ABSTRACT

Telecommunications businesses provide telecommunications networks which form the foundation of the advanced information society. For the smooth materialization of such a society, it will be necessary to promote the wholesome development of the telecommunications businesses. In order to achieve this end, on April 1 of this year, the Ministry of Posts and Telecommunications carried out a major reform of the telecommunications system in Japan. The major pillars of reform were: placement of Nippon Telegraph & Telephone Public Corporation under private management, and introduction of the principle of competition into the telecommunications business. Due to the enforcement of the new system, it has become necessary to interconnect the networks of those enterprises which are already in the business and those which will join the business in future. As a consequence, it has become necessary to examine new issues from the viewpoint of traffic engineering, such as routing and traffic control.

1. ADVANCED INFORMATION SOCIETY AND TELECOMMUNICATIONS

1.1 Changes in the Environment Surrounding Japan

Japan underwent remarkable economic and social development after W.W.II, and became a modern society and one of the advanced nations of the world. However, in the recent years, there have been marked changes in the situations surrounding it, and such situations have increased in severity. That is, domestically, there have been stagnation in the economy and changes in the social structure consequent upon the transition from the high economic growth to stable economic growth, and internationally, the effects of the high interest rates in the Unites States and accumulation of loans to developing countries have brought about multipolarization and instability.

Due to these changes in the environmental conditions, at present, Japan faces many difficult issues. These are for instance the need to achieve proper economic growth by utilizing the vitality of private management, coping with the rapidly progressing aging or maturing society, elimination of social and economic gaps between cities and local areas, and coping with the aggravating international trade and other frictions. If, toward the 21st century, Japan were to fulfill its obligations in the international society and to continue to enjoy its present prosperity, it will be necessary for it to properly cope with these issues.

1.2 Building of the Advanced Information Society and Telecommunications

Hopes are being placed on information as something which will play an important role in coping with these issues. It is undeniable that information has been necessary for the smooth operation of the society and economy up to the present. However, the rapid development of electronics technology in the recent years has markedly enhanced its usefulness. And as a result, dependence by society on information has magnified to a degree uncomparable to the past. In the future, these tendencies are expected further to progress, leading to the materialization of a society in which smooth distribution of and access to the needed information will be secured for all of the members of the society including individuals, homes, enterprises, and administrative organs—that is, to the advanced information society.

As something which will allow us properly to cope with the various issues which Japan faces by utilizing information as a resource to substitute oil, so to speak, in the past high growth era, hopes are being placed on the advanced information society as one which makes possible the following:

i) Building of people-centered, rich national life

Through such means as home shopping, banking, security, and working at home, such society will enhance the convenience and efficiency in various spheres of people's living. As a result, the spare time created can be spend for creative activities by utilizing the rich information services provided through the videotex, etc. In addition, because in such a society the individuals and homes will be directly linked with the enterprises using networks, it will be easier for the latter to provide goods and services which are in coping with the former's individualized and diversified needs.

ii) Switchover to industrial structures which are more efficient and full of vitality

Due to the development of information and communication networks, it is expected that the so-called new-media-related, knowledge-intensive, high value added information industries such as the software industry and information services will develop. In addition, through efficient utilization of communication systems connecting enterprises in the same or different businesses. It can be expected that rationalization will be promoted in all areas of corporate activity such as production, distribution, sales, and business
management.

iii) Promotion of independent development of local communities

By utilizing the information and communication networks, it becomes possible to decentralize the various social functions which had hitherto tended to concentrate in large cities to local regions. By so doing, such a society will solve such problems as depopulation and overpopulation, traffic congestion and housing shortage in large cities, and improve the amenity of local areas. In addition, by building up information and communication networks which have roots in the local community, it will improve local living and culture.

iv) Promotion of international solidarity and cooperation

Due to the advancement of international communications networks, it will be possible to eliminate international communication gaps, and build a stable international society which is based on the spirit of solidarity and cooperation. In order to build such an advanced information society, what become indispensable are telecommunications networks to interconnect all of the members of the society such as individuals, homes, enterprises, and administrative organs. Today, telecommunications is therefore playing the role of leading the society in the formative stage of the advanced information society. And not only that, it is also expected to play a fundamental and nucleic role in the actual advanced information society. It can therefore be said that toward the smooth realization of such a society, telecommunications has further grown in importance.

2. NEW DEVELOPMENTS IN THE TELECOMMUNICATIONS POLICIES

2.1 Liberalization of the Telecommunications Businesses

The telecommunications businesses provide the telecommunications networks which form the foundation of the advanced information society. For the smooth materialization of such a society, it will be necessary to promote the wholesome development of telecommunications businesses. Based on such a recognition, the Ministry of Posts and Telecommunications carried out a major reform of the telecommunications system which had, as its main pillars, entrance by private enterprises into the telecommunications business and placement of Nippon Telegraph & Telephone Public Corporation under private management. And on April 1, 1985, the so-called three NTT reform laws were enforced: the Nippon Denshin Denwa Kabushiki Kaisha Law, the Telecommunications Business Law, and the Law Regarding the Revision and Adjustment of Laws Related to the above two laws.

In Japan, the telecommunications business had been utterly operated by the state before W.W.II and by NTT Public Corporation (by Kokusai Denshin Denwa Co., Ltd. in the case of international communications) after the war. Through concentrated utilization of the limited amount of resources, NTT Public Corporation had answered the voluminous telecommunications-related demand from the post-war reconstruction period to the period of high economic growth, making Japan one of the foremost and advanced telecommunications nations in the world. However, now that backlog of demands has been eliminated and nationwide subscriber dialing service has been achieved, there has been less necessity to promote the concentrated utilization of resources through unitary operation. In addition, the telecommunications business has been said as one in which natural monopolistic tendencies and technological uniformity exert strong influence, and these had been given as grounds for continuing the unitary operation. However, due to the advent of new media such as satellite communication and optical-fiber cables regarding which the concept of scale-merit does not necessarily apply, and to the progress of the interface technologies which enable the coexistence of a multiple number of networks, these problems are also about to be eradicated. Moreover, there has been a strong demand for pluralized operation due to such factors as the advent of various new media which is a result of progress of electronics technologies, advancement and diversification of users' needs, and activation of the telecommunications businesses in order to attentively cope with these needs. In view of these changes in the situation, the revisions effected in the system this time aimed at promoting the smooth materialization of the advanced information society by establishing a pluralistic telecommunications system by introducing the principle of competition. (See Figure 1 and Table 1.)

2.2 The Basic Idea Governing the New System

The basic idea governing the new system is to activate and bring up the efficiency of telecommunications businesses by utilizing the vitality of private management. It also aims at ensuring the public properties of communication businesses and promote the benefit of the people who are the ultimate users of communication services. The new system is made up of the following four pillars.

i) Ensuring of Flexibility

Telecommunications involves vanguard technology. Therefore, in order to enable enterprises to cope flexibly with technological progress and trends of demand in the future, the new system allows them to enter into any of the fields of telecommunication.

In addition, the telecommunication services are expected in the future to undergo diversification due to technological renovations and advancement in the demand for them. Therefore, the enterprises are striving to provide all kinds of communication services including telephones, telex, teletext, VAN, and data communication. In this respect, in comparison to the former way of thinking of classifying telecommunication services into basic services and advanced services, the new system is believed to facilitate enterprises to cope appropriately with new developments; the recent trend of technological development from unitary services to integrated services.

The Telecommunications Business Law divides telecommunications businesses into Type I and Type II telecommunication businesses. It then
### Historic Background

**Post-W.W. II Reconstruction Period**
- Materialization of a telephone which can be instantly installed
- Materialization of a telephone which can be instantly connected
- Concentrated utilization of a limited amount of resources

### Telecommunications System

A unitary system operated by NTT Public Corporation
- Expansion and consolidation of telecommunication networks
- Nation-wide spread of the telephone

- Elimination of backlog of demands, achievement of nation-wide subscriber dialing service
- Advent of satellite communication, optical-fiber cables, etc.
- Development of interface technologies
- Changes in environmental conditions
- Advancement and diversification of users' needs
- Activation of telecommunications businesses
- Demand for pluralized operation

### The Fundamentals of Telecommunications Policies

- Securing of key telecommunication networks
- Securing of essential communications
- Ensuring of privacy
- Ensuring of safety and reliability
- Rational rates

### Advanced Information Society

- Realization of a rich society supported by nation-wide and multi-layered telecommunications networks

### Present

A pluralistic telecommunications system introducing the principle of competition
- Utilization of the vitality of private management
- Pluralization of telecommunications businesses

### Figure 1. Revisions in the Telecommunications System

### Table 1. Outline of the New Telecommunications System

<table>
<thead>
<tr>
<th></th>
<th>The Old System (Monopoly)</th>
<th>The New System (Competition)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Businesses operated by:</strong></td>
<td>NTT Public Corp., KDD</td>
<td>Private enterprises</td>
</tr>
<tr>
<td></td>
<td>Small and Medium Enterprises VAN only.</td>
<td>Long-distance, large-capacity circuits</td>
</tr>
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<td></td>
<td></td>
<td>Two-way CATV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VAN</td>
</tr>
<tr>
<td><strong>Rates</strong></td>
<td>Principal rates are to be determined by law (others to be approved)</td>
<td>Approval</td>
</tr>
<tr>
<td></td>
<td>Approval not necessary</td>
<td>Approval not necessary</td>
</tr>
<tr>
<td><strong>VAN business</strong></td>
<td>To be determined by law</td>
<td>Approval (to cope with diversification by making the best use of the originality of private enterprises)</td>
</tr>
<tr>
<td></td>
<td>Prohibited</td>
<td>Approval not necessary</td>
</tr>
<tr>
<td><strong>Ensuring of privacy</strong></td>
<td>To be determined by law</td>
<td>To be determined by law</td>
</tr>
<tr>
<td>of communication, of transmission of important communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ensuring of services</strong></td>
<td>Impartial service throughout the nation, as long as budget allows;</td>
<td>Provision of services (ensuring of the least necessary means of telecommunication)</td>
</tr>
<tr>
<td><strong>Use of circuits</strong></td>
<td>Strict restrictions on use by others, common use, and interconnections (guaranteeing of monopoly)</td>
<td>Approval not necessary in principle</td>
</tr>
<tr>
<td><strong>Terminal Equipments</strong></td>
<td>Direct management in principle (prohibition, in principle, of customer provision)</td>
<td>Liberalization (liberalization of customer provision of main telephones, multi-function and high-quality equipments through competition)</td>
</tr>
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</table>
Further divides the Type II businesses into General and Special Type II businesses. Figure 2 shows the positions of these different kinds of businesses in the form of a hierarchical structure.

**Figure 2: A Hierarchical Structure of Networks**

First, the lowest layer, which comprises the physical transmission lines, forms the infrastructure which provides the foundation for all of the telecommunication services. In the past, these lines were mainly made up of pair cables and coaxial cables. In the recent years however, optical-fiber cables which enable broadband, large-capacity, and economical transmission, and communications satellites which can cover the entire nation at once, have emerged.

The next layer comprises physical networks provided by the Type I telecommunications enterprises in a form which is closely related to and indivisible from the physical transmission lines set up by such enterprises. At present, the subscription telephone network, which is a nation-wide analog exchange network, has been consolidated. In the future however, due to the progress of the digital technology, the trend is expected to be toward an integrated digital network. In addition, due to the progress of the interface technology, it has become possible to interconnect a plural number of networks.

The third and fourth layers comprise functional networks operated by the Type II or Type I telecommunications enterprises and which are built on the physical networks operated by the Type I telecommunications enterprises. The so-called VAN which has diverse functions such as one enabling easy communication between different kinds of computers, belongs to this layer.

The third and fourth layers correspond to the Special and General Type II telecommunications businesses, respectively. In order to give objective clarity to the category of the Special Type II businesses, the law defines them as a) those which carry out businesses by covering many and unspecified persons, and b) those operating facilities of sizes larger than the one prescribed by cabinet order.

Finally, the fifth layer comprises the systems privately operated by individual enterprises, etc.

When these five layers of networks function organically, they mutually complement one another, and form the desired network society.

In addition, in order to prevent excess facilities, their rates are not placed under a perfectly free competition market. As a consequence, the market rates will not necessarily and fully be formed. And because such rates must be public rates which are closely related to the people's daily living, and so that they should be "just and proper ones when compared with the proper cost under efficient management", they are placed under a permit system. By the same token, the Type I telecommunications businesses are obliged by law to provide their services in their own areas of business, so that users in such areas should be able to use the services with equality.

In this way, as public service enterprises, the Type I telecommunications businesses are placed under a minimum of restrictions. In fact, in order as much as possible to guarantee their free business activities, they are not placed under the usual restrictions binding on other public service enterprises such as restrictions on engaging in side businesses, and those concerning transferring of facilities.

Next, the Type II telecommunications businesses, which provide telecommunications services by borrowing telecommunications circuits and facilities from Type I enterprises, can relatively easily enter the business by simply setting up computers. And because this is a field which provides attentive services by coping with users' diverse needs, the market can be expected to expand if maximum respect is paid to the principle of free competition among enterprises. Therefore, the enterprises in this category are placed under a notification system in principle.

iii) Ensuring of public properties

The objective of the Telecommunications Business Law is to promote the wholesome development of the telecommunications businesses by utilizing the originality of private management. However, the telecommunications business has its own public properties based on its very nature as something dealing with communication. And because ensuring of these properties is also an objective of the Telecommunications Business Law, it lays down the measures necessary to achieve this end.

First, communication is indivisible if human beings were to carry on social life. And if they were to carry out free and frank communication with peace of mind, the most
important thing is to secure the privacy of communication. For these reasons, the law prohibits third party state organs and private individuals to infringe on the privacy of communications being handled by telecommunications enterprises. At the same time, it also lays down the duty of individuals engaged in such businesses to protect the privacy and to take the necessary measures with respect to facilities and management.

In addition, as in the case of violation of privacy, interruption of service and outbreak of trouble due to accidents, etc., cause unexpected damage to users. Therefore, it is extremely important to ensure the safety and reliability of communication and to maintain wholesome networks. For these reasons, and from the standpoint of smooth provision of telecommunication services, the law lays down fixed technical standards for the telecommunication facilities of the particularly consequential Type I and Special Type I telecommunications businesses.

iv) Liberalization of circuit and terminal use

In the past, in order to ensure the unitary operation of telecommunications businesses by NTT Public Corporation and KDD, various restrictions had been imposed on the use of telecommunication circuits and terminal equipments. However, with the introduction of the principle of competition as a turning-point, the various legal restrictions have been abolished, and users are now able to use these services according to their own needs, and as freely and efficiently as possible.

In addition, with the liberalization of the use of terminal equipments, administrative functions such as laying down of technical standards for terminal equipments and compliance approval for the same which NTT had hitherto been carrying out were transferred to the state, so that enterprises may engage in fair competition among themselves.

3. PROMOTION OF NEW ENTRANCE AND ISSUES FOR TECHNOLOGICAL EXAMINATION

With the liberalization of the telecommunications businesses, it can be said that the telecommunication system has been consolidated for the time being toward the smooth materialization of the advanced information society. However, if telecommunications were truly to play a nucleic role in such a society, realistic measures and policies are needed which will make the most of the system's spirit. To achieve this end, the law encourages enterprises to enter into the various fields of the business. However, at the same time, it will be necessary to examine various technological issues.

ii) New entrance into inter-city services

The Telecommunications Business Law also allows the entrance into the intra-city communication business. Some of the forms which such entrance are expected to take are for wire broadcasting telephone companies and CATV companies to become Type I telecommunications businesses by interconnecting with inter-city networks, and entrance into car telephone and pocket-bell service businesses.

4. CONCLUSION

Today, the world is increasingly becoming interdependent in all of the areas of society and economy, and in the field of telecommunications also, various issues have emerged as a consequence of the progress of such interdependence. These are for example transborder data flow, distribution of such resources as satellite orbits and transmission frequencies, liberalization of service trade, and procurement of materials, etc.
These problems are developing on a worldwide scale, and among the Western advanced nations, they have emerged as problems related to liberalization of service trade between the United States and Europe which see the field of telecommunications as a strategic industry. And between the Western and the Eastern nations, they have emerged as problems associated with news agencies and satellite broadcasting in connection with the problem of free distribution of information. And between advanced nations and developing nations, they have emerged as problems of imbalance of information distribution and of north-south gap in the communications infrastructure.

By taking into consideration the progressing interdependence of the world, it is believed important for Japan also to deal comprehensively with these problems from a long-term perspective.