Overview of the 2022 White Paper on Information and Communications

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1. Introduction

The Ministry of Internal Affairs and Communications (MIC) has published the 2022 White Paper on Information and Communications in Japan in July this year. [in Japanese] This is the 50th edition since the first White Paper on Communications in Japan was published in 1973.

Part 1 deals with the changes in ICT and the digital economy, including the changes in systems, services, and technologies in the ICT sector over the past 50 years since the publication of the first White Paper on Communications. It also discusses the roles of ICT in the future. Part 2 describes the trends in the ICT market and in the use of digital technologies, as well as the trends in the ICT policies of the Ministry of Internal Affairs and Communications. The following is an overview of the contents of Parts 1 and 2.

The latest White Paper provides new data on trends in domestic and overseas markets for equipment, devices, services, and applications, as well as trends in the use of digital technologies in daily life, in corporate activities, and in the public sector, both in Japan and overseas. The White Paper is presented in concise text, with the data published on the MIC website as part of a collection of data (Figure 1).

Figure 1: Site of publication of data collection, Example: Section 1 of Chapter 3

[Data related to Section 1 of Chapter 3]
https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r04/html/nf301000.html

2. Part 1: Changes in the current environment since the publication of the first White Paper

In the 50 years since the publication of the first White Paper on Communications in Japan, ICT has become more sophisticated, and a variety of services have emerged. The main communication tool in 1973 was the subscriber telephone, and the means of communication while on the go was the pay phone, which is now replaced by the mobile phone. In addition, various communication tools such as e-mail and social media (SNS) are now in wide use.

In 1973, people watched videos through analogue terrestrial broadcasting on television. At present, satellite and cable TV broadcasting, as well as ultra-high-resolution 4K and 8K video are available. Internet video streaming services can now also be used to view videos on mobile devices.

ICT is now widely used in various areas of social and economic activities. In the corporate sector, cloud technology has enabled companies to share data and expand functions without having to build an in-house IT system. In disaster prevention and mitigation, sensors and drones can now be used to check on-site damage from a remote location. In the medical field, electrocardiogram data can now be transmitted from an ambulance to a cloud server so that they can be viewed at the hospital even before the ambulance arrives (Figure 2). In the field of education, the use of computers and tablets in classes under the GIGA School Program has now become widespread. In the agricultural sector, smart agriculture is making significant progress, such as in crop growth management using sensor information and pesticide spraying using drones.

Figure 2: New areas for ICT application

(Source) Chiba City Fire Department, Niigata City Konan Elementary School, Photo AC

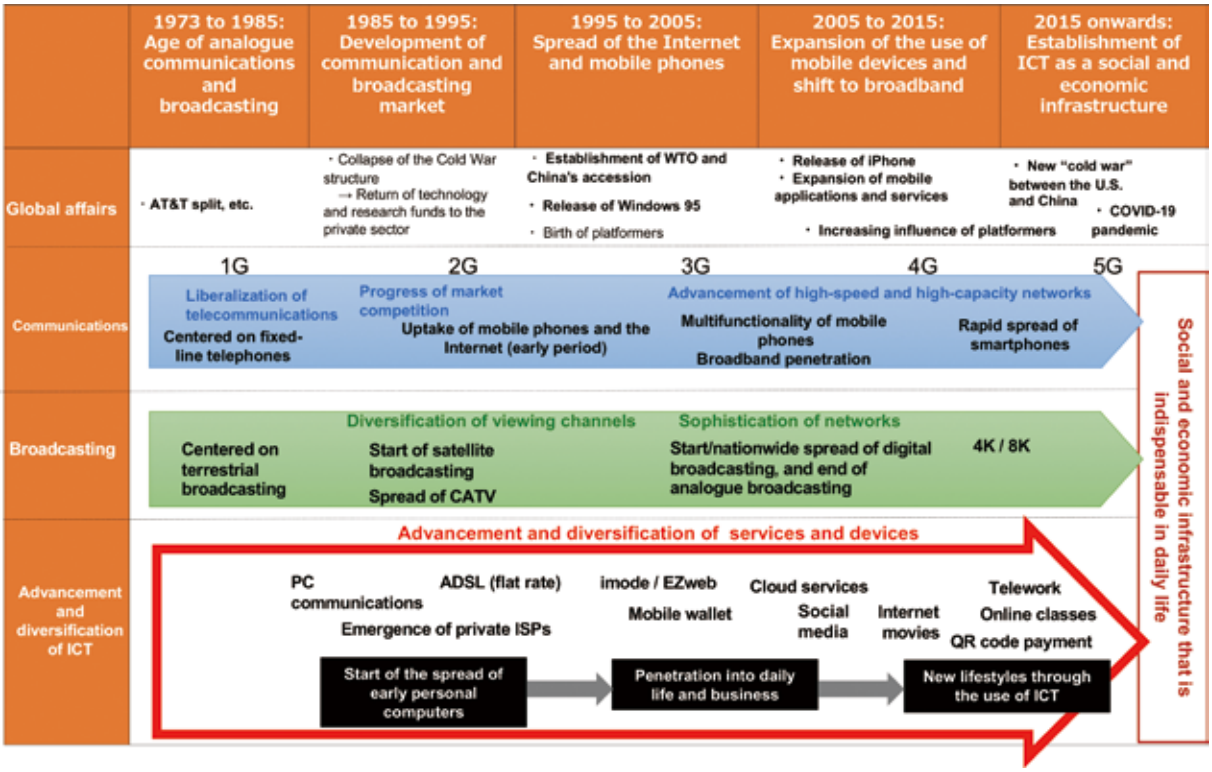
3. Part 1: Changes in the ICT sector over the past 50 years

From 1973 to 1985, as fixed-line telephones and television broadcasting became widespread, Nippon Telegraph and Telephone Public Corporation was privatized, introducing the principle of competition into the telecommunications market.

From 1985 to 1995, competition in the fixed and mobile communications markets progressed along with the spread of PC communications using character-based data communication. Services in the field of broadcasting diversified with the launch of BS and CS broadcasting.

From 1995 to 2005, significant progress was made in broadband and mobile communications in the field of telecommunications. With the uptake of the Internet, it became possible to view photos and images via the Web, and online businesses (e-commerce malls, portal sites, etc.) became prevalent. The number of mobile phone subscribers increased rapidly due to the lower rates brought about by the abolition of the fee authorization system in 1996. At the same time, however, negative aspects of the Internet, such as the spread of illegal and harmful

Figure 3: Changes in the ICT sector over the past 50 years

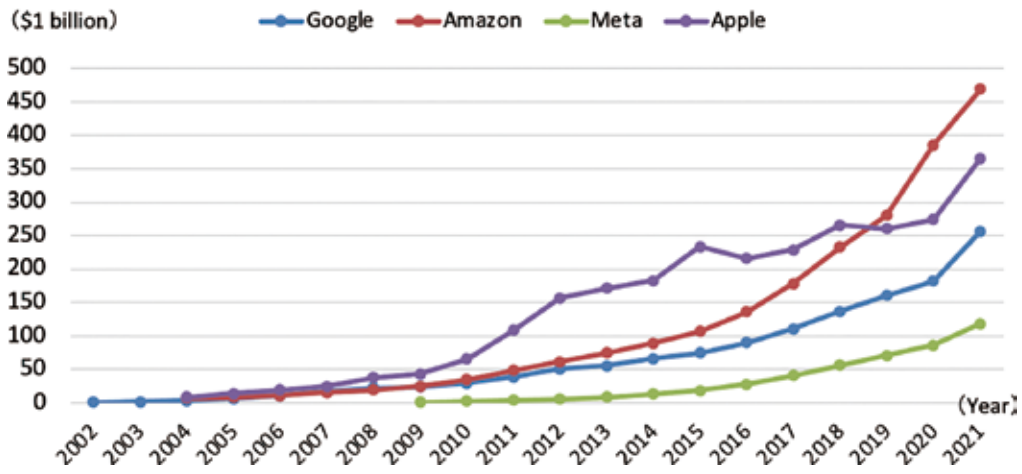


information, also became magnified, leading to reinforcement of institutional responses. Digitalization also made headway in the field of broadcasting, such as through the launch of digital terrestrial broadcasting in 2003.

Between 2005 and 2015, networks became more sophisticated, leading to the widespread adoption of FTTH for fixed-line communications and LTE for mobile communications. After the launch of the iPhone in Japan in 2008, smartphones became increasingly popular, and various services such as maps, social media, and search engines were provided as smartphone apps, leading to the wide use of mobile devices. Further, the Internet of Things (IoT), which connects everything from cars to home appliances to buildings and factories to the network, began to spread.

From 2015 to the present, the network has become even more sophisticated, eventually leading to the launch of 5G services in March 2020. Likewise, video streaming services, the sharing economy, drones, AI, and other ICT services have emerged, penetrating all areas of society. Meanwhile, the COVID-19 pandemic paved the way for further advancement in the use of ICT that enables contactless and non-face-to-face lifestyles, such as telework, online education, and online medicine. Thus, ICT has become the "infrastructure of infrastructures" that underpins all social and economic activities. In the midst of these developments, global platformers like GAFA have been gaining more market power (Figure 4), bringing to the fore issues pertaining to the oligopoly and handling data (see section (5) below).

Figure 4: GAFA sales trends



(Source)Prepared using data from Statista

4. Part 1: The Roles of ICT in the future

This part summarizes the roles of ICT in the future, as Japan continues to face various social and economic issues.

● **Improvement of labor productivity and labor participation rate**

Amid concerns of labor shortage due to a shrinking working-age population, labor productivity should be enhanced by improving work speed, accuracy, and the efficiency of work processes using AI. In addition, telework and other work arrangements will enable diverse and flexible working styles, leading to improvement in the labor participation rate.

● **Regional revitalization**

With concerns over shrinking regional economies due to the declining birthrate and aging population in the regions, the use of ICT should expand the trading area of regional companies beyond the constraints of time, place, and scale. Telework and other measures will also make it possible to work in a way that is not constrained by location. Residents can enjoy the same services as those in cities, such as through Internet shopping, online medicine, and online education, likely leading to an increase in the number of residents in the regions.

● **Collection and dissemination of information in the event of disasters**

Natural disasters are becoming more severe and frequent; but the use of ICT, such as sensors and drones, should enable disaster prevention and mitigation through the quick and efficient collection and provision of disaster-related information.

● **Maintenance and management of social infrastructures**

The aging of social infrastructures is progressing rapidly, e.g., the proportion of highway bridges that are more than 50 years old is seen to increase from 25% in 2018 to 63% in 2033. The use of ICT in monitoring and analysis operations should enable prolonging the life of social infrastructures and reducing costs for maintenance and management over the long term.

● **Contribution to the realization of a green society**

While global warming is predicted to worsen, Internet traffic is increasing along with the digitalization of society and economy, further increasing the power consumption by ICT equipment. Contributions to the realization of a green society are expected through "Green of ICT," i.e., the use of new technologies to reduce the power consumption of ICT equipment, as well as through "Green by ICT," i.e., the use of ICT to improve work efficiency and reduce the movement of people and goods in society as a whole.

5. Part 1: Responding to emerging social issues

Certain issues have already become apparent with the spread of ICT in social and economic activities. The White Paper highlights three of these issues and summarizes the current initiatives to addresses them.

● **Responding to risks associated with changes in the international environment**

In the midst of the race for technological supremacy between the United States and China, the global situation is becoming more complex as countries around the world are implementing initiatives with an awareness of the relationship between economic activity and security (economic security), mainly in the high-tech sector, as a real-world policy theme.

Under these circumstances, it is important for Japan to strengthen telecommunication networks and the supply chain for ICT-related equipment and components and to ensure the stable supply of ICT services. In May 2022, Japan enacted the Economic Security Promotion Act centered on four pillars: (1) ensuring stable supply of key products, (2) ensuring stable provision of essential infrastructure services, (3) enhancing development of advanced critical technologies, and (4) non-disclosure of selected patent applications. Likewise, in June 2022, the Ministry of Internal Affairs and Communications formulated a new technology strategy to accelerate research and development through intensive national investment in the development of world-leading advanced technologies, such as all-optical network technology, non-terrestrial network technology, and secure virtualization and integrated network technology.

● **Data governance**

Data analysis has become widespread, and global platformers are collecting, analyzing, and utilizing user data, raising concerns about the oligopoly and handling of data. Specifically, there is growing concern that certain companies will use data to control people's behavior and preferences.

In response to the increasing economic value of data, in June 2021, the Cabinet of Japan approved the "Comprehensive Data Strategy" for the effective and appropriate use of data. In addition, in June 2022, the revised Telecommunications Business Act was enacted to require telecommunications carriers, which have a significant impact on the interests of users, to formulate and report rules on the handling of information that they acquire from users.

● **Measures against illegal and harmful information**

With the spread of social media, video streaming, and other Internet services, the distribution of illegal and harmful information, including defamatory statements and contents that infringe on intellectual property rights, and false information has become a problem.

Japan, therefore, has implemented institutional measures such as the revision of the Provider Liability limitation Act (the amended Act was enacted in April 2021), which includes the creation of a new judicial process (non-contentious case procedure system) for the disclosure of sender information. Moreover, various stakeholders in the private sector are promoting different initiatives to improve user ICT literacy, establish consultation desks, and promote fact-checking.

6. Part 2: Trends in the ICT market and in digital utilization

ICT includes terminals and equipment that serve as points of contact for users, networks provided by telecommunications carriers and broadcasters, cloud and data centers, content and services such as video and music distribution, as well as security and AI services (Figure 5). The following is an overview of the trends in the ICT market and in digital utilization

● Overview of Japan's ICT Industry (2020)

- Nominal GDP of the information and telecommunications industry was 51.0 trillion yen (down 2.5% year-on-year).
- Value of exports of ICT goods and services (nominal value) was 10.6 trillion yen (13.7% of total exports), and value of imports (nominal value) was 16.8 trillion yen (18.4% of total imports).

● Telecommunications business

- Net sales of the Japanese telecommunications industry in FY2020 were 15.2405 trillion yen (up 2.5% year-on-year).
- The COVID-19 pandemic has led to the rapid increase of Internet traffic in Japan.

● Broadcasting and content

- Net sales for all Japanese broadcasters in FY2020 were 3.5522 trillion yen (down 8.1% year-on-year)
- In Japan, Internet advertising (2.7052 trillion yen) surpassed the four major types of advertising media (2.4538 trillion yen) for the first time in 2021.

● Usage status of radio waves

- The number of radio stations in Japan increased 2.3 times from 120.99 million stations at the end of FY2010 to 277.11 million stations at the end of FY2020.
- As of the end of FY2020, the 5G infrastructure deployment rate was 16.5%, and the number of 5G base stations was approximately 210,000.

● Terminals, equipment, etc.

- In 2021, production value of network equipment in Japan was 774.3 billion yen (down 0.5% year-on-year), and shipment value of semiconductors was 741.2 billion yen (up 29.6% year-on-year).
- Value of Japan's exports of ICT equipment in 2020 was 6.0871 trillion yen, and value of imports was 9.5804 trillion yen, pointing to an excess of imports at 3.4932 trillion yen.

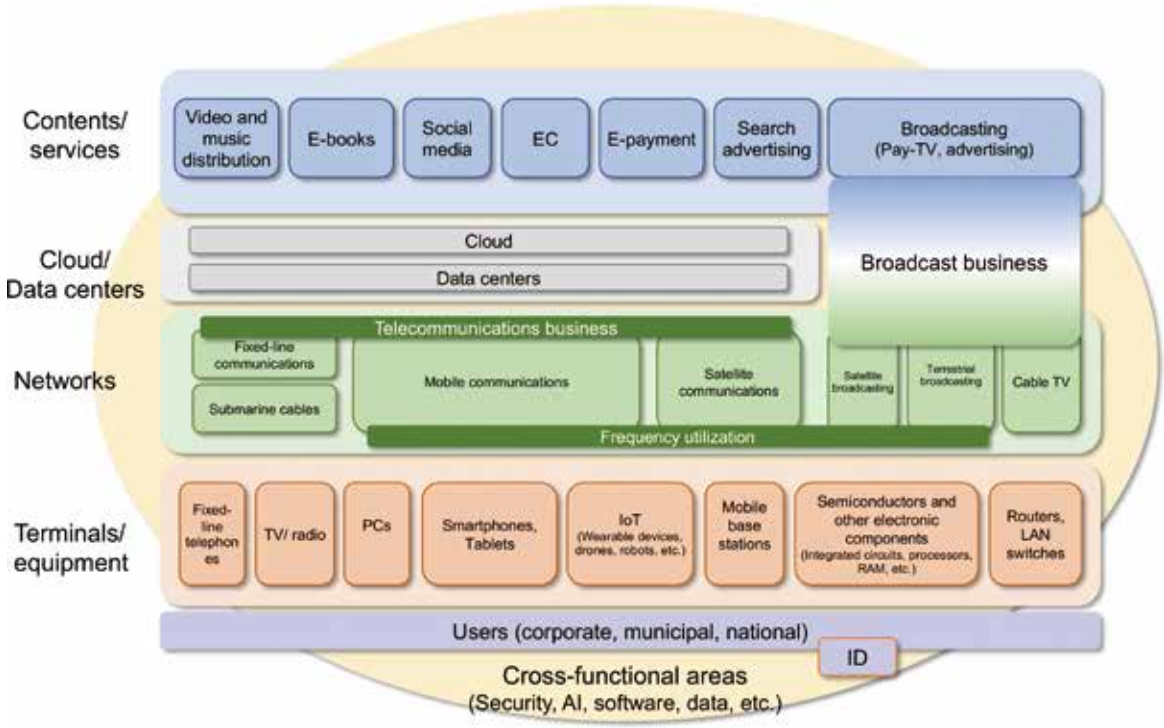
● Services and applications

- The data center service market scale in Japan in 2021 was 1.7341 trillion yen (up 11.6% year-on-year)[*1].
- The public cloud service market scale in Japan in 2021 was 1.5879 trillion yen (up 28.5% year-on-year)[*2].

● Cybersecurity

- The volume of cyber-attack-related communications reported on NICTER in 2021 was approximately 518 billion packets (down 9.2% year-on-year).
- In 2020, foreign-affiliated companies accounted for more than 50% of the total sales of domestic information security products by vendor[*3].

Figure 5: Market structure surrounding ICT by layer



＊1 to 3 Source: IDC Japan

● **Digital utilization (daily life, corporate activities, public sector)**

・In 2021, 74.3% of individuals owned smartphones (up 5 points year-on-year).

・The Internet usage rate was over 90% for all age groups between 13 and 59, with the usage rate decreasing at age 60 and higher.

● **Postal service and correspondence delivery service**

・Consolidated financial results of Japan Post Holdings for FY2021 reported ordinary revenues of approximately 11.3 trillion yen (down 3.9% year-on-year) and net income of 501.6 billion yen (up 19.9% year-on-year).

7. Part 2: Trends in ICT Policies of the Ministry of Internal Affairs and Communications

The Ministry of Internal Affairs and Communications is implementing cross-cutting initiatives within the ministry as well as initiatives in various policy areas (telecommunications, radio waves, broadcasting, etc.) as part of its ICT policies, and the status of such efforts is described in the White Paper. The following is an overview of these cross-cutting initiatives.

● **Initiatives to promote the Realization of the Vision for a Digital Garden City Nation**

To promote regional revitalization through digital implementation, in November 2021, Japan established the Council for the Realization of the Vision for a Digital Garden City Nation, with the Prime Minister as Chair. In November 2021, the Ministry of Internal Affairs and Communications established the Headquarters for the Promotion of the Vision for a Digital Garden City Nation, headed by the Minister of Internal Affairs and Communications. Initiatives are being promoted around the three pillars of "digital infrastructure development," "fostering and securing digital human resources/ ensuring that no one is left behind" and "digital implementation to resolve regional issues." (Figure 6).

● **Inquiry on information and communications policy with a view to 2030**

The Ministry of Internal Affairs and Communications sent an inquiry to the Information and Communications Council on the "state of information and communications policy with a view to 2030." In response, the Council conducted an investigative study aimed at realizing Society 5.0 and ensuring economic security. The Council's report (June 2022) outlines the directions of initiatives to ensure strategic autonomy and to acquire strategic indispensability of the information and telecommunications industry. It also presents the eight areas to focus on, such as the (1) uptake, sophistication, and overseas expansion of 5G, and (2) and expansion of broadband services.

Figure 6: Towards the realization of the Vision for a Digital Garden City Nation