

**Developments of the IT Revolution and
Informatization in East Asia**

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—Contents—

| | |
|--|-----------|
| Introduction..... | 1 |
| 1. Development Process of the Telecommunication Industries | 1 |
| 2. Developments of the Telecommunication Industries in East Asia..... | 5 |
| 3. Deployments of Mobile, Internet and Broadband in Asia..... | 11 |
| 4. National IT strategies Pursued by Asian Countries..... | 14 |
| (1) Japan..... | 25 |
| (2) Singapore | 27 |
| (3) South Korea..... | 29 |
| (4) Asia’s Regional Endeavors Towards IT Strategies..... | 31 |
| (5) Japan’s measures – “Asia Broadband Program” | 33 |
| 5. Changing World of Telecommunications | 35 |
| Conclusions..... | 37 |

Introduction

The telecommunication industries in America and Europe plunged into a long recession in 2000, following the collapse of the bubble of the 1990s. Burdened with excess capacities, large liabilities and surplus staff, the world's major telecommunication carriers, such as AT&T, WorldCom, British Telecom, Deutsche Telecom and France Telecom, are restructuring their business strategies fundamentally.

A number of new carriers, which emerged in the 1990s in anticipation of explosive growth in telecommunication traffic resulting from rapid expansion of the Internet, filed for bankruptcy in the wake of the burst of the bubble. Industry watchers expect the slump in the telecommunication industries to continue until around 2005, when the disposal of excess capacities would be completed.

In contrast, the telecommunication industries in Asia have made remarkable progress in recent years. South Korea and Japan are now leading the world markets in the areas of broadband and mobile Internet, while Chinese telecommunication industries have seen the significant growth since the 1990s as IT infrastructure have been supporting the country's remarkable continued economic expansions.

Following the lead of their European and American counterparts, the telecommunication industries in the NIEs – South Korea, Hong Kong, Taiwan and Singapore – have grown sharply since the 1980s. Other countries in Asia, such as Thailand, Malaysia, the Philippines and Indonesia, have also reported the steep growth since the 1990s thanks to liberalization and deregulation.

Meanwhile, major countries began to promote nationwide deployment of Internet and telecommunication services in the mid-1990s as a key basic infrastructure for the information network society and the knowledge-based economy.

This paper provides an overview of the developments of the telecommunication industry in East Asian countries and their national strategies on IT.

Let us briefly review the general development process of the telecommunication industries before moving on to the main theme.

1. Development Process of the Telecommunication Industries (Figure1)

The history of the telecommunication industries began with the invention of the telegram in the 1830s, followed by the invention of the telephone by Alexander Graham

Bell (he obtained the telephone patents in 1876). These innovative devices were introduced in one country after another, including Japan, as a means of transmitting information electrically.

By the early 20th century, many countries established state-owned monopolies to construct and run postal, telegram and telephone facilities and promote the use of telephone services nationwide, although the U.S. and some other countries opted to allow a number of private-sector companies to enjoy regional monopolies.

Similar to computer and semiconductor industries, the telecommunication industries have been relying heavily on technological innovations. Demands have diversified since the 1970s from simply transmitting voice and sound to sending data, as well as still and moving images. Together with the technological innovations in radio, satellite and fiber optics, those movements have led to the erosion of the “natural monopolies,” enabling new market entrants to offer terminal equipment, long-distance and international telecommunication services.

**Figure 1 Development Process of the Telecommunication Industries
With Focus on Developments in Industrialized Nations**

(1) Type Age of telegrams (1830's) → Age of voice telephony (1876-) → Age of diversification and integration involving multimedia, such as sound, data and images (1990-) → Age of Internet, broadband and mobile technologies, and fusion of telecommunication and broadcasting (2001-)
(Dates are a rough guidance.)

(2) Technology Digital → Shift from analogue to digital lines (Japan completed the shift in 1996) → Currently used digital circuit-switching → Digital IP packet switching to be used in the future

(3) Monopoly Monopoly of postal, telegram and telephone operations by the state → Competition with private-sector operators (emerging competition/full-fledged competition)
 Competition (State-run company → public corporation and the separation of postal and telephone operations)

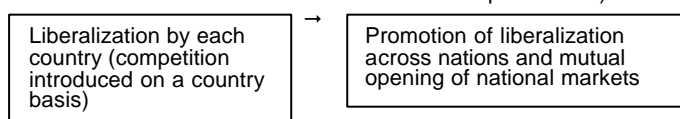
(4) Liberalization of telecommunication operations (the degree of ease with which different areas can be opened to competitions)

| | |
|---------|--|
| Easiest | Terminals, long-distance and international telephone services, resale services |
| Next | Value-added telecommunications, public phones, mobile phones |
| Hardest | Local fixed line services |

(5) Steps towards the liberalization of telecommunication operations a)

| | | Monopoly | Emerging competitions | Full-fledged competitions |
|-------------------------|--------|----------|---|---|
| The number of operators | Fixed | 1 | Several companies due to license restrictions | Many due to the absence of license restrictions |
| | Mobile | 1 | 2 | more than 3 |

(6) Steps towards the liberalization of telecommunication operations b)



January 1998: Full liberalization of the telecommunication industries in the EU, including infrastructure and basic telephone services
 February 1998: The World Trade Organization put into effect its Agreement on Basic Telecommunication Services

(7) Regulatory system

| | |
|--|---|
| Establishing independent regulatory bodies | Separation of regulatory functions from management and policymaking functions in order to ensure independence, promote fair competition and protect consumers |
| Introducing asymmetrical regulations | To implement different regulations to temporarily protect and nurture new market entrants so that they will become able to compete effectively against massive telephone carriers that are owned by the state or have a monopoly. Regulations on rates and mutual connections imposed on existing carriers. No such regulations for new operators in principle. |

(Note) Monopoly was believed to suit the telephone business in view of its unique intrinsic features. Just like electricity and transport, it requires massive fixed assets for the production, distribution and consumption of services and must provide intangible services indispensable to everyday life and businesses, continuously for 24 hours a day. These characteristics of the industries have been known as “natural monopoly”.

For the reasons mentioned above, the telecommunication industries saw competitions first introduced after more than a century of monopolies in the areas of terminal equipment and long-distance services in the U.S., the country that had been the world's leader in terms of telephone usage, technological standards and business management, more than hundred years.

Interstate long-distance telephone services were finally liberalized in the late 1970s in the U.S., before the Telecommunications Act of 1996 opened up all segments of the telecommunication markets, including local telephone services that were regarded as the last sphere of monopolies for telephone companies.

Liberalizations of the telecommunication industries, which originated in the U.S., spread to the U.K. and Japan in the mid-1980s. Competitions were introduced in most countries in Europe, Asia and other parts of the world in the 1990s.

Following the liberalizations, the separation of labor-intensive postal services from technology- and capital-intensive telecommunication operations took place. Moreover, the state-run telephone companies have been transformed into public corporations or privatized in some cases, in an effort to enhance business efficiency and better cater to customers and market needs.

When the telecommunication markets opened to competitions, new companies were set up mainly by domestic companies with commercial telecommunication networks, such as electric power companies and railway operators, with foreign telecommunication companies assisting with technological and operational know-how in some cases.

Liberalizations were carried out in stages. During the period of emerging competitions, the number of fixed telephone operators was limited to two or three, while mobile phone services were restricted to only two. However, the markets have since entered into a period of full-fledged competitions, as the restriction on the number of fixed phone companies was lifted and more than three companies were licensed to mobile phone businesses.

In summary, the age of voice telephony monopolized by the state-run companies until the 1980s was replaced in the 1990s by the age of multimedia communications, in which a number of private-sector companies offered a variety of advanced telecommunication services, including voice, data, still and moving images.

Analogue technologies, which transmit voice signals in waveforms, were superseded by digital technologies, which transmit signals in the form of “0” or “1” bit. Fixed telephones, which use wires for the last mile to the home, are being gradually taken over by mobile telephones that make connections with radio waves.

Following the rapid expansion of the Internet among business and individual users, it became possible in the late 1990s to conduct all types of communications, including one-way, two-way, one-to-one, one-to-many (mass communication) and n-to-n (medium communication). (Figure 2)

Figure 2 Types of Communication Methods

| | | One-to-one | One-to-one one-to-many (mass communications) | N-to-n (medium communications) |
|---------|-------------------|---|---|--------------------------------|
| One-way | Physical | Postal services, door-to-door parcel delivery | Publishing and printing, newspapers and magazines, advertisements, door-to-door parcel delivery | |
| | Telecommunication | Telephone | Broadcasting | |
| Two-way | Physical | Face-to-face, stamped and self-addressed envelope | | |
| | Telecommunication | Telephone, e-mail | Telephone, e-mail | Telephone, e-mail |

(Note) Internet can be used in any of the telecommunication modes listed above

In addition, any form of information, including voice, data, still and moving images can be transmitted via the Internet. In addition to Internet broadcasting, the Internet is also used in conjunction with mobile phones linked with Internet, which are fast becoming a primary means of personal communications, in advertisements for targeted customers and proving effective marketing methods.

Transmission of large volumes of documents and moving video content is becoming possible, as major countries with leading technologies have switched to broadband from dial-up connections since 2001.

2. Developments of the Telecommunication Industries in East Asia

The telecom industries in East Asian countries developed in tandem with the staggered pace of economic developments in the region until the early 1990s. Telephone usage spread first in Japan, followed by the NIES (South Korea, Hong Kong,

Taiwan and Singapore) and ASEAN countries (Thailand, Malaysia, the Philippines and Indonesia).

However, Japan has been overtaken by some countries in some areas in recent years. For instance, South Korea is the world's leader in broadband, while the penetration rate of mobile phones in Taiwan has surpassed 100% significantly.

(Note) Key factors behind the surge of mobile phones especially in Europe and Asia since the late 1990s include lower rates due to stiff competitions among more than three mobile telephone operators and the introduction of pre-paid telephones that can be used by people without the strict personal identification or sufficient credit guarantee.

It is likely that a single person uses more than one pre-paid telephones in Taiwan and therefore a sizable number of telephones might not be in actual use.

Narrowing the gap with these countries, the telecommunication industries in China have developed sharply since the 1990s. At the end of 2002, both fixed telephones and mobile phones exceeded 200 million each in China. With fixed phones increasing by 30 million a year and mobile phones expanding twice as much, China is now the world's largest telecommunication markets in terms of infrastructure and the number of users.

Vietnam and other Indochina countries, which joined ASEAN in the 1990s, started building the nationwide backbone networks and local networks in major cities in the recognition of the crucial role information and telecommunication infrastructure plays in economic developments. These developing countries also see mobile phone usage growing faster than fixed phones.

Please refer to Figure 3 for the overview of the telecommunication industries in East Asian countries and Figure 4 for the liberalization process of the telecommunication sector.

Developments of the telecommunication industries in East Asian countries vary, depending on the state of economic progress of the country in question. But it can be summarized as follows.

a) Telegrams and telephones were introduced by the U.S. and the use were expanded to European powers and also Japan by the end of the 19th century. Similar to the U.S. and European nations, many countries had a state-run monopoly in integrated postal, telegram and telephone services until recently. (One exception is the Philippines, where several private-sector companies developed under regional monopolies, just like in the U.S.)

b) In ASEAN countries, where economic developments were relatively slow, fixed phone usage grew mainly in major cities and regional towns until the 1980s, leaving rural areas unconnected.

c) Use of mobile phones has grown sharply since the 1990s, when competitions were introduced among mobile phone operators. The number of mobile phone subscribers has surged five times that of fixed phone subscribers in the Philippines in recent years. Thailand's mobile phone subscribers have grown three times faster than the number of fixed line subscribers, while Malaysia and Taiwan have seen the number of mobile phone subscribers increase twice as much.

The percentage of those who own mobile phones is especially high among younger generations in their teen's and 20's. Together with low-income groups, they tend to stop subscribing to the fixed telephone, when they start using mobile phones especially in the prepaid type.

d) Liberalizations of fixed phone operations have taken place in stages, starting with long-distance and international calls, and terminal equipment. Even local services including telephone lines have been opened up for competitions in recent years.

e) Former state-run companies with a national monopoly have been still dominated not only local services but also long-distance and international calls several or many years after the liberalizations. Even so, consumers and corporate users are benefiting greatly from lower rates, diversifying operations and better customer services as the result of competitions.

f) Liberalizations of the telecommunication markets in each country and moves to open the domestic markets to foreign capitals have been accelerated by the WTO's Basic

Agreement on Telecommunications, which came into effect in February 1998. For instance, Singapore fully liberalized its fixed telephone markets and lifted the restriction on the number of operators in 2002, two years before the deadline originally agreed to with the WTO. Thailand, one of the slowest countries to move towards liberalizations, has also pledged to fully liberalize its telecommunication industries by 2006.

g) The gap between the industrialized nations and the developing countries in terms of telephone usage remained large until the early 1990s, as fixed phones remained a main device. Following rapid growth of mobile phones, however, the gap is narrowing in terms of total tele-density (total number of fixed and mobile phones per population), narrowing the divide.

In recent years, industry observers have pointed out the digital divide over Internet and broadband uptake between industrialized nations and developing countries, between cities and rural areas, between different income groups, and between men and women and other standards.

h) Telecommunication investments slowed in some countries in the wake of the currency and economic crisis that hit Asia over the summer of 1997 and 1998. But telecommunication investments have picked up in recent years, as governments realized their importance as basic infrastructure in an information network society.

Meanwhile, foreign capital pulled out of Indonesia's projects to expand its telephone system in its key areas after the value of its currency, the Indonesia rupiah, declined sharply following the collapse of the dictatorial regime of former President Suharto. Indonesia is trailing far behind other countries in efforts to develop its telecommunication industries.

i) Traditional views called for maintaining telephone operations as a state-run monopoly up to a certain level -- for instance, until some 10% of the population owns telephones, especially in rural areas -- before competitions should be introduced or privatisation carried out, in order to expand telephone usage as a basic means of communications. Reflecting the surge of mobile phone use, however, more people are urging the governments to open up the markets early to promote the telephone usage in the competitive environments.

Figure 3 Overview of Telecommunication Industry in East Asian Countries (2000)

| | Japan | China | Hong Kong | Taiwan | South Korea | Singapore |
|---|---|---|---|--|--|---|
| Population (10,000) | 12,697 | 129,533 | 673 | 2,228 | 4,730 | 402 |
| Number of fixed telephones (10,000) | 5,209 | 21,441 | 393 | 1,264 | 2,193 | 195 |
| Number of mobile telephones (10,000) | 7,351 | 20,662 | 622 | 2,391 | 3,234 | 324 |
| Percentage of subscribers to population | 41.0 57.9 98.9 | 11.1 26.1 37.2 | 58.3 85.2 143.5 | 56.8 106.0 162.8 | 46.4 66.9 112.3 | 48.5 78.0 126.5 |
| Governing Law | 1984 Telecommunications Business Law, NTT Law | Telecommunications Ordinance | Telecommunications Ordinance (amended in 2001) | 1996 Telecommunications Law | 1987 Telecommunications Business Law/Telecommunications Framework Law | 1999 Telecommunications Law |
| Policy-making body | Ministry of Public Management, Home Affairs, Posts and Telecommunications | Ministry of Information Industry | Hong Kong Economic and Trade Office Office of the Telecommunications Authority | Ministry of Transport and Communication | Ministry of Information and Communication | Ministry of Communication, Information and Technology |
| Regulatory body | | | | | Korean Communications Commission | Infocomm Development Authority |
| Characteristics of telecommunication and the degree of liberalization | -Liberalization and privatisation started in 1985. -Shift from controlled liberalization to market-based competition since the end of the 1990s | -Having developed 2-3 times the rate of economic growth since the 1990s -Government aiming to create competition among four groups of fixed/mobile telephone operators -Nationwide telecommunication network using cutting-edge technologies under construction | -Liberalization of fixed telephone services started in 1995 -Competition among 6 cell phone operators -Fixed phone operations fully liberalized in January 2003 | -Mobile phone operations liberalized in 1994 -Liberalization of fixed phone services began in 1996 -Boasts one of the world's highest tele-density ratios at 162% | -Liberalization of international call services in 1991 -Opening up of long-distance call services in 1994 -Cyber Korea 21 was launched in 1999 to informatize the entire nation -Ranks top in the area of broadband | -Government taking an initiative since the 1980s to make Singapore a global information and telecommunications hub, as well as a financial and shipping center in East Asia |
| | Thailand | Malaysia | Philippines | Indonesia | Vietnam | |
| Population (10,000) | 6,061 | 2,327 | 7,650 | 21,209 | 7,983 | |
| Number of fixed telephones (10,000) | 559 | 463 | 306 | 666 | 254 | |
| Number of mobile telephones (10,000) | 1,757 | 893 | 1,527 | 1,166 | 172 | |
| Percentage of subscribers to population | 9.2 28.2 37.4 | 19.9 39.4 58.3 | 4.0 18.1 22.1 | 3.1 5.0 8.1 | 3.2 2.1 5.3 | |
| Governing Law | 2001 Telecommunications Law | 1998 Telecommunications Multimedia Law | 1995 Public Telecommunications Policy Law | 1999 Telecommunications Law | Plans to enact new Post and Telecommunication Act | |
| Policy-making body | Ministry of Transport and Communications | Ministry of Energy, Communications and Multimedia | Department of Transportation and Communications | | Ministry of IT and Telecommunications??? | |
| Regulatory body | National Communications Commission (scheduled to be set up) | Communications and Multimedia Commission | National Telecommunication Commission | | | |
| Characteristics of telecommunication and the degree of liberalization | -Telephone Organization of Thailand (ToT) and Communications Authority of Thailand (CAT) still enjoy a monopoly today. -Pledged full liberalization by 2006 to the WTO | -Established a legal framework for the age of telecommunications and broadcasting under the Telecommunications and Multimedia Law | -Unlike other Asian countries dominated by state-owned carriers, a number of private-sector companies played a major role | -Opted to have a telecommunications network financed by foreign capital in exchange for revenue distribution -Virtually all foreign investors pulled out after the 1997 currency and economic crisis. | -Vietnam Posts and Telecommunications Corp. enjoys a monopoly across the country. -Separation of postal and telecommunication services in July 2002 | |

" Yearbook of Statistics 1991-2000"published by the International Telecommunication Union (ITU) in December 2001.

Percentage of subscribers to population indicates percentages in the order of fixed telephones, mobile telephones, and total. The number of mobile telephones indicates figures as of December 2002 (ASIAcom March 4, 2003).

Figure 4 State of Liberalizations of the Telecommunication Industries in Asian countries as of February 2002

| | Entry restrictions | Local/long-distance calls | International calls | Cellular phones | Internet service provider |
|-------------|--|--|---|---|--|
| Japan | Entry is not restricted | NTT is dominant | NTT, KDDI, Japan Telecom are dominant | NTT DoCoMo is dominant | Players include Nifty, Biglobe, NTT (OCN), JT (ODN), KDDI(DION) |
| China | There are restrictions. Plans to open up the markets in stages after the entry into the WTO | China Telecom is dominant | China Telecom is dominant, with four other voice-over IP providers | China Mobile and China Unicom have a duopoly | Some 600 players, led by ChinaNet |
| Hong Kong | Entry is unrestricted, except in the domestic fixed-line phone markets | Four operators, with PCCW-HKT are playing a dominant role | No restrictions | Six operators, including Hutchison | 200 players, led by Netviator, CTI Net and HKNet |
| Taiwan | Partially liberalized. Government is proposing to raise the maximum investment by foreign companies to 49% from 20%, while maintaining the combined limit of direct and indirect investments at 60%. | Chunghwa Telecom is dominant. Three new licenses were issued in March 2000. | Chunghwa Telecom is dominant, with three new licenses issued in March 2000. | Six operators, such as Chunghwa Telecom and Taiwan Cellular | More than 90 players, led by HiNet and SeedNet |
| South Korea | Partially liberalized. Upper limit of foreign investments set at 49% (KT : 33%) | KT and Hanaro Telecom have a duopoly on local calls. KT and Dacom dominate long-distance calls | KT, Dacom and Onse Telecom | SK Telecom, Shinseqi Mobile Communications, KT Freetel, LG Telecom | More than 60 players, led by Thrunet, KT and Hanaro |
| Singapore | No restrictions | SingTel is dominant | SingTel is dominant | SingTel Mobile, Starhub and Mobile One | Three major providers – Singnet, Starhub Internet and Pacific Internet |
| Thailand | There are restrictions. Upper limit of foreign investments set at 40% | Telephone Organization of Thailand (TOT) and its licensees | Communications Authority of Thailand (CAT) and its licensees | Advanced Info Service and Total Access are dominant | More than 20 providers, with CAT and its licensees holding a dominant position |
| Malaysia | Partially liberalized. Upper limit of foreign investments set at 49% | Telekom Malaysia is dominant | Telekom Malaysia is dominant | Maxis Communications, Digi Communications, Celecom (Malaysia), Time Telekom, and Telekom Malaysia | MIMOS, Telekom Malaysia, Maxis, Digi, Celecom and Time |
| Philippines | Partially liberalized. Upper limit of foreign investments set at 40% | PLDT is dominant | PLDT is dominant | Globe Telecom and Smart Communications are dominant. Other players include Celltel???, Islacom and Extelcom | PLDT (Infocom), MosCom, SKY Internet and Globe (G-Net) |
| Indonesia | Partially liberalized. Upper limit of foreign investments raised to 95% from 49% in August 2000 | PT Telecom and 5 KSO partners have an oligopoly (partnership was terminated in 2002-2003). PT Indosat obtained a domestic license in September 2000. | PT Indosat and PT Satelindo have a duopoly. To be liberalized in 2002 | PT Telecom, PT Indosat, Telecomzel??? and Satelindo enjoy an oligopoly. Nine new licenses have been issued | Many licensed providers |

"Liberalization, Privatisation and Reforms of the Telecommunication Industries in the Asia Pacific Region" published by the Gartner Group in April 2002.

3. Deployments of Mobile, Internet and Broadband in Asia

The International Telecommunication Union (ITU), a United Nations special umbrella organization comprising almost 200 countries, predicted in its Internet report published in December 2001 that the number of mobile phone subscribers in the world would exceed fixed line subscribers totalling 1 billion in the first half of 2002. The organization also said that the world's Internet users totalled more than 500 million as of the end of 2001.

Internet penetration rates came to 8.2% of the world's population at the end of 2001, the same level reported by mobile phone subscribers at the end of 1999. This shows that the use of the Internet and mobile phones is growing rapidly around the world, with a time lag of some two years between them.

NTT DoCoMo's "i mode" linked with the Internet on always-on basis, introduced in February 1999, offers text and graphic information via mobile phones. Constantly connected to the Internet through packet switching, it allows users to send and receive e-mail, browse websites, as well as pay money into bank accounts and reserve tickets online for a low charge (some information services are not free).

The ITU report pointed out the revolutionary changes to the fusion of mobile phones and the Internet with the introduction of new applications and services expected to be used for everyday life and businesses. The i mode and other mobile Internet services, which already boast 60 million subscribers, almost half the population of Japan, are making mobile commerce as real as electronic commerce.

Fixed-line phones are said to have penetrated the society, when one fixed phone is found in every household. In contrast, mobile phones are a means of personal communications owned by most people in their teens and older. It will not be long before they can be constantly connected to the external world via the Internet.

Meanwhile, access points for wireless LAN networks called Hotspot or Wi-Fi have been set up at train stations, airports, coffee shops in shopping districts and hotels in recent years, providing wireless connections to laptop PCs linked with mobile phones via Wi-Fi cards within the distance of hundred meters. This allows businessmen on the move to access the database of their headquarters to search for information, and send and receive e-mail.

Connecting to the Internet (64kbps) via telephone lines is being increasingly replaced by broadband technologies, which allows continual connections to the Internet at higher speed (1.5Mbps, for instance).

By using DSL (digital subscriber lines) broadband technologies to carry data at higher speeds than through existing metallic telephone lines, the amount of transmittable information will increase by tens or hundreds of times.

(Note) Transmission capacities of broadband via DSL lines are much higher, compared to the dial-up system (64kbps).

500 kbps: 8 times larger, 1.5Mbps: 24 times larger, 8Mbps: 128 times larger, 12Mbps: 192 times larger

Broadband services are offered not only through fixed telephone line technologies, including DSL and FTTH (Fiber to the home), but also through mobile phones, cable TVs (high-speed cable modems), wireless local loop (WLL) and satellites (See Figure 5).

Figure 5 Types of Broadband Services

| | Characteristics | |
|---------------------|---|---|
| Fixed telephones | DSL | DSL technology helps existing metallic telephone lines carry data at high speeds, usually up to 10Mbps |
| | FTTH | Fiber optic lines are installed in homes, enabling data to be transmitted at a speed of more than 10 Mbps up to Gbps. |
| Cable TV | High-speed cable modems are used on existing cable TV lines to transmit data at speeds of over 10 Mbps. | |
| Cell phones | Third-generation cell phones are able to carry data at speeds of up to some 2Mbps. Fourth-generation cell phones currently under development will be able to transmit data at even faster speeds. | |
| Wireless local loop | Instead of fixed telephone lines, radio signals make connections between two fixed spots. | |
| Satellites | High-speed access to the Internet is made possible through the satellite | |

Currently, telephone companies using the DSL technology and cable TV operators using high-speed cable modems are competing in the area of broadband services. But competition involving broadband technology differs from country to country, depending on how developed the cable TV industries are in the country in question.

Although most countries have the nationwide network of telephone services and other telecommunication operations, few nations except for the U.S. and some

Western European countries boast the developed cable TV industries, situations that have partially shaped the way broadband services have been introduced in a given country.

Broadband services through other technologies, including fixed lines using fiber optics (FTTH), mobile phones, wireless local loop, (???) satellites, have yet to develop. These technologies are expected to compete against the DSL and cable modems, while helping remote areas without telephone exchanges for fixed lines or base stations for mobile phones to get connected.

Instead of giving priority to a particular technology, most governments have adopted the neutral position in an effort to promote competitions among a number of technological platforms to encourage the nationwide use of broadband services.

Broadband services with intensifying global competition can be summarized as follows.

a) Home and corporate users can enjoy constant connections to the Internet, send and receive e-mail, browse websites and use e-commerce freely at high speeds.

b) Since broadband services are offered for flat (usually monthly) rates, subscribers do not need to pay extra, no matter how much they use the services. Carriers also usually offer the fixed Internet access charge.

(Note) In Japan, subscribers can have unlimited access to the Internet and use broadband services freely (1.5Mbps, 8Mbps, 12Mbps) for the combined total of 4,000-5,000 yen a month.

c) A shift away from constant connections at a fixed rate under the dialup basis to broadband services is expected to bring about revolutionary changes, as subscribers will be able to gain access to the Internet to carry out activities related to everyday life, corporate and industrial activities, electronic government, e-commerce, education, medical care and entertainment at much higher speeds. Given that actual high-speed transmission of data has yet to expand, competitions is also heating up among service providers to come up with killer contents, applications and solutions.

Please refer to Figure 6 for the use of the Internet and broadband services in Asian countries.

The U.S. had some 16 million broadband subscribers at the end of 2002, of which high-speed cable modems accounted for 10 million, with the rest using DSL technology, making the country the world's largest number of broadband users. This was followed by South Korea with over 10 million subscribers and Japan with more than 8 million. In terms of penetration rates to each country's population, South Korea ranks top with 21%, followed by Hong Kong with 12%, Taiwan with 10% and Japan and Singapore with 6%, demonstrating that Asian countries are now leading the world in this area.

China, which sees continued expansions of fixed and cellular phone services across the nation using the latest technologies, is also expected to advance rapidly in broadband services.

4. National IT strategies Pursued by Asian Countries

Singapore became the first government to adopt the national policy designed to promote the developments of information technologies, when it announced the National IT Program in 1986. China, with its continued robust economic growth and other developing countries that began to grow from the 1980s have given priority to the telecommunication industries as the basic infrastructure of an information network society certainly promoted telecommunication services, which have been growing much faster than the economic growth rate, as a crucial part of their economic policies.

NTT announced its "Visual, Intelligent and Personal (VI&P) Plan" in 1990 as a vision for telecommunications business in the 21st century. It predicted the emergence of broadband and intelligent services, as well as growth of mobile phones after the expansions of analogue telephone services. Although it failed to foresee sharp growth of the Internet, it was largely correct in painting the pictures of how the telecommunication industry would develop.

NTT aims to build FTTH across the nation by 2015 as part of the visual segment of its VI&P Plan. This formed the basis of Japan's national IT strategy to date.

Meanwhile, Bill Clinton from the Democratic Party won the U.S. presidential election in 1992. One of his election promises was the establishment of the Information Super Highway as telecommunication infrastructure for the 21st century.

The Clinton administration announced “National Information Infrastructure (NII) Action Plan” in September 1993. The plan called for further deregulations and more competitions to encourage private-sector companies to build the information super highway across the country, with the federal and state governments to play the supplementary role.

Vice-president Al Gore proposed the Global Information Initiative (GII) during the United Nations Telecommunication Development Conference held in Brazil in March 1994. He stressed the importance of building the global broadband networks through international cooperations, in a bid to help developing countries achieve the meaningful economic growth and higher standards of living.

At that time, analogue networks were increasingly replaced by digital modes in many countries. Digitization led to the emergence of an age of multimedia, in which voice, data, still and moving images are transmitted in the form of bits represented by 0 and 1. Many countries were concentrating efforts to construct the nationwide network to make multimedia and broadband telecommunications possible.

Figure 6 Number of Subscribers connected to the Internet and Broadband Services in Asian Countries

| | Internet | | Broadband | | Types of technology for broadband services (2002) | | | Penetration rates (2002) | |
|-------------|----------|-------|-----------|------|---|-------|---------|--------------------------|-----------|
| | 2001 | 2002 | 2001 | 2002 | DSL | Cable | Others | Internet | Broadband |
| Japan | 5,036 | 6,210 | 283 | 781 | 565 | 195 | FTTH 21 | 49% | 6% |
| China | 3,370 | 5,910 | 74 | 340 | 240 | 100 | | 5% | 0.3% |
| Hong Kong | 202 | 137 | 61 | 92 | 54 | 23 | LMDS 16 | 20% | 13% |
| Taiwan | 669 | 490 | n/a | 210 | 182 | 28 | | 22% | 10% |
| South Korea | 2,538 | 2,597 | 777 | 986 | 638 | 345 | 4 | 56% | 21% |
| Singapore | 192 | 200 | 14 | 23 | 13 | 10 | | 51% | 6% |
| Thailand | 354 | n/a | n/a | 0.4 | 0.4 | | | 6% | 0.06% |
| Malaysia | 212 | 261 | n/a | 1.9 | 1.9 | | | 12% | 0.1% |
| Philippines | 60 | 100 | 0.6 | 1.2 | 1.0 | 0.2 | | 1.3% | 0.03% |
| Indonesia | 58 | 100 | n/a | 1.5 | 0.1 | 1.4 | | 0.5% | 0.007% |

(Note) The number of Internet subscribers in Japan as of January 2003 was taken from the statistics published by the Ministry of Public Management, Home Affairs, Posts and Telecommunications.

The Internet explosively developed as the “Network of Networks” in the latter half of the 1990s, enabling people around the world to exchange information, search for data and carry out various transactions. This has made daily life more convenient and the Internet is now used widely in business and industrial activities, administrative and public services provided by the governments and municipal bodies, as well as for the purpose of education, medical care and entertainment.

National IT strategies focused mainly on nationwide use of the Internet via dialup connections towards the end of the 1990s. In recent years, national governments have been directing efforts to establish broadband networks to make access to the Internet much faster.

“e Europe 2002”, the European Commission’s program for 2000-2002 aimed at achieving the information society for the entire population of its 15 member countries, by making Internet access affordable and reliable for large sections of the society by 2002. “e Europe 2005” for 2003-2005 aims to connect every public organization, including administrative bodies, schools and medical care centers, via broadband technologies by 2005.

How are Asian countries pursuing their national IT strategies in the global environments?

A report submitted in December 2002 to the Ministry of Home Management, Public Affairs, Posts and Telecommunications (MPHPT) in Japanese Government by a study group on Asia’s broadband programs concluded that Asia boasts higher penetration rates of broadband technologies since the beginning of this century, compared to the time when the U.S. and Europe led the world in the area of narrowband connections.

a) Broadband technologies are expected to contribute greatly to improving the quality of life and the development of social economy in Asia, in view of its enormous population and high growth potential.

b) Asian countries enjoy the close geographical, social, economic and cultural ties with one another. In recent years, cross-border businesses have grown sharply and the economic integrations within the region have been well under way. Personal communications are expected to become increasingly important, given increasing exchanges among Asian people. Broadband technologies are likely to further promote closer relationships mentioned above, including the free trade agreements (FTAs).

c) Broadband technologies are expected to play a major and vital role in preserving and sharing various cultures in Asia, while contributing to the establishment of the prosperous society.

d) As a result, exchanges of information will accelerate within Asia. This is expected to reinforce its position as one of the world's three information bases, together with North America and Europe.

Figure 7 National IT Strategies of Major Countries

VI&P æ NII/GII æ Multimedia æ Digital Divide æ Broadband/Mobile/Fusion

| | 1990 | 1993 | 1994 | 1995 | 1996 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---------------|-------------------------------|--|---|--|--|--|---|--|--|--|
| Japan | NTT's "VI&P" program | | | | | | Reorganization of NTT preceding full liberalization of the industry | IT Basic Law | "e-Japan National IT Strategy", "e-Japan Priority Program" | "e-Japan Priority Policy Program 2002" |
| North America | | Information Super Highway, "National Information Infrastructure (NII)" | Vice-president Al Gore proposed the "Global Information Infrastructure (GII)" | "1996 Telecommunications Act" designed to introduce full-fledged competitions and to provide universal services to schools and libraries | | Next-generation Internet, Internet 2 | | Digital divide | Canada's "Connecting Canadians" program | Federal Communications Commission (FCC) started reviewing regulations on broadband |
| Europe | | | Bangemann Report on "Information Society in Europe" | | | Full liberalization of telecommunications industry | | "e Europe 2002", the U.K.'s "U.K Online" and "Broadband Britain" programs | | "e Europe 2005" |
| South Korea | | | | | Planned to build "Super high-speed information and telecommunications network" | | "Cyber Korea 21" | | Ranked top in the use of broadband technologies | "e Korea Vision 2006" |
| Singapore | "National IT Program" in 1986 | "IT 2000 Vision" (Intelligent Island) announced in 1991 | | | "Singapore One" | | | Liberalized telecommunications industries two years before the original schedule | "Infocomm21" | |
| Asia | | | Malaysia's "Multimedia Super Corridor" project | | | | | ASEAN accord | China's entry into the WTO and sharp growth of its telecommunications sector | |

In summary, broadband technologies will be the foundation of Asia's developments in the 21st century helping the region to become the global information hub. Observers argue that industries, the public sector, academia and NPOs should join hands to promote the wider use of broadband technologies.

Figure 8 shows national IT strategies of major Asian countries. Their main features can be described as follows.

a) Singapore, Malaysia and South Korea formulated the well-defined programs and targets relatively early. Outlining the course of the future economic development, these governments have been working in the close cooperation with private-sector companies.

b) Singapore, a small city-state in Southeast Asia, has focused efforts to expand broadband infrastructure, promote its use and nurture experts in a bid to become one of the global IT hub, as well as one of the global financial, distribution and transport center.

c) Malaysian Prime Minister Mahathir Mohamad vowed to catch up with the developed countries by 2020 in the "Vision 2020" announced in 1990. In addition, the Malaysian government revealed the "Multimedia Super Corridor" program in 1996, in the efforts to switch from economic growth relying mainly on export industries financed by foreign capital to the knowledge-based economy. The country established Cyberjaya, a huge base for the information and telecommunications industry in the suburbs of the capital Kuala Lumpur, in order to promote the Malaysian IT industries.

d) South Korea drew up "Cyber Korea 21" in 1999 as part of the economic radical reform measures initiated by the International Monetary Fund in the aftermath of the Asian currency and economic crisis of 1997. Aiming to establish the foundation for information and telecommunications services, the country has been urging companies and industries to enhance their competitive edge through informatization, promoting the IT entrepreneurship, building IT/broadband infrastructure through competitions and nurturing specialists. The South Korean government has been pressing ahead with "e Korea Vision 21" announced in April 2002, aiming to build on the past success and make the country one of global leaders in the 21st century.

e) Japan is somewhat lagging behind other countries. But following the enactment of the IT Basic Law in January 2001, the country has been making efforts, mainly through the government's IT Strategic Headquarters, to achieve the goals set for each segment under the "e Japan Strategy".

f) Other Southeast Asian countries have their national IT strategies too, but the extent of progress has not been made public clearly.

g) Although China does not have the explicit national IT strategies, it has been building the telecommunications network at a rate 23 times higher than its annual average economic growth rate of 8% as the crucial part of the country's economic development policies in the 1990s. Both China's public and private sectors can be said to have been involved in its national IT strategies for more than a decade, although all the major carriers, such as China Telecom and China Mobile, are still run by the state.

Figure 8 National IT Strategies of Major Asian Countries

| | | |
|-------|---|--|
| Japan | "e Japan Strategy" launched in January 2001 | <p>a) Aims to become one of the world's most advanced IT nations within 5 years</p> <p>b) To establish the environments in which 30 million households can be constantly connected to the Internet at high speeds and 10 million households can be constantly connected to the Net at super high speeds of 30-100 Mbps by 2005, as part of efforts to build one of the world's most advanced IT networks.</p> <p>c) Four key policy areas – infrastructure, e-commerce, e-government and nurturing experts in IT</p> <p>d) Supervisory ministries examine how much progress key IT projects in the "e Japan Priority Policy Program" have made every year. 220 projects in FY2001 and 318 projects in FY2002</p> |
| China | 10th Five-year plan for 2001-2005 | <p>a) Aims to establish the high-speed network</p> <p>b) Aims to achieve 300 million mobile phone subscribers by the end of 2005, by increasing the number of cell phone subscribers by 26% every year over the five-year period.</p> <p>c) Main points:</p> <ul style="list-style-type: none"> -Promotion of digitization and networking in both the government and the private sector -Further expansion of telecommunications infrastructure -Fostering the core information industry -Enhancing the security system of information networks |

| | | |
|-------------|---|---|
| South Korea | "Cyber Korea 21" for 1999-2002, "e Korea Vision 2006" for 2002-2006 | <p>I) Cyber Korea 21</p> <p>a) Establishing the high-speed information infrastructure and promoting e-government in order to improve the competitive advantages in the world and catch up with the developed countries in terms of quality of life by 2002</p> <p>b) Priorities</p> <ul style="list-style-type: none"> -Establishing the information infrastructure as the basis for creativity- and the knowledge-based nation -Improving productivity of the entire nation by capitalizing on its knowledge and information base. -Fostering new businesses by using the information infrastructure <p>II) e Korea Vision 2006 See Figure 9</p> |
| Malaysia | "Multimedia Super Corridor" Program | <p>a) Prime Minister Mahathir announced the program in August 1996 as part of the country's Vision 2020 Program, which was designed to help the country become the developed nation by 2020.</p> <p>b) Cyberjaya, a 15km x 50 km area between Malaysia's capital Kuala Lumpur and the new international airport, will be connected by fiber optics and used as the "test bed of an information society" to develop a huge base for the IT industry.</p> <p>c) Priorities</p> <ul style="list-style-type: none"> -To attract the pioneering companies and research institutes in the areas of multimedia and IT -Demand creation by developing applications for constant use -Development of intelligent cities <p>d) Targets set under the eighth national development plan for 2001-2005</p> <ul style="list-style-type: none"> -To establish Malaysia as the global IT and multimedia hub -To expand telecommunications infrastructure as a means to bridge the digital divide -To train specialists in the IT sector -To enhance a competitive edge by promoting the use of e commerce -To strengthen capabilities to create contents locally -To concentrate and strengthen small and medium size companies in IT-related areas. -To reinforce R&D activities |
| Singapore | "Singapore One" (1996), "Infocomm 21" (2001-2005) | <p>I) Singapore One</p> <p>a) Was announced in June 1996 as an action plan for "IT2000"</p> <p>b) Aims to establish the infrastructure and develop applications to connect all households to a wide bandwidth network, enabling them to access the Internet at high speeds and use multimedia</p> |

| | | |
|--|--|---|
| | | <p>services from home</p> <p>c) Fiber optic cables are ready to be installed in all households in Singapore</p> <p>II) Infocomm21 formulated in 2000</p> <p>a) Basic policies to promote IT, with 2005 set as the target year</p> <p>b) Aims to make Singapore a global IT hub</p> <p>c) Priorities</p> <ul style="list-style-type: none"> -Promotion of IT-related industries -Informatization of businesses -Informatization of everyday life -Informatization of the public sector -To train IT specialists |
|--|--|---|

Based on a report submitted to the public management ministry by the study group on Asia's broadband programs (December 2002)

Figure 9: e Korea Vision 2006 — The Third Master Plan for Informatization
(2002-2006)

- (1) Purpose – to make South Korea one of global leaders in the 21st century
 - a) To help the South Korean economy succeed in the global economy
 - b) To take full advantage of IT technologies in every industry
 - c) To establish the knowledge-intensive industries, such as biotechnology, nanotechnology, cultural technology, environmental technology and space technology, in order to support sustainable growth
 - d) To cooperate with China and Japan in developing the information industries
- (2) Establishment of lifelong learning systems
 - a) Everyday learning system – online education program for civil servants
 - b) Nationwide learning network – elementary and secondary schools, private sector facilities, regional life-long study centers and job information system
 - c) Creation of digital contents for educational purposes and online learning environments, including digital texts
- (3) e work system
 - a) Mobile working arrangements – workers can access information they want from anywhere, at any time
 - b) IT trainings designed to help increase employment in IT-related industries
- (4) Promoting industrial informatization

| | |
|------------------------------|---|
| Textile industry | Procurement online by installing the supply chain management systems |
| Construction industry | The Contractor Integrated Technical Information Service was introduced in 2003, allowing the sharing of all the documents, materials and designs regarding construction processes |
| Financial industry | Online insurance, Internet banking, online foreign currency transactions (24-hour e-banking system) |
| Medical industry | Linking all the databases owned by medical practitioners to allow the sharing of knowledge |
| Small and medium-sized firms | Linking all the companies in the country via the Internet to expand the e-business base nationwide |

Ministry of Information and Communication in April 2002

The following are case studies of Japan, Singapore and South Korea

(1) Japan

The Japanese government set up IT Strategic Headquarters in July 2000 and enacted the IT Basic Law in January 2001 on the assumption that the ongoing IT revolution on a global scale will lead to the historic changes comparable to those from the Industrial Revolution and the knowledge-based society will emerge in its wake. The government aims to make Japan one of the world's most advanced IT nations by 2005 through these measures.

IT Strategic Headquarters came up with the e Japan Strategy as the blueprint for promoting the IT revolutions and announced the e Japan Priority Policy, policy areas the government should stress and carry out quickly to help achieve an advanced information network society (Figure 10).

Figure 10 e Japan Strategy and Overview of e Japan Priority Policy Program

1. Key areas of the e Japan Strategy
 - a) To establish super high-speed network infrastructure and competition policies
 - b) To hammer out rules on e-commerce and to establish a new framework
 - c) To achieve the e-government
 - d) To direct more efforts toward nurturing experts

2. Main policies included in the e Japan Priority Policy Program
 - a) Formation of one of the world's most advanced high-speed telecommunications networks
 - To establish conditions for fair competition
 - To promote the formation of a super high-speed network infrastructure
 - To encourage research and development
 - To promote the digitization of broadcasting
 - b) To foster education and learning, and nurture human resources
 - Informatization of school education
 - To provide opportunities to learn IT
 - To Nurture qualified people with special knowledge and technical skills
 - c) Promotion of e-commerce
 - Revision of regulations
 - Adequate protection and use of intellectual properties

- Consumer protections
- Formulation of new rules
- Small and medium-sized firms
- d) Informatization of administrative services and promotion of the use of IT technologies in the public sector
 - Informatization of administrative services
 - Use of IT technologies in the public sector
- e) To ensure security and reliability of advanced IT networks
 - To draw up schemes and build foundations
 - Policies designed to ensure information security within the government
 - Policies designed to ensure information security in the private sector
 - Policies aimed at protecting the key infrastructure from cyber terrorism
 - R&D, nurturing specialists and international cooperation
- f) Cross-border issues
 - To encourage R&D
 - To bridge the digital divide
 - Promotion of international cooperation and contribution
 - To address new challenges

The government plans to assess progress of the policies spelled out in the e Japan Key Program 2001 announced in June 2001 and the e Japan Key Program 2002 launched in June 2002 every year. In particular, the government wants to ensure the establishment of broadband infrastructure, education and training of experts, promotion of e-commerce, informatization of administrative services (e-government and e-municipal bodies), as well as security and reliability.

The government originally aimed at connecting 30 million households to the Internet at high speeds (several Mbps) and 10 million households to the Net at super-high speeds (30 Mbps –100Mbps) by 2005 under the e Japan Priority Policy Program 2002, the targets that have already been accomplished.

(Note) NTT East and NTT West have already installed optical fiber cables close to residential areas covering some 70% of the population. These cables can be extended to reach households on demand.

(2) Singapore

Singapore aims to make multimedia, IT and broadband services available across the entire island in the bid to become one of the global hubs in IT, as well as in finance and logistics. As part of efforts to sustain high economic growth in this small city-state with a population of 4 million, the government has taken the initiative in bolstering its IT industry in the “IT2000 Vision – Intelligent Island” (1991) and the “Singapore One Program” (1996).

Broadband services became available in all households and businesses in Singapore by 1999. But actual use was quite limited at that time.

“Infocomm 21” (Figure 11), a program announced in 2001 to help Singapore become one of the world’s IT capitals, emphasizes private-sector initiatives, instead of relying on the government initiative. The program calls on the government to play a catalytic role in order to achieve the environment conducive to the expansion of IT and broadband services.

Singapore at least matches or may have even surpassed Japan in terms of economic developments. Amid the continued recession reflecting the slowdown in the U.S. and other major economies, the Singapore government has shifted from growth strategies focusing on turning Singapore into a cosmopolitan nation with the vibrant culture and art under its Singapore Remaking Program.

Figure11 Infocomm21 – To Develop Singapore Into One Of Global IT Hubs

(1) Basic concepts

- a) With the Internet revolution requiring the paradigm shift, the strategies Singapore pursued in the past may no longer suit the New Economy. Given the intensifying competition on the global scale, Singapore’s current advantage in IT and telecommunications in Southeast Asia could be easily eroded by Asian nations that pursue more focused national strategies in the area of IT than the IT2000 program.
- b) Singapore must “think globally and act locally”, and move at the speed of the Internet to shorten the time required to enter into the market.
- c) As an IT capital, Singapore aims to become one of the major centers in the Asia Pacific region to lead the IT industry, the corporate sector, R&D, venture capital, intellectual capital, education and ideas.
- d) It also aims to become a world-class showcase and test bed for innovative IT applications and services in both public and private sectors.

(2) Six strategic areas

| | |
|--|---|
| To make Singapore one of major IT hubs | <p>-To develop Singapore into the premier IT hub closely linked to the world's other major IT technology and development centers and markets.</p> <p>-IT will be the growth engine of Singapore's e-economy.</p> <p>-Singapore aims to become one of the top two IT hubs in the Asia Pacific region by 2005.</p> |
| Singapore business online (Dot-coming the private sector) | <p>-Singapore aims to become one of the world's reliable hubs in e-business, where B to B and B to C e-commerce dominates transactions between businesses, and between businesses and consumers.</p> <p>-Singapore aims to become one of the top three countries in the world and to capture the top position in the Asia Pacific region in terms of e-commerce infrastructure by 2002.</p> <p>-Singapore targets to be one of the top five places in the world and the top ranking in the Asia Pacific region in terms of ebusiness systems.</p> |
| Singapore government- online (Dot-coming the public sector) | <p>-Singapore aims to become one of the best e-governments in the world by delivering better services to Singapore's citizens.</p> <p>-Singapore aims to be in one of the top five e-government positions by 2002.</p> |
| Singapore- online (Dot-coming the people sector) | <p>-Singapore aims to become a society rich with advanced IT offering extensive e-lifestyles.</p> <p>-Singapore aims to be in one of the top five IT-rich societies in the world by 2005.</p> |
| Singapore as a capital of IT talent | <p>-Singapore hopes to establish itself as a capital of IT talent and an e-learning hub.</p> <p>-Singapore aims to become a location of choice for high-level IT talent and a locus of the best e-learning practices.</p> <p>-Singapore aims to become one of the top two IT talent capitals and one of the top two e-learning hubs in the Asia Pacific region by 2005.</p> |
| Creation of an environment to support businesses and consumers | <p>-Singapore intends to draw up policies designed to support companies and consumers, as well as to create regulatory environments that will encourage the development and growth of the New Economy.</p> |

(3) South Korea

The South Korean government has been focusing efforts to establish South Korea as the information society with advanced information infrastructure since the mid-1990s under its first “Master Plan for Informatization” (1996) and “Cyber Korea 21” (1999) (Figure12). In addition, the government announced “e Korea Vision 2006” in April 2002, in the bid to become one of global leaders in the 21st century.

Figure 12 Degree of Informatization in South Korea

| | Prior to the first Plan (end of 1995) | Prior to CK21 (end of 1998) | After CK21 (end of 2001) |
|---|---------------------------------------|-----------------------------|--------------------------|
| Percentage of e-certifications by the government (%) | - | 21.2 | 80.6 |
| Percentage of e-procurement by the government (%) | - | 19.3 | 87.5 |
| Percentage of e-trade (%) | - | 3.7 | 66.6 |
| Internet banking users (%) | - | - | 11.3 |
| Exports of IT products (100 million dollars) | 317 | 305 | 384 |
| IT manufacturing output (1 trillion won) | 51.4 | 88.1 | 150.3 |
| Households subscribing to broadband services (10,000) | - | 1.4 | 781 |
| Internet users (10,000) | 37 | 310 | 2,438 |
| Number of PCs (10,000) | 535 | 827 | 2,070 |
| Mobile phone subscribers (10,000) | 164 | 2,682 | 2,904 |
| Market value of e-commerce (1 trillion won) | - | 0.05 | 88.5 |

(Note) 10 won = 1 yen (information and communication ministry's “e Korea Vision2006” (April 2002))

With subscribers to broadband services totaling 10.41 million as of the end of December 2002, South Korea is ranked top in the world in terms of the percentage of broadband subscriptions per capita.

(10,000)

| Technology | Telephones (DSL) | Cable TV (high-speed modem) | LAN | Satellite | Total |
|-----------------|------------------|-----------------------------|-----|-----------|-------|
| Number of users | 566 | 355 | 118 | 0.6 | 1,041 |
| Percentage | 54% | 34% | 11% | 1% | 100% |

(Note)

1. LAN is made available by installing optical fiber cables in apartment blocks and linking each unit with metallic lines or coaxial cables.
2. Korea Telecom (4.92 million) and Hanaro Telecom (2.87 million) account for 75%.

The followings are the reasons behind the development of South Korea's broadband market.

- a) Internet cafes mushroomed across the nation and the dialup access to the Internet increased sharply among households, schools and businesses in the aftermath of the 1997 currency and economic crisis, partly because schools started to give students homework that required them to access the Internet.
- b) Broadband services via high-speed cable modems were introduced in 1998, while Korea Telecom entered the broadband market in 1999 using DSL. The services expanded rapidly under strong competitions.
- c) South Korean people are known to be fast-paced in the highly competitive society, the national trait that helped accelerate the shift from the dialup system to broadband technologies, together with intensifying competitions over the flat charge system.
- d) Since almost half of South Korea's total households of some 14 million live in apartment blocks, it is easy to provide broadband services by installing fiber optics.
- e) The government has been focusing the efforts to improve IT literacy among housewives.

Encouraged by this success, the government is aiming to maximize the use of IT technologies in every industry to make the South Korean economy successful in the global markets. The government is also seeking to establish the knowledge-intensive industries, such as biotechnology, nanotechnology, cultural technology, environmental technology and space technology to support sustainable growth under its "e Korea Vision 2006". The government set out the goals listed below.

- a) 90% of the population will be connected to the Internet by 2006
- b) Regardless of age, income or region, every household will have access to broadband services at a minimum speed of 1Mbps by 2005.
- c) The number of students per PC will be reduced to fewer than five at an average minimum speed of 2Mbps by 2006
- d) Half of all households will use digital TV by 2006
- e) To increase IT exports to 300 billion dollars by 2006
- f) Major industries will conduct 30% of transactions online by 2006, with the ratio for other industries set at 25%.

- g) Entire administrative services will be offered online by 2006. Digital civil services can also be customized.
- h) As many as 10,000 schools across the nation will be opened as community IT centers after school, as long as the schools agree to such programs.

As the world's first country to designate broadband platforms for universal services, the South Korean government has been concentrating efforts to further expand the use of broadband across the nation in a bid to become a leader in the global competitions in the information age.

(4) Asia's Regional Endeavors Towards IT Strategies

The digital divide – the gap between developed nations and developing countries in terms of the use of the Internet and PCs – may prevent developing nations from achieving economic progress and lead to a wider gap between countries and between in different societies.

The United Nations Development Report of 1999 warned that higher productivity brought about by new technologies could result in further widening of an information gap between very rich countries and countries which lack capabilities, resources and infrastructure needed to become in the information-based society.

Alarmed by such a scenario, some international organizations operating in Asia have drawn up a framework and action plan to help developed countries in the region by providing assistance to developing countries and promoting IT and broadband services in all the member countries, as part of efforts to bridge the digital divide.

Figure 13 Measures Taken by Major International Organizations in Asia to Promote IT Strategies

| Organization | Agreed measures on IT strategies and their progress |
|--|---|
| Asia-Pacific Tele-community | <p>-Tokyo Communiqué (November 2000)</p> <p>a) To make utmost efforts locally and internationally to enable everyone in the Asia-Pacific region to have access to the Internet from public facilities such as schools and post offices by 2005, if possible.</p> <p>b) Key points</p> <ul style="list-style-type: none"> -To cultivate the common understanding regarding IT -To bridge the digital divide -To establish the foundations for IT -To train specialists and improve IT literacy |
| Asia-Pacific Economic Cooperation (APEC) | <p>-e-APEC Strategy (Nov. 2001) to build the digital society in the region</p> <p>a) Three pillars</p> <ul style="list-style-type: none"> -To establish the environment conducive to bolstering the market structure and market systems -To establish the environment for infrastructure-related investments and technology development -To nurture human resources and encourage entrepreneurial spirit <p>b) Programs</p> <ul style="list-style-type: none"> -Development of technologies in the areas of Ipv6, mobile Internet, satellite broadband -Promotion of e-commerce and e-government -Promotion of mutual authentications of telecommunications equipment -Joint training of specialists by businesses, government and academia <p>c) Specific targets towards bridging the digital divide (Nov. 2000)</p> <ul style="list-style-type: none"> -To triple the number of people having access to the Internet by 2005 -To enable everyone to have access to the Internet by 2010 |

(Note) Furthermore, the ASEAN agreed to join forces in their efforts to improve international competitive advantage in the area of IT and diminish the digital divide under the e-ASEAN Framework announced in November 2000.

(Report submitted in December 2002 by the Public Management Ministry's study group on Asia broadband programs)

(5) Japan’s measures – “Asia Broadband Program”

IT Strategic Headquarters, including the Public Management Ministry, drew up its “Asia Broadband Program” in March 2003 as part of its “e Japan Priority Policy Program 2002” designed to bring about the globally balanced IT community supported by the international Internet network. The program calls on the relevant ministries and agencies to cooperate in order to prepare the broadband environments in Asia.

As shown in Figure 14, the program aims to create the environment in which everyone in Asia will gain access to the broadband platforms, as part of efforts to invigorate information flows within Asia and make Asia the global information hub.

The deployment of broadband technologies to achieve the high-speed, large-capacity constant connections at flat rates is beneficial in a number of ways. These include better quality of life, the demonstration of creative talent, revitalization and improved efficiency of businesses, the administrative bodies and non-profit organizations, economic growth and revitalization, promotion of trade, wide-ranging sharing of cultural diversities, promotion of science and a variety of cross-border activities. Broadband technologies are expected to contribute to the social, economic and cultural developments of Japan and other Asian countries, as well as peace and stability of the Asian region and the world.

The Japanese government plans to play a leading role using its technological expertise and know-how, in carrying out the concrete measures to achieve goals in cooperation with other governments in Asia, business entities and non-profit organizations both at home and abroad, and international organizations.

Figure 14 “Asia Broadband Program” drawn up in March 2003 by the Public Management Ministry in line with the e Japan Strategy

- | |
|---|
| <ol style="list-style-type: none">1. Targets to be achieved by 2010<ol style="list-style-type: none">a) To create an environment, in which everyone in Asia will be able to access the Internet through broadband technologies.b) To create an international network, which has sufficient bandwidths for connecting countries directly.c) To establish a framework in which Asia will lead the world in IPv6 and the next- |
|---|

generation mobile communication technologies.

- d) To create secure the network communication environments.
- e) To digitise and archive Asia's cultural contents and make them available within the region and to the world via broadband.
- f) To develop and commercialize the machine translation technologies for major languages in Asia.
- g) To sharply increase the number of engineers and researchers in the IT fields in Asia

2. Concrete measures to be taken

- a) To help developing countries build network infrastructure
- b) To establish international network infrastructure in Asia
- c) Developments and liberalizations of the network infrastructure technologies suitable for Asia
- d) Promotion of R&D and standardization of network infrastructure
- e) To nurture human resources and promote exchanges
- f) To close the digital divide affecting the developing countries or rural areas – To build access circuits via various platforms, including wireless technologies, to create the IP-based networks and to assist in efforts to set up Internet centers at post offices
- g) To make international Internet connections smoother and faster – To give assistance to private-sector ISPs in each country, to promote the establishment of the international Internet exchanges and to launch the super high-speed Internet satellite (WINDS) by 2005 and to conduct the experiments aimed at its commercialisation.
- h) Further standardization of third-generation mobile phone systems through cooperation between the public and private sectors and to encourage research of applications.

(Note) Ipv6 (IP version 6) increases the IP addresses from 32 bits to 128 bits and thus is able to offer enough addresses to meet the explosive increases in Internet usage, solve security problems and run on high-speed networks. Shift to the Ipv6 is under way on a global scale.

The program will be reviewed by the end of fiscal 2005, with the future use of broadband technologies in Asia to be taken into account.

Most countries are capitalizing on IT to create the high value-added, knowledge-based economies in the 21st century. These countries are in the process of refining their economic and industrial structures by deploying broadband nationwide. Meanwhile, the overall standards are rising in Asia, as the developed nations are providing assistance to developing countries.

Main areas of focus include promoting the construction of broadband infrastructure through competitions among private-sector companies, encouraging individuals, businesses and governments to use broadband in the area of education, medical care and entertainment, bridging the digital divide between developed nations and developing countries, between cities and rural areas, between different income groups, different classes and different sexes, promoting e-commerce and resolving issues that can have negative consequences, including intellectual properties, security and privacy.

5. Changing World of Telecommunications

The world's telecommunication industries have been undergoing the sweeping changes in terms of quality and structure since the 1990s. Innovations, stiffer global competitions and developments of mobile phones, Internet and broadband technologies may transform the industries even more drastically.

- a) Mobile phones have begun to play the primary role, replacing fixed phones as the main devices for communications. It is unlikely that fixed-line phones will survive, unless they use broadband technologies to gain high-speed access to the Internet, as voice telephony and normal dialup connections to the Internet are expected to be increasingly carried out via mobile phones.
- b) Wider use of broadband connections allows the transmission of high-speed video and high-resolution images, downloading of moving images and video streaming, benefiting not only entertainment but also the long-distance medical care and education. Unlike dialup connections incapable of sending large documents at high speeds, broadband will enable business people to access the database of their main office from outside to retrieve necessary detailed information and conclude business deals, a move expected to encourage teleworking.
- c) As both individual and business users are likely to require broadband access at the speed faster than 100 Mbps in the future, DSL or high-speed cable modems will no longer be sufficient. The latter half of this decade may be called the "Age of FTTH", with fiber optic circuits to be extended to user homes.
- d) The telecommunication industries are replacing the existing circuit-switching networks with IP-based packet-switching networks. The move allows very efficient integrated transmission of voice, data and videos, so telephone companies may start to

offer reasonable flat rates, covering the basic fee for local and long-distance call charges.

e) Improved data rates achieved through the broadband connections of telephone circuits has made transmission of TV programs possible, while cable TV operators can now offer telephone services through digitisation, two-way connection and refinement of cable systems.

Telephone companies only offer very limited video transmission services right now. Just as cable TV operators offer only limited telephone services. In contrast, competitions are intense in the field of broadband services between telephone carriers offering DSL and FTTH and cable TV operators offering high-speed cable modems. However, competitions are expected to heat up in the near future in the quest for the significant share in the vertically integrated market involving telephone, video transmission and broadband operations.

f) Broadband services are replacing the dial-up system for the same constant connections at the fixed charge not much higher than that for the latter. Although it is convenient, the question is how high-speed connections will be used in everyday life and businesses in the future. Competitions over the development of contents and applications using broadband technologies are likely to have an impact on video information searches, online games, e-commerce, global collaborations in the field of designing and software development.

g) The telecommunication industries can be divided into two – the infrastructure segments, which builds and operates network facilities for relaying and accessing, and the service provider segments, which offer value-added services to a variety of end-users. Profit margins for the network infrastructure segments are shrinking due to higher costs for innovations and intensifying competition. Higher growth is likely to rest with service providers, which provide solutions encompassing fixed-line and mobile phones, Internet, broadband and videos to different markets and different cross-border users.

The ITU Report published in March 2002 says that the goal of the telecommunication industries in the 21st century is to make it possible to communicate “everywhere, all the time and with everyone”, in contrast with communicate “anywhere, at any time and with anyone”, the target set by the industries for the last century.

In other words, the industry tried to remove the obstacles to opportunities for communication, while aiming to make it possible to send and receive information whenever, wherever and between whoever.

Conclusions

The telecommunication industries in Asia in general have enjoyed rapid growth in tandem with economic development since the 1990s. Governments are adopting policies designed to transform their economic structures based on the export-oriented manufacturing industries into the knowledge-based economies led by the value-added IT industry. IT is regarded as basic infrastructure in the information network society and has developed on the back of growing competition as a result of deregulations.

In many countries, GDP growth has been outpaced by growth of the telecommunication industries, which either accompanies movements of people, goods and money to facilitate industrial or economic growth and make everyday life more convenient for handling independent flows of information.

(Note) The OECD Telecommunications White Paper 2001 published by The Organization of Economic Cooperation and Development in Paris said that the percentage of telecommunication revenue to GDP rose sharply in the 1990s, as shown below. Japan (1964) and South Korea (1994) are the only two members of the OECD from Asia.

| | 1990 | 1999 |
|----------------------------|-------|-------|
| Japan | 1.56% | 2.99% |
| South Korea | 2.04% | 4.36% |
| Average of 30 OECD members | 2.07% | 3.12% |

According to the ITU, the Asia-Pacific region is expected to account for 46% of all the fixed phones in the world in 2010, up from 30% in 2000, while the percentage of mobile phones in the world is projected to rise from 27% to 50% during the same period. Since the Asia-Pacific region accounts for more than 50% of the world's population, the telecommunication industries in the region is simply growing in line with the population trend. But it is certain that Asia will see the sharp growth of the telecommunication industry during the current decade.

Major carriers in the U.S. and Europe are suffering from the prolonged telecommunication recession, burdened with huge debts as the result of payments for mobile phone licenses, diversifying efforts and entry into overseas markets in the wake of liberalizations. In contrast, Asian countries -- Japan, South Korea and China in particular -- have benefited from the development of broadband technologies and mobile Internet and are leading the world in these segments.

As stated before, the telecommunication industries in China, with its population of 1.3 billion, developed sharply during the 1990s. The Chinese government and state-owned major carriers have been actively constructing telecommunication networks based on cutting-edge technologies in inland and peripheral regions, as well as coastal areas. Telephone carriers, equipment manufacturers and service providers from Japan, the U.S. and Europe are eyeing the telecommunication markets in China for the possible business opportunities and closely watching what kind of applications will emerge. Given the size of the markets, Chinese telecommunication industries may affect the rest of the world in terms of technical standards, efficient business models and regulations for the next-generation cellular phones.

Among the other telecommunication markets in Asia, Taiwan boasts total tele-density of 160%, which means that every person including children in Taiwan owns 1.6 telephones. The Philippines accounts for one sixth of short messages sent via mobile phones in the world, with 12 short messages sent from the country's more than 11 million mobile phones every day. Singapore is able to install fiber optic cables to every household at any time.

The ASEAN and the APEC are making efforts to develop and promote the telecommunication industry in member countries at the general economic level and more specifically at the IT level (through e-ASEAN and e-APEC initiatives). Developed nations and developing countries are joining hands to encourage the wider use of broadband and nurture IT specialists.

IT revolution and informatization in Asia is likely to continue under competitions, while the region leads the world both in the areas of Internet infrastructure and applications. They are expected to result in higher efficiency of business and industrial activities, as well as improved convenience of everyday life, contribute to education, medical care, welfare and leisure, and further bridge the digital divide.