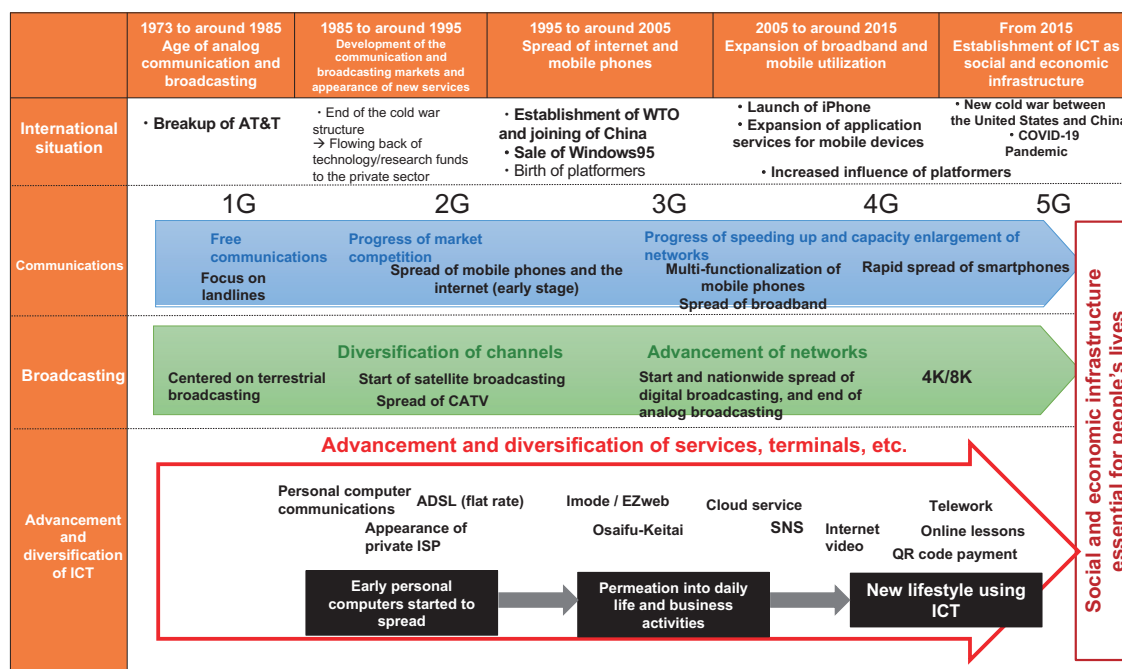


Chapter 1

Review of Changes Over the Past 50 Years in Chronological Order

In Chapter 1, we divide the 50 years since the first publication of the White Paper into five periods from the viewpoints of ICT advancement, service diversification, and international changes regarding ICT, summarize changes in systems, services, technologies, etc., in each period while mentioning turning points, and provide an overview of the processes where ICT has come to play an important role in social and economic activities (**Figure 1-0-1-1**).

Figure 1-0-1-1 Trends in the information and communication field in the past 50 years



(Source) MIC (2022) "Research Study on Economic Security in Digital Society"

Section 1 1973 to 1985: Age of Analog Communications and Broadcasting

From 1973 to 1985, the foundation for the spread of ICT was fostered mainly in developed countries, and nations like the United States and the United Kingdom saw progress in the liberalization of the telecommunication industry. Changes for the basis of today's information society were seen also in Japan, as exemplified by the spread of fixed telephone, television broadcasting and privatization of Nippon Telegraph and Telephone Public Corporation (hereinafter "NTT Public Corporation"). We name the period from 1973 to 1985 as the **"Age of Analog Communications and Broadcasting"** and provide an overview for the status of the ICT sector during this period.

1. International Events and Trends

In 1973, when the first White Paper was published, the 4th Arab-Israeli War triggered the first oil crisis. In 1979 the world experienced a second oil crisis that was triggered by the Iranian Revolution. The experience of the tough economic situation brought about by the oil

crises led to the direction to break away from mass consumption of resources and energy and **shift to a resource-conserving and knowledge-intensive industrial structure**. The **Information and communications industry** was widely expected to become the

core of the movement.¹

The United States is notable for the development of the military use of radio communication and electronic applied equipment. Military use of integrated circuits (IC) components developed during the Vietnam War in the latter half of the 1960s. As a result, the U.S. electronic equipment industry grew rapidly. In addition, advances in the development of memory and microprocessors, through support by the Department of Defense and the National Aeronautics and Space Administration (NASA),² helped the **growth of the information and communications industry** in the country.

Furthermore, in the 1980s, the principle of competition was introduced into the telecommunications market

of the United States and the United Kingdom. Liberalization of the telecoms sector in the United States progressed around the antitrust suits of the Department of Justice against the monopoly by AT&T (The American Telephone & Telegraph).³ After several suits, AT&T was broken up in 1984. In the United Kingdom, after the inauguration of the Thatcher administration in 1979, a wide range of state enterprises were privatized in order to restore the national finances and the economy of the country. In 1982, a license for telecommunication business, a sector that had been monopolized by British Telecommunications, was given to a competitor, and this was followed by the privatization of British Telecommunications in 1984.

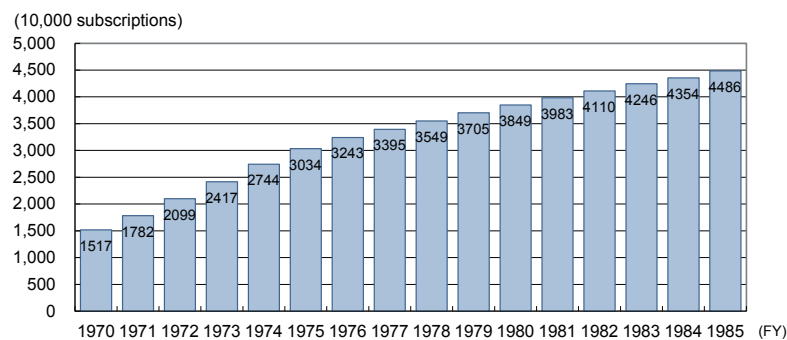
2. Trends in Japan's ICT sector

In Japan, fixed landline telephones rapidly spread from 1952, when the NTT Public Corporation was established with the aim of promoting the development of the telephone network. The number of fixed landline telephone subscribers, which was 1.40 million at the time of the establishment of NTT Public Corporation, reached 24.17 million in fiscal year 1973, when the first White Paper was published. **Voice calls using fixed landline telephones** became the main means of communication (Figure 1-1-2-1).

Around this time there was a problem of the long waiting period from application to telephone subscription and it took several hours to make a long-distance call because telephone operators had to connect the line

manually. As a result of the efforts made by NTT Public Corporation, the waiting list was eliminated in 1978, automated immediate connection was completed nationwide in 1979, and the number of subscribers with telephones exceeded 40 million in 1981.⁴ It is thought that communication services reached a turning point through the elimination of the waiting list and the nationwide immediate connection, which gave rise to discussions on new technologies and media. Much attention was paid to these new technologies, including integrated circuits, optical fiber communication, and space communication, while media such as image communication, data communication and other media also attracted attention.⁵

Figure 1-1-2-1 Transitions in the number of subscribers with subscription telephones



(Source) Prepared from History of the Nippon Telegraph and Telephone Public Corporation

¹ "Upon the Publication of the First Communications White Paper" of the 1973 White Paper states: "the current tough situation brought about by the oil crisis calls for sincere reflection on our economic society based on mass consumption of resources and energy and urges us to shift to a resource-saving or knowledge-intensive industrial structure. Under the circumstances, the role of communications will become more crucial by very effectively contributing to conservation of resources and energy and being at the very core of the knowledge and information industries." <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/s48/index.html>

² Inoue (1992) "Defense expenditures and the development of US semiconductor industry under the Vietnam War", Keio University, Mita Journal of Economics, Volume 85 No.2

³ Here, AT&T is not the current AT&T (<https://www.att.com/>). The current AT&T was established by a merger of Southwestern Bell Corp, one of the seven RBOC companies established in 1984 as a result of a split with three other RBOC companies (BellSouth, Ameritech and Pacific Telesis), and the AT&T long distance division.

⁴ The number of subscribers with subscription telephones exceeded 60 million in fiscal 1995.

⁵ See the 1978 Communications White Paper, Part 1, Chapter 2, Section 1 https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/s55/pdf/S55_05_C2E81C9F4C2E82BECF.pdf

In the field of mobile communications, NTT Public Corporation launched the first-generation mobile telephone service using a cellular system in 1979 as the first commercial service of this kind in the world. A shoulder-type device that enabled calls outside of cars appeared in 1985. However, this had limited users and did not spread widely due to its high cost: the price of the device itself required a security deposit of about 200,000 yen, the monthly basic charge was over 20,000 yen and the communication fee was as high as 100 yen per minute.

Telecommunication services during this period were operated as a **monopoly by NTT Public Corporation** under the supervision of the Ministry of Post and Communications. Monopoly by a public corporation was adopted because a monopoly was favored in light of the public nature,⁶ natural monopoly and technical consistency⁷ of telecommunication services, and also because a public corporation with a certain degree of independence in management, rather than one under government management, was thought to be desirable in order to achieve network expansion through efficient management.

Around this time, the government discussed administration and public finance reform for the purpose of “fiscal reconstruction without tax increases.” Besides NTT Public Corporation, problems were also pointed out with the Japan National Railway and the Japan Tobacco & Salt Public corporation, such as inefficient management of such huge organizations and insufficient response to technological innovation. In 1985, **competition was in-**

troduced to the telecommunications market through the privatization of NTT Public Corporation and the establishment of the Nippon Telegraph and Telephone Corporation (hereinafter “NTT”).⁸ This marked a turning point for Japan’s telecommunications policy.

At the end of the 1972 fiscal year there were 105 private broadcasters in addition to Japan Broadcasting Corporation (NHK) and the number of NHK subscriptions had reached 24.43 million. **Television broadcasting continued to spread further thereafter.** According to a national audience survey conducted by NHK in November 1985, the ratio of people who watched television broadcasting (NHK and private), even a small amount, was 90% on weekdays. This means that almost all members of the public watched television every day in some way.⁹ Television became an indispensable part of people’s daily lives and the influence of television broadcasting on public opinion increased. For example, it is suggested that the broadcasting of war zones as news amplified the spread of anti-war movements, later civil movements and counterculture.¹⁰

While terrestrial broadcasting spread, the Cable Television Broadcast Act (Act No.114 of 1972) was enforced in 1973. Cable television that had spread as joint community reception facilities, mainly in mountainous regions and other areas where radio waves do not reach, became widely used to eliminate reception difficulties for television broadcasting caused by tall structures, etc.¹¹

⁶ Communications as a public service were thought to be indispensable for people’s lives and economic activities. For this reason, it was believed that service providers were obliged to provide their services universally at reasonable prices. Because communication services were used between users, a monopoly was thought desirable in order to prevent regional differences in service quality, charges, etc.

⁷ In the case of communication services that are possible by connecting a large number of users through a communication network, connection of equipment of different technical specifications would involve costs to maintain service quality across the network. A monopoly was thought desirable to prevent this.

⁸ The Act on Nippon Telegraph and Telephone Corporation, etc. (Act No.85 of 1984) and the Telecommunications Business Act (Act No.86 of 1984) were enacted in 1984, and were followed by the establishment of the NTT Corporation and enforcement of the Telecommunications Business Act on April 1, 1985.

⁹ See 1986 Communications White Paper, “Part 4 Broadcasting” <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/s61/html/s61b0401.html>

¹⁰ <https://www6.nhk.or.jp/special/detail/index.html?aid=20160221>

¹¹ See 1975 Communications White Paper, Part 2 Chapter 5 Section 1 https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/s50/pdf/S50_09_C2E82C9F4B3C6CFC0C2E85BECFC2-5.pdf

Section 2 1985 to 1995: Development of Communications and Broadcasting Markets and Appearance of New Services

From 1985 to 1995, the foundation of the information society was built around the Internet thanks to the flow of technologies, human resources and funds from the military sector to the private sector as “peace dividend” of the end of the cold war and the opening of the Internet to the private sector. In Japan too, there were activities toward the provision of diverse telecommunication and broadcasting services through increased competition in the telecommunications market and the advancement of broadcasting services. We name the period from 1985 to around 1995 the “Development of Telecommunications and Broadcasting Markets and Appearance of New Services” and give an overview of the situation of the ICT sector during the period.

1. International Situation and the Trends Outside of Japan

In 1989 the Berlin Wall, a symbol of the cold war, fell, and the cold war structure based on east-west confrontation that had dominated the international community since the Second World War ended, and the world entered a new era. The European Union (EU) was established in 1993 and the strengthening of telecommunications in EU was recognized as one of the important requirements to complete a market where people, goods, services and capital move freely.¹² The 1994 termination of the Coordinating Committee for Multilateral Export Controls (COCOM),¹³ which had restricted economic activities between the East and West, developed an environment to globally enable free transactions in various sectors including ICT. Furthermore, China transitioned to a market-oriented economy and actively promoted the introduction of foreign investments. This nurtured an environment for China to become a major force in the global economy later.

The end of the cold war made it easier to divert the results of R&D by defense expenditure to the private sector. In addition, it was notable, particularly in the United States, how human resources and funds of the military sector flew into the private sector and such flow

gave rise to **innovation** through vigorous R&D investment. The **development of information technologies**, including computers and the Internet, first triggered by R&D in the military sector, can be regarded as a peace dividend that was brought about by the shift of technology resources to the private sector following the end of the cold war structure.¹⁴

The Internet originated from the Advanced Research Agency Network (ARPAnet), the research for which started in 1967 with funds provided by the U.S. Defense Department during the cold war. At first, it was a connection tool used by computer scientists, but it was later made open to researchers in general and its convenience came to be known to private businesses as well. At that time, the US government presented the direction of commercial use of Internet in the NII (National Information Infrastructure)¹⁵ Program, **and the Internet was opened to the private sector**. Thanks to the resulting general commercial use of the Internet, together with the technology innovations of personal computers and the Internet, **informatization progressed rapidly**.

2. Trends in the ICT sector of Japan

During this period, competition developed in the fixed landline communication market of Japan, while mobile phone services started to gradually spread. In addition, communication using personal computers, whereby data is exchanged over telephone lines, started to rapidly spread.

With the opportunities offered by the liberalization of the telecommunications market in 1985, long-distance, regional, satellite and international telecommunications markets became competitive with the entry of new operators into those markets. For example, three compa-

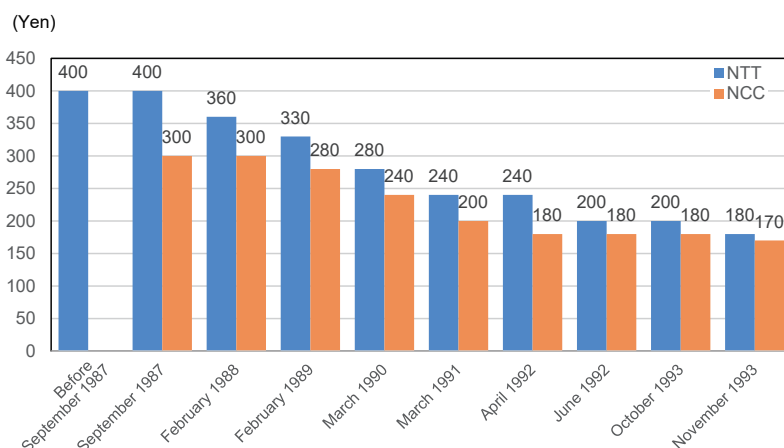
nies entered the long-distance telecommunications market, and this led to fierce price-cutting competition, especially in the Tomeihan Market, which connects Tokyo, Nagoya and Osaka, and was the largest market in Japan. Active new entries into the market saw the lowering of charges, **especially in long-distance call services**: charges for long distance telephone calls, which were 400 yen for three minutes in 1985, fell to 170 yen in November 1993 (**Figure 1-2-2-1**).

¹² See 1995 Communications White Paper, Part 3 Chapter 1 Section 2. <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h07/html/h07a03010201.html>

¹³ The committee was established by capitalist countries in Autumn 1949 and started its activities in January 1950 with the aim of regulating exports of high-tech goods to communist countries in order to establish a technology gap with communist countries to address security threats by the Soviet Union and the Warsaw Treaty Organization during the cold war.

¹⁴ SHINOZAKI, Akihiko (2003) “Economic Impact of the Information Economy: Comparative Studies of Japan and the U.S.” Chapter 4 Sections 4 and 5, and Internet Association Japan, “Internet White Paper 1996” Section 1 <https://iwparchives.jp/files/pdf/iwp1996/iwp1996-ch02-01-p036.pdf>

¹⁵ In the United States, the Clinton administration promoted informatization. The initial “Information Super Highway Concept” advocating construction of an optical fiber network by the government was changed to the promotion of private investment and market competition, which pushed the spread of the internet open to the private sector. In the background there was criticism by the communications industry toward government interventions and difficulties with measures involving huge government spending when the 1993 Gramm-Rudman deficit-reduction law was enacted. The National Information Infrastructure: Agenda for Action paper, which was released in 1993, assigned the government a complementary role including cutting-edge experiments, securing of fair competition and infrastructure development.

Figure 1-2-2-1 Transitions in charges for long distance telephone calls¹⁶

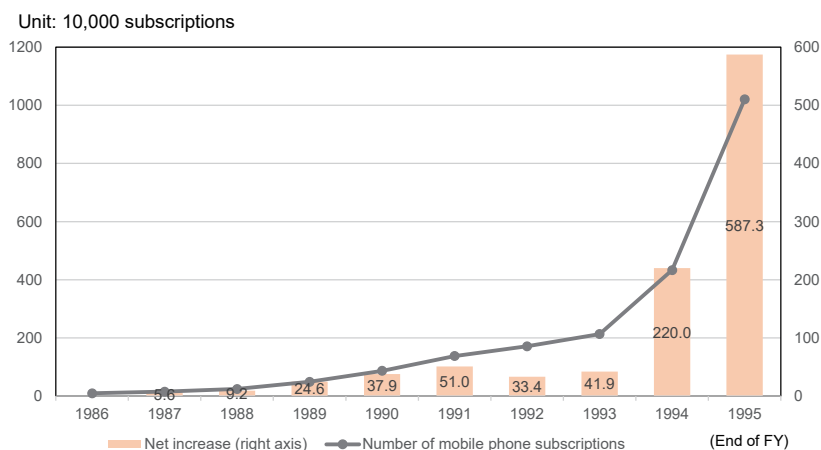
(Source) Prepared from NTT (1996) "10 years of NTT from 1985 to 1995: an overview of its history"

While competition intensified in the fixed-landline communication market, **competition gradually progressed in the mobile communication market**. Mobile phone services were only provided by NTT for a while after communication liberalization,¹⁷ but two new business operators (mobile NCCs) entered the market and NTT was in competition with one or the other in each region. Specifically, IDO Corporation started to provide services in the Kanto/Tokai regions in 1988 and DDI Cellular Group gradually began to provide services in other regions, starting from Kansai in 1989 to Okinawa in 1992.¹⁸ Mobile phones continued to be miniaturized. In 1991, NTT launched the "mova" series, the

smallest mobile phone in the world at that time, and digital services (2G) started in 1993.

The number of mobile phone subscribers increased after communication liberalization partially due to the effect of new entries into the market, but hit a ceiling for a while in the early 1990s (**Figure 1-2-2-2**). However, the Ministry of Posts and Telecommunications introduced a system allowing people to purchase and own mobile terminals (previously they were only rented) in 1994, and manufacturers competed to offer terminals attractive for users, the number of subscriptions exceeded 10 million in 1995, and this prepared the way for the rapid growth of mobile phone services.

Figure 1-2-2-2 Transitions in the number of mobile phone subscribers



(Source) Prepared from 1997 Communications White Paper¹⁹

¹⁶ NCC (New Common Carrier) is the generic name for former Type 1 Telecommunications Operators who entered the market following communication liberalization in 1985.

¹⁷ Mobile communication services were separated from NTT in 1992 and a new company named NTT Mobile Communication Network Inc. (currently NTT DOCOMO) started operations.

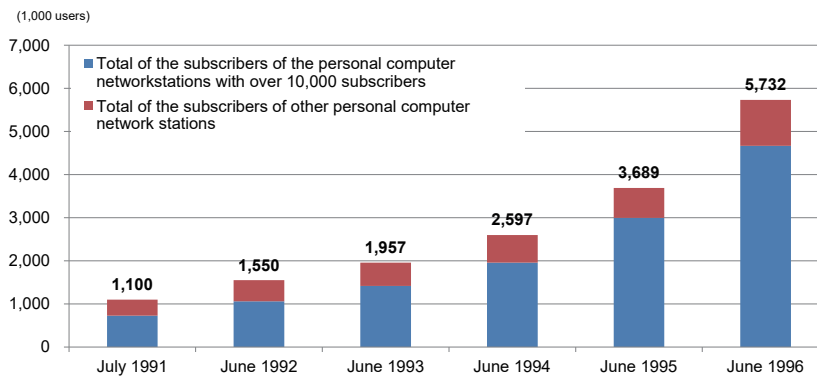
¹⁸ In 2000, IDO Corporation (IDO), DDI Group and Kokusai Den Shin Denwa Co. Ltd. merged to establish KDDI. Digital Phone Group and TU-KA Group launched mobile phone services (in Kanto Koshinetsu, Tokai and Kansai) in 1994, established a joint venture (Digital TU-KA Group) in 1996 and started mobile phone services in other regions. Later, the venture was acquired by SoftBank in 2006 after the acquisition by J-Phone and Vodafone. Through these processes, the 3-company structure of NTT DOCOMO, KDDI and SoftBank was established. Later, the entry of Rakuten Mobile into the mobile phone market in 2020 created more competition in the market.

¹⁹ <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h09/html/h09a01010101.html>

In the first half of the 1990s, before the Internet became widespread, a large number of people used **personal computers communication services** connected to carrier computers via telephone lines or ISDN. The number of users rapidly increased from 1.10 million in 1991 to 5.73 million in 1996 (**Figure 1-2-2-3**). Personal computer communication was mostly text-based, including emails, forums and chat, but this paved the

way to data communication in addition to voice communication. It represented a big turning point for the communications industry, which had once focused on voice calls, to shift to the Internet, which spread later. In Japan, Internet Initiative Japan Inc. (IIJ) had already started business as an internet service provider in the first half of the 1990s.

Figure 1-2-2-3 Changes in the number of users of personal computer communication



(Source) Prepared from the 1997 Communications White Paper²⁰

During this period, the **diversification of services** progressed in the broadcasting market. NHK **started BS broadcasting** using Broadcasting Satellites in 1989, and this was followed by Japan Satellite Broadcasting Inc. (currently WOWOW) in 1990. In 1992, **CS broadcasting began** using Communication Satellites (CS).

The government also implemented policies to encourage media companies to move toward multi-channels.

For example, toward the 21st century, the **High-Vision City Concept**²¹ was promoted to build cutting-edge cities full of energy and charm while taking advantage of regional characteristics by pioneering the introduction of advanced video media in urban living spaces. The Ministry of Posts and Telecommunications designated 13 regions as model cities in March 1989, and a further 35 regions were designated at the end of fiscal 1992.²²

²⁰ <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h09/html/h09a01010502.html>

²¹ See 1989 Communications White Paper, Chapter 1 Section 4

<https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h01/html/h01a01040501.html>

²² See 1993 Communications White Paper, Chapter 2 Section 3

<https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h05/html/h05a02030102.html>

Section 3 1995 to 2005: Spread of Internet and Mobile Phones

During this period Internet access rapidly spread to the public, especially in developed countries, and a shift to digital broadcasting started in Europe and the United States. In Japan too, the expansion of broadband and mobile communications significantly progressed in the information and communications field, and digitalization started in the broadcasting field. While ICT spread and developed, the negative aspects of ICT gradually surfaced, including the digital divide. We name the period from 1995 to around 2005 as “Progress of ICT – Spread of Internet and Mobile Phones” and provide an overview of the situation of the ICT sector during this period.

1. International Situation and Trends Outside of Japan

With the establishment of the World Trade Organization (WTO) on January 1, 1995, in addition to the enhancement of existing trade rules,²³ rules in the new field (service trade) were established and a more multi-lateral trade system was fostered compared with the era of the General Agreement on Tariffs and Trade (GATT). In 2001, China became a member of WTO, which raised the momentum of free trade worldwide. For the communications sector, WTO formulated “Annex on Telecommunications” to provide rules on access to and use of public telecommunications networks and services under its “General Agreement on Trade in Services (GATS). Negotiations on basic telecommunications started in 1994 toward liberalization in the field of basic telecommunication services including voice telephony.

In addition to the rise of free trade in the ICT sector, the “New Economy” theory, which appeared in the United States in the latter half of the 1990s, increased **expectations for active ICT investments and the role of ICT as a source of economic growth.**²⁴

After the commercialization of the Internet and the **launch of Microsoft Windows 95** equipped with a TCP/IP protocol in the initial state, which provided a dial-up connection to a preinstalled Web browser in personal computers, use of the **Internet rapidly spread to the public.** Furthermore, the spread of Netscape Navigator, Internet Explorer and other web browsers **enabled users to view photographs and other images and to browse text-based information over the Internet.**

The spread of the Internet with a hierarchical model enabled the separation of communication equipment and services, and made the **vertical separation of layers** apparent. As a result, many services were individually provided in each layer, and businesses dedicated to such services emerged. The upper layers saw the birth of diverse content/application businesses and global

platformers represented by GAFA which have a big market share today.²⁵ In the lower layers, the progress of IP use and other factors gave rise to the emergence of manufacturers of routers, servers, switches and other network equipment in addition to manufacturers of conventional communication equipment.

With the rapid spread of the Internet, **institutional responses to the negative aspects of the Internet progressed** in developed countries. In the United States, the Communication Decency Act (CDA) Section 230 was enacted in 1996. It established that providers, etc., are in principle not responsible for the information transmitted by third parties. The Child Online Protection Act (COPA) and the Digital Millennium Copyright Act (DMCA) were enacted in October 1998. The former aims to prevent children from viewing pornography over the Internet, while the latter aims to effectively protect the copyright of digital images, sounds, text and other productions exchanged on the Internet. The EU adopted an action plan on promoting *safer* use of the *Internet* by combating illegal and harmful content on *global* networks in 1999. The EU Council also adopted and approved the e-Commerce Directive stipulating that providers, etc., are not in principle responsible for information transmitted by third parties.

While the Internet continued to spread, mostly in developed countries, a gap in the ICT usage environment between developed and developing countries came to surface as a global issue. In this context, the issue of the **widening information gap between developed and developing countries** was presented at the ITU Plenary Conference of the International Telecommunication Union in 1998. Further, in 2000 the Kyushu-Okinawa Summit (G8 summit meeting) adopted the “Okinawa Charter on Global Information Society,” which stipulates that **bridging the “digital divide”** is a common challenge for the international community.²⁶

²³ <https://www.mofa.go.jp/mofaj/gaiko/wto/gaiyo.html>

²⁴ Regarding the long economic growth led by the United States at the time, “2000 White Paper on World Economy” (Cabinet Office) reads as follows: There are three viewpoints among the economists in the world. One of them is “rapid development of the information and communication technologies (IT) generated new industrial forms and social conditions and created a new economy that cannot be explained by the existing economic theories and experiences. For this reason, we expect a long and continuing boom in the future.” (snip) The rapid growth and spread of information and communication technologies are called “IT Revolution.” Japan, lagging behind these countries, needs to accelerate drastic deregulation and structural reform in order to accomplish dramatic “IT revolution.” The analysis above also found this need.

²⁵ Amazon.com started in 1995. Google started in 1997. Apple launched iMac in 1998 and Facebook was established in 2004. Major platformers - Baidu (2000), Alibaba (1999) and Tencent (1998) - were also established in China.

²⁶ Ministry of Foreign Affairs “Kyushu-Okinawa Summit” https://www.mofa.go.jp/mofaj/gaiko/summit/ko_2000/outline/jp/overview.html

2. Trends in the ICT sector of Japan

During this period, the **Internet and mobile phone use rapidly spread**²⁷ in Japan as well.

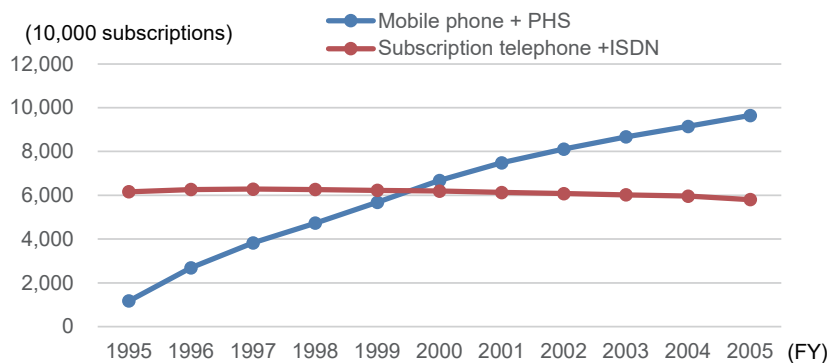
The dial-up connection for accessing the Internet, predominant when the Internet first started to spread, could not handle voice calls and Internet connection simultaneously, and users needed to create a connection each time they wanted to use the Internet. However, ADSL internet connection services, launched in 2000, enabled simultaneous voice calls and an Internet connection and provided **continuous Internet connection**, which fueled the spread of Internet use. New rules on connections of communication equipment/networks among business operators were established in the same year²⁸ for ADSL Internet connection services. As a result, new entrants to the market, including Yahoo!BB, started to provide low-price services in 2001, and charges went down, including the fees charged by NTT East, which had been providing services from the beginning. In addition, line speeds increased from an initial 1.5Mbps to 50Mbps by 2004. Thanks to lower prices and increased line speeds, the number of subscriptions rapidly grew to over 10 million by 2003, just three years after the launch of services.

A feature of the communication services in this period was the viewing of **images, including photographs**, in combination with text-based information through the Internet thanks to the spread of web browsers as described above.

In parallel with the above, **businesses and services using the Internet also expanded** in Japan around this time.²⁹ For example, in 1997 Rakuten promptly launched a shopping mall on the Internet called Rakuten Ichiba, which rapidly expanded as an EC mall where on-line shops could be opened with a small initial investment. In 1996, Yahoo launched its search service called Yahoo! Japan, a representative portal site for internet users in Japan. Later, Yahoo developed diverse services including news distribution, bulletin boards, shopping and auction services in order to increase traffic.

The number of mobile phone service subscriptions increased by about 10 million every year from 1996 to 2002 thanks to the introduction of device sales in 1994, which enabled users to own their mobile phones, and also because of lower costs as a result of the **termination of the charge approval system** in 1996. The number of mobile telephone (mobile phone and PHS) service subscribers exceeded the number of fixed landline telephone subscribers in 2000 (**Figure 1-3-2-1**). In addition, the launch of i-mode by NTT DOCOMO in 1999 triggered the **full-fledged development of access services to diverse sites** (e.g., e-mail, bank transfer, ticket purchase) for **mobile phones**. At the end of 2005, the number of internet users via mobile devices exceeded the number of Internet users using personal computers.

Figure 1-3-2-1 Number of subscribers of communication services



(Source) MIC "Information & Communications Statistics Database"³⁰

During this period, the Ministry of Posts and Telecommunications took various measures aimed at the **further promotion of fair competition in the telecommunications market, and the creation of an environment for information and communication use** in response to the rapid spread of the Internet and

mobile phone services. For example, **in order to further promote fair competition in the long-distance telecommunication market and NTT's business improvement, NTT was reorganized** into one long-distance/international telecommunication company and two regional telecommunication companies under a

²⁷ 2001 Information and Communications White Paper considers 2001 to be the "First Year of Broadband"

²⁸ In 2000 rules were established on connection charges and conditions for unbundled connection of metallic subscriber lines, etc. (so-called dry copper and line sharing), and on conditions and procedures for the installation of connection equipment by competing businesses in NTT East/West stations. In 2001, rules were established for the opening of unbundling of subscriber system optical fiber (so-called dark fiber).

²⁹ In its introduction, the 2000 Communications White Paper states "Internet businesses are expanding. IT is not only generating new businesses but also is used as an effective tool for streamlining of enterprises. It has become rooted also in people's daily lives, expands their communication and influences their time management and lifestyles." The white paper compiled a special topic titled "The 21 Century Opened by IT – A Frontier Expanded by the Internet and Mobile Communication."

³⁰ <https://www.soumu.go.jp/johotsusintokei/field/tsuushin02.html>

holding company.³¹ These companies became NTT (Nippon Telegraph and Telephone Corporation: holding company), NTT Communications Corporation (long-distance/international telecommunication company), Nippon Telegraph and Telephone East Corporation (regional telecommunication company) and Nippon Telegraph and Telephone West Corporation (regional telecommunication company)

Amid growing competition in the regional telecommunications market, a fund was created where a part of costs was paid by individual carriers (the **Universal service subsidy program**)³² in order to ensure **universal services (fixed telephones, pay phones, emergency calls** and other telecommunication services that should be provided all over Japan because these services are indispensable for people's lives). Moreover, the **prior notification of communication charges was abolished in principle** and replaced by ex post facto remedial actions, including orders for business improvement, in order to **lower communication charges**. For the **safe and secure use of communication services**, carriers were obliged to provide an outline for charges and other conditions when concluding contracts, so as to appropriately and promptly process complaints and inquiries from users and to notify users before the termination of all or part of the business.³³

A new development in mobile communications in 2001 was the entry of **Mobile Virtual Network Operators (MVNOs)**, who provide mobile communication services to end users by procuring mobile communication networks from Mobile Network Operators (MNOs), who in turn provide mobile communication services using the frequencies allocated to them. In 2002, MIC published its “Guidelines on the Application of the Telecommunications Business Act and Radio Act related to MVNOs.”

On the other hand, as the rapid spread of the Internet made it easy for anyone to disseminate information online, there was an expansion in the **negative aspects** of the internet, including **the spread of illegal/harmful information**. Accordingly, measures were taken by industry groups, and laws were developed to address this

problem. Specifically, in 1998, the Telecommunications Services Association formulated and released its “Guidelines on responses by business operators pertaining to internet access services,” which stipulated responses by providers who discover that illegal/harmful information is being disseminated. The Act on the Limitation of Liability for Damages of Specified Telecommunications Service Providers and the Right to Demand Disclosure of Identification Information of the Sender (Act No. 137 of 2001) was enacted in 2001 to specify the requirements for the limitation of liability for damages of service providers and the right to demand disclosure of identification information of a sender, when the rights of others are violated through distribution of information. In addition, in response to personal information leak cases that occurred around 2000, the expansion of electronic commerce and other issues, the Act on the Protection of Personal Information (*Act No. 57 of 2003*) was enacted in 2003.

In the broadcasting market during this period, the **digitalization of broadcasting media (terrestrial broadcasting, satellite broadcasting and cable television) continued to develop**, which formed the foundation for today's digital broadcasting. Advantages of broadcast digitalization include: (1) higher audio and video quality and increased channels; (2) upgrading of broadcasting services including data broadcasting and service cooperation with the Internet and other communication networks, and; (3) services friendly to the elderly and people with disabilities.

CS digital broadcasting started in 1996 as the first digital broadcasting service in Japan, and this was followed by digital broadcasting of cable television in 1998 and BS digital broadcasting in 2000. For terrestrial broadcasting, which had attracted widespread popularity among the public, digital broadcasting started in the three metropolitan areas (Kanto, Kinki and Chukyo) in 2003. Through digitalization, broadcasting programs started to provide high-definition³⁴ videos. Old CRT televisions were replaced by liquid crystal and plasma televisions as a result of technical innovations in flat displays, and the price per inch was lowered.

³¹ Based on the 1997 amendment of the Act on Nippon Telegraph and Telephone Corporation

³² Based on the 2001 amendment of the Telecommunications Business Act. The subsidy program started in 2006.

³³ Based on the 2003 amendment of the Telecommunications Business Act.

³⁴ Refers to a television method that provides clear images and high-quality sound on a wide screen by changing the aspect ratio from 3:4 of a conventional television to 9:16, the number of scanning lines from 525 to 1,125 and the method from analog to digital. <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h01/html/h01a01040501.html>

Section 4 2005 to 2015: Rapid Penetration of ICT - Expansion of Broadband and Mobile Phone Utilization

The launch of iPhones spread worldwide, and both Apple and Google, providing OS for smartphones, established their position as global platformers. In Japan too, networks were further upgraded, smartphones spread rapidly and the use of mobile devices expanded widely, which was partially because various services were developed and provided as applications on smartphones. We name the period from 2005 to around 2015 as the **“Rapid Penetration of ICT - Expansion of Broadband and Mobile Phone Utilization”** and provide an overview of the situation of the ICT sector during this period.

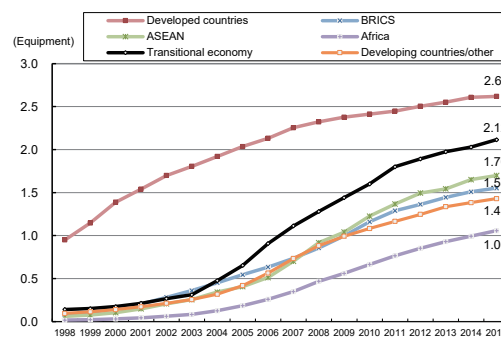
1. International Situation and Trends Outside of Japan

From the latter half of the 2000s, emerging countries began to rapidly increase their presence as exemplified by the increasing share of China and South American countries in the world's GDP. In particular, the fall of Japan's GDP to third place in the world behind China in 2010 symbolized the rise of emerging countries.³⁵

In the mid-2000s, the **spread of mobile phones accelerated in emerging and developing countries as**

well (Figure 1-4-1-1). The Internet diffusion rate, which in 2000 was 6.5% worldwide and under 10% in more than half of all countries, reached 38.5% in 2013. The number of subscriptions increased 3.1-fold in Japan, the United States, Canada and Europe from 2000 to 2013 and 16.6-fold in emerging/developing countries in the same period.³⁶ The internet spread rapidly in emerging/developing countries.

Figure 1-4-1-1 Changes in ICT equipment amount per capita by region



*ICT equipment amount is the sum of the number of fixed landline telephone lines, mobile phone subscribers, fixed broadband internet connections, internet users and households owning computers divided by the population.

(Source) Noguchi et al. (2018)³⁷

The upgrading of mobile networks (the expansion of broadband) expanded the use of the Internet via mobile phones.

In 2007, **sales of iPhones** started in the United States. The potential of smartphones to enable the use of

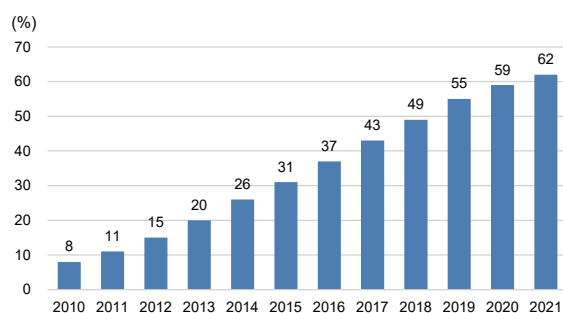
various contents and applications attracted global attention, and manufacturers followed suit by introducing their products one after another. As a result, **smartphones came to take the principal position in the mobile phone market (Figure 1-4-1-2).**

³⁵ https://www5.cao.go.jp/jj/wp/wp-je11/h02_01.html

³⁶ See 2015 Information and Communications White Paper Chapter 2 Section 3
<https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h27/html/nc123210.html>

³⁷ NOGUCHI Masato, WASHIO Satoshi, SHINOZAKI Akihiro (2018) “Global transformation from digital divide to digital dividends – Long-term observation using 2015 global ICT data base”, InfoCom Research Inc., Infocom Economic Study Discussion Paper Series, No. 6
https://www.icr.co.jp/service/infocom-ict/download/discussion-paper/pdf/2018/DP_06_201806.pdf

Figure 1-4-1-2 Transitions in the spread of smartphones in the world

(Source) Prepared based on Statista³⁸

In tandem with the global spread of smartphones, **the marketing of content and applications** for end users (e.g. games, video/music streaming, maps, social media, search apps) **rapidly expanded**. As a result of this expansion, platform services that gather these con-

tents/applications also rapidly emerged. Within this process, a few **global platformers** who succeeded in gathering important contents/applications **started to increase their market power**.

2. Trends in the ICT sector of Japan

During this period, Japan also saw the **further upgrading of network infrastructure and progression in the diversification of services**, and **smartphone use rapidly spread**.

In the fixed telecommunication network sector, the spread of **faster FTTH** using optical fiber **progressed**. The total number of FTTH subscriptions reached 13.76 million in 2007, overtook DSL in fiscal 2007 and reached 28.79 million in fiscal 2015 (**Figure 1-4-2-1**). Areas where broadband is available also expanded during this period. The ratio of households that can use FTTH or other fixed ultrafast broadband³⁹ was 83.5% at the end of March 2007, and reached 99.0% at the end of March 2015.

The upgrading and expansion of mobile communication networks also continued: LTE services were launched in 2010 and the number of subscribers with 3.9-4th generation mobile phones (LTE) reached 87.39

million at the end of fiscal 2015.⁴⁰

With the speeding up and capacity enlargement of communication networks, an environment was gradually developed to post and view videos and other large volume contents, and services on the Internet were further diversified.

In 2008, iPhone was also launched in Japan and there was a remarkable **shift to smartphones** (**Figure 1-4-2-2**). As described above, a smartphone enables use of various original content and applications via a mobile OS. Users can select services from among diverse content/applications including games, video/music streaming, maps, social media and search services regardless of hardware, **which greatly expanded the uses of mobile devices**.

Figure 1-4-2-1 Changes in the number of fixed broadband subscriptions in Japan

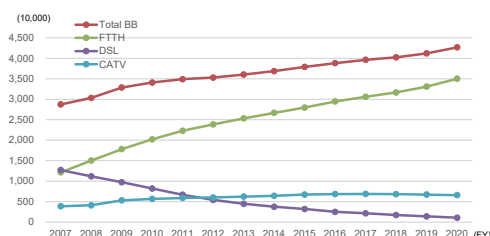
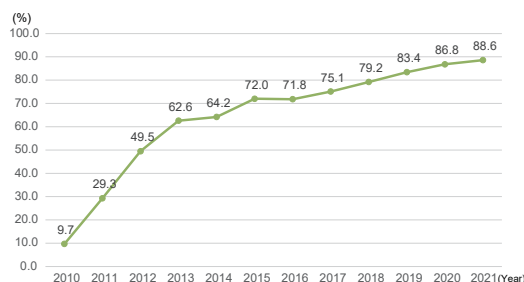
(Source) MIC "Information & Communications Statistics Database"⁴¹

Figure 1-4-2-2 Changes in the ratio of households with smartphones

(Source) Prepared from MIC "Communications Usage Trend Survey"⁴²

³⁸ <https://www.statista.com/forecasts/1146202/smartphone-penetration-forecast-in-the-world>

³⁹ Here, "fixed ultrafast broadband" refers to "FTTH, CATV Internet (downlink speed over 30Mbps)" as of the end of March 2007, and "FTTH, CATV Internet, FWA (downlink speed over 30Mbps except FTTH)" as of the end of March 2015.

⁴⁰ <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h28/html/nc252210.html>

⁴¹ <https://www.soumu.go.jp/johotsusintokei/field/tsuushin02.html>

⁴² <https://www.soumu.go.jp/johotsusintokei/statistics/statistics05.html>

Around this time, **vertical separation and horizontal integration of layers** further progressed in the communications market of Japan as well. While amid the diversification and globalization of the markets, domestic businesses were also providing various online services, including search and internet shopping services, in the upper layers as mentioned above, Google, Amazon and other **global platformers** that provide various application services and functions for smartphone users **increased their influence** in the Japanese market as well.

In addition, against the background of the expansion of broadband as well as the downsizing, lower prices and high functionality of sensors, IoT started to spread during this period. Beyond conventional communication equipment, such as personal computers and smartphones, the concept of connecting **everything**, including equipment and daily necessities that had never been equipped with communication functionality before, such as cars, televisions, air conditioners, refrigerators, buildings and factories, **became connected to networks**.

The rapid spread of advanced and diversified ICT services brought about significant convenience in people's lives. However, the use of Internet and mobile phones by young people in this period gave rise to new problems, such as young people becoming involved in crime through the use of online dating services mainly from mobile phones and cyber bullying via underground websites, and this led to growing calls over the need to strengthen countermeasures.

To address this situation, MIC conducted R&D on filtering in cooperation with mobile carriers, and the mobile carriers **started filtering services in 2005**. The Act on the Establishment of an Enhanced Environment for Youth's Safe and Secure Internet Use (Act No. 79 of 2008) was enacted in 2008 and enforced in 2009. The act obliges mobile carriers to set a filtering function in mo-

bile phones that are to be used for internet access by young people (younger than 18) before providing the phones in principle.

With increasing phone fraud and other crimes using mobile phones, the Act on Identity Confirmation, etc. Performed by Mobile Voice Communications Carriers for their Subscribers, etc. and Prevention of Wrongful Use of Mobile Voice Communications Services (Act No. 31 of 2005) was enacted in 2005 and fully enforced in 2006 in order to promote subscriber management systems of mobile carriers and to prevent the wrongful use of mobile voice communication services. This act obliges mobile carriers to confirm the identity of subscribers when concluding a contract and at the time of contract transfer.

Furthermore, MIC in cooperation with the Ministry of Education, Culture, Sports, Science and Technology and carriers started **"e-net Caravan" for children to promote the safe and secure use of the Internet**.

With the transition to digital broadcasting, **1seg** for receiving television broadcasting with mobile devices **started** in 2006, and this enabled the viewing of digital broadcasting both outside of home and at home.⁴³

In 2008, NHK was allowed to distribute already broadcasted programs via the Internet for a fee as a "complemental use of broadcasting"⁴⁴ and it started "NHK on Demand" in December of the same year.

In 2011, BS analog broadcasting ended and BS broadcasting fully moved to digital. With **the end of terrestrial analog broadcasting** in all 47 prefectures in 2012, terrestrial broadcasting also **moved to digital broadcasting**.⁴⁵

In addition, in September 2013 NHK started **"hybrid casting,"** a new broadcasting service to provide applications and content via the Internet in conjunction with broadcast programs,⁴⁶ and private broadcasters followed suit from 2014.

⁴³ The 2007 amendment of the Broadcasting Act allowed broadcasting of programs different from ordinary television programs (independent use).

⁴⁴ Based on the 2007 amendment of the Broadcasting Act

⁴⁵ "Provisional project to eliminate poor terrestrial digital television reception through satellite" ended in March 2015. "The digital-analog conversion service" provided by cable TV broadcasters for smooth transition to terrestrial digital broadcasting also ended at the end of April of the same year.

⁴⁶ Use of hybrid cast realizes new broadcasting services fully taking advantage of communication services (bidirectional information exchange, distribution of large-volume contents, etc.) by using Web technologies, which include coordination with smartphones and other mobile terminals and provision of high-definition videos including 4K in addition to the conventional data broadcasting news, weather forecast, program-related information (program summary, etc.) and simple games (questionnaire, quiz, etc.)

Section 5 From 2015: Establishment of ICT as a Social and Economic Infrastructure

With the appearance and rapid spread of new ICT services including the sharing economy, such as ride sharing, private accommodation and crowdfunding, drones, AI, online lessons and online diagnosis, ICT has become a social economic infrastructure that is indispensable for people's lives. We name the period from 2015 as the "Establishment of ICT as Social and Economic Infrastructure" and provide an overview of the situation of the ICT sector in and outside of Japan during this period.

1. International Situation and Trends Outside of Japan

In various fields including ICT, China further grew as an economic power and achieved the second largest GDP in the world. China also took the number 1 spot, followed by the United States and Japan, in terms of the output of information and communication industries in 2014. Originally the United States had been number 1 in 2000.⁴⁷ In this context, criticism of China mounted in the United States for its violation of intellectual property rights and its demands for forced technology transfers. Amid a technology leadership competition between the United States and China, the United States enacted the

2019 National Defense Authorization Act, followed by The Foreign Investment Risk Review Modernization Act (FIRRMA) in August 2018, and the screening of foreign investments in the United States by the Committee on Foreign Investment in the United States (CFIUS) was strengthened. At the same time, the Export Control Reform Act (ECRA) was enacted to strengthen export controls.⁴⁸ The **relationship between economic activities and security** with a focus on high-tech industries achieved recognition as a real policy theme⁴⁹ (**Figure 1-5-1-1**).

Figure 1-5-1-1 Trends in the initiatives for economic security in the United States and China

Country	Trends of initiatives for economic security
The U.S.	<p>"The National Strategy for Critical and Emerging Technologies" was released in October 2020. Pillars of the strategy include promoting National Security Innovation and Industrial Base (NSIB) and to protect the country's tech advantages in critical and emerging technologies in order to lead the world in these technologies.</p> <p>The strategy identifies 20 technology area priorities, which include: "Communication and Networking Technologies," "Quantum Information Science," "Semiconductors and Micro-electronics" and "Space Technologies." The 2021 Innovation and Competition Act that passed the Senate in June 2021 includes the Endless Frontier Act, the Strategic Competition Act, the Securing America's Future Act (provisions related to the Committee on Homeland Security and Governmental Affairs of the Congress) and the Meeting the China Challenge Act.</p>
China	<p>U.S. sanctions against China (high-tech cold war) made China face the vulnerability of its own supply chains. Starting with Huawei in May 2019, one Chinese high tech company after another were placed on the trade restriction "Entity List", which was designated by the U.S. Department of Commerce under the Export Administration Act, and became unable to procure American products.</p> <p>In order to overcome this weakness, the country announced a policy to upgrade industrial infrastructure, modernize industry chains and promote digitalization in "the 14th Five-year Plan."</p>
Reference Japan	<p>The government held expert meetings for economic security legislation to discuss economic security legislation from technical viewpoints.</p> <p>A bill for ensuring security by integrally taking economic measures with the four pillars of "supply chain," "critical infrastructure," "public-private technical cooperation" and "patent non-disclosure" was submitted to the 2022 ordinary session of the Diet and enacted in May of the same year.</p>

(Source) MIC (2022) "Survey Research on R&D on the Latest Information and Communications Technologies and Trends of Use of Digital Technologies in Japan and Abroad"

⁴⁷ ONOZAKI, Ayako (2021) "The impact of ICT progress at the inter-industry structure: A comparative study of Japan, the U.S., and China using IO tables," InfoCom Research Inc., InfoCom Economic Study Discussion Paper Series, No.16.
https://www.icr.co.jp/service/infocom-ict/download/discussion-paper/pdf/2021/DP_16_202101.pdf
 She calculates and analyzes the output, added values, etc. of the information and communication industries (ICT hardware, communications, information services and contents) of the world and by major countries in 2000 and 2014, which was the latest year with available data by using the World Input Output Database (WIOD 2016).

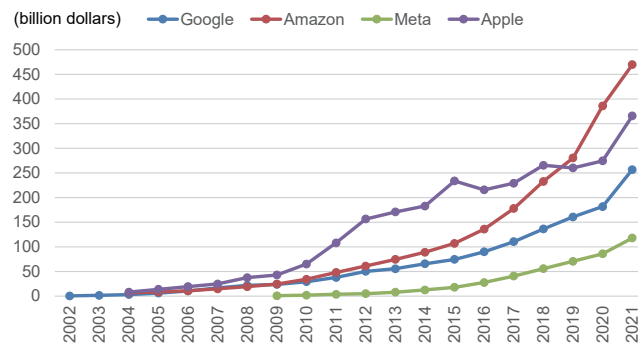
⁴⁸ MIC, "Summary of the White Paper on International Economy and Trade"
<https://www.meti.go.jp/report/tsuhaku2019/2019honbun/i0110000.html>

⁴⁹ SHINOZAKI, Akihiko, "Cases to consider for Japan's economic activities and security in the face of Ukraine Crisis" Business + IT (March 15, 2022) <https://www.sbbt.jp/article/cont1/82774?page=2>

Since the mid-2010s, **big data analysis using AI, etc., has grown** and the services provided by global platformers have been further upgraded. Specifically, global platformers collect and analyze personal data including end users' attributes, locations, e-commerce purchase history, and video/music viewing history, and provide value-added services to present advertisements and other information according to the preferences of individual end users. On the other hand, as the market power of the global platformers in online businesses has further grown (**Figure 1-5-1-2**), issues have been pointed out with respect to **data oligopoly and han-**

dling by the global platformers and rule setting on platforms. Specifically, concerns are increasing about the situation where actions and preferences are managed by specific enterprises as a result of the concentration of data with enormous economic value to a few global platformers. In addition, as enormous amounts of data are transferred across borders, privacy and security risks have become apparent when transferred data are not appropriately managed. Concerns are rising about data management by the global platformers who are the recipients of especially great amounts of data.

Figure 1-5-1-2 Changes in the sales of GAFA



(Source) Prepared based on Statista data

Amid the rapid spread of smartphones and the evolution of mobile communication systems into local/social infrastructure, countries all over the world are investing in 5G networks and allocating frequencies to 5G. Starting with the **launch of 5G services** for smartphones in the United States and ROK in April 2019, 5G services have since started in countries around the world.

Against the background of the COVID-19 pandemic, which started in 2020, the role of ICT further expanded as it enables non-contact/non-face-to-face activities in social/economic activities. On the other hand, as exemplified by the Russian invasion of Ukraine in February 2022, ICT is also being abused as a means of assault, such as cyberattacks and the spreading of false information.⁵⁰

⁵⁰ YONETANI, Nami (2022) "Russian Invasion of Ukraine and Trends in the ICT Sector," FMMC Researcher Report, March 2022, No.1. https://www.fmmc.or.jp/Portals/0/resources/ann/report_ru_220315_zenpen.pdf

2. Trends in the ICT sector of Japan

With the increasingly complicated international situation and rising influence of the global platformers, Japan is taking various actions to deal with these issues, including upgrading and increasing the resilience of ICT infrastructure and promoting data governance (See Chapter 2 for the details).

Considering that the number of telephone subscriptions has decreased and that transit switches and signal switches will reach their maintenance limit around 2025, NTT announced a plan in 2015 to **change the Public Switched Telephone Network (PSTN) of NTT East and West to an IP network** by 2025 and began this change in 2021.

While Communication infrastructure continues to be further upgraded, NTT DOCOMO, KDDI and SoftBank launched 5G services in March 2020. 5G has special features, such as high speed/large capacity, high reliability/low delay and multiple simultaneous connections. Its use cases include 4K/8K live streaming, highly immersive VR/AR experiences, multifaceted sports viewing, remote surgery and automatic driving. In addition, a **Local 5G** system has been established in Japan. Local 5G is available for various entities beyond carriers, and can be adapted according to local or regional needs. Demonstration experiments that are conducted to promote the utilization of 5G in diverse fields include medical/health care, agriculture, fisheries and manufacturing (in factories).

Discussions toward **6G/Beyond 5G, which will be the communication standard to follow 5G**, have started in many countries. In Japan, too, discussions have started on technical strategies for the construction of next-generation networks toward the 2030s.

Upgrading of broadcasting networks are also continuing to progress: new full-fledged **4K8K satellite broadcasting** for homes started in BS in 2018 and the number of televisions with which new 4K8K broadcasting can be viewed reached 12.64 million in April 2022.⁵¹

As the upgrading of ICT progresses in this way, various services that take advantage of ICT have appeared and ICT use has spread in various fields of social/economic activities.

For example, there continues to be progress in the **sharing economy**, that is to say economy vitalization activities to make assets (including intangible assets such as skills and time) held by individuals available for other individuals via matching platforms on the Internet.⁵² Various share services have appeared and grown since the mid-2010s, such as the sharing or sale of “goods” (e.g. Mercari), “space/place” (e.g., Airbnb),

and “means of transportation” (e.g., Uber), and the sharing of “money” whereby participants lend money to other people and organizations (e.g., READY FOR), and the sharing of “skills/human resources” including housekeeping and childcare (e.g., AsMama).

Video streaming over the Internet has rapidly grown since 2015, the year that Netflix and Amazon Prime Video started **video streaming services** in Japan. Information providers have further diversified because anyone can easily distribute or provide content with YouTube, TikTok, etc.

In addition to investments in and content provision to video streaming services, some broadcasters have constructed their own platforms to provide VOD (Video On Demand)⁵³ services and streaming services based on program organization.⁵⁴ For example, TVer was launched in 2015 through a common portal to make free internet video streaming available (missed-program webcasts) and it has been implemented individually by five private key stations in Tokyo.⁵⁵ Its reproduction number is steadily increasing.⁵⁶ In addition, **real-time program streaming services started being provided** by Nippon Television from October 2021, and by Television Asahi, TBS, Television Tokyo and Fuji Television Network from April 2022.

Use of AI has progressed with its incorporation in various goods and services. Examples close to daily life include internet search engines, audio response application of smartphones, voice search/input functions and cleaning robots. Humanoid robots equipped with AI are also being put into practical use as exemplified by Pepper of SoftBank Robotics.

As described in the Introduction, the utilization of ICT has grown in various fields of the public's socioeconomic lives, including disaster management and medical care, and the COVID-19 pandemic has further pushed **ICT utilization in terms of enabling a non-contact/non-face-to-face lifestyle** that incorporates telework, online learning and online medical care.

As a more specific example, the COVID-19 pandemic has led to the rapid introduction of telework by private enterprises. According to the Communications Usage Trend Survey of MIC, telework implementation rate among enterprises greatly increased from 20.2% in 2019 to 51.9% by the end of August 2021.⁵⁷

In the education sector, **online lessons** were implemented due to the temporary closure of elementary, junior-high and high schools and universities. According

⁵¹ The Association for Promotion of Advanced Broadcasting Services: <https://www.apab.or.jp/>

⁵² Government CIO Portal Sharing Economy Promotion Office website: <https://cio.go.jp/share-eco-center>

⁵³ Video services to allow users to view already broadcasted programs and movies when they want to view the program after the end of release

⁵⁴ Unlike VOD, the service distributes video contents according to a predetermined program (timetable)

⁵⁵ VOD services through which already broadcasted programs can be viewed for a fixed period (e.g., a week) just after their broadcasting

⁵⁶ https://www.soumu.go.jp/main_content/000808154.pdf

⁵⁷ MIC “Communications Usage Trend Survey” (survey at the end August 2021) covering enterprises with more than 100 full-time employees <https://www.soumu.go.jp/johotsusintokei/statistics/statistics05.html>

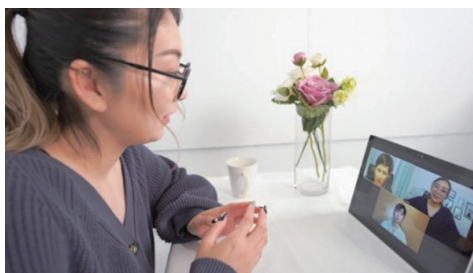
to a survey conducted by the Cabinet Office from April to May 2020, just after the declaration of a state of emergency, the ratio of elementary/junior-high school students receiving online education was 45.1% nationally and 69.2% in the 23 Wards of Tokyo.

In the medical field, considering the difficulties people faced in visiting medical institutions due to the spread of COVID-19, telephone and **online diagnosis and prescription** were made possible from initial examination as provisional/exceptional measures in April 2020. As a result, online medical care was available in 15.0% of all medical institutions as of the end of June

2021. Medication education over the phone or via information/communication equipment was also allowed, provided that pharmacists implemented it appropriately after obtaining information on the patient and their prescription situation.⁵⁸

In response to the increase in working from home and staying indoors, online events rapidly spread, such as online meetings and drinking parties using social media, teleconference systems (e.g., Zoom) and online concerts using video streaming platforms, etc. (**Figure 1-5-2-2**).

Figure 1-5-2-2 Online meeting



(Source) AC

As described above, ICT has come to fulfill a role as the “infrastructure of infrastructure” that supports all

social and economic activities, including education, medical care and labor.

⁵⁸ See Ministry of Health, Labour and Welfare, “Annual Report on Health, Labour and Welfare” Part 1, Chapter 1 Section 1 <https://www.mhlw.go.jp/stf/wp/hakusyo/kousei/20/index.html>