminative pricing is approved.

In the rate of return regulation in telecommunication in Japan, the total cost is calculated by each service units such as telephone service, leased line service, and telegram, etc. Also, the cross-subsidization between the service units is strictly prohibited. Further, the rate of return is chosen by the service providers within certain predetermined rates. This method is aimed at both permitting the service providers to set prices flexibly, and avoiding predatory pricing and excessive profits.

It has been already seen that the shortcomings regarding the rate of return regulation. In addition, Ide (1994b) pointed out the several issues concerning the rate of return regulation in Japan. First, the regulatory agency has used the price regulation scheme to protect and help the growth of the NCCs. The MPT has kept the 20 percent price difference between NTT and NCCs. Because of this, the long distance NCCs could expand their market share rapidly. Second, although the Type I carriers are supposed to be under the rate of return regulation, the actual operation of the regulation did not always reflect the actual cost based pricing. For example, even though three long distance NCCs adopted the different network strategies (i.e., while DDI made the microwave based network, JT designed the fiber optic network), their prices were the same. Third, the MPT has not had an aggressive attitude regarding the introduction of new telecommunication services and new tariffs because it is difficult to predict their future demand. Thus, the competition between the incumbent carriers and NCCs happened in just price levels. Fourth, the present regulation system usually takes several months to get approval of new service provision and modification of the tariff. The average delay is about 1.5-2 months, but it can be over a year for major new services such as NTT's introduction of ISDN (Glynn, 1992). Thus, operators cannot provide new services or decrease prices on a timely basis.

In summary, the rate of return regulation in Japan is used for flexible pricing scheme for regulators, by which regulators can reflect their policy intention (Nagai, 1994a). The tariffing is handled through informal "guidance" from the MPT rather than formulas (Glynn, 1992). While the USA and the UK have already moved or have been moving to

the incentive regulation such as a price cap, the Japanese regulatory agency still clings to the traditional rate of return regulation. We cannot find reasonable explanation why the MPT did not move toward the alternatives from the rate of return regulation, which does not fit the competitive market. However, at least the MPT makes use of it for its influence on the regulated company.

In terms of telecommunication service development, several questions can be raised. How does this Japanese style price regulation affect the actual price reduction? How do the characteristics of Japanese style price regulation affect the development of new services? These questions are examined in later chapters.

Chapter 5

Basic Telephone Services

From chapter five to chapter eight, the development of four telecommunication services in three countries; basic telephone services, Integrated Service Digital Network (ISDN), Videotex, and Data and Valued Added Services, are examined. In each chapter, the development of the services are reviewed first, and then, the policy factors which influenced the service development are analyzed.

In this chapter, I begin with the basic telephone service since the main telecommunication policy debate usually concerns this service the most. Also, development of basic telephone service is reviewed in four aspects: 1) public telecommunication market, 2) rates, 3) service quality, and 4) traffic growth. Although the first item, public telecommunication market, does not indicate basic telephone service directly, this item is examined because it gives an idea how the telecommunications market in general has grown. Also, in many countries, the basic telephone service still occupies the biggest share of the telecommunications market. The second and the third items, rates and service quality, are often used as indicators of service development. Finally, the fourth item, traffic, is an actual indicator of people's usage of the telephone. Traffic growth can be said to be the indicator of basic telecommunication service development from the demand (users) side, while rates and quality service are those from the supply side.

5.1 The United States

5.1.1 Public Telecommunication Market

Table 1 shows the compound average growth rate (CAGR) of public telecommunication market revenue in the three countries and the OECD average. As the table shows, the public telecommunication market in the USA has expanded significantly since 1982. Although the growth rate is decreased between 1987 and 1992, the number still show above the UK and Japan.

Table 1: Public telecommunication revenue

	Revenue CAGR1982-87	CAGR87-92
USA	10.89	3.34
UK	4.95	1.77
Japan	3.25	1.96
OECD Ave.	7.22	3.44

(Source, OECD, 1995a, p.22)

5.1.2 Rates

Table 2 shows the summary of the US telephone price change. Although it is dangerous to generalize the price change by only viewing the average indicators because price changes are not the same among users (residential users or business users) and in the area (a metropolitan area, city area or rural community, etc), the general trend of telephone prices can be recognized.

Table 2: Summary of US price changes, 1980-1992

	Local	Interstate toll	Intrastate toll	All tel. service	All goods & services
1980	7.0	3.4	-0.6	4.6	12.5
1981	12.6	14.6	6.2	11.7	8.9
1982	10.8	2.6	4.2	7.2	3.8
1983	3.1	1.5	7.4	3.6	3.8
1984	17.2	-4.3	3.6	9.2	3.9
1985	8.9	-3.7	0.6	4.7	3.8
1986	7.1	-9.4	0.3	2.7	1.1
1987	3.3	-12.4	-3.0	-1.3	4.4
1988	4.5	-4.2	-4.2	1.3	4.4
1989	0.6	-1.3	-2.6	-0.3	4.6
1990	1.0	-3.7	-2.2	-0.4	6.1
1991	5.1	1.3	-1.5	3.5	3.1
1992	0.5	-1.3	-2.4	-0.3	2.9

* Note: consumer price indexes: annual changes in index levels.
(Source: OECD 1995b; p.36)

As the table shows, major price reduction has occurred in the long distance market, especially interstate toll market. AT&T tariff rates fell by over 70 per cent in real terms between 1983 and 1991 (OECD, 1995b; p.16). The rate reduction occurred also in the other long distance service like WATS. AT&T's inflation adjusted prices to business customers for 800 services have decreased 67.9 per cent since 1984 (OECD, 1995b; p.16).

By the divestiture, local rates were expected to gain a great rate increase due to the difference between local pricing and its actual cost. However, the result was not worse than expected. Actually, the local rates increased more than price index of all goods and services between 1982 and 1986, but after 1987, the local rate rose less rapidly than the index of all goods and services.

In all telephone services as a total, it is difficult to say that telephone rates decreased significantly. In the early and mid 1980s, users experienced higher rate increase in telephone than in all goods and services, but after 1987, rate increase in telephone has been less than in all goods and services, except in 1991.

How have these price changes been related to the policy factors? In the case of the long distance market, the FCC's pro-competitive policy and divestiture can be significant influencing factors. Also, the primary effect of divestiture and federal deregulation reduced prices for services that were becoming competitive (Noll, R. & Smart, 1991).

The OECD report (1995c) analyzes the effect of price cap regulation of AT&T on the long distance rate change (p35-39). The report observes substantial decrease in the real price of AT&T's telecommunication services under the United States price cap regime. Also, by examining the relationship between price cap limits and prices of services in each baskets, the report concludes that services have generally been kept near the levels permitted by the price cap limits and that price cap limits were effective in containing price increase for these services (p35).

However, these policies are not the only factors of rate changes. Rate changes may come from several other factors, such as technological progress, and demand expansion. For example, Noll, M.A. (1994) maintains that neither competition nor divestiture has had real effect on long distance rates. After he examines long term trends in long distance rates, he explains the rate reduction was caused by technical progress coupled with an increase in productivity and market demand.

Also, the change of the cost separation rule with the introduction of subscriber line charges (SLC) and a series of accounting changes was a big factor of both long distance rates decrease and local rate increase. During the 1980s, the FCC tried to shift non-traffic sensitive cost from long distance companies to final consumers by instituting fixed monthly subscriber line charges (SLCs). Also, a series of accounting changes effectively reduced interstate costs while increasing intrastate costs. The decrease of long distance rates was a response to lower interstate access rates that are the result of a cost shift (Crandall, 1991, 58, Taylor et al, 1993). Taylor et al (1993) states "Beyond the mandatory reflection of access charge reductions in AT&T's rates, interexchange carriers initiated no significant reduction for toll services" (186-187).

Furthermore, many experts explained the early 1980s rate increase by "regulatory lag" (Noll, R. & Smart, 1991; Crandall. 1991). The increases in the early 1980s were largely a reflection of regulated firms catching up with past inflation (Crandall, 1991). On the other hand, the rate increase in 1984-1986 was probably a direct consequence of divestiture, competition, and accompanying FCC policies (Noll, R. & Smart, 1991). We can observe that the mid-1980s increase was accompanied by a rate reduction of long distance rates.

It is difficult to analyze how much each factor influences the price change. However, it is certain that the competition policy through the MFJ and price regulation has been one of the big factors. Without competitive pressure, long distance rates would not have been reduced even if SLC or a new access charge rule was established.

5.1.3 Quality of Service

Service quality is one of the issues upon what policy makers put the most priority. Even if telephone rates decrease or remain stable, the decrease of service quality means a substantial increase in service price. Thus, regulated companies and regulators have taken into consideration numerous technical measures related to service quality. However, problems, which are a lack of consistency in the measures of service quality across the regulatory agency, company and time, exist (Curry, 1991). Here, I look at the OECD's data, which are based on the FCC report, to avoid these problems.

The divestiture of AT&T had the potential to disrupt voice and data communications throughout the nation and significantly affect the service quality (Curry, 1991). However, the indicators of service quality show improvement between 1985 and 1990 in almost every item (table 3). During this period, all segments of users from residential to large business have showed improved customer satisfaction. Some technical indicators such as call completion improved, as well. The competition among operators and technological advancement such as fiber optic deployment may contribute to the satisfactory results.

Table 3: Quality of service in the United States

	1985	1990
Customer satisfaction		
Residential	93.5	94.3
small business	92.1	94.0
Medium Business	91.4	96.2
Large Business	91.5	94.5
Dial Tone Response	97.7	99.0
Transmission quality	91.7	98.3
On time service orders		
Residential	98.0	97.6
access	98.2	98.6
Business/Special	97.6	98.3
Call Completion		
IntraLata	99.5	99.6
InterLata	97.1	98.9

Note; The data represents all company composites compiled for the individual Bell Holding Companies by the FCC (Source: OECD 1995b; p.38)

The introduction of a price cap by the FCC raised the service quality issue. Many state regulators and consumer advocacy groups argued that the FCC plan to replace the rate of return regulation with a price cap would degrade the level of service quality because it encourages reductions in network investment and maintenance expense (Curry, 1991). Also, since many states currently have begun to adopt incentive regulations, service quality has become a significant issue at the state level.

The OECD report (1995c) introduces a FCC's price cap performance review (p.62). According to the FCC's review, service quality did not deteriorate under price cap regulation. The performance standards such as trunk blockage, installation and repair intervals, and dial tone response times were met successfully over 95 per cent of the time. The average unscheduled downtime per loop remained less than 4 minutes per year for

LECs under the price cap. It should be noted that extensive study of this point was not discovered in the literature on the field.

However, the FCC observed some decrease of service quality in other indicators after 1991, too. For example, residential service quality complains per million residential customers rose in 1991, and remained high through the first quarter of 1993, although it fell in the second quarter of 1993 (OECD, 1995c, p62). Unfortunately this trend still holds.

5.1.4 Traffic

Traffic is an indicator which shows people usage of telephones. If national traffic does not show improvement regardless of rate decrease, it means that the telecommunication service market does not develop soundly. It is useful to compare the trends of traffic between years and also between countries to understand the characteristics of telecommunication usage.

In case of the USA, the introduction of competition policy certainly influenced on telecommunication service usage, and traffic. Table 4 shows the US traffic growth. The numbers in the table show the per cents of traffic increase over the previous year. As the table presents, the most competitive market, which is the interstate long distance market, shows a significant traffic increase in the 1980s.

Table 4: US traffic Growth (increased over previous year %)

	Local	Intrastate toll	Interstate toll
1980	--	--	--
1981	2	7	8
1982	3	5	7
1983	3	5	10
1984	3	19	23
1985	2	12	20
1986	2	7	8
1987	1	7	9
1988	5	6	9
1989	2	7	7
1990	1	5	3
1991	1	1	4

(Source: OECD 1995b; p.42)

5.1.5 Summary -Policy and Service-

From the above discussion,. it is observable that the USA's structural change of the industry, such as new market entry and divestiture, was positively related to basic telephone service development. The structure change from the monopoly to competition in the long distance market lead to drastic rate reduction in toll prices. Some price increase occurred in local service, but the range was not as big as expected. Partly due to this rate reduction, the toll traffic also has expanded significantly. Also, during 1985-1990, service quality shows improvement.

The relationship between basic telephone service development and new incentive price regulations, such as a price cap, needed more sufficient empirical data. However, the past research see some positive relation between the price cap regulation and rates decrease, although some other factors are also involved. Further, in the field of service quality, some negative consequences were found.

The new telecommunication act will have significant influence on the US telecommunication service in the future US telecommunication services, because it might change the current telecommunication industry structure. Several new services offering and higher quality of service will be expected.

5.2 The United Kingdom

5.2.1 Public Telecommunication Market

In the previous section (5.1.1), the public telecommunication revenue in the UK, the USA and Japan were presented. As the table 1 showed, the revenue of the public telecommunication in the UK continues to grow since 1980. The UK enjoys above average growth rates since 1985. Although it is difficult to specify whether these data come from the price and structural policy, the data are partly the results of the British liberalized market.

5.2.2 Rates

How does the introduction of a price cap and duopoly in the UK affect the telephone prices? Table 5 shows the movement in BT's connection charges, exchange line rentals and call charges from 1984 to 1993. BT's average prices have fallen by about 26 per cent between 1984 and 1992, and by 12 per cent between 1989 and 1992 (OECD, 1995c, p34).

Table 5 Index of BT's price changes adjusted for inflation

	1984 -85	1985 -86	1986 -87	1987 -88	1988 -89	1889 -90	1990 -91	1991 -92	1992 -93	1993 -94
Connection Charges	91	91	97	102	94	100	100	104	69	68
Rentals	101	107	107	102	94	94	100	104	108	110
Trunk calls	169	162	140	133	123	112	100	97	96	85
Local calls	120	124	131	125	115	107	100	100	99	88

1. Base year=1990-91.
2. Based on 1989-90 revenue weights.
3. Inflation adjusted using July PRI of rice control year (price control year runs from August to July).
4. For price control year 1993-94, February 1994 RPI used.
(Source: Oftel cited by OECD, 1995c, p35)

First, the price decrease in trunk calls is significant. The rate has dropped continuously since 1984, and the price level of 1993-94 was almost half of the 1984-85 level. The price cap and competition with Mercury could be pressure to decrease the long distance rates. A price cap made it possible for BT to respond to the competitive environment and to decrease the long distance price.

On the other hand, concerning the local telephone services, the rental, connection charges, and average local call rates increased between 1984-87. Also, the table shows an increase in rental charges existed in recent years. This is because of the "rebalancing", which brought prices more closely into line with the costs of providing the different services, was taking place. Since a price cap made it possible for firms to change their rates quickly, the significant degree of price rebalancing has taken place under the price cap regime in the United Kingdom (OECD, 1995c, p43).

5.2.3 Quality of Service

One shortcoming of the price cap system is it might create incentives for the regulated firm to reduce the quality of service. Unfortunately, BT's reputation for its quality of service was not good. A report issued by Oftel showed numerous statistics which indicated that BT's service quality was declining (Bolter at al., 1990). The table 6 shows some results. After the price cap was introduced, all the data pointed to a worsening situation of service quality. Many believe this is too high a price to pay for price cap regulation and privatization.

Table 6: Service quality in the UK

	March 1986	March 1987
Service Worsened	10%	23%
Service Improved	12%	8%

Complains	1985	1986	1987
	9,917	15,410	23,264

(Source: Oftel data, cited by Bolter et al., 1990, p349)

Oftel began to publish its survey figures on service quality in order to improve this situation. Oftel's service 1990 Annual report noted that increase in percentages of faults repaired in one day from 65 percent to 86 percent (Oftel cited by Noam 1992). Table 7 shows comparative data about the quality of service in the UK. The numbers show strong improvement in the service quality.

Table 7: Quality of Service in the UK

	1985-86	1992-93
Network reliability		
Local calls failed	1.7	0.2
National calls failed	4.1	0.2
Network faults per line per annum	0.20	0.17
Fault repair		
Faults cleared within two working days	87.1	98.5(buss.) 96.8(Resi.)
Installation		
Business orders completed on time	60.8	68.6
Residential orders on time	59.4	84.2
Operators services		
Inland operator calls answered within 15 seconds	85.6	92.2
Inland directory calls answered in 15 seconds	76.6	88.1

(Source: OECD, 1995b)

However, some statistics still showed its comparably poor quality of service. Table 8 shows some comparison data. As the table shows, BT's quality service was still far behind that of USA and Japan.

Table 8:Quality of service:fault incidence and repair time, 1992

	Faults per 100 lines per year		Faults repair within 24H	
	1990	1992	1990	1992
Japan	2.0	2.0	50.0	100.0
UK	18.0	17.0	92.5	81.7
US	n.a	8.0	n.a	-----

(Source: OECD, 1993, 1995a)

Currently, BT has operated a financial compensation scheme since 1989 for an increase in service quality under the scheme. BT compensates customers if certain nonstructural standards for services such as installation and repairs are not met. For business customers, the compensation of 25 pounds per line each day BT falls short of its target. For residential customers, compensation is one month's network rental charge for each day that BT falls short of its installation and repair targets, including weekends. Compensation can be higher if the customer can prove actual financial loss (OECD, 1993).

It is hard to say the price cap or duopoly caused the low level of service quality, but we can see the competition with Mercury did not work well in regard to service quality.

3.2.4 Traffic

Does the introduction of competition and incentive regulation (price cap) lead to the increase of traffic? The table 9 shows growth rates in telephone traffic. As the table shows, the UK shows a significant increase of traffic, even higher than the increase of the US long distance traffic.

Table 9: Growth rate in telephone call volumes over the previous year

Call Growth	1991	1992	1993	1994	1995
Domestic	4	1	-	6	7
International	6	4	6	6	5

(Source: BT, 1995)

5.2.5 Summary -Policy and Service-

In the field of basic telephone service, certain influence of the UK telecommunication liberalization policy can be observed. Also, structural policy (duopoly) and price policy (price cap) supported the liberalization policy as major components, even though it is sometimes difficult to specify the clear attribution of duopoly and price cap.

Telephone rates are the area which the competition between BT and Mercury have the most effect. The competitive pressure decreased BT's long distance rates about 25% between 1984 and 1990. Also, the price cap made it possible for BT to rebalance its tariff structure.

Service quality had been one of the big issues in the UK telecommunication. The introduction of a price cap might have negative effect on service quality. Actually, after the price cap was introduced, some indictors of service quality became worse. Oftel responded to this situation by monitoring BT's service quality more closely, and recently, the service quality of BT shows improvement.

As the significant expansion of the UK's public telecommunication market and telephone traffic during the duopoly era shows, structure and price policy in the UK succeeded basically. However, the UK government decided on further deregulation by abandoning duopoly and admitting free entry into the telephone market. It is too early to evaluate the new structure policy. We need to keep observing the trend of the future UK basic telephone services

5.3 Japan

5.3.1 Public Telecommunication Market

Table 1 (in section 5.1.1) shows, the revenue of the public telecommunication in Japan continued to grow since 1982. However, the growth rate is clearly lower than that of the USA and the UK. It is necessary to analyze the market in more detail, but this general tendency has to be considered seriously.

Table 10 shows the revenue of telephone services. It is clear that the liberalization policy in Japan did not affect developing the telecommunication market significantly.

Table 10: Telephone service Revenue in Japan

	1985	1986	1987	1988	1989	1990	1991	1992
Revenue	4,200	4,324	4,503	4,599	4,744	4,884	4,940	4,969
Growth Rates	---	3.0	4.1	2.1	3.1	3.0	1.1	0.6

* Units: billion Yen (Revenue), per cent (Growth rate)
(Source, MPT cited by Ozawa, 1994, p.26)

5.3.2 Rates

After the structural change of telecommunication industry in Japan in 1985, substantial rate reduction was made. As table 11 shows, NTT's long distance rate in 1992 was reduced to half of the level of 1985. "It can be regarded as a textbook case in which monopoly prices are decreased by the competition from new entrants" (Oniki, 1993, 75).

Table 11: Rate Reductions in Long distance telephone service

	1985	1986	1987	1988	1989	1990	1991	1992	1993
NTT	400	400	360	330	280	240	240	200	180
NCCs	----	---	300	280	240	200	200	180	170

* Unit: Yen. Tokyo-Osaka (500 Km): 3 minutes, daytime
(Source, InfoCom Research Inc, 1994, p.34)

The table also shows the rates were maintained by the 10 percent to 20 percent difference between the NTT's price and NCCs' prices. As mentioned in the chapter four, this result implies the MPT used the price regulation scheme to protect and help the growth of the NCCs.

Also, the one important characteristic of Japanese rates structure is that rate rebalancing has not been done until recent years, unlike the USA and the UK. This was because NTT did not separate its accounting sufficiently between local and long distance services, the MPT thought NTT needed to restructure its management before rebalancing, and the MPT aimed to protect NCCs (Koshiro & Nambu, 1993). Thus, NCCs could gain competitive advantage with NTT. The MPT's price regulation helped NCC to expand its share in the long distance market.

5.3.3 Quality of Service

In Japan, service quality has not been a big issue. Telecommunication operators achieved good performance in the quality of service. The table 12, 13 show some indicators of quality of service including faults per 100 lines, and waiting time for

telephone lines. Overall the numbers indicate satisfaction with the performance of telecommunication operators.

Table 12: Quality of service: Fault incidence and repair time, 1992

	Faults per 100 lines per year		Faults repair within 24H	
	1990	1992	1990	1992
Japan	2.0	2.0	50.0	100.0
UK	18.0	17.0	92.5	81.7
US	n.a	8.0	n.a	n.a

(Source: OECD, 1995a, p88)

Table 13: Waiting time for telephone line installation, 1980-90

	1980	1988	1990	1992
US	5	n.a.	0	0
UK	3	0	0	8
Japan	1	0	0	0
OECD Ave.	15	7	3	-

* Unit: in months (1980,88,90), in days (1992)
(Source: OECD, 1993, p.72, 1995a)

It can be concluded that the competitive market structure in the Japanese telecommunication industry has improved service quality.

5.3.4 Traffic

In section 5.3.1, we observed that the telecommunication market in Japan did not expand as it had in the USA and the UK. Telecommunication revenue can be affected by the several factors such as price reduction, and here we see the traffic as a indicator of service market development.

As Table 14 shows, even though NCCs traffic increased considerably, the total Japanese national traffic did not increase significantly. Furthermore, the statistics show NTT and NCC are merely competing to get a larger share of the "pie", not expand the "pie". The international comparison describes more clearly the Japanese telecommunication service market situation. The competitive industry structure did not appear to contribute to the service market expansion as in the USA and the UK (Table 15). Thus, the low rate of market growth, which was seen in section 5.3.1, was not because of the rate reduction, rather because of the low traffic growth.

Table 14: National Traffic (long distance + Local)

	1989	1990	1991	1992
NTT	71,840(--)	72,610(1.1)	73,270(1.0)	72,760(-0.1)
NCCs	1,360(--)	2,450(80.1)	3,600(46.9)	4,490(24.7)
Total	73,200(--)	75,060(2.5)	76,870(2.4)	77,250(0.5)

*Unit: million call times, ( ): Growth rate
Source: MPT, 1994

Table 15: National traffic and network utilization

	CAGR Total national traffic (per cent)	CAGR total national traffic per mainline (per cent)
UK	9.01(85-89)	4.48
USA	7.20(85-91)	4.20
Japan	6.83(88-91)	2.95

*Note: USA, Long distance call traffic
Source: OECD, 1995b

5.3.5 Summary -Policy and Service-

In the field of basic telephone service, the telecommunication reform in Japan was basically successful. The structure change from a monopoly to competitive industry

contributes to drastic rate reduction. Although some lack of clarity existed in the MPT's price regulation and its operation, the policy works effectively in the rate reduction.

However, Japan's case shows some unique characteristics, too. Even though the long distance rate decreased drastically due to competition, the service market in terms of revenue and traffic did not appear to develop well, compared with the USA and the UK. Although clear link between this situation and MPT's structural and price policy cannot been found, the strongly managed competition by the MPT might have a certain effect on the Japan's weak market expansion.

Recently, much discussion about further structural change (NTT's divestiture) is underway. Also, the call for a new price regulation scheme such as incentive regulations is increasing. This movement will be crucial for the future development of telecommunication service in Japan.

Chapter 6

ISDN

ISDN (Integrated Services Digital Network) is a network feature using digital technology to support integrated voice, data and image services through standard interfaces. ISDN indicates technical concept, infrastructure, and service. ISDN is a digital, end to end, public network, which will be integrated into the current analog public switched telephone network.

In this chapter, ISDN in the USA, the UK and Japan is examined. In each country, ISDN development is reviewed, first. After that, effects of the structure and price policy are analyzed.

6.1 USA

6.1.1 ISDN Development in the USA

Since the first ISDN call in North America was placed in 1986, ISDN in the US has not been developed smoothly. For example, the ISDN access availability is very different among companies; Bell Atlantic planned about 87% availability until the end of 1994, whereas Southwestern Bell planned just 23% availability for the same time period. (Karpinski, 1993, 22). Compared with the other countries, access availability in the US is lower. ISDN service was available on 60% of the U.S. circuits in 1993, while availability of ISDN in France, Germany, and the UK has been 100% for several years (Galvin & Hauf, 1994). Critics explained the many factors that have caused the slow ISDN

deployment, such as standards, equipment, lack of infrastructure, restrictive regulation, lack of availability, lack of connectability, high costs, lack of application and poor marketing (Goleniewski & Horak, 1993).

Carriers and vendors have striven for a breakthrough. In 1992, the Corporation for Open Systems (COS) and the North American ISDN User's Forum (NIUF) sponsored the Transcontinental ISDN project 1992 (TRIP 92) and was successfully demonstrated in ISDN. NIUF also standardizes national ISDN standards (NI). In addition, many RBOCs pushed forward their ISDN availability.

The future prospects of ISDN in the U.S. can be termed positive or negative. From the negative side, detailed standardization and availability are still issues. Also, competition with the other services such as frame relay and SMDS (Switched Megabit Data Service) will be severe. "Some argue that ISDN is too little, too late. They contend other technologies and services now compete against ISDN and will outpace it long before it has achieved its potential" (Freuck, 1993, 26). On the other hand, from the positive side, both RBOCs and IXCs have increased their commitments, promising broader usage, availability, and affordability (Tebes, 1994). Also, several applications, which fit with ISDN, such as telecommuting, LANs interconnection, and the internet access, have begun to emerge (Tebes, 1994). Overall, the enthusiasm has gone but ISDN will develop its market as real user demand services.

6.1.2 Structural Policy and ISDN Deployment

Although it is difficult to see the direct effect of the structural policy on ISDN deployment, some relation can be found.

First, one of the big stumbling blocks of ISDN development has been its standard setting. The industry structure imposed by the MFJ had a certain effect on this issue. Prior to 1984, the U.S. telecommunication market had been well structured. Bell Laboratories played the central role in setting the model and developing standard, in which local exchange carriers and inter-exchange carriers manage their networks. However, the MFJ structure created seven RBOCs. Without the power of an integrated AT&T to set standards, standardization could be more a complicated process. Sirbu (1991, 334) said that divestiture can probably be blamed for a two-year delay in the development of standards for the ISDN CPE (Customer Premise Equipment) interface with the network.

Also the seven RBOCs' own business plans affect the adoption of ISDN standards. Where in the past AT&T may have forced all of the Bell Operating Companies to adopt a common approach, divestiture has made divergence easier (Sirbu, 1991). For example, even though, in 1992, the transcontinental ISDN project '92 (TRIP '92) set National ISDN standard, US West and Southern Western Bell do not follow this way by their management decision (Goleniewski & Horak, 1993). As a result, the full ISDN connectivity to the users is not possible.

Further, geographical separation of the local telephone service has caused geographical variance in the deployment of ISDN. The differences in the territories served by the RBOCs have led to differential emphasis on technologies. As mentioned before, Bell Atlantic planned about 87% availability until the end of 1994, whereas Southwestern Bell

planned just 23% availability for the same time period. (Karpinski, 1993). This is because each RBOC plans its own investment and strategic business plan. The MFJ structure makes it difficult to develop new infrastructure universally.

Moreover, competitive market structure does not always work for ISDN development. For example, by network requirements associated with equal access, the RBOCs and IXCs invested billions of dollars in transport facilities, switches and software rather than ISDN development. Also, carriers clearly focused on competition for the immediate market, rather than on rebuilding the infrastructure along ISDN lines (Goleniewski & Horak, 1993).

Finally, the line of business restriction affected the ISDN deployment. Since RBOCs were restricted in entering in information business, the RBOC did not have a strong incentive to develop ISDN, whose primary expected application is information service (Goleniewski & Horak, 1993). Gregg (1992, 427) said the restrictions which the consent degree impose on RBOCs denied their development of the technology, even though their contribution was needed.

Overall, it is seen that the US's structural regulation has had a negative influence on ISDN deployment, generally. The old separated Bell system now has its own strategy of new service development. Thus, even in the United States, some RBOCs adopt different technical detail from the other RBOCs and it makes interconnection inconvenient. Also, the line of business restriction gave disincentive to RBOCs to build the new technology. ISDN in the US is still struggling and cannot find its clear way even if the continuing effort for development is continued.

6.1.3 Price Policy and ISDN Development

How has the changing regulatory environment affected the ISDN evolution in the USA? Even though much theoretical research about price regulation exists, little empirical research is available.

Gregg (1992, 427-428) suggested that the rate of return regulation could be an impediment to ISDN supply and should be replaced by price cap regulation. He thinks the rate of return regulation encourages inefficiency because only profits resulting from new equipment purchase could be kept by the company; all other profits had to be returned to the customers in the form of rate cuts. On the other hand, by price caps, companies are rewarded for their efficiency, and services already experiencing competition are not affected. He also mentioned customers are treated fairly because price caps are determined using the consumer price index minus a productivity figure.

Recently, Greenstein et al. (1995) examined the investment patterns of local exchange telephone companies (LECs) in the United States in the post-divestiture era. They used four measures of infrastructure deployment: Optic cable, SS7, digital stored program, and ISDN. Also, they used the econometric framework to measure the effect of the local regulatory structure on long-run infrastructure deployment. The study relates individual LEC investment patterns to LEC-specific regulatory, demographic, and economic characteristics. The study is significant in that it tries to isolate the contribution of state regulatory policies from that of other demographic and economic factors in the determination of infrastructure deployment at the state rather than at the corporate level.

In their conclusion, they found price regulations, which are price cap and price freeze, greatly increase LEC's incentives to deploy ISDN lines although they cannot find a significant difference between the effect of price-cap regulation and price freeze regulation. They also provide the predicted change over the estimated year of what would be achieved by imposing an incentive regulation on companies that in 1991 had no incentive scheme. They find price regulation (price cap or price freeze) provides 114% increase in deployment of ISDN over the base year, compared with the rate of return regulation.

However, some critiques to Greenstein's analysis exist. For example, the type of regulation probably have no impact on ISDN development. Even if, in Greenstein et al's study, price cap scheme, price freeze method and earning sharing scheme was analyzed as independent variables, the actual difference in its implementation is not clear (We can say that price freeze scheme is a strict form of price cap method.).

Overall, although some research that price cap regulation provides more a positive effect than the traditional rate of return regulation in terms of ISDN development is found, the more empirical and theoretical analysis is necessary for a concrete conclusion. In case of ISDN, other factors such as corporate strategy, users' demand, availability of technology may be equally important.[11]

6.2 The United Kingdom

6.2.1 ISDN Development in the UK

[11] For example, LEC's aggressive involvement of video dialtone from 1991 might lead to their disincentive for ISDN investment.

ISDN development in the UK has been related closely to British Telecom's (BT) activity. BT's ISDN service started in 1985 with the launch of the single-line integrated digital access (IDA) service (Griffiths, 1992). The services, Integrated Digital Access, had limited applications but was aimed at determining user requirements for eventual ISDN service. Currently, BT offers two levels of ISDN services: ISDN 30 and ISDN 2. ISDN 30, launched in October 1988, offers 64k bps circuit-switched channels with CCITT Primary Rate Access (30B+D). ISDN 30 is targeted primarily at larger institutions, in particular those requiring bulk transmission of data and voice. BT upgraded its IDA series in 1990 with ISDN 2, a CCITT-compatible services offering 2B+D channels. ISDN 2 is aimed primarily at branch offices and smaller data capacity users. Coverage is over 80% of both business and residential numbers. BT's ISDN 2 tariffs, like those in France and Germany, are priced the same as regular calls but include a one-time connection charge and yearly rental fees (Noam, 1992).

The deployment of ISDN in the UK is not so quick. Table 16 shows the number of ISDN lines installed. As the table shows, the UK is behind France and Germany in basic rate ISDN offering.

Table 16: Installed ISDN lines as of January 1, 1991

	Primary rate	Basic Rate
UK	1,700*	500
France	500	5,000
Germany	640	7,615

*BT, 1000; Mercury, 700
(Source: Heywood, P. & McMaster, S. , 1992)

The main reason of late ISDN deployment is in the BT's ISDN strategy. In the UK, ISDN development essentially depend on BT. However, BT does not consider ISDN as more than a means of data transmission and wants to let the market decide how much and to what extent it wants ISDN (Arladis, 1994). BT does not intend to have too arbitrary an approach as far as ISDN concerned. Even though ISDN should allow BT to increase its supply of enhanced services, the BT will not heavily promote ISDN. BT regards ISDN as not the kind of service from which short-term benefits are to be gained. However, Mercury does not seem to be willing to invest heavily in ISDN, either (Arladis, 1994).

The future of ISDN in the UK is not clear. The Commission of European Union is proceeding with a policy, in which European wide ISDN (Euro-ISDN) is promoted to develop aggressively. ISDN Memorandums of Understanding (ISDN-MOU), envisioning a widespread, interconnected ISDN across European countries, was signed by 20 countries in Europe in 1989 (Fuchs, 1993). In the commission's vision, ISDN is identified as a universal access to information society, and many countries such as France and Germany, are aggressive on ISDN deployment. In the UK, ISDN development depends on BT's strategy. Whether BT follows the European trend or go its own way has not been apparent, yet.

6.2.2 Policy and ISDN Development in the UK

Davies (1994) explained that this BT's passive investment attitude toward ISDN development comes partially from Oftel's regulation. BT's investment strategies are governed by the need to recoup fixed costs quickly rather than to expand the capacity and

services available over a nationwide network. In the UK, Oftel does not have the necessary political power to prevent BT from abusing its necessary political power and to prevent BT from abusing its monopoly position. In June 1992, however, following widespread public criticism in the press, Oftel was forced to intervene where the market had failed by requiring that BT build a ubiquitous digital broadband infrastructure to serve the requirements of British society as a whole (Davies, 1994).

Overall, competition under duopoly did not promote ISDN deployment in the UK. Competitive market made BT's strategy focus on more short-term profit origin typed service.

6.3 Japan

6.3.1 ISDN Development in Japan

ISDN in Japan began in 1988 as NTT's INS-Net services. ISDN was expected to be a key infrastructure and service in the "Information society".

Two types of INS-Net services currently exist: INS-Net 64 and INS-Net 1500. INS-Net64, started in 1988, is a domestic basic-rate ISDN service providing transmission with two B channels at 64K bps and one D channel operating at 16K bps. INS-Net1500 was introduced in 1989, mainly for large volume transmissions. The primary rate service uses 24 B channels and a D channel, operating at 64k bps.

Table 17: Number of ISDN subscriber lines

	1988	1989	1990	1991	1992	1993
INS64	1,198	6,574	27,313	84,139	156,811	234,786
INS1500	-----	117	560	1,751	3,109	4,645
Total	1,198	6,691	27,873	85,890	159,920	239,431

(Source: Infocom, 1994)

ISDN in Japan has steadily increased its subscribers (Table 17). The main applications of INS-Net64 are for data communications and facsimile communication. Also, INS-Net1500 is used for the corporate internal communication systems such as PBX (Private Branch Exchange) connection and video communication such as video conference (MPT, 1993).

Although ISDN in Japan looks successful compared with the USA and the UK, it has not developed as NTT expected. Also, users complain about the high price of lines and customer premise equipment, limitation of service area, poor marketing, etc (Mizuno, 1995). NTT's ISDN unit has continued to have pretax losses since it began operation in 1988. Revenues for the year which ended March 1992 was US$135 million, but pre-tax losses reached US$587 million due to investment in equipment which amounted to about US$625.5 million (Dhilawala, 1993).

The prospects for ISDN in Japan are not clear, either. At present, both positive aspects and negative aspects can be found. The positive aspects are: equipment for ISDN continue to decrease (Mizuno, 1995); ISDN has gotten a foothold in the corporate telecommunication (Staal et als, 1995). On the other hand, negative aspects are emergence of new competing services, such as framerelay and VPN (Virtual Private Network); few unique ISDN services exist, etc. Recently, NTT identified the present ISDN as a universal multimedia network, and began aggressive sales promotion, including announcing new discount tariff plans and a discount for customer premise equipment such as TA (Terminal Adapter) (Mizuno, 1995). "ISDN in Japan is no longer perceived as a good in itself." (Staal et als, 1995)

6.3.2 Policy and ISDN

The telecommunication reform in 1985 influenced significantly Japanese ISDN development. First, privatization of NTT made it difficult for NTT to implement ISDN as they first expected ISDN as future universal digital network services. Privatization made NTT more conscious about its costs. Thus, NTT's emphasis shifted from universal to business-oriented services (Komiya, 1991).

Second, introduction of a new entry into the telecommunication market did not work in terms of ISDN development. Since deployment of ISDN facility needs a great amount of investment, no strong incentive exists for New Common Carriers (NCCs) to enter the ISDN market. Although three long distance NCCs provide long distance ISDN voice service over their trunk lines, local ISDN connections are supplied only by NTT until now[12].

Rather, the MPT expected NTT to play the central role of modernization of Japan's telecommunications network and encouraged NTT to promote digitization of its system as quickly as possible. Thus, the MPT asked NTT to start ISDN service as quickly as possible (Nambu, 1994). Here, the MPT's characteristics of managed competition policy can be found.

Further, the price of ISDN seemed to be strategically guided by the MPT. At the early stage of ISDN development, equipment costs for ISDN were significantly large. Thus, if the price was decided by cost-based pricing as the Telecommunication Business Law

---

[12] Recently, several new local telecommunication carriers (local-NCCs) announced the plan of ISDN service. (Mizuno, 1995). This movement will have a significant consequence on ISDN development in Japan.

states, the price should have been set higher. However, the price of ISDN was decided at a surprisingly low level, despite the fact that NTT preferred cost-based pricing.[13] For example, charge of INSNet-64 (Basic interface) for business users are 5,400 Yen/Month (as compared with 2,350 yen/month for analog telephone service) plus usage based charge, which is the same as the analog telephone service. As Komiya (1991) pointed out, "the charges were decided by the MPT, and NTT had no choice but to accept them" (p.262). NTT lost the strong incentive to promote ISDN by this pricing because the larger subscribers meant a greater loss for them.

It is hard to say whether the MPT's policy has a positive or negative influence on ISDN development in Japan. Also, it is still too early to assess ISDN in Japan. Compared with the USA and the UK, ISDN in Japan shows solid growth, but that does not mean sound development. So far, ISDN is dependent on the NTT's huge loss.

[13] The MPT thought low level of rate could encourage rapid diffusion of ISDN. This stance was influenced by the European policy of keeping ISDN usage charges at the level of basic telephone services (Staal et als., 1995)

Chapter 7

Videotex

Videotex is defined by International Telecommunication Union (ITU) as "an interactive service which, through appropriate access by standardized procedures allows users of Videotex terminals to communicate with databases via telecommunication network" (OECD, 1988, p.9). Some common characteristics of videotex include interactivity, simplicity of use, information retrieval and transaction. Since videotex began in the UK as Prestel system, videotex has been expected to be new interactive media in every developed country. However, except for the French Minitel system, the development of videotex has not succeeded significantly all over the world.

In this chapter, policy influence on the videotex service in the USA, the UK and Japan will be explored. The videotex deployment has been influenced by several factors, in addition to policy, such as network architecture, information source, and marketing approach, etc (Bouwman et al, 1992). However, policy factor also plays an important role in Videotex development.

7.1 Videotex in the USA

7.1.1 Videotex Development in the US

Videotex in the US has several unique characteristics, compared with the other countries. First, unlike European countries and Japan, in which PTOs (public telephone operators) are the monopolistic service providers, the USA does not have monopolistic

videotex providers. Generally, since AT&T and RBOCs have been prohibited from providing information service, the US telephone companies are limited to providing the transmission service. Instead, many competing service providers are in existence (Steinfield, 1992).

Second, related to the first point, since no dominant videotex provider exists, no specific display protocols using special purpose terminals exists. US videotex systems tend to use personal computers as terminal equipments with ASCII text instead of graphical oriented displays (Steinfield, 1992). Thus, few strictly defined videotex systems exist in the USA. Most of the service are videotex like systems, such as on line service.

The US videotex had several pilot projects failed in the early and mid 1980s. Videotex operated by Knight Ridder Newspapers Inc. and Times Mirror Co. are examples (OECD, 1988). These services are based on NAPLPS (North American Presentation-Level Protocol Syntax), which AT&T developed for videotex protocol. Over this period, wealthy suburbs were targeted but only a few subscribers were willing to pay connection fees of up to $20 a month along with one-time charges for terminals of $400 or more (Noam, 1992).

Also, on-line services, such as CompuServe, began in the late 1970s. CompuServe used its installed base of mainframe and a widespread packet switching network.

In 1987, restrictions on RBOCs to enter the information market was relaxed and gateway services, which provide easy connections to any database of enhanced service provider by offering user-friendly menu services, were created. Several RBOCs started gateway services in 1988 and 1989, but most failed soon after their introduction (Noam,

1992). These services required additional cost for subscribers and subscribers can access directly to information providers without gateway services.

If on-line services like CompuServe are included, the current US videotex market can be a quite big (Table 18). Although the consumer market consist of only 2.7%, table 19 shows subscribers are increasing.[14]

Table 18 The US Online Service Market 1990

- 4,200,000 on line service subscribers
- 90% growth rate in revenues from 1986 to 1990
- 1990 revenues of nearly $9 billion

Market Segments	
Financial/ Brokerage	49.0
Credit reporting/ Verification	18.2
Financial News/ research	16.1
Legal/ regulatory	7.5
Professional	6.5
Home consumer	2.7
Marketing	0.1

Source: SIMBA Information, Inc. cited in Steinfield, 1992.

Table 19 Growth in Subscribers for Selected Services

	87	88	89
CompuServe	340,000	416,000	760,000
GEnie	37,000	85,000	252,000
Delphi	45,000	55,000	80,000

Source: Rlen Communications, March, 1991 cited in Steinfield, 1992.

[14] The recent data shows drastic expansion of on-line services. Currently, America on line has 4.5 million subscribers, CompuServe has 4 million subscribers, and Prodigy has 1.5 million subscribers (Ziegler & Sandberg, 1996)

7.1.2 Policy and Videotex

The two structural policy frames in the US, the FCC computer inquiries and the Modified Final Judgment (MFJ), have had critical influence on videotex development.

Computer inquiries, as mentioned in chapter two, have been the FCC's effort to specify the conditions which regulated carriers could provide unregulated information services (Steinfield, 1992). Especially Computer Inquiry III will have significant effect on videotex marketplace. District court Judge Harold Greene allowed the RBOCs to enter the information services via the overturning his previous decision in July 1991. Computer Inquiry III and its Open Network Architecture may free the RBOCs from having to form separate enhanced service subsidiaries (Datapro, 1993a).

The MFJ prohibited the RBOCs from offering any information service. Also, Judge Harold Greene continued to oversee the MFJ and he had to preempt the ability of the FCC to determine the conditions under which regulated common carriers might provide information service. Thus, "he has significantly shaped the information service industry in the U.S." (Steinfield, 1992, 160). Although this prohibition was lifted in 1991, this policy was critical in the formation of the videotex market.

The MFJ's geographical business restriction was also a negative factor for RBOCs. Since their business is limited in Intra-LATA transport, they would need to place videotex access point in each LATA in order to offer videotex service (Steinfield, 1992). Apparently, it is not an economical approach.

Because of these prohibitions, RBOCs did not have a strong incentive to develop the videotex market. They have no real interest in seeing the market flourish under the present

line of business restrictions. The formation of the US videotex market has been influenced by these policy factors.

7.2 Videotex in the UK

7.2.1 Videotex Development in the UK

Prestel was the world's first public interactive videotex system, developed in the early 1970s at the Post Office Research Center. The trial service was begun in 1979, and regular service started in 1979.

The Prestel system has several characteristics (Bouwman et al., 1992): the consumers need to buy a television-set with a special decoder, a subscription is needed, the system architecture is complex as is the centralized system, etc. The Prestel system influenced many other countries' videotex system such as in Denmark and Netherlands

Prestel service was welcomed by the UK government and BT. The government needed a highly visible indicator of British scientific and engineering know-how (Noam, 1992). The government also wanted to capture international markets by speeding up videotex implementation (OECD, 1988). BT expected revenue increase from traffic rise and facility charge for information providers.

However, Prestel in the UK could not show significant success. Although Prestel increased its subscribers in the 1980s, the number began to decrease in the 1990s (Table 20). Compared with the other major European countries and Japan, its failure is apparent (Table 21). The failure may be attributed to several factors such as network design (Prestel does not use national public packet-switched data network), terminal strategy (the

terminal costs expensive), access and billing conditions (users have to pay telephone charges, Prestel subscription charge, and Prestel usage based charge) (Thomas et al, 1992).

Table 20 Prestel Development

	1980	1984	1986	1988	1991
Subscribers	10,000	47,000	70,000	95,000	fewer than 50,000

(Source: 1980-1986, OECD 1988; 1988, Bouwan et al, 1992; 1991, Bouwan et al, 1994)

Table 21 Diffusion of Videotex

	# of terminals
UK	100,000
France	5,700,000
Germany	260,000
Japan	122,993

Notes: UK, France, Germany; Figures as of mid-1991, Japan; end-1991)
(source: UK, France, Germany; Bouwan et al, 1994, Japan; InfoCom, 1994)

7.2.2 Policy and Videotex in the UK

The policy environment in telecommunication certainly has affected videotex development in the UK. First, BT's privatization was a big factor. When Prestel was being developed, the UK post office had been already transformed from a state agency to a more market-oriented state corporation. Although Prestel was set up as a separate "profit center", the effort to prepare for the competition reduced the effort to development of videotex (Thomas et al, 1992).

The UK's deregulation policy also worked negatively for Prestel. After the value-added services liberalized in 1981, the private videotex system went beyond their initial 'in-house' uses (Thomas et al, 1992), and they became strong competitors for Prestel.

After privatization, BT became more cost-profit conscious. In order to adjust competitive environment, BT improved several technical side of Prestel such as the introduction of mailbox services and the connection of external computers to Prestel via gateway. On the other hand, BT considered seriously the change of videotex system design from Prestel to the French Minitel type design. However, BT eventually dropped the plan, because "BT did not think that a mass-market service would be profitable enough to risk the investment, and was worried that the mass distribution of terminals might lead users to access services run by other organizations" (Thomas et al, 1992).

Further, the new pricing scheme, which was adopted after BT privatization, affected the BT's investment attitude. The privatized BT was prohibited from practicing the cross-subsidization between networks, equipment and service provision. Therefore, BT could not take free terminal distribution strategy like French Minitel. Also, videotex unit could not even count the extra local traffic generated by videotex as part of their revenue, even though the cost of the Prestel access network is charged (Thomas et al., 1992).

7.1 Videotex in Japan

7.1.1 Videotex Development in Japan

Videotex in Japan is called CAPTAIN (Character And Pattern Telephone Access Information Network) which was developed by the Nippon Telegraph and Telephone. The

introduction of CAPTAIN was carefully planned and prepared by both the Ministry of Post and Telecommunications (MPT) and NTT. They conducted CAPTAIN experiments in 1979 and 1981 with information providers, manufacturers and users groups (OECD, 1988). After the examination of experiment results, CAPTAIN was launched in 1984 on a commercial basis by NTT. An important characteristic of Japanese videotex system at the initial stage is the heavy involvement of the MPT. The MPT expected CAPTAIN to be a leading service in the "new media" era.

The main characteristics of the CAPTAIN system are summarized as follows: 1) provision of data transmission service to anyone with an appropriate terminal such as CAPTAIN terminal or decoder and television; 2) users are offered a wide variety of services at different costs depending on the complexity; 3) Service prices are determined by information providers, according to the value of information (OECD, 1988).

Other companies besides NTT exists that offer videotex services. They use a different protocol from CAPTAIN such as the US standard NAPLPS. Most of them provide the service only though terminals in public places instead of users' terminals. Their business turnover is much smaller than NTT's CAPTAIN (Komiya, 1991).

Since the introduction of service, CAPTAIN has not met NTT's growth projections, even though subscribers increased continuously (Table 22). In order to stimulate demand, NTT took on several strategies; price reduction of terminal equipment, marketing for computer adopters, installation of public terminals, etc (OECD, 1988). Also, the MPT established a group which examined CAPTAIN development. The group recommended 1) the changes of CAPTAIN tariff structure, such as price reduction and a volume discount

for information provider, 2) development of more diversified terminal functions, and 3) improvement of CAPTAIN information sources, such as indexing, databases and the information center (OECD, 1988).

Regardless of these efforts, videotex in Japan is far from a success as in other countries. The reasons include poor information sources, expensive tariff for both users and information providers, and slow transmission speed. The main challenge for CAPTAIN today is to foster demand for services among the general public (OECD, 1988).

Table 22: Number of CAPTAIN subscribers

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Business	5.1	11.3	22.3	37.1	49.4	53.7	57.8	62.8	68.2
Resid.	0.6	2.1	8.1	25.3	40.0	48.5	53.5	60.2	70.8
Total	5.6	13.4	30.3	62.4	89.3	102.3	111.3	123.0	139.0

Unit: Thousand subscribers
(Source: InforCom, 1994, p.49)

7.3.2 Policy and Videotex

Structure and price policy in Japanese telecommunication in the 1980s have not played an important role in videotex development, but Japan's Videotex case presents one aspect of typical Japanese telecommunication policy characteristics.

While the MPT introduced competitive policy in the long distance telephone market and regulated NTT heavily, the MPT took a favorable stance to NTT in the videotex development. This is because NTT's strong initiative was necessary for videotex development. Like ISDN, CAPTAIN was the MPT's main project in the 1980s. The MPT

guided NTT to activate the market in several ways. Thus, the videotex policy has a strong industrial policy aspect, rather than regulation on NTT. This government involvement of the particular telecommunication service is rarely seen in the US and the UK. On this point, this Japanese videotex policy is similar to the French's Minitel case.

However, the market did not respond to this effort. Although the CAPTAIN market still shows an expansion trend in recent years, the number of total subscribers are small. While, recently, other on-line computer services (like CompuServe in the US) are expanding their subscribers drastically[15] , CAPTAIN's future does not look so promising. NTT is no longer emphasizing the captain service as an information service tool. Instead, NTT wants to revitalize the videotex network as a means of low-cost, two-way communication (Lehmann, 1994).

[15] Nifty Serve (one of the leading Japanese on-line service providers) recently increases 50,000 subscribers every month. The company project more than 70,000 new subscribers in 1995 (Nikkei Communications, 1995a).

Chapter 8

Data and Value Added Services

This chapter explores the development of data and value added services in the three countries. Since the 1970s, the integration of computer technology and telecommunication has created several kinds of new telecommunication services, such as packet switching services, electronic mail services, protocol conversion services, and database services, etc. Many scholars and much literature have focused on these new services and several terms and definitions have been developed for these new services: Value Added Network Services (VANS), Enhanced Services, and Telecommunication Network Based Services (TNS), etc. However, it becomes increasingly difficult to define these services precisely because they are complex plus dynamically emerging, and changing.

Noam (1992) presents a conceptual framework of these enhanced services, so called VANs. He thinks of VANs as a system of multiple levels of resale and transformation, and categorizes them into four levels of services: the first level consists of the basic transport carriers (AT&T, MCI, RBOCs, etc.), which lease capacity to the level two operators; the second level is basic value added networks, which are operated by network operators, such as basic packet switched transmission service and some basic protocol conversions; the third layer is the generic services where additional software and organized features are added, such as voice mail, electronic mail, video conferencing, etc; the fourth level is specific VANS applications, which are specified for users.

In this chapter, following Noam's framework, the development of data and value added services are investigated. At the beginning of each section, the general VANs services in each county are overviewed.[16] After that, this chapter focuses mainly on level I and II services of VANs, such as leased line, virtual private network, and packet switching, etc, because these services are important basic data service for business users and common non-PSTN services.

Due to the vague definition and the complex markets, little reliable and consistent service and market information exist in this field. Also, little empirical research has been done (Stoetzer, 1992). Within this limitation, this chapter will attempt to overview the Data and Value added services in the three countries.

8.1 The United States

8.1.1 VAN Development in the US

General VAN Overview

Since the concept of VAN rarely exists in the US, it is difficult to overview the VAN market, in general. Dowling et al. (1991) analyzed the US Value added services by categorizing the suppliers into three groups: 1) Value-added networks (VANS) suppliers, such as Tymnet and Telenet, 2) long distance carriers such as AT&T, MCI, and Sprint, and 3) Regional Bell Operating Companies, such as NYNEX and Ameritech.

---

[16] Since the definition of VAN and data services is different among countries, institutes, and articles, "VANs" service in this chapter does not clarify the definition. However, it includes the all "services which combine information production, manipulation, storage and/or distribution, with the use of telecommunication facilities and software functions" (Bouwman & Latzer, 1994).

The first category of VANs services is supplied by the Value Added Networks providers. A variety of value added services are provided by the VANS suppliers, adding their own functionality. The VANs suppliers initially promoted the services to connect users' facilities over long distance, but have moved into a whole range of applications, such as electronic data exchange (EDI), electronic mail, transaction processing, etc. It is difficult to measure the market volume due to little reliable research (Stoetzer, 1992).

The second service categories are provided by the long distance carriers. Long-distance carriers moved their business to enhanced service like data communications, e-mail, and facsimile network. Their strategies focus more on responding to corporate user needs through offering a variety of data communication services and enhanced services.

Also, some VANS are provided by the RBOCs. The seven RBOCs are interested in expanding their enhanced services offerings. In 1988, Judge Greene allowed them to transmit information services, and to provide voice massaging, storage and retrieval, and electronic mail. Among them, audiotext is the most successful service so far (Dowling et al., 1991).

Overall, value added and data services markets have been formed by several players under the competitive market environment.

Leased (private) Circuits Services

Leased line service market has been shaped by serious competitive forces. After the FCC authorized MCI to build and operate a private line system, a variety of new entrants were allowed to operate private lines. Also, the FCC's decision in 1976 removed virtually

all legal restrictions on the resale and shared use of common carrier interstate private line services (Bolter et als., 1990, P87).

Currently, leased lines are offered at all levels of network-local, intraLATA, interLATA, and international by various providers. Also, leased lines are available in a wide variety of transmission rates from 9.6Kbps through T1 (1.544M bps), to T3 (45M bps), and even to higher levels of the Synchronous Optical Network (SONET) hierarchy which goes to more than 600M bps (Briere, 1995).

The use of leased circuit is growing continuously. Although data are old, a survey by Communication Week showed that, of 583 users of leased circuits, 49.9% increased their use by approximately 50% in 1986 over 1985 (OECD, 1989). [17]

Virtual Private Networks (VPNs)

The virtual private networks (VPNs) are telecommunication services in which the public switched network provides capabilities similar to those of private lines, such as conditions, error testing, and higher speed transmission with a line quality adequate for data (Newton, 1994). It became popular in the late 1980s. Originally VPN was developed to meet voice networking needs associated with large PBXs, but VPNs expanded into data and video for domestic and select international locations (Striplin, 1994).

[17] Also, Switched Digital Services are one of the fastest growing services although they are not leased circuits. Switched Digital Services , which are digital service using public switched carrier, provide much of the same quality as digital private lines but often at a lower cost per minutes for the small users. Both local and long distance carriers provide the services (Briere, 1995; Briere, 1991)

Currently, several VPN vendors exist, such as AT&T, MCI, Sprint, Cable & Wireless and NYNEX. VPNs have showed strong growth so far and the market growth is expected to top 25% through 1995 (Striplin, 1994).

Packet Switching

The US has developed a variety of packet switching services since the U.S. Department of Defense developed it in the late 1960s (Rowe, 1991).

X.25 is a basic type of packet switching service, adopted by the CCITT (Consultative Committee for International Telegraphy and Telephony) standard in 1976 as a standard network access protocol. In addition to local and long distance carriers, some VANs operators such as Telenet and Tymnet provide the service (Rowe, 1991).

Frame Relay services are the fast packet services. Frame relay services are designed to handle speeds up to 1.5M bps. (Actually, vendors are working on speeds up to 45M bps and down to 9.6K bps). Right now, in many applications, frame relay services are replacing private lines because they work like private lines in a more efficient fashion (Briere, 1995). The number of users in 1994 expanded 4.1 times as big as those in 1993 (Wada, 1994).[18]

Further, Switched Multimegabit Data Service (SMDS) is growing, recently. SMDS is a connectionless, cell-switched data transport service designed for high speed communications, such as LAN interconnection. Typically, speeds of SMDS rage from 1.5M bps to 45M bps (Alber, 1993). SMDS became available commercially in the Bell

[18] According to the North America Frame Relay Forum, the number of users in January 1993 are 171 and those in January 1994 are 710 (Wada, 1994)

Atlantic region during late 1991 and 1992, and all RBOCs have either implemented or are testing SMDS (Striplin, 1994). Recently, some interexchange carriers begin or prepare to offer SMDS, too (Briere, 1995).

8.1.2 Policy and Data and Valu Added Services

Several points can be addressed regarding the US telecommunication policy and value added and data services development: market entry by structure policy, tariff polices, and network interconnection and use policies (OECD, 1989).

First, structure policy is important because structure policy shapes the structure of service market . The 1982 MFJ and several computer inquires have played a significant role in VANs development. As mentioned in the previous chapters (Chapter 2 & 7), RBOCs are prohibited from providing enhanced or information services (however, some restrictions were relaxed in 1988). Several computer inquires tried to specify the conditions which regulated carriers could provide unregulated information services. Computer Inquiry III and its Open Network Architecture may free the RBOCs from having to form separate enhanced service subsidiaries (Datapro, 1993a).

In this policy background, the US's unique VAN policy characteristics can be seen. In the US, VANs are merely functional descriptions, while in many other countries VANs are regulatory categories. In the US, the regulatory distinction between "basic" and "enhanced" services serves to prevent the cross-subsidization by a dominant carrier of its value-added services through revenue gained in dominant activities. All enhanced services

in the US are open to competition and are not regulated. The distinction is established to protect the newcomers from the established carriers (Noam, 1992).

Second, price policies affected the service development. The US had made an effort to bring the prices for telecommunication services closer to the cost (rebalancing) since the 1980s (OECD, 1989). This rebalancing made the conditions for a competitive market. Also, the competitive long-distance market provides leased lines at much lower prices. This lower tariff provides lucrative incentives for VANs providers. (Dowling & Witte, 1991).

Thirdly, network interconnection and use are the important aspect of VANs service development. The US has the most liberalized policy on this point. For example, in terms of leased circuit availability, the US has no policies that limit the use of national leased circuits and no restrictions limiting resale in all interstate (and most intrastate) exist. (OECD, 1989). Further, leased circuit in the United States may be interconnected with any public network. Common carriers are required upon request to interconnect their networks with other public networks and with private networks (OECD, 1989).

Overall, these US policies are efforts to create fair competitive VANs and data markets. These policies contributed apparently to the advanced US VANs service development. Now that the RBOCs are permitted to enter the market, the market may become more competitive.

8.2 The United Kingdom

8.2.1 Data and Value Added Services development in the UK

VAN Overview

Prior to the telecommunication reform of 1984, the liberalization of VANS (Value added Network Services) began in the UK. In 1982, the beginning stage of the liberalization, the UK government opened the VANS market and permitted private suppliers of VANs to receive licenses (Vickers et al, 1988). Furthermore, a new 12-year class license for the value added and data services was signed in 1987.

However, the government did not permit the resale of leased line capacity until 1989.[19] The prohibition of resale worked as an entry barrier of the private circuits market for the potential providers. Thus, in the 1980s, this policy established duopoly by BT and Mercury in the leased line market, while it created a completely competitive VANs market.

Due to the liberalization, serious competition existed between BT, Mercury and other licensed operators, and VAN market in the UK has expanded drastically. The initial approval of VANS license in 1982 were 40 VANS vendors (Bolter et al, 1990). In February 1987, 221 registered value added service providers offered 841 services. Among them, store and retrieve systems were the most popular (112 services) and mailboxes (90), protocol conversion (90), customers' databases (66), and deferred transmission (63) followed. (Noam, 1992).

---

[19] The major reason of prohibition on resale was that prices of BT's private lines were set excessively low. If resale is permitted in this situation, incentives are created to develop private leased circuit networks and public network can be used inefficiently (Cave & Trotter, 1989; OECD, 1989).

Presently, the UK's data and VAN services market is the largest in Europe. The market was estimated to be worth 2.5 billion pounds in 1993 (Datapro, 1993b).

Leased Circuits

After the duopoly system was established in 1984, leased circuits services were provided by BT and Mercury. In 1989, restrictions on simple resale of private circuits was abolished and simple resale of leased circuits were approved (Cave & Trotter, 1989, 62).

Since BT took a low leased circuit tariff policy in order to encourage their growth in the early 1980s, corporate users in the UK tended to build private network (Datapro, 1994b).

In 1989, the Department of Trade and Industry (DTI) approved an Oftel report that recommend to allow simple resale of BT's leased lines. The UK was the first European nation to permit leased line resale. The DTI began issuing licenses to private network operators and lifted restriction on the number of connections to other private network (Noam, 1992).

Currently, BT provides a variety of leased circuits: both analog and digital (Griffiths, 1993). "Kilo Stream" offers digital full duplex transmission at up to 64K bps between main business centers. "Kilostream N" is used nationally in multiple of 64k bps. "MegaStream" is a range of digital private circuits available nationally at speed of 2M bps and above.

Also, in terms of the price level of the UK leased lines, table 23 shows a basket of leased line charges over different speeds and distances. The UK users enjoy clearly the low tariff

of leased line. Especially, the tariff of high speed digital leased lines, 1.5/2Mbps, is set extremely low.

Table 23 OECD basket of leased line charges, January 1994

	9.6Kbps	Index	64Kbps	Index	1.5/2.0Mbps	Index
USA(Nynex)	45,542	101	76,565	84	423,435	76
UK(BT)	39,514	86	43,229	48	211,233	38
Japan(NTT)	38,910	86	70,771	78	558,271	101
OECD Ave.	45,297	100	76,565	100	423,435	100

Note: in US$ based on PPPs (Purchasing Power Parities), excluding tax
(Source: OECD, 1995a, p.65)

Packet Switching

BT and Mercury offer packet-switched data network service conforming to X.25 standard, both nationally and internationally. Also, in the UK, managed data network services (MDNS) is an important sector. Currently, several companies, such as IBM, BT-tymnet, and EDS etc. are competing and the market was approximately 0.4 billion pounds in 1993 (Datapro, 1993b). Due to the development of MDNS, corporate users began to move from leased circuits to MDNS (Datapro, 1993b).

However, the packet switch data communication charges in the UK do not look attractive, yet. An expensive fixed charge makes packet service more expensive than the USA, Japan, and OECD average (Table 24).

Table 24 OECD basket of packet switched data communication charges, January 1994

	Fixed charge	Usage charge	Total
USA	6,347.73	2,419.23	8,766.96
UK	7,803.61	6,243.06	14,046.67
Japan	1,855.11	10,546.66	12,401.76
OECD	3,053.71	6,107.41	9,161.12

Note: in US$ based on PPPs, excluding tax
(Source: OECD, 1995a, p.66)

Virtual Private Network (VPN)

BT provides several kinds of Virtual Private Network (VPN) services called "FeatureNet". They include "FeatureNet 1000", all facilities of a private network on the Public Switched Telephone Network, "FeatureNet 5000", a digital networked centrex service, and "FeatureNet ACD", a networked Automatic Call Distribution service, etc. These services started in 1992 (Griffiths, 1993).

8.2.2 Policy and Data and Value Added Service Development

Since VANs market was liberalized in 1981 and 1987, the UK has had a completely liberalized VANS and data service market with licensing requirements having been reduced to the minimum. This liberalization policy has had apparently positive effects on VANS development (Thimm, 1992). It promotes the competition among the players and contributes to the growth of VAN and VAN suppliers. Currently, the UK has the biggest VANS market in Europe.

For example, BT has reacted aggressively to VAN's liberalization policy by offering its own services. Before 1982 public E-mail was virtually nonexistent. However, BT had

two-thirds of the 70,000 users in its customer base by 1986 (Bolter et al., 1990). Further, BT participates lucratively in joint ventures with providers of information services. BT provides the communication medium and the partner provides the voice message or other information (Bolter et al., 1990).

Also, the duopoly structure between BT and Mercury in the leased circuits affected positively VANs suppliers, which use leased lines as their VAN's access or backbone networks. Leighfield (1991) stated that the transition from monopoly to duopoly contributed clearly to the expansion of VANs business, when he reviewed the duopoly from the VAN supplier's aspects. He pointed out BT's improvement of service provisions, such as dates needed for installation, and users' demand sensibility.

Further, the effect of price policy on the BT's leased circuits services tariff can be seen. In the mid 1980s, BT proceeded the rate rebalancing of leased circuits because prices of BT's leased circuit were set traditionally under their costs. Also, in 1989, at the same time prohibition of simple resale of BT's and Mercury's leased lines was abolished, and price cap regulation was imposed on BT's private circuits. BT was required to hold the real price of its private services at the level of PRI-4 (Cave & Trotter, 1989). Through this process, BT rebalanced its tariff structure of leased circuits.

8.3 Japan

8.3.1 Data and Value Added Services Development

General VANs

Prior to the telecommunication reform of 1985, liberalization of data communication circuit utilization and introduction of competition in the VANs market had begun in 1982. Shared use and third-party use of leased circuit, circuit utilization, and interconnections between private and public networks were liberalized in 1982.[20] Also, private companies could provide partly value-added communication services by utilizing circuits leased from NTT (Tomita, 1984). Furthermore, the telecommunication reform in 1985 liberalized completely Japan's VAN market (Hayashi, K, 1989).

The telecommunication business law in 1985 divided the telecommunication service providers into two categories: Type I carriers, which own their own transmission circuits and facilities, and Type II carriers, which do not have their own facilities. Data and VAN service can be provided basically by both types of carriers, and thus, serious competition has existed.

Due to user demand and competition, the VANs market expanded drastically in the late 1980s. The market size in 1992 had grown six times as big as that of 1985 (table 25). The number of Type II carriers had increased and the total of 1128 Type II carriers existed in 1992 (Table 26).

---

[20] The exception is that connections at both ends of the leased circuits to the public network.

Table 25 Market Size

	1985	1986	1987	1988	1989	1990	1991	1992
VAN	34.7	44.7	60.4	104.7	141.3	203.4	230.0	227.6

Unit: Million Yen
(Source: InfoCom Research, 1994, p199)

Table 26 Number of Type II carrier

	1985	1986	1987	1988	1989	1990	1991	1992
Type II Special	9	10	16	22	26	27	34	36
Type II General	200	328	512	668	813	912	1000	1092

(Source: MPT, 1994)

Leased circuit

Since the telecommunication reform of 1985, both NTT and NCCs have provided a variety of leased circuits services. For example, NTT provides basic leased circuits, high speed digital leased circuits, video transmission, TV relay, and satellite communication services.

The markets have grown steadily. The basic leased circuit showed an average 10% growth of subscribers between 1986 and 1991 (table 27). Especially, high-speed digital private-line services, whose transmission speeds are more than 64K bps, increased significantly their subscribers. Table 28 shows an average 30 % growth between 1985-1991. It is remarkable that NCCs have about 25% of the share in this market. In 1994, in order to respond to the demand of high speed data communication, NTT began to provide 150M high-speed digital private-line services.

Table 27 Subscribers of leased circuit (General)

	1986	1987	1988	1989	1990	1991
NTT	574,488	644,292	746,844	825,261	901,055	961,848
NCCs	410	1,129	1,603	3,429	5,516	7,976

(Source: InfoCom Research, 1994, p55)

Table 28 Subscribers of leased circuit (High Speed Digital)

	1986	1987	1988	1989	1990	1991
NTT	2,125	3,812	5,289	6,644	8,453	11,108
NCCs	100	595	1,165	1,915	2,830	3,967

(Source: InfoCom Research, 1994, p55)

Also, a number of resellers of private line services, which are Type II carriers exist. In 1994, 138 Type II general type carriers did resale business (MPT, 1994). They have expanded their business by offering cheap rates and they became big threats to the both NTT and Type I NCCs.

Virtual Private Networks

Both NTT and NCCs provide virtual private networks. In 1994, NTT began VPN service called "Members' Net". One year later, NCCs began VPN service, called "VP Net" (DDI), "J Net" (JT), and "Teleway superNet" (TWJ) (Nikkei Communications, 1995b).

Packet Switching

NTT provides three types of basic packet switching services: Digital Data Exchange-packet services (DDX-P), which use X.25 protocol, Digital Data Exchange- telephone

packet services (DDX-TP), which users access via a public switched telephone network, and INS packet services (INS-P), which use B or D channel of NTT's ISDN services. As table 29 shows, the subscribers of packet switching are increasing steadily. Also, the Type II carriers offer packet switching services.

Table 29: NTT Packet Service subscribers

	1988	1989	1990	1991	1992
DDX-P	33,941	41,031	48,356	47,511	43,669
DDX-TP	87,339	139,993	190,331	288,188	339,408
INS-P	N.A.	N.A.	4,429	27,809	59,155

(Source: MPT, 1994)

Following the US, frame relay service became available in Japan. The Type II carriers, Star Net and AT&T Jens, first introduced the service in 1993. NTT began to provide the service in 1994. Until the end of the 1994, eight type II carriers and two Type I carriers provided the service (Nikkei Communications, 1995c, p36).

So far, no service providers provide SMDS in Japan.

8.3.2 Policy and Data and Value Added Services

The liberalization policy to both facilitated based carrier (Type I) and Value added Network service providers (Type II) brought competition in every segment of value added and data communication services. Furthermore, the competition provides users many service options and cheaper rates.

Also, as Matsuura (1994) pointed out, the structural separation of Type I carriers and Type II carriers is generally successful. The separation is a legally clear concept. Also, it

makes it possible for both types of carriers to take several business strategies. Especially, due to loose regulation by the MPT, the number of Type II carriers have been increasing and several services have become available. Some advanced services, such as Virtual Private Network (VPN) services and frame relay service were introduced first by the Type II carriers and Type I carriers followed them. Therefore, in general, the structural separation can be evaluated positively.

However, some issues still exist. Compared with the United States, the introduction of new services, such as VPN and SMDS were late or not available in Japan. Some part of this reason can be attributed to a policy issue: network inter-connection problem. Since NTT still dominates virtually all the local access networks, the other long distance carriers and Type II carriers have to use NTT local network in order to provide their services to their customers. Since NTT did not open its Open Network Discipline (OND) until recently,[21] the negotiation about interconnection made it difficult to reach an agreement. This situation delayed or suspended new service offerings. For example, VPN took five years to reach an accord between NTT and NCCs. Also, two years were spent trying to reach an agreement on frame relay service (Mizuno, 1994).

In the near future, new services using intelligent network function and CATV network will emerge. Therefore, without presenting a clear policy about interconnection, Japan will be far behind in terms of developing new advanced services.

---

[21] In October 1995, NTT announced its Open Network Discipline (OND), in which NTT can accept any interconnection with the other network.

Chapter 9

Summary & Conclusion

First, in this chapter, a general summary of the previous chapters is addressed, and then, answers to the research questions are presented. Finally the policy implications for future telecommunication service development are explored.

9.1 General Summary

In chapter 2, telecommunication policy in the US was examined. Historically, the US telecommunication history has had unique characteristics: it has developed as private telephone systems; two jurisdictions, the Federal Communication Commission (FCC) for interstate telecommunication service and state Public Utility Commissions (PUC) for intrastate telecommunication, have existed for policy making, and courts have strong virtual policy making power through their decisions. With these characteristics, the US initiated liberalization of the telecommunication market faster than other countries.

The liberalization policy began in the late 1960s, mainly by the courts' decisions and the FCC's policy. Following several deregulation policies, in 1982 the modified Final Judgment (MFJ) played a decisive role in shaping the present form of the US telecommunication industry. The MFJ divested the Bell system and created seven Regional Bell Operating Companies and a smaller AT&T.

In terms of structure policy, the MFJ and the FCC's computer inquiries have played an important role for the service development. While the MFJ gave freehand to AT&T, it

imposed several restrictions on the RBOCs, such as geographical restrictions of RBOC's service area, and the prohibition of long distance service, manufacturing, and information service. Although this policy was aimed at restricting the exercise of RBOC's monopolistic market power, it might have given RBOC disincentive to develop new services.

Also, the FCC's several computer inquiries provided structural framework of telecommunication service. In the inquiries, the FCC attempted to define the conditions under which regulated common carriers could provide unregulated "enhanced services". This policy promoted competition in enhanced services. Further, in the third inquiry, the FCC proposed an Open Network Architecture (ONA), which unbundles the network service, instead of structural separation.

In terms of price policy, since the late 1980s, the traditional rate of return regulation began to be replaced by the alternatives in both interstate and intrastate levels. In 1988, at the interstate level, the FCC introduced a price cap method to AT&T. Also, at the intra-state level, several states moved to the alternatives, such as price cap methods, price freeze schemes, and earning sharing schemes. These changes might influence the behavior of the regulated companies, and would influence the telecommunication service development.

In chapter 3, telecommunication policy in the United Kingdom was examined. The UK telecommunication had been operated by the state owned monopoly, the post office. The liberalization policy began partly in the late 1970s, and telecommunication act in 1984

played a significant role in creating a new UK telecommunication system. The reform privatized British Telecom, and created the licensing system and the regulatory agency, the Office of Telecommunication (Oftel). In the field of basic telephone service, the new entry was admitted and duopoly between BT and Mercury was created. Also, besides basic telephone service, anyone could enter the market. During the late 1980s and the early 1990s, further liberalization policies, such as licensing Value Added Data services and permission of simple resell of leased circuit were furthered.

In terms of structure policy, duopoly policy from 1983 to 1991 played a major role. The introduction of competition between BT and Mercury created a competitive marketplace in a rather moderate way. While duopoly promoted competition, BT could take time to reorganize its structure for competition. However, after the duopoly policy was reviewed in 1990, the UK decided to abandon duopoly and introduced a more competitive policy through approving more entries into the basic telephone market.

Regarding price policy, the UK was the first country which introduced a price cap in the field of telecommunication. In 1984, a price cap to BT's pricing, PRI-X formula, was adopted. Price cap aimed mainly to reduce the detail intervention on prices and profits by regulators, and to give more managerial incentive to BT. Although some shortcomings, such as a decrease of service quality and several operational changes existed, a price cap method has continued to be a basic policy scheme of the UK telecommunication.

In chapter 4, telecommunication policy in Japan was analyzed. Like the UK, the Japanese telecommunication system was provided by the state owned monopoly, Nippon

Telegraph and Telephone Public Corporation. Some liberalization began in the 1970s, and major change occurred in 1985, when Telecommunication Business Law (TBL) and NTT corporation Act were introduced. NTT was privatized and all kinds of telecommunication services were open to competition. Several new common carriers (NCCs) entered into both the local and long distance market.

Regarding the structure policy, the TBL categorized telecommunication service providers into two types of carriers: Type I, which owned their own facilities, and Type II carriers, which leased facility. The Ministry of Post and Telecommunication (MPT), Japanese regulatory agency, regulates strictly Type I carriers through controlling market entry and exit, while it regulates much less Type II carriers. Also, the MPT segmented telecommunication market into several sub-markets, and, at each market, incumbent carriers (NTT and KDD) and NCCs, specializing in each segmented market, are competing.

In terms of price policy, the MPT also exercised a strong regulatory power on the type I carriers. The TBL states service prices offered by Type I carriers need approval by the MPT. Furthermore, the law adopted the rate of return regulation, but the MPT used it to protect and help the growth of the NCCs. The tariff has been handled through informal "guidance" by the MPT rather than by the formula.

Overall, Japanese telecommunication policy since 1985 can be characterized as managed competition. The MPT has used both structure and price policy in order to realize a competitive market.

In chapter 5, basic telephone service development and policy in the three countries were analyzed, in terms of market growth, rates, service quality, and traffic growth. In the US, it can be observed that the US's structural change of the industry by deregulation policies and divestiture had generally a positive impact on basic telephone service. The structure change from the monopoly to competition in the long distance market became a factor of the drastic rate reduction in toll prices. Some price increase occurred in local service, but the range was not as big as expected. Partly due to the toll rate reduction, the toll traffic has expanded significantly. However, service quality shows some decrease in various service categories after 1991 under price cap schemes, although it showed general improvement during 1985-1990.

In the UK, basic telephone service development has shown some relation with the UK telecommunication liberalization policy. Telephone rates are the area on which the competition between BT and Mercury have the most influence. The competitive pressure decreased BT's long distance rate about 25% between 1984 and 1990. Also, the price cap made it possible for BT to rebalance its tariff structure. Service quality, one of the big issues in the UK, was influenced negatively by a price cap. After the price cap was introduced, some indicators of service quality became worse. Oftel responded to this situation by monitoring BT's service quality more closely. Recently, the BT's service quality shows improvement. As the significant expansion of the UK's public telecommunication market and telephone traffic during the duopoly era indicates, structure and price policy in the UK succeeded basically. Moreover, the UK government decided

further deregulation by abandoning duopoly and admitting free entry into the telephone market.

In Japan, in terms of the field of basic telephone service development, the telecommunication reform was basically successful. The structure change from a monopoly to competitive industry contributed to a drastic reduction in the long distance rate. Although some lack of clarity existed in the MPT's price regulation and its operation, the policy helped effectively the rate reduction. Also, service quality has continued to be at a high level.

However, Japan's case shows some unique characteristics, too. Even though the long distance rate decreased drastically due to competition, the service market did not appear to develop well in terms of revenue and traffic. Although we could not find a clear link between this situation and the MPT's policy, the strongly managed competition by the MPT could be a certain factor in the Japan's weak market expansion.

In chapter 6, the development of ISDN and policy were discussed. The US has been struggling with the development of ISDN since it was introduced in 1986. Currently, carriers are working on solving the problems of ISDN, such as a lack of availability, connectability, and applications, but prospects are still not promising.

In terms of policy, both structure and price policy are related to ISDN development, although some other factors, such as corporate strategies and user demand, are strongly related to ISDN development, also. The structural separation of Bell systems by the MFJ created different technical detail, and line of business restrictions gave disincentive to

RBOCs for ISDN deployment. On the other hand, as Greenstein (1995) analyzes, the movement from the rate of return regulation to a price cap will probably have a positive effect on future ISDN development.

In the UK, ISDN development has been promoted mainly by BT. Although BT began a standard ISDN offering in 1988, BT did not promote it so aggressively. The UK's installed line of basic rate ISDN is far behind those of Japan and the other major European countries. Regarding policy, competition under duopoly policy did not promote ISDN development. The competition with Mercury made BT's strategy focus on more short-term profit origin type services.

In Japan, ISDN development appears to be the most successful, compared with the US, and the UK. Since NTT began the service in 1988, the subscribers have been increasing steadily and by 1993 the service had 240,000 subscribers. In terms of policy, ISDN in Japan presents a good example of Japanese style of managed competition. However, introduction of a competitive market structure in 1985, did not play a major function in ISDN development. NCCs did not have strong incentives to promote ISDN because of the high cost of equipment. Rather, the MPT expected NTT to play the major role of promoting ISDN and urged NTT to be heavily involved. For example, the price of ISDN was strategically guided by the MPT to a low level, even lower than the cost, in order to promote ISDN. However, this policy guidance did not work as well as the MPT and NTT expected. The subscribers are still under the initial NTT's plan and it is difficult to determine a positive future. Currently, ISDN is dependent on the NTT's huge loss.

In chapter 7, the development of videotex and the policy on videotex were analyzed. In the US, videotex has developed in a unique way; it was not provided by the telephone operators, like many other countries. Several kinds of service providers, some from computer services and some from news industry, emerged. In the US, no strictly defined videotex have existed, instead many videotex-like services has existed.

This unique development has been largely influenced by structure policy. Since the consent decree in 1956, AT&T was prohibited from providing information service. Also, the MFJ in 1982 continued to prohibit the RBOCs from information services. Although the prohibition was lifted in 1991, it had had critical influence on the videotex development. Furthermore, the FCC's Computer Inquiry III and the Open Network Architecture (ONA) may give the RBOCs more freedom to provide information services.

The UK introduced the world's first videotex, Prestel. The Prestel service started in 1979, but its development did not show significant success even though it was largely expected by the government and BT; the subscribers were fewer than 50,000 in 1991.

In case of the UK, the policy did not seem to influence directly videotex development, but the policy environment influenced the development, indirectly. Privatization made BT more cost-profit conscious, and BT could not invest much into the videotex promotion. Also, VAN liberalization created competitors for Prestel. Furthermore, a new rule for pricing, strict prohibition of cross-subsidization, worked negatively for the promotion.

Japanese videotex, CAPTAIN, was launched in 1984 with high expectation of both the MPT and NTT as a key service of the "new media". Regardless of NTT's promotion and the MPT's involvement, videotex in Japan is far form success. The subscribers are

increasing, but the number is far from a critical mass. Videotex policy shows both Japanese style managed competition and industrial policy aspects. The competitive structure did not help in the videotex development, and the MPT expected only NTT to develop videotex. However, this industrial policy aspect completely failed and the market did not respond to the policy. Recent rapid development of commercial on line services is impressive, compared with a videotex policy failure.

In chapter 8, value added and data services were discussed. Both general value added services and some specific services, such as leased circuits, virtual private network (VPN) and packet switching services, were overviewed. In the US, value added and data services have been supplied by several providers, such as VAN providers, long distance carriers, and the RBOCs. Due to users' strong demand of enhanced service and the competitive market environment, the market has steadily expanded. Some reports stated that from 1988 to 1992, the VAN market showed a compound annual growth rate of 10 %. Also, the US has been enjoying very diversified services. Leased line, VPN, and packet switching (X.25, frame relay and SMDS) services have several kinds of services, depending on speed and capacity. Also, recently new services are dynamically emerging.

These dynamic value added and data service developments are largely related to the US telecommunication policy. The MFJ and computer inquires have helped to open the all enhanced service markets and protected new comers from the monopolistic powers. Also, efforts to rate rebalancing established the basis for the competition. Furthermore,

liberalized network interconnection and use are important. These policies are efforts to create fair competition in the value added and data service market.

The UK has a developed value added service market, too. Since the liberalization in 1982 and 1987, the number of VAN operators has increased drastically, and the market, estimated at 2.5 billion pounds, has become the largest in the Europe. Leased lines services especially provide low rates. VPN service began in 1992 and several kinds of packet switching services are available. Since the UK customers use leased circuits heavily, it still needs effort to market the packet switching services.

The growth of value added and data service in the UK has been partly attributed to the liberalization policy. It promotes the competition among the players. Even BT reacted aggressively to the VAN service.

Like the USA and the UK, Japanese value added and data services were liberalized in the 1980s. These services are provided by both Type I carriers and Type II carriers, thus severe competition among the players exists. Due to user demand expansion and competition, some research reported in 1992 the market grew six times as big as that of 1985. All major data services, such as leased circuits, VPN, and packet switching are offered by several providers.

The development of the services are attributed partly to the liberalization policies. The structural separation between Type I carrier and type II carrier made Type II carrier do business in a flexible way through loose regulation. However, Japanese policy is still facing a big policy issue in terms of the development of value added and data services;

network interconnection problem. Since NTT still dominates the local access network, this problem will be a key issue for the further development of value added and data services.

9.2 Research Questions

This section provides tentative answers to the research questions addressed in chapter 1. To the questions, "How has structural policy in the three countries been formed in the 1980s and early 1990s?", "What structural differences exist among the three countries?", the structure policy of the US, the UK, and Japan are summarized in Figure 1. All these countries experienced drastic structural change in telecommunication industry in the 1980s: The MFJ and the FCC's computer inquiries established the present US telecommunication industry structure; in the UK, the telecommunication reform in 1984 liberalized the market and established the duopoly system; also, Japan followed the two countries by the Telecommunication Business Law and NTT law in 1985. However, we can observe difference in the approach to create competitive market structure. In the US, all markets except the local telephone market, became completely free. In the UK. in both local and long distance service, a more moderate competition policy by duopoly was adopted, first, but it changed to more competitive policy in 1991. In Japan, both local and long distance markets were open to competition, but the MPT still exercises strong entry and exit regulation to Type I carrier. So, the competition has been controlled by the MPT. All three countries have a completely free VAN market.

Fig. 1. Structure Policy in the USA, the UK, and Japan

	USA	UK	Japan
Legal framework	- MFJ - Computer Inquires	- Telecom. Act 1984	-Telecom. Business Law -NTT Law
Local	PC	PC->C(1991)	C
Long Distance	C	PC->C(1991)	C
VAN	C	C	C
Comments	-geographical separation -Line of business restrictions (RBOCs) -ONA	-BT privatization -Duopoly (1983-1991) -more open entry (1991-)	-NTT privatization -Type I & Type II -Entry & Exit control to Type I carriers -NTT for domestic KDD for international -NCCs serve segmented market

*PC: partly competitive, C: Competitive

Fig. 2. Possible effects of structure policy on Service Development

	USA	UK	Japan
Basic Telephone Services	-rate reduction (Long distance) -market & traffic expansion	-rate reduction (Long distance) -market & traffic expansion	-rate reduction (Long distance) -improve service quality -little market & traffic expansion
ISDN	-standard, interconnection, availability problem -different RBOC's strategy	-BT: no strong incentive, look for short profit services	-The MPT's involvement -competition not work
Videotex	-RBOCs cannot provide -private videotex develop	-BT:wanted to avoid heavy investment -competitions with other systems	-The MPT's involvement -competition not work
Value added & data services	-promote competition -market growth -a variety of services	-promote competition -market growth	-promote competition -market growth -interconnection issues remain

To the questions, "how is structure policy related to telecommunication service development among the three countries?", Figure 2 shows the summary of the previous discussions. The introduction of competitive market structure led to the reduction of long distance telephone rates significantly in all three countries. However, only in Japan it did not lead to substantial market and traffic growth, while the US and the UK have grown significantly. Also, regarding ISDN development, ISDN in the US has been affected by the structure policy. The US's divided market by several RBOCs made it difficult for ISDN to be developed ubiquitously. ISDN in the UK and Japan has not been influenced by the structure policy. Both countries chose the development by the former monopoly initiatives, rather than by the competitive forces. However, both of them could not succeed in its development. Further, structure policy affected the videotex market. In the US, the prohibition of providing information service by the old AT&T and RBOCs promoted the development of private videotex systems. On the other hand, the UK and Japan chose the development by the former monopoly, BT and NTT, but the competitive structure did not promote videotex development in either country. In the value added and data services, all three countries have a completely free market structure. This policy promoted competition effectively and those three countries have the most advanced value added and data service market in the world.

Overall, the US has experienced the substantial consequences of structure policy. The MFJ works both positively and negatively, and computer inquiries work positively, in general. The UK and Japan developed services by both competitive market force and

former monopoly driven development, depending on services. In the case of new service, such as ISDN and videotex, BT and NTT played an essential role. However, in the field of basic telephone and value added services, the competitive market structure critically affected their development.

To the question "How has price regulation in the three countries been formed in the 1980s and early 1990s?" and "What differences in price regulation may exist among the three countries?", Figure 3 shows the summary. Both the US and the UK moved from the traditional rate of return regulation to the other alternatives, such as a price cap. In the US, the FCC adopted price cap regulation in 1989 to AT&T. At the local level, many states moved to the several kinds of incentive regulations. In the UK, a price cap has been used since 1984. Although several operational adjustments of the price cap formula occurred, the system provides the managerial flexibility to the regulated company. Only Japan still uses the rate of return regulation. However, the operation of the rate of return regulation is changeable there. The MPT uses this price regulation to achieve its policy goal with price approval power.

Fig. 3. Price Policy in the USA, the UK, and Japan

USA	UK	Japan
-Price cap (Interstate) (1989) -ROR -> price cap,etc. (Intrastate)	-Price cap(1984)	-ROR to Type I -need MPT's approval -MPT's guidance

To the question; "How has price regulation been related to telecommunication service development?", Figure 4 summarizes the possible points. In the basic telephone services,

carriers can react flexibly to the competitive business environment under a price cap. In the US and the UK, long distance service rates decreased drastically, but local rates increased because of the effort of rate rebalancing. On the other hand, since the rate of return regulation in Japan used for MPT's policy tool, local rates did not increase and the rate rebalancing could not be achieved. Further, in the UK, the introduction of a price cap led to a decrease of BT's service quality, and, in the US, the decrease of service quality was reported, too. In the case of ISDN development, some scholars reported a price cap method increased the RBOC's incentive to invest in ISDN. In Japan, again, the MPT's guided pricing operation becomes clear. The price of ISDN was decided by the MPT's strategic guide for quick diffusion, not by the actual operation of the rate of return regulation. However, this guidance could not have significant effect on Japanese ISDN development. Clear relation between the price policy and videotex development could not be found, generally. However, in the UK, prohibition of cross subsidization, which is introduced with a price cap had a negative effect on videotex development. Since almost of all value added and data services are exempted from price regulation, the effect of price policy on this market could not be observed.

Fig. 4. Possible Effects of price policy on Service Development

	USA	UK	Japan
Basic Telephone Services	-rate reduction (Long distance) -rate rebalancing -negative impact on service quality	-rate reduction (Long distance) -rate rebalancing -decreased service quality	-rate reduction (Long distance) -No rebalancing
ISDN	-increase RBOC's ISDN investment	- no significant influence	-MPT's Price guidance
Videotex	-no significant influence	-prohibition of cross-subside-zation	-MPT's Price guidance
Value added & data services	-a variety of services & prices offerings -rebalancing give lucrative price for VAN providers	-a variety of services & prices offerings	-a variety of services & prices offerings

Overall, the US has made an effort to give telecommunication providers more freedom to set prices in order to respond to the competitive market. Also, the UK tried to follow the same way, while it is still observing closely BT's pricing through checking its profitability and productivity. On the other hand, in the case of Japan, a clear policy in pricing cannot be found. In some services, the MPT exercises its regulatory power to set the strategic price, and this behavior is completely different from the idea of the rate of return regulation.

9.3 Future Policy Implications

In this section, the future policy implications in three countries are discussed. Currently, all the countries are facing the need for further telecommunication reform in order to

respond to changing technological and market environments. This section overviews briefly their present policy discussion and explores its implications as to the influence on service development.

The United States

For several years, the US Congress had attempted to rewrite the Communication Act of 1934 and had failed, since so many interests have been involved in this subject. Finally, however, the new telecommunication bill has passed on February 2, 1995. This law will change drastically the US telecommunication industry and provide a significant impact on the service development.

In terms of structure, the bill will change the current industry structure fundamentally (Wall Street Journal, 2/2/96). First, the law opens local phone markets to new competitors such as long distance telephone companies and cable companies. The law prohibits state and local governments from preventing any competition. Second, it establishes a mechanism under which the seven RBOCs may enter other lines of business. The RBOCs can enter the long-distance market after proving they have opened their local phone networks to new competitors. Also, they can enter equipment manufacturing business and information services. Third, the law repeals cross-ownership restriction of the 1984 Cable Act which prohibited telephone companies from providing cable services within their own telephone service areas. By these measures, the old structure policy of the US telecommunication, which was formed by the MFJ, is abolished. The new law will create a more competitive US telecommunication marketplace.

The new act will definitely influence service development. First, as a more competitive local market will emerge, more local service development will be promoted. Although some are afraid the local telephone price will increase (Wall Street Journal, 2/2/96), advanced services like CLASS will be marketed more aggressively. Not only RBOCs but also the other telecommunication providers, including cable companies and long distance carriers, will enter the market by providing user specific type of services. Second, the abolishment of RBOCs' line of business restriction and permission of RBOC's video market will increase RBOC's incentive for new services development. Since the local market will not be monopolized, the RBOC will have to develop new markets. Overall, the new telecommunication law will help strongly to develop services by the competitive market forces.

The United Kingdom

The UK continues to seek more a competitive telecommunication market. In its future plan, Oftel (1995b) stated that Oftel's goal is " to provide the best possible deal for the customer in terms of quality, choice and value for money" and that the best deal for UK customers will be achieved through a fully competitive market in networks and services. After the UK quit the duopoly structure in 1991, Oftel has worked on several remaining issues in order to achieve this goal, such as price controls, interconnection, universal service, and number portability, etc (Oftel, 1995b).

In terms of structure, a main structure reform had been completed when the UK abolished the duopoly and admitted more new entries into the market. As mentioned in

chapter 2, after this decision, several new providers entered the market and a significant competition emerged even in the local market.[22] Therefore, Oftel's structural policy focuses more on conditions of effective competition, rather than on structure regulation such as entry regulation and line of business restrictions.[23] In July 1995, Oftel published a document called "Effective Competition Framework for Action", following the related consultative document in December 1994. This policy statement considered the path regulation should take toward the goal of a competitive market place, and Oftel put priority on interconnection issue for effective competition (Oftel, 1995a).

Since Oftel thinks the price control arrangement will directly relate to the development of competition in the UK telecom market, pricing is one of the biggest issues in the UK telecommunication policy (Oftel, 1996). In the document "Effective Competition Framework for action", policy recommendations that the RPI-2% constrain on on-line rental price increases should be lifted, and that BT should be encouraged to introduce a more flexible range of service and tariff offerings to meet the needs of different groups of consumers, were presented (Oftel, 1995a). Furthermore, since current price controls in BT's license expire in 1997, a consultative document, "Pricing of telecommunications Service from 1997", was published in December 1995. This document proposed a new idea in which Oftel will introduce a network charge cap to act as a broad control on the interconnection charges which competing operators pay to BT and more to some services from the controlled baskets where a clear prospect exists that they will be subjective to competition (Oftel, 1995a).

---

[22] Cable telephony is the most developed in the UK because of the cable company's entry into the local telephone market (Datapro, 1994).

[23] One exception is video service by BT. BT is prohibited from providing video service until 1999.

These policies will influence the future service development in the UK. First, the fully competitive marketplace with a framework of effective competition will give incentive to new entry. As cable companies began to take BT's customers, local competition will be more severe. It will lead to the rate reduction of basic telephone services and improvement of service quality. Also, diffusion of cable telephony may result in the competition in the field of future broadband services. Second, giving BT more pricing flexibility will increase BT's effort for marketing and service development.

Overall, the UK has a balanced policy between competition through a competitive market force and regulation on BT. However, for a certain period, the BT's dominant market power will still exist. How Oftel will deal with the BT's market power in order to realize a truly competitive market is a key issue of the UK's telecommunication policy.

Japan

Since the telecommunication reform took place in 1985, the MPT has tried to establish a framework of a fair and effective competitive market (chapter 4). However, this attempt has not achieved significant results. As seen in previous chapters, the Japanese telecommunication still has several issues to solve. The MPT published an official statement in January 1996, titled "Deregulation Package of Telecommunications and Broadcasting for the 'second reform of the info-communications system in Japan'". In this statement, the MPT presented a further deregulation policy package, such as revisions of the regulations on market entry, revision of the framework on interconnection, and future status of NTT and KDD (MPT, 1996a).

Among the several issues, a key structural issue is on the status of NTT. According to the government measure in 1990, the status of NTT is scheduled to be reviewed and decided in fiscal 1995, which ends March 1996. The MPT inquired about NTT's status to the telecommunication council in April 1995 (MPT, 1995) and, since then, a hot debate continued (MPT, 1996b). Generally, while the MPT take a stance which prefers the divestiture of NTT in order to realize more a competitive market, NTT and some industry circles are opposed to the plan. Whether or not NTT will be divested, the conclusion of this issue will clearly have significant influence on Japanese telecommunication development.[24]

Also, the MPT plans some structural modification (MPT, 1996a). The MPT will ease market entry and exit of Type I telecommunication carriers. Furthermore, the MPT will clarify the absence of regulation on telecommunication carriers by service classification, other than for NTT and KDD.[25] Although these policy modification is not fundamental change in market structure, it will give more incentive to telecommunication providers.

Regarding price policy, the MPT has continued to have an ambiguous policy. While the TBL states the fair rate of return for pricing of telecommunication services provided by the Type I carriers, the real operation has been intentionally guided by the MPT (Chapter 4-9). In the deregulation package, the MPT stated that deregulation of Type I telecommunication business rates is planned. It said that the MPT will apply the prior-notification system by the end of March 1997 to rates charged for mobile

---

[24] In March, 1996, the telecommunication council issued its final recommendation that recommend to divide NTT into three companies, one long distance company and two regional companies, to the Minister of Post and Telecommunication.

[25] Although TBL does not prohibit type I carriers from entering the more than one service classification, the MPT unofficially guided the NCCs to serve in one classification.

telecommunications, which are currently subject to the authorization system, and that the MPT continues to reform the regulation in the case of other rates, paying heed to the Telecommunications Council's report on the status of NTT (MPT, 1996b). So far, since the discussion of the council is not fully opened, the new pricing scheme is not been clear yet. However, a new pricing scheme has to be considered for more effective and fair competition.

From the previous discussion, it is still not clear where Japanese telecommunication policy is headed for. Overall, compared with the US and the UK, Japan's policy effort to establish the rule for competitive market does not look solid. This lack of clarity will affect service development. First, whether or not NTT will be broken up, the present form of structural regulation to Type I carriers does not have a reasonable explanation. The movement toward free competition can be seen in both the US and the UK. The managed competition by the MPT will hinder the providers' incentive for developing markets. Second, the new price scheme has to be created for effective competition. The present rate of return has not virtually worked, and, without clear pricing policy, fair competition will rarely occur. Japanese telecommunication policy is facing a turning point.

In conclusion, the policy reform in the 1980s entered into another stage in the 1990s. In terms of structure, in 1991 the UK changed their 1980s' duopoly policy, and following the UK, the US enacted a new telecommunication law, which changed fundamentally the MFJ structure and approved a wide range of competition. Also, Japan is seeking a more competitive and deregulated policy by breaking up NTT. Regarding price policy, both the

US and the UK have adopted flexible pricing schemes and attempted to improve operations of the scheme in an effective way. Only Japan has not presented a clear pricing policy scheme, while it still keeps the rate of return regulation.

In the present and near future, conduct regulation, such as implementation of open access rule, interconnection and number portability will become more emphasized than structure policy in a fully competitive market. Regarding these upcoming policy issues, the UK's Oftel appear to have clear visions, and the US is also working on them since the new communication law was enacted. Presently, Japan seems to have not reached this stage yet. Their current discussion still focuses on the market structure (NTT's status).

These policy changes in 1990s will substantially influence the future service development as the policy of the 1980s has affected the current service development. The possible influences are summarized in the following three points: First, the fully free competitive market structure, which the three countries are trying to achieve, will develop several new and advanced services. For example, cable telephony, high speed data service, and video service will be developed even for residential customers, to replace the old narrow band plain telephone services: Second, a flexible pricing scheme will promote a service providers' marketing effort: Third, conduct regulation will set a rule of competition. Thus, whether a fully competitive market works or large companies dominate the market will depend largely on how the rules will be set. The rules can give providers incentive or disincentives to develop services. Thus, in such ways, the current and future policies will substantially influence future service development.

Chapter 10

Recommendations for Future Research

As a final chapter of this thesis, limitations of this thesis and recommendation for future research are addressed.

This thesis has attempted to analyze telecommunication policy and service development by examining four service areas in three countries. However, this thesis has some limitations in both the depth and the scope of the research. First, the focus of this thesis has been on two kinds of policy instruments, structure and price, and some significant influence of these policies on the services development have been found. However, the recent policy issues are moving toward further specific conduct regulation, such as interconnection, number portability, and access charges, etc. Thus, policy analysis will require a wider scope.

Second, as mentioned in chapter 1, the service development can be affected by several factors besides policy, such as social, technological and economic factors. Overall this thesis concentrates on policy issues, but some service development is clearly affected by the other factors. Furthermore, this thesis did not isolate the policy factor from the other factors.

Third, this thesis selected three countries and four service areas as a case study. Of course, it is not possible to say that price cap regulation is better than rate of return regulation and that structural regulation has a negative effect for telecommunication

service development when only viewed by these results. A further look at service development in a wider scope is needed in order to reach a general concrete conclusion.

Therefore, responding to the limitations of this study, three future research recommendations can be presented. First, the policy factor in future services development needs to be analyzed in more diversified aspects. Especially, interconnection, numbering, number portability, and universal service policy will be important policy issues in the future as a condition for service development. Also, an international comparative study of these polices will provide some significant insight about service development.

Second, the examination of the other factors on service development, such as economic, technological, and social elements, will be necessary. Through studying those factors and the policy factors, the importance of policy on service development will be clarified objectively.

Third, the wider ranged and deeper analyzed empirical research is desirable to generalize about the performance of the policy scheme. Also, more international comparison would help further to understand the policy factors, and such research will be necessary in order to look for an optimal policy scheme.

Therefore, from these points, this study can be a beginning step toward further research.

Bibliography

Alber, Robyn. (1993) "Living with SMDS,, frame relay and ATM" Network World, February 1, 51.

Arladis, Jacques (1994) "ISDN: A European Prospect" in Steinfield, Charles., Bauer, James M., & Caby, Laurence (ed.) Telecommunications in Transition, (pp. 223-235), Thousand Oaks: SAGE

Beesley, Michael E. & Laidlaw, Bruce. (1989) The Future of Telecommunications-An Assessment of the role of competition in UK Policy-, Institute of Economic Affairs.

Bernier, Paula.(1994) "ISDN achieve 'critical mass'," Telephony, September 12, 7-8.

Bernt, Phyllis & Weiss, Martin (1993), International Telecommunications, Sams Publishing.

Bolter, Walter G., McConnaughey, James W., & Kelsey, Fred J. (1990) Telecommunications Policy for the 1990s and beyond, M. E. Sharpe, Inc.: New York.

Bouwman, Harry., Christofferson, Mads. & Ohlin, Tomas. (1992) "Introduction Videotex: Is there a life after death?" in Bouwman, H. and Christofferson, M. (ed.) Relaunching Videotex, (pp. 7-13), Kluwer Academic Publishers; Dordrecht.

Bouwman, Harry & Latzer, Michael (1994) "Telecommunication Network-Based Services in Europe" in Steinfield, Charles & Bauer, James M., & Caby, Laurence (ed.) Telecommunications in Transition, (pp. 161-181), Thousand Oaks: SAGE.

Briere, Daniel. (1991) "Buyer's Guide: Switched data services come of age", Network World, September 23, 53-58.

Briere, Daniel. (1995) "Communications Services: Overview", DataPro, January, McGrow-Hills.

British Telecom (1995) Annual Report, BT.

Brock, Gerald W. (1994) Telecommunication Policy for the information age, Cambridge: Harvard University Press.

Cave, Martin. & Trotter, Stephen. (1989) "The Regulation of Competition and Entry in Markets for U.K. Telecommunications Service" in Elixmann, D. et al. (ed.) Communications Policy in Europe. (pp. 57-84) Springer-Verlag: Berlin.

Cole, Barry G. (ed.) (1991) After the Break up, Columbia university Press, New York.

Crandall, Robert W. (1991) After the Breakup, The Brookings Institution, Washington, D.C.

Curry, Rowland L. (1991) "Service Quality" in Cole, B.G. (ed.) After the Break up, (pp. 235-253), Columbia university Press; New York.

Datapro (1993a) "A history of Telecommunications Regulation", McGraw-Hill.

Datapro (1993b) "United Kingdom: The Commercial and Regulatory Environment", McGraw-Hill.

Datapro (1994) "Cable Telephony", McGraw-Hill.

Davidson, W. (1987) "Japanese telecommunications policy: New direction and old dilemmas", Telecommunications policy, June.

Davies, Andrew. (1994). Telecommunications and Politics. New York: Printer Publishers.

Dhilawala, Sakina. (1993) "Japan The Commercial and Regulatory Environment" Datapro, McGraw-Hill.

Dowling, Michael. & Witte, Eberhard. (1991) "Value-added services: Regulation and reality in the USA" Telecommunications Policy, December, 509-518.

Einhorn, Michael A. (ed.) (1991). Price caps and incentive regulation in telecommunications, Boston, MA: Kluwer Academic Publishers.

Freuck, Paul.(1993) "Beyond TRIP: National ISDN-2," Telephony, May 31, 26.

Fuchs, Gerhard. (1992) "ISDN- the telecommunications highway for European after 1992?", Telecommunications Policy ,November, 635-644.

Galvin, Mark. & Hauh, Al. (1994) "Expanding the market for ISDN access", Telecommunications, October, 35-38.

Glynn, S. (1992) "Japan's success in telecommunications regulation, A Unique regulatory mix" Telecommunications policy, January/February, 5-12.

Goleniewski, Lillianan. & Horak, Ray (1993) "ISDN: Promise, Product, or Puzzle?" DATAPRO, McGraw-Hill, 329-334.

Greenstein, Shane. et al. (1995) "The effect of incentive regulation on infrastructure modernization: Local exchange companies' deployment of digital technology" Journal of Economics & Management Strategy, Volume 4, November 2, Summer, 187-236.

Gregg, Kathleen M. (1992) The status of ISDN in the USA, Telecommunications Policy, July, 425-439.

Griffths, Sarah. (1993) "BT", Datapro Report, McGraw-Hill.

Hayashi, Koichiro. (1989) Networking no Keizaigaku [The Economics of Networking], NTT Syuppan: Tokyo.

Hayashi, Koichiro (1994) uniba-saru sa-bisu ,[Universal service], Tokyo: Chuko Sinsyo.

Hayashi, Toshihiko & Matsuura, Katsumi, (ed.) (1992) Terekomyunike-syonn no Keizaigaku [Economics of Tlecommunication], Tokyo: Toyo Kezai Sinposya.

Hayashi, Toshihiko, (ed.) (1994) Koza: kotekikisei to sangyo 3 : Denkitusin, [Telecommunication infrastructure & services], Tokyo: NTT Syupan.

Heywood, Peter. & McMaster Sam. (1992) "European PBX Networks", Data COmmunication, Feburary, 70-75.

Ide, Hideki (1994a) "Igirisu ni okeru denkitusin no tenkai" [Telecommunication development in the UK] in Nagai (ed.) Gendai terekomu sangyo no keizaibunseki, [Economic analysis of telecommunication industry], Tokyo: Hosei Daigaku Syuppan-kyoku.

Ide, Hideki (1994b) "Denkitusin Kisei no Gaiyo [Telecommunication regulation Overview]" in Hayashi, Toshihiko (ed.) Koza: kotekikisei to sangyo 3 : Denkitusin, [Telecommunication infrastructure & services], (pp. 228- 243), Tokyo: NTT Syupan.

Ito, Yoichiro. (1986) "Telecommunications and Industrial policies in Japan: Recent Development". in Snow, M.S. (ed.) Marketplace for Telecommunications, (pp. 54-79), Longman, New york & London

Inforcom Research, Inc (1994) Information & communications in Japan 1993-1994, Tokyo:Inforcom Research, Inc.

Janisch, H & Kurisaki, Y. (1985), "Reform of telecommunications regulation in Japan and Canada", Telecommunications policy, March.

Joskow, Paul L. & Noll, Roger G.(1977) "Regulation in Theory and Practice: An Overview" in Schmalensee, Richard (ed.) Studies in public Regulation, (pp. 1-78), The MIT Press; Cambridge, MA.

Joscher, Chareles. (1986) "Telecommunications Liberalization in the United Kingdom", in Snow, M.S. (ed.) (1986) Marketplace for Telecommunications, (pp. 153-172), Longman, New york & London.

Jussawalla, Meheroo. (ed.) (1993) Global Telecommunications Polices: The Challenge of Change, Connecticut: Greenwood Press.

Karpinski, Richard. (1993) "ISDN train keeps a 'rolling'," Telephony, May 31.

Koshiro, Makoto & Nambu, Tsuruhiko (1993), "Denkitsusinn Kisei no Rekishi to Nichibei Hikakaku [The history of telecommunication Regulation and Japan- USA Comparison]" in Okuno et al (ed.), Nihon no Denki Tusin [Telecommunication in Japan], (pp. 27- 74), Tokyo: Nihon Keizai Shinbunsya.

Komiya, Megumi. (1991) Japan's changing telecommunications industry: An analysis of competition, market power, and regulation, Unpublished doctoral dissertation: East Lansing, MI.

Lehmann, Yves. (1994) "Videotex: A Japanese Lesson", Telecommunications, July, 53-54.

Leighfield, John. (1991) "The Duopoly Review and the Value-added Service Supplier" in Gillick, David and Skinner, Sandy (ed.) UK Telecommunications Policy review 1991. (pp. 69-74), IBC Technical Services Ltd, London.

Majchrzak, Ann. (1984) Methods for policy research, SAGA Publications Newbury Park, CA, 59.

Mansell, Robin (1993) The New Telecommunications-a political economy of network evolution- SAGE Publications, London

Mansell, Robin (1988) "Telecommunication network-based services", Telecommunications Policy, September, 243-255.

Matsuura, Katsumi (1992) "Telekomu keizai no Genjyo to Kadai"[The present situation and issues of telecommunication economics] in Hayashi, Toshihiko & Matsuura, Katsumi, (ed.) Terekomyunike-syonn no Keizaigaku [Economics of Telecommunication], Tokyo: Toyo Kezai Sinposya.

Matsuura, Katsumi (1994) "Denkitsusin no Sangyo Soshiki"[Industrial organzation of Telecommunication] in Hayashi, Toshihiko, (ed.) Koza: kotekikisei to sangyo 3 : Denkitusin, [Telecommunication infrastructure & services], (pp. 3-20), Tokyo: NTT Syupan.

Mizuno, Hiroyasu. (1994) "Tusin sa-bisu Tayouka he [Toward the diversity of communication service]" Nikkei Communications, November, 21, 51-56.

Mizuno, Hiroyasu. (1995) "ISDN no Yukue [The future of ISDN]" Nikkei Communications, August 7, 15-53.

Ministry of Posts and Telecommunications (1993,1994) White paper

MPT (1995) "Status of Nippon Telegraph and Telephone Corp.-Towards the creation of Dynamism in the Info-Communications Industry-(Unofficial Translation) Inquiry" http://www.mpt.go.jp/Report/Info-comm-industry/inquiry.html

MPT (1996a) "Deregulation package of Telecommunications and Broadcasting for the 'second reform of the info-communications system in Japan' ". http://www.mpt.go.jp/cgi-bin/imagemap/kanwa?268,110

MPT (1996b) "Telecommunications Council Special Subcommittee on the Status of NTT". http://www.mpt.go.jp/Council/Council-home-j.html

Nagai, Susumu ed. (1994a) Gendai terekomu sangyo no keizaibunseki, [Economic analysis of telecommunication industry], Tokyo: Hosei Daigaku Syuppan-kyoku.

Nagai, Susumu. (1994b) "Japan: Technology and Domestic Regulation", Noam, E., et al (ed.), Telecommunications in the Pacific Basin, (pp. 458-472), Oxford University Press, New York

Nambu, Tsuruhiko (1986), Terekomu ekonommikusu [Telecom Economics], Tokyo: Nihon Keizai Shinbunsya.

Nambu, Tsuruhiko (1994), "Comparison of deregulation Policies", Noam, E., et al (ed.) Telecommunications in the Pacific Basin, (pp. 32-44), Oxford University Press, New York.

Naoe, Shigehiko (1994), "Japan's telecommunications industry" Telecommunications policy, November.

Nikkei Communications (1995a) "Naniga Kitemo Ukete Tatsu"[Interview with Mr. Tomoo Okada (President of Nifty-Serve Corp.)] Augest, 21.

Nikkei Communications (1995b) "Tyokyorikei NCC VPN kaishi [The three Long distance NCCs start VPN offerings]" May 15, 55.

Nikkei Communications (1995c) "NTT Tojo de Honkakutekini ugokidashita Frame Relay sijyou [Frame relay Market start with NTT]" Feburary 20, 36.

Noam, Eli M. (ed.) (1983) Telecommunications Regulation Today and Tomorrow, New York, NY: Law & Business, INC.

Noam, Eli M.(1992) Telecommunications in Europe, New York, NY: Oxford University Press.

Noll, A Michael. (1987) "Bell System R&D activities", Telecommunications policy, June, pp. 161-178.

Noll, A Michael. (1991) "The future of AT&T Bell Labs and telecommunications research", Telecommunications policy, April, pp. 101-105.

Noll, A Michael. (1994) "A study of long-distance rates; divestiture revisited", Telecommunications policy, volume 18, November 5, pp. 355-362.

Noll, Roger (1989) "Telecommunication Regulation in the 1990s" in Newberg, Paula R (ed.) New directions in Telecommunication Policy (pp. 11-48), Durham: Duke University Press

Noll, Roger & Smart, Susan R. (1991) "Pricing of Telephone Service" Cole, Barry G. (ed.) After the Break up, Columbia university Press, New York. pp185-210.

Norman, Adrian. (1993) "Recent Developments in UK Telecommunications Policy", Jussawalla, M. (ed.) Global Telecommunications Policies-The Challenge of Change-Greenwood Press

Nowotny, Kenneth, Smith, David B, & Trebing, Harry M. (ed.) Public Utility Regulation, Kluwer Academic Publishers, Boston.

OECD (1988) New Telecommunications Services: Videotex Development Strategies, OECD: Paris.

OECD (1989) Telecommunication Network-Based Services, OECD: Paris.

OECD (1993) Communications Outlook OECD: Paris.

OECD (1995a) Communications Outlook OECD: Paris.

OECD (1995b) Telecommunication Infrastructure: The Benefits of Competition OECD: Paris.

OECD (1995c) Price Caps for telecommunications Policies and Experiences, OECD: Paris.

Office of Telecommunications (1995a) Effective Competition Framework for action, http://WWW.open.gov.uk/oftel/oftelwww/compet.htm

Office of Telecommunications (1995b) Oftel's Paln for 1995.96 and Beyond, http://WWW.open.gov.uk/oftel/oftelwww/manage/plan9596.htm

Office of Telecommunications (1996) Pricing of Telecommunications services from 1997, http://WWW.open.gov.uk/oftel/oftelwww/pri1997/contents.htm

Okuno, Masahiro & Suzumura Kotaro (1993), "Denkitsusinjigyo no kisei to seifu no yaluwari" [Regulation of telecommunication business and the role of the government] in Okuno et al (ed.), Nihon no Denki Tusin [Telecommunication in Japan], (pp. 75-104), Tokyo: Nihon Keizai Shinbunsya.

Oniki, Hajime (1993) "Impacts of the 1985 Reform of Japan's Telecommunications Industry on NTT", in Jussawalla, M. (ed.) Global Telecommunications Policies-The Challenge of Change- , (69-90), Greenwood Press.

Ozawa, Takahiro (1994) "Wagakuni Jyohotusin Sangyo no genjyo [The Current Situation of Japanese Info-communication Industry]" in Nagai (ed.) Gendai terekomu sangyo no keizaibunseki, [Economic analysis of telecommunication industry], (pp. 1-54), Tokyo: Hosei Daigaku Syuppan-kyoku.

Rowe, Stanford H. II.(1991) Business Telecommunications (2nd ed). Macmillan Publishing: New York.

Sirbu, Marvin A. (1991) "Advances in Network Technology", in Cole, Barry G. (ed.) After the Break up, (pp. 326-337), Columbia university Press, New York

Snow, Marcellus S, (ed.) (1986) Marketplace for Telecommunications, New york: Longman.

Striplin, Patricia Dewar. (1994) "United States: The commercial and Regulatory Environment" Datapro, McGrow-Hill.

Spulber, Daniel F. (1989) Regulation and markets, The MIT Press, Cambridge, Massachusetts.

Staal, Peter van der. & Grassmuck, Volker. & Hatta, Keiko. (1995) "ISDN in Japan: Actors, status and expectations", Telecommunications Policy ,vol. 19, No. 7, pp.531-544.

Steinfield, Charles. (1992) "US: Videotex in a "Hyperevolutinary" Market" in Bouwman, H. and Christofferson, M. (ed.) Relaunching Videotex, (pp. 149-164), Kluwer Academic Publishers; Dordrecht.

Stoetzer, Matthias-Wolfgang. (1992) "Value-added services-problems of definition and data", Telecommunications Policy, July, 388-400.

Taylor, William E. & Taylor, Lester D (1993) "Postdivestiture Long-Distance Competition in the United States", American Economics Review, VOL.83 NO.2, 185-190.

Tebes, John. (1994) The year of ISDN: A Progress Report", Telecommunications, October, 24,79.

Thimm, Alfred L. (1992) America's Stake in European Telecommunication Policies, Quorum Books, westport, Connecticut.

Thomas, Graham., et al. (1992) "The United Kingdom, France and Germany: Setting the stage" in Bouwman, H. and Christofferson, M. (ed.) Relaunching Videotex,(pp. 15-29), Kluwer Academic Publishers; Dordrecht.

Tomita, T. (1992) "Telecommunication policy in Japan", in Sapolsky, H. et al, (ed.) (1992) The telecommunication Revolution, (pp. 114-119), Routledge, London.

Tomita, T. (1984) "Japan's policy on monopoly and competition in telecommunications", Telecommunications policy, March, 44-50.

Vickers, John & Yarrow, George (1988) Privatization: An economic Analysis, The MIT Press, Cambridge, Massachusetts.

Wada, Eiichi. (1994) "The Growing US frame relay market", Nikkei Communication, June 20, pp. 28-29.

Wall Street Journal (1996) "Telecom Vote Signals Competitive Free-For-All" Feburary 2.

Weigglesworth, Bill & Barnes, Fod (1992) "UK policies and regulations" Telecommunications Policy , December 1992, pp721-725.

Ziegler, Bart. & Sandberg, Jared. (1996) "IBM, Sears Explore Selling Prodigy On-Line Service" Wall Street Journal, January 15, A3, A4.

MICHIGAN STATE UNIV. LIBRARIES
31293015592706