

Chapter 4

Basic Data on the ICT Field

Section 1 ICT industry trends

1. Economic size of the ICT industry

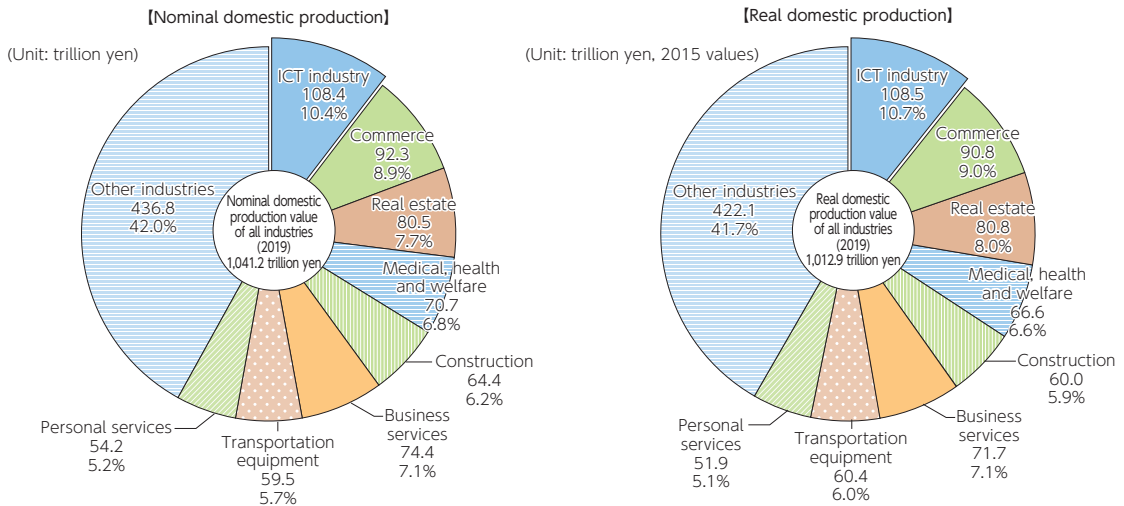
(1) Domestic production value

- ICT industry's production value was 108.4 trillion yen, making it the largest industry

The ICT industry's nominal domestic production value in 2019 was 108.4 trillion yen, accounting for 10.4 percent of all industries and making it the largest industry in the country (Figure 4-1-1-1). It had reached 120.4 trillion yen in 2000, however, its production value cooled off

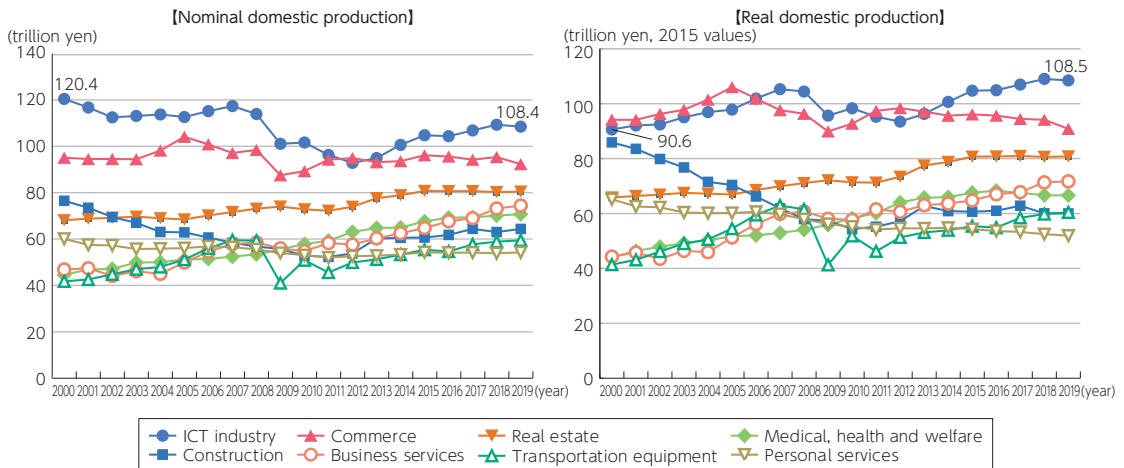
for several years in response to the collapse of the IT bubble. The industry started growing again in 2005 and reached 117.3 trillion yen in 2007, but its production value plummeted to 101.1 trillion yen in 2009 due to the 2008-2009 global financial crisis. Even after 2010 it continued to slide, dropping to 92.8 trillion yen in 2012. However, since 2013 signs of recovery finally started to appear to be 108.4 trillion yen in 2019 (Figure 4-1-1-2).

Figure 4-1-1-1 Domestic production values of major industries (based on nominal and real) (breakdown) (2019)



(Source) MIC (2021) "Study on Economic Analysis of ICT"

Figure 4-1-1-2 Changes in domestic production values of major industries (based on nominal and real)



(Source) MIC (2021) "Study on Economic Analysis of ICT"

In 2019 the ICT industry's real domestic production value based on constant 2015 values was 108.5 trillion yen and accounted for 10.7% of all industries. In contrast to the nominal values, it has increased since 2000 and reached 105.3 trillion yen in 2007. It decreased to 93.5 trillion yen in 2012, but signs of recovery could be seen from 2013 (Figure 4-1-1-2).

(2) Gross Domestic Product (GDP)

- The nominal GDP of the ICT industry in 2019 was 51.7 trillion yen and accounted for 9.4 percent of all industries

The nominal GDP of the ICT industry fell in 2019 by 0.1 percent year-on-year to 51.7 trillion yen. Looking at the size of nominal GDP of the main industries shows that the ICT industry's nominal GDP accounts for 9.4 percent of the combined nominal GDPs of all industries and is the third largest after the commerce and real estate industries. Real GDP according to constant 2015 values accounted for 9.9% of the real GDP of all industries (Figure 4-1-1-3).

Looking at the growth rate in 2018-2019, ICT industry rose by 0.9% year-on-year, and is the fourth highest after

medical, health and welfare (2.4%), business services (1.4%) and personal services (1.1%) industries (Figure 4-1-1-4).

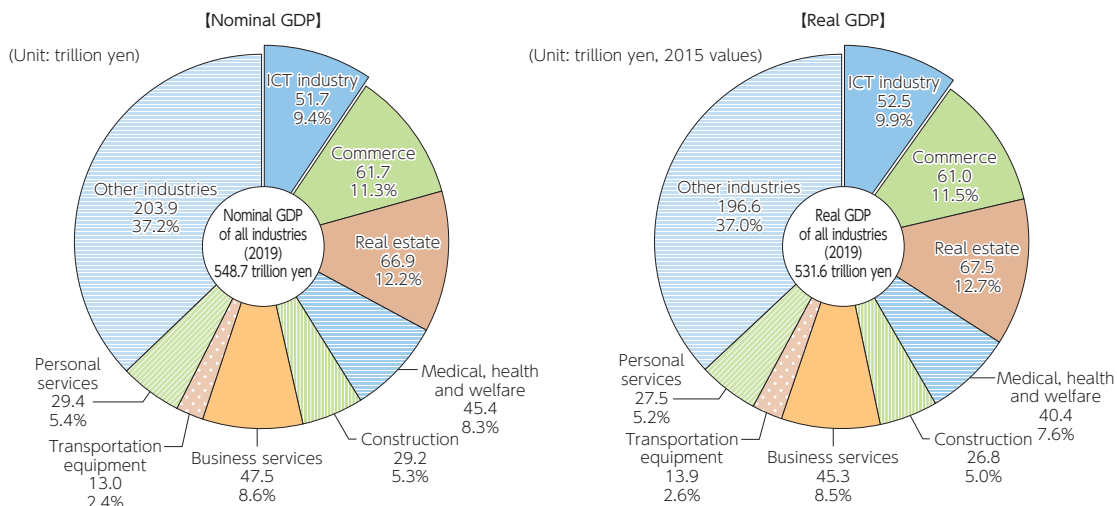
Similar to the nominal domestic production value, the nominal GDP of the ICT-related manufacturing and ICT-related construction industries has been decreasing. On the other hand, the Internet-related services industry has grown rapidly.

(3) Employment

- ICT industry employment totaled 4.058 million in 2019 and accounted for 5.6 percent of total employment in all industries, which is a 16.5% decrease from 2000

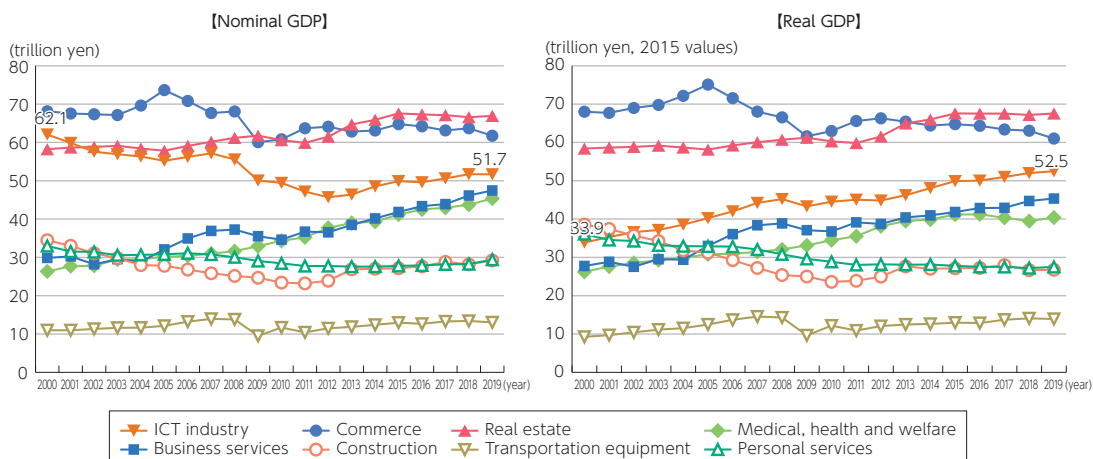
The ICT industry employed 4.058 million people in 2019 (±0.0 percent from the previous year), and accounted for 5.6 percent of total employment in all industries. Compared with 2018, Internet-related services (up by 6.7 percent from the previous year), ICT-related services (up by 2.5 percent from the previous year) and research (up by 0.6 percent from the previous year) were steadily growing. However, video, audio and text information production (down by 4.6 percent from the previ-

Figure 4-1-1-3 GDP of major industries (based on nominal and real)



(Source) MIC (2021) "Study on Economic Analysis of ICT"

Figure 4-1-1-4 Changes in GDP of major industries (based on nominal and real)

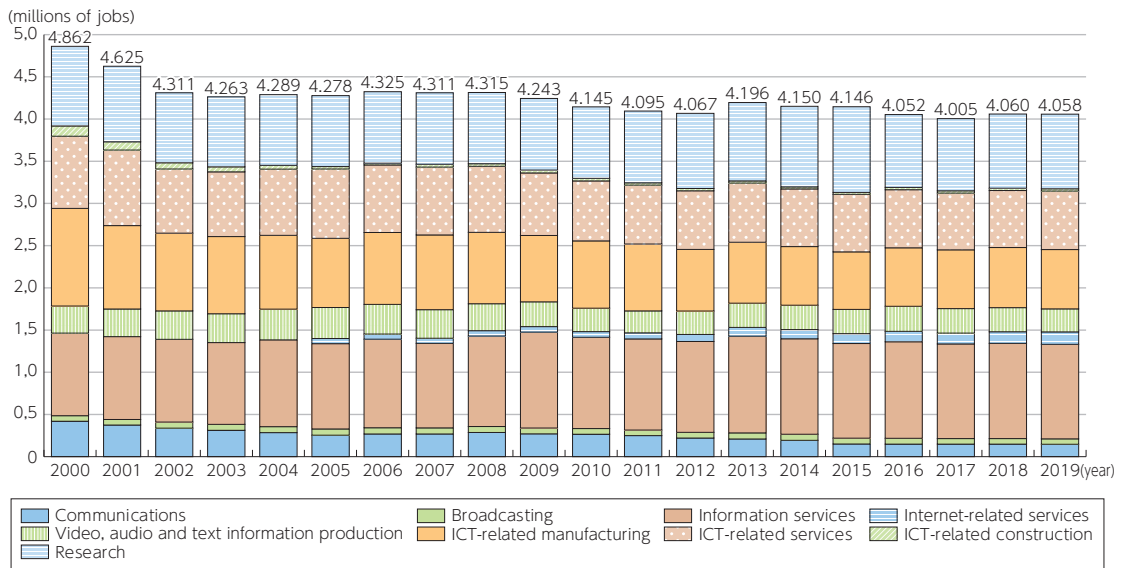


(Source) MIC (2021) "Study on Economic Analysis of ICT"

ous year), communications (down by 1.5 percent from the previous year) and ICT-related manufacturing (down

by 1.4 percent from the previous year) decreased (Figure 4-1-1-5).

Figure 4-1-1-5 Changes in employment in the ICT industry



(Source) MIC (2021) "Study on Economic Analysis of ICT"

2. ICT industry contributions to the national economy

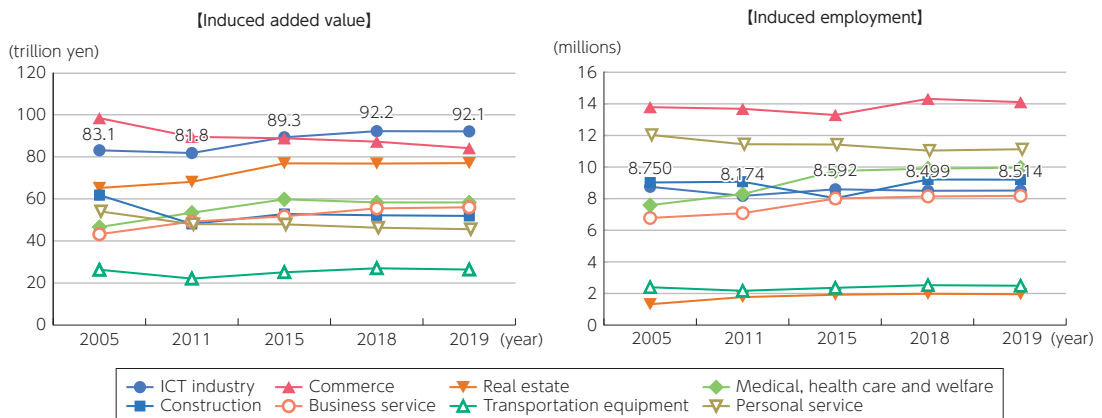
(1) ICT industry's economic spillover effects

- The scale of economic spillover effects caused by the ICT industry is one of the largest in all industries in terms of induced added value

When different industries make intermediate inputs to the production activities of the ICT industry, this generates added value (e.g. operating surplus and employee compensation) and employment in those industries. The economic spillover effects¹ of the ICT industry were es-

timated to be 92.1 trillion yen in induced added value, and 8.514 million in induced employment. ICT industry shows the largest economic spillover effect in terms of induced added value, and also shows higher inducement in jobs than the transportation equipment industry (2.490 million jobs), which is recognized as one of broad industries (Figure 4-1-2-1).

Figure 4-1-2-1 Changes in economic spillover effects (induced added value and induced employment) from major industries' production activities



(Source) MIC (2021) "Study on Economic Analysis of ICT"

¹ There are two methods of calculating economic spillover effects: (1) calculating the economic spillover effects for all Japan's industries brought about by each industry sector's final demand, focusing on the goods and services that constitute the industry sector's final demand and (2) calculating the economic spillover effects for all Japan's industries brought about by each industry sector's production activities (total of final demand and intermediate demand), focusing on the industry sector itself. The latter method was used here.

3. Exports and imports in the ICT field

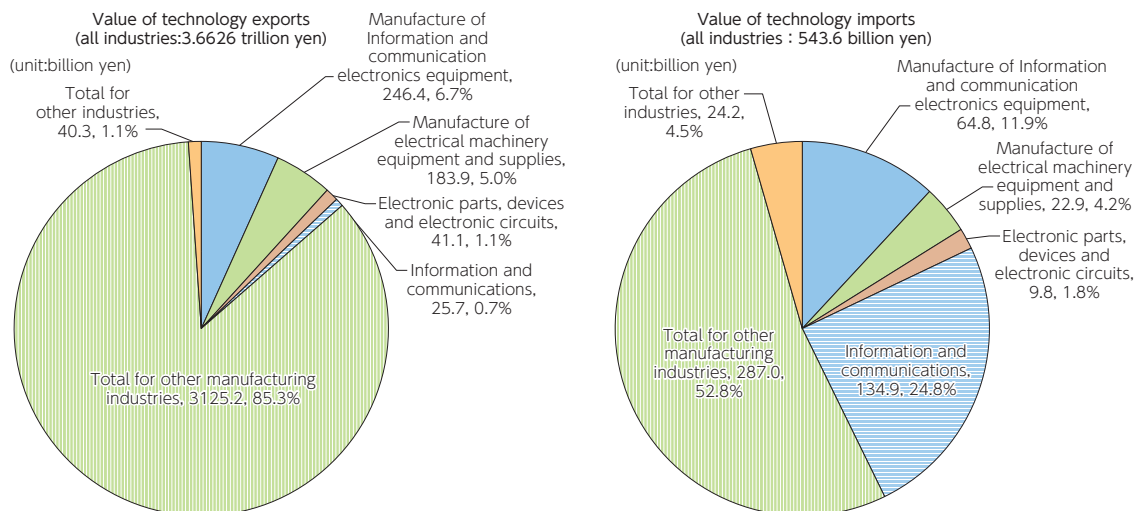
(1) Technology balance of payments

- The ICT industry posted a surplus in technology exports² in FY 2019

The receipts from Japan's technology exports in FY 2019 totaled 3.6626 trillion yen, to which the ICT industry contributed 497.1 billion yen, or 13.6 percent. On the other hand, the payments from technology imports was 543.6 billion yen, of which 232.4 billion yen came out of the ICT industry, or 42.7 percent. While the balance of

payments, together with the ICT industry, posted export surplus, in the breakdown, the information and communications posted import surplus. Manufacture of information and communication electronics equipment sector accounted for the largest share of the ICT industry's technology exports, while information and communications sector accounted for the largest of share of imports (Figure 4-1-3-1).

Figure 4-1-3-1 Technology exports and imports by industry (FY 2019)



(Source) Prepared from MIC "Survey of Research and Development"

4. Research and development in the ICT field

(1) Research and development spending

- The ICT industry³ spent 3.8571 trillion yen on research in FY 2019, accounting for 27.1 percent of all enterprise research expenditure

According to the "Survey of Research and Development", Japan's total scientific and technological research expenditure (i.e., research spending) in FY 2019 stood at 19.5757 trillion yen (the combined research spending by enterprises, nonprofit organizations, public agencies, universities, etc.).

Enterprise research expenditure, which accounts for about 70 percent of all research expenditure, was 14.2121 trillion yen. Of this amount, 3.8571 trillion yen (27.1 percent) was spent on research by the ICT industry. Manufacture of electrical machinery, equipment and supplies sector was the largest research spender in the

ICT industry (Figure 4-1-4-1).

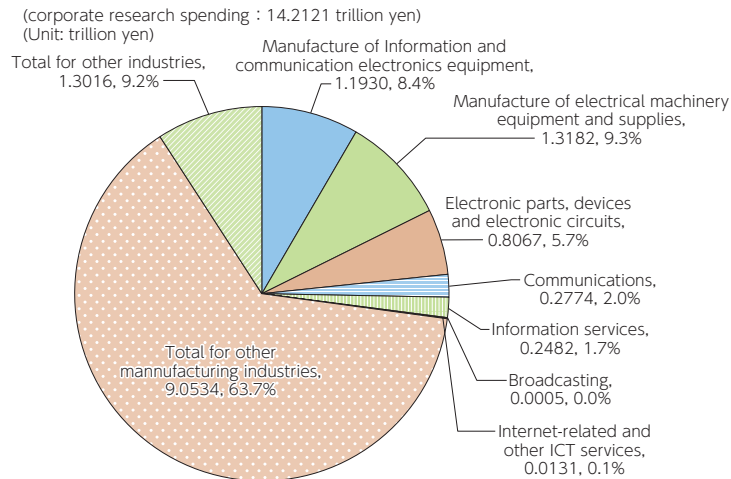
(2) Number of researchers

- The ICT industry employed 174,277 researchers, or 34.3 percent of all enterprise researchers in Japan

There were 880,954 researchers in Japan as of March 31, 2020 (the total of all researchers at enterprises, nonprofit organizations, public agencies, universities, etc.). 174,277 people (34.3 percent of all enterprise researchers) out of 507,473 enterprise researchers (about 58 percent of all researchers) are in the ICT industry. The manufacture of information and communication electronics equipment sector had the most researchers in ICT industry sector (Figure 4-1-4-2).

² The value of technology trade is the equivalent value received from the provision (export) of patents, knowledge, technical direction, and other forms of technology transfers to other countries or the equivalent value paid the reception (import) of the same forms of technology transfers from other countries.

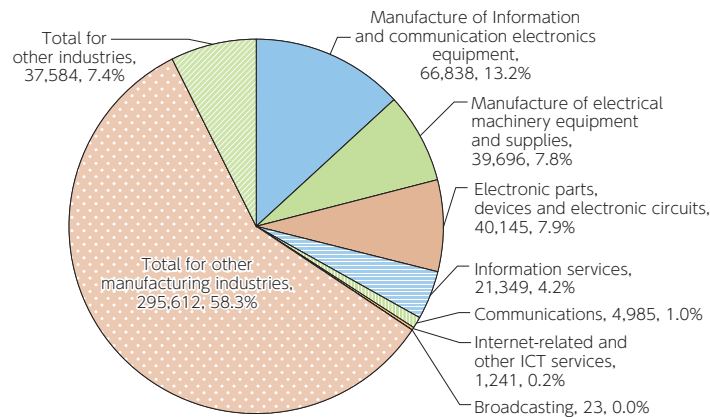
³ ICT industry here refers to the manufacture of information and communication electronics equipment segment, the manufacture of electrical machinery, equipment and supplies segment, the electronic parts devices, and electronic circuits segment, and the information and communications segment (including information services, communications, broadcasting, Internet-related services, and other ICT sectors).

Figure 4-1-4-1 Breakdown of corporate research expenditure by main industries (FY 2019)

(Source) Prepared from MIC "Survey of Research and Development"

Figure 4-1-4-2 Enterprise researchers by industry (as of March 31, 2020)

(corporate researchers in all industries : 507,473)
(unit:people)



(Source) Prepared from MIC "Survey of Research and Development"

5. State of ICT enterprise operations

The Basic Survey on the Information and Communications Industry is a general statistical survey (started in 2010) that MIC and the Ministry of Economy, Trade and Industry jointly conduct under the Statistics Act (Law No. 53 of 2007) to clarify the operations of enterprises belonging to the ICT industry — a Large Category G in the Japan Standard Industry Classification — and to obtain basic data for ICT industry policies. The following sections provide an overview of the 2020 survey that pertains to enterprises operations.

(1) Summary of enterprises engaging in ICT business operations (activity-base results)

a. General summary of the survey results

- 5,714 enterprises were engaged in ICT business operations with sales in excess of 50 trillion yen

Sales attributed to ICT business operations in FY 2019 totaled 51.6459 trillion yen (total sales by all enterprises were 70.3384 trillion yen). By sector, the telecommunications sector accounted for 34.0 percent of all sales (down by 0.6 percentage points from the previous year),

the computer programming and other software services sector 31.6 percent (up by 1.2 percentage points from the previous year) (Figure 4-1-5-1).

The number of enterprises engaging in ICT business operations (irrespective of whether ICT business operations are the enterprise's mainstay operations) stood at 5,714. Operating profits were 6.3194 trillion yen, ordinary income was 7.0269 trillion yen, and the enterprises held 10,118 subsidiaries and associated companies.

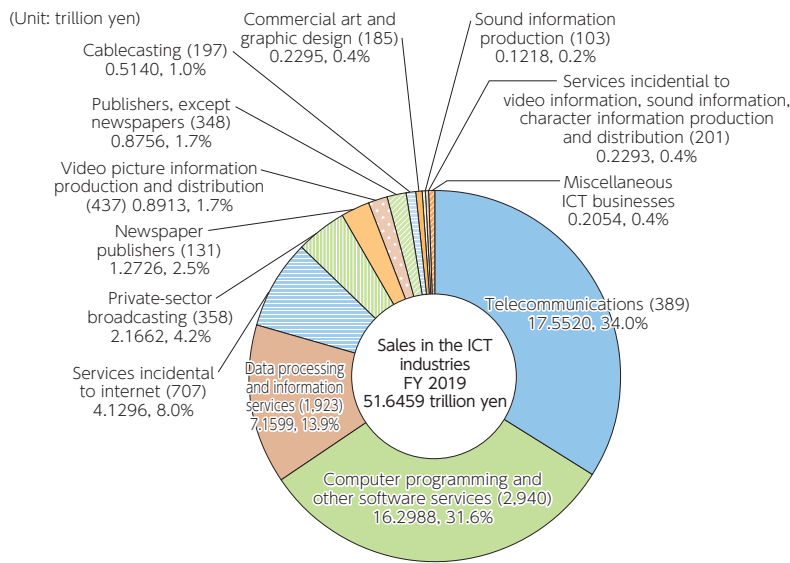
b. Breakdown of sales

- Enterprises capitalized at less than 100 million yen accounted for more than 60 percent of all enterprises in 8 out of 12 ICT industry sectors

A breakdown of ICT industry enterprises by capital size reveals that enterprises capitalized at less than 100 million yen accounted for more than 60 percent of all enterprises in 8 out of 12 ICT industry sectors. Of particular note are the sectors in video picture information production and distribution, sound information production, commercial art and graphic design where enterprises capitalized at less than 50 million yen accounted

for more than 40 percent of all enterprises in each respective sector (Figure 4-1-5-2).

Figure 4-1-5-1 ICT industry sales



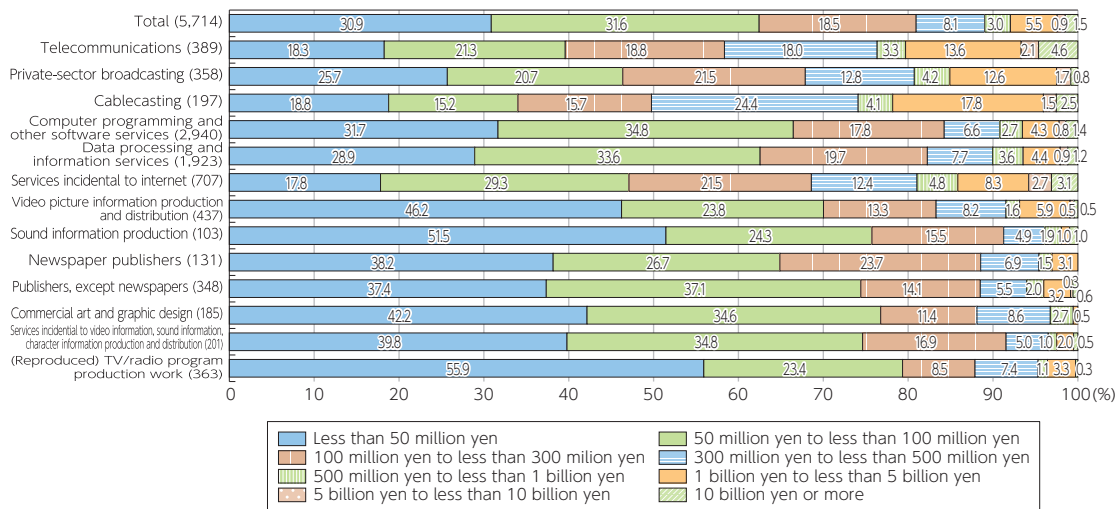
(Notes)

* 1 Figures in parentheses are the number of companies.

* 2 "Miscellaneous ICT businesses" refers to enterprises that selected "other" as the primary business in the breakdown for sales attributable to ICT business operations.

(Source) MIC / METI "2020 Basic Survey on the Information and Communications Industry"

Figure 4-1-5-2 Breakdown of ICT industry enterprises by capital size



(Source) MIC / METI "2020 Basic Survey on the Information and Communications Industry"

6. Telecommunication market trends

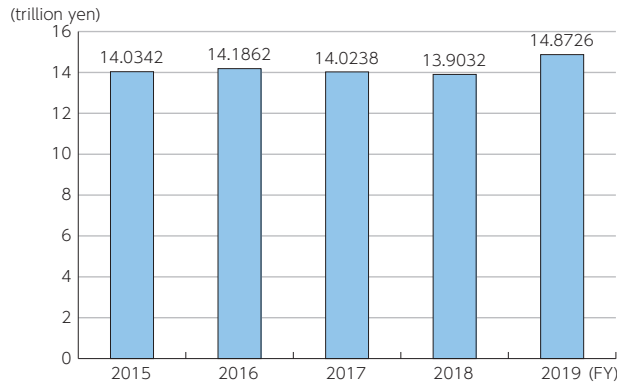
(1) Market size

- Sales is increasing in the telecommunications sector, while, by service category, the data transmission services accounted for approximately 50 percent of share

Sales in the telecommunications sector in FY 2019 (Figure 4-1-6-1) were 14.8726 trillion yen (an increase of 7.0 percent from the previous year). Fixed line commu-

nications accounted for 28.5 percent, and mobile communications for 49.9 percent, of all sales in FY 2019 (Figure 4-1-6-2). Looking at sales by service category shows that voice transmission services accounted for 29.2 percent and data transmission services for 49.3 percent (Figure 4-1-6-3).

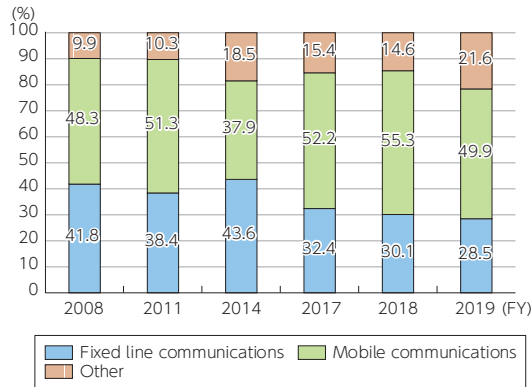
Figure 4-1-6-1 Changes in telecommunications sector sales



(Note) Comparisons must be made with caution, as sales represent a simple sum of figures from all responding carriers and the number of responding carriers differs from year to year.

(Source) Prepared from MIC / METI "Basic Survey on the Information and Communications Industry"

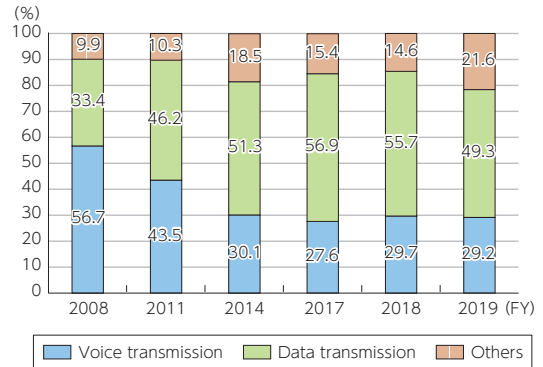
Figure 4-1-6-2 Changes in telecom carriers' sales breakdown by fixed-line communications and mobile communications



(Note) Calculating excluding sales breakdown "Unknown".

(Source) Prepared from MIC / METI "Basic Survey on the Information and Communications Industry"

Figure 4-1-6-3 Changes in telecom carriers' sales breakdown by voice transmission and data transmission



(Note) Calculating excluding sales breakdown "Unknown".

(Source) Prepared from MIC / METI "Basic Survey on the Information and Communications Industry"

7. Broadcasting market trends

(1) Size of the broadcasting market

a. Broadcaster sales

- Broadcaster sales totaled 3.8643 trillion yen in FY 2019

Japanese broadcasters are divided into two categories: Japan Broadcasting Corp., a public broadcaster known as NHK, which depends on receiving fee revenues, and private broadcasters that depend on advertisements or paid programming. Aside from these two categories, the Open University of Japan also provides broadcasting services for educational purposes.

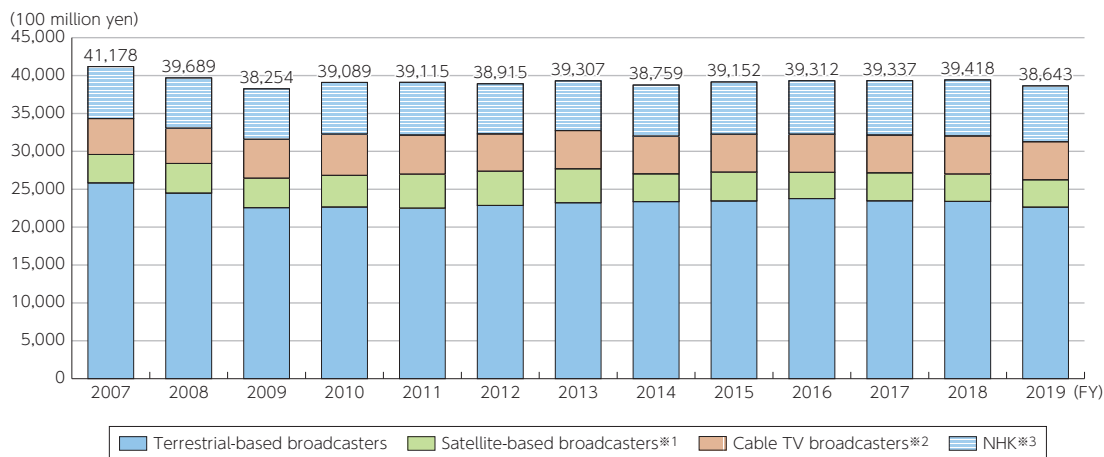
Sales for the entire broadcasting sector, including revenues from broadcasting and non-broadcasting operations, decreased from FY 2018 to 3.8643 trillion yen (down by 2.0 percent from the previous year) in FY

2019.

By category, terrestrial-based private broadcasters' sales were 2.2640 trillion yen (down by 3.2 percent from the previous year), satellite-based private broadcasters' sales were 362.3 billion yen (up by 0.1 percent from the previous year), and cable TV broadcasters' sales were 500.8 billion yen (down by 0.4 percent from the previous year). NHK's ordinary operating income was 737.2 billion yen (± 0 percent from the previous year).

In terms of market share, terrestrial-based private broadcasters accounted for 72.4 percent (down by 0.6 percentage points) of private broadcasters' sales (Figure 4-1-7-1).

Figure 4-1-7-1 Changes in and breakdown of the broadcasting sector market size (total sales)



fiscal year		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
private broadcaster	Terrestrial-based broadcasters	25,847	24,493	22,574	22,655	22,502	22,870	23,216	23,375	23,461	23,773	23,471	23,396	22,640
	Community broadcasters included in total above *4	148	150	123	116	120	115	124	127	126	136	136	143	145
	Satellite-based broadcasters *1	3,737	3,905	3,887	4,185	4,490	4,510	4,491	3,661	3,809	3,463	3,697	3,619	3,623
	Cable TV broadcasters *2	4,746	4,667	5,134	5,437	5,177	4,931	5,030	4,975	5,003	5,031	4,992	5,030	5,008
NHK *3	6,848	6,624	6,659	6,812	6,946	6,604	6,570	6,748	6,879	7,045	7,177	7,373	7,372	
total	41,178	39,689	38,254	39,089	39,115	38,915	39,307	38,759	39,152	39,312	39,337	39,418	38,643	

(Notes)

* 1 Calculated from operating revenues of satellite-based broadcasting services.

* 2 Cable TV broadcasters until FY 2010 were business enterprises providing independent broadcasting services with facilities licensed under the former licensing scheme under the former Act on Cable Television Broadcasting. (Note that facilities registered under the former Act on Broadcast on Telecommunications Services included those that use the same broadcasting method as facilities licensed under the former licensing scheme). From FY 2011 onwards, cable TV broadcasters were registered general broadcasting enterprises with wired telecommunication facilities providing independent broadcasting services (Both exclude business operators using IP multicasts).

* 3 Figures for NHK represent ordinary operating income.

* 4 Community broadcasting operators that also provide cable TV broadcasting services are excluded.

(Source) Prepared from MIC materials and NHK financial statements for each fiscal year

8. Content market trends

(1) Size of Japan's content market

- The Japanese content market was valued at 11.9552 trillion yen, nearly 60 percent of which was attributable to video content, about 35 percent to text-based content, and about 7 percent to audio-based content

The Japanese content market was valued at 11.9552

trillion yen in 2019. By content segment, video content accounted for nearly 60 percent of the market, text-based content, 35 percent, and audio-based content, 7 percent⁴ (Figure 4-1-8-1).

The overall size of the content market has gradually

⁴ The market size was measured and analyzed not by media types, but by assessing the primary nature of the content works and recalculating the value at each distribution level, such as primary distribution or multi-use.

been increasing. The size of each content segment shows that, though the video content segment expanded while the text-based content segment contracted recently, from 2018 to 2019, all sectors stayed flat (Figure 4-1-8-2).

(2) Trends in the online content market

- The market for online content, which is consumed via the Internet on computers and mobile phones, was 4.2868 trillion yen, accounting for 35.9 percent of the entire content market

Within the overall content market, the market for online content, which is consumed via the Internet on computers and mobile phones, reached 4.2868 trillion yen. By content segment, the video content segment accounted for 61.8 percent of the online content market, the text-based content segment accounted for 28.5 percent, and the audio-based content segment had 9.7 percent (Figure 4-1-8-3).

The online content market has been growing steadily. The market size by content segment shows that the vid-

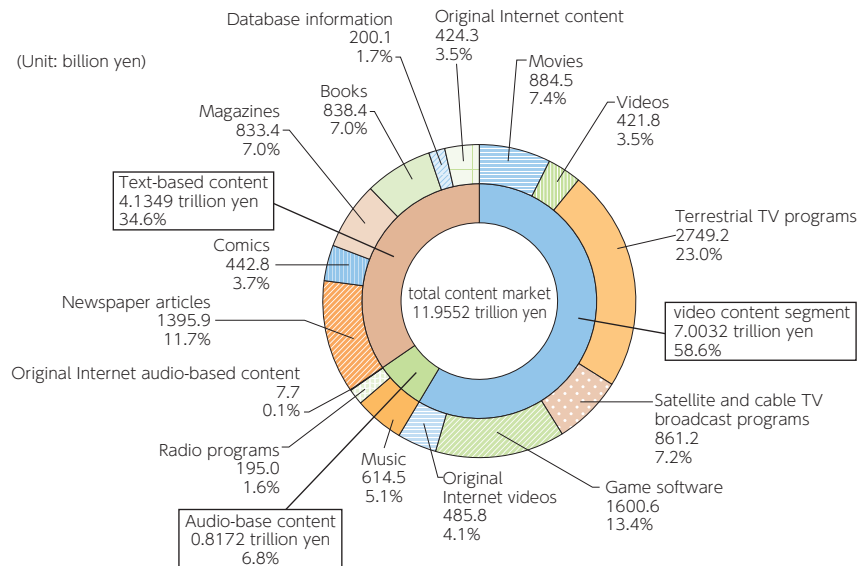
eo content segment has been increasing because of the increase in the movies and original internet contents, which drives the expansion of the online content market (Figure 4-1-8-4).

(3) Trends in the broadcast content market

- The export value of Japanese broadcast content was 52.95 billion yen in FY 2019

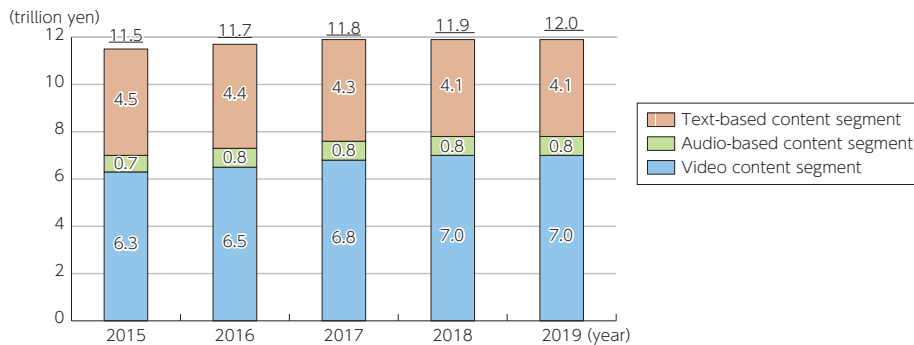
The export value of Japanese broadcast content in FY 2019 was 52.95 billion yen (Figure 4-1-8-5). Looking at the composition of the export value of Japanese broadcast content, the total of program broadcast rights, Internet distribution rights, and commercialization rights account for more than 90 percent. Especially, export value of commercialization rights have shown significant growth. The export value of program broadcasting rights includes cases in which program broadcasting rights and Internet distribution rights are sold as a set, so Internet distribution has a high impact on the overall exports (Figure 4-1-8-6).

Figure 4-1-8-1 Breakdown of Japan's content market (2019)



(Source) Institute for Information and Communications Policy, MIC "Survey on the Production and Distribution of Media Content"

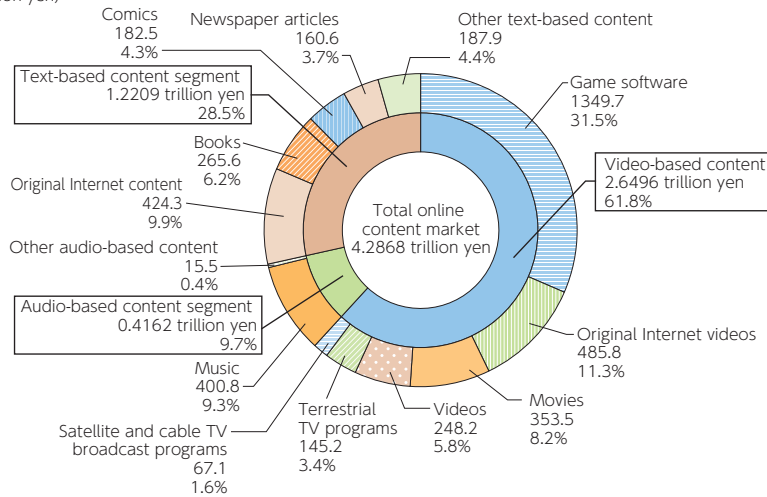
Figure 4-1-8-2 Changes in Japan's content market size (by content segment)



(Source) Institute for Information and Communications Policy, MIC "Survey on the Production and Distribution of Media Content"

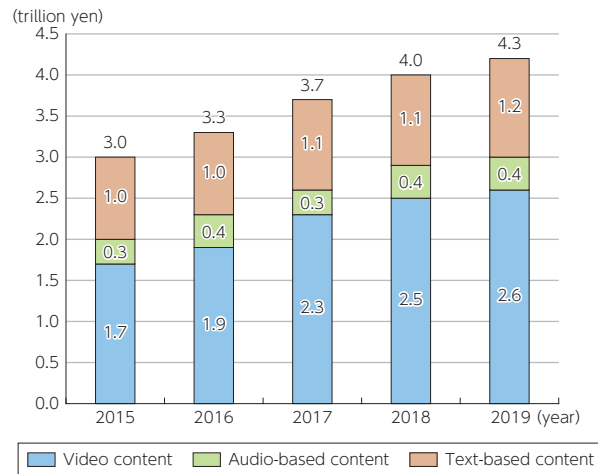
Figure 4-1-8-3 Breakdown of the online content market (2019)

(Unit: billion yen)



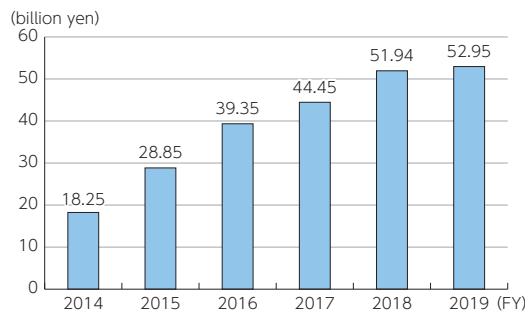
(Source) Institute for Information and Communications Policy, MIC "Survey on the Production and Distribution of Media Content"

Figure 4-1-8-4 Changes in the online content market size (by content segment)



(Source) Institute for Information and Communications Policy, MIC "Survey on the Production and Distribution of Media Content"

Figure 4-1-8-5 Changes in Export value of Japanese broadcast content

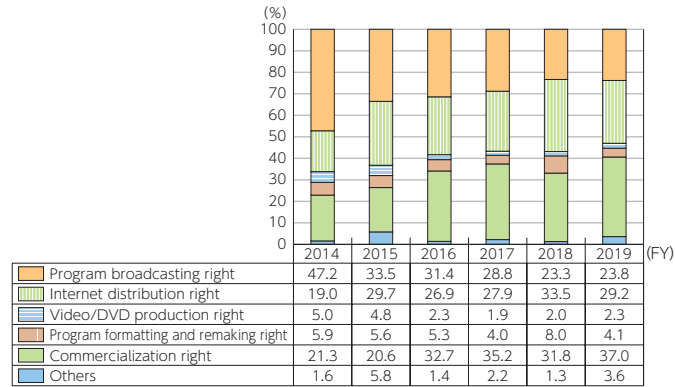


(Notes)

- * 1 Export value of broadcast content: program broadcasting rights, Internet distribution rights, video/DVD production rights, program formatting and remaking rights, commercialization rights, and similar rights.
- * 2 Calculated based on questionnaire responses from NHK, main commercial broadcast stations, producers, sub-main commercial broadcast stations in Osaka, local stations and satellite broadcasting stations.
- * 3 Calculations for FY 2016 and later include digital gaming rights.

(Source) Prepared from MIC "Survey on the State of Overseas Expansion of Broadcast Content"

Figure 4-1-8-6 Changes of the Export value of Japanese broadcast content by broadcast rights



(Notes)

* 1 Commercialization and video/DVD production rights do not cover character goods sales or video/DVD sales.

* 2 Those that cannot be clearly classified into any category are included into the program broadcasting right category. Broadcast content exports that failed to be broken down by category are included into the program broadcasting right category.

* 3 Calculations for FY 2016 and later include digital gaming rights in commercialization rights.

(Source) Prepared from MIC "Survey on the State of Overseas Expansion of Broadcast Content"

Section 2 ICT Service Usage Trends

1. Internet usage trends

(1) ICT device ownership

a. Major ICT device ownership (households)

- Ownership rate of smartphones for households is 86.8 percent

The ownership rate for ICT devices (households) in 2020 was 86.8 percent for "smartphones", which is included in "mobile devices" (96.8 percent) and the rate of "personal computers" is 70.1 percent. The rate for "fixed-line telephones" was 68.1 percent (Figure 4-2-1-1).

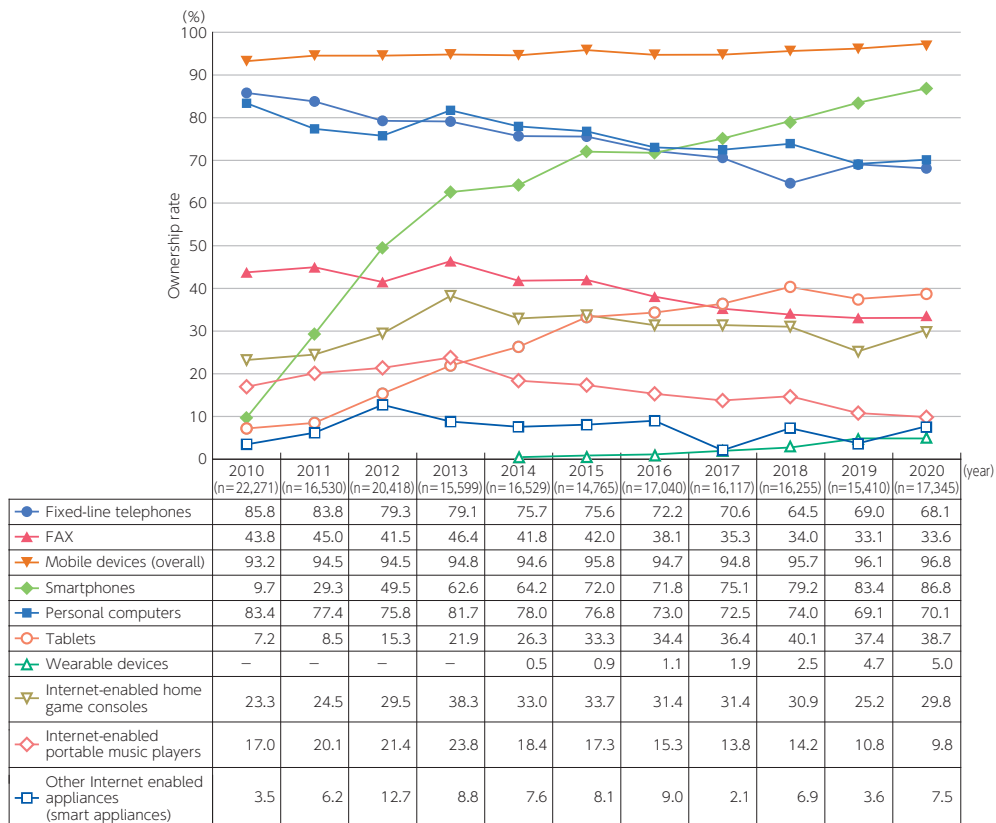
(2) Internet usage

a. Internet usage rate (individuals)

- Usage of the Internet by individuals was nearly 80 percent

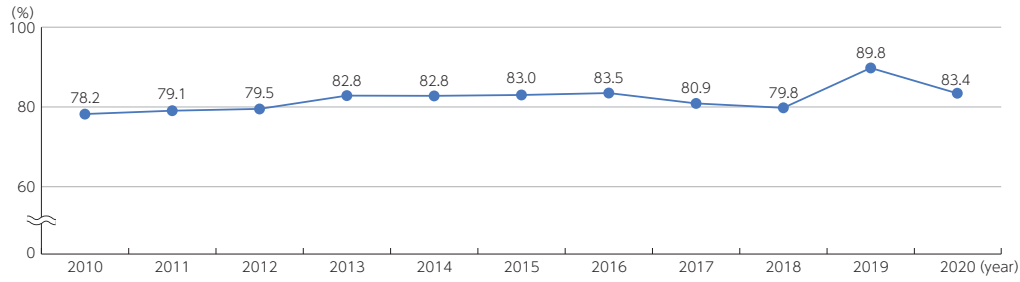
The Internet usage rate (individuals) in 2020 was 83.4 percent (Figure 4-2-1-2). Looking at the Internet usage rate by devices, "smartphones" (68.3 percent) exceeded "personal computers" (50.4 percent) by 17.9 points (Figure 4-2-1-3).

Figure 4-2-1-1 Changes in ownership rates for ICT devices (households)



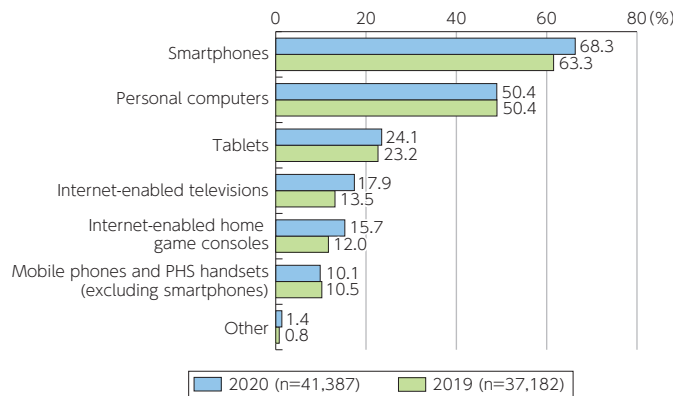
(Source) MIC "Communications Usage Trend Survey"

Figure 4-2-1-2 Changes in the Internet usage rate



(Source) MIC "Communications Usage Trend Survey"

Figure 4-2-1-3 Device used for Internet by category



(Note) Figures indicate the percentage of people who accessed the Internet using the corresponding device during the past twelve months.

(Source) MIC "Communications Usage Trend Survey"

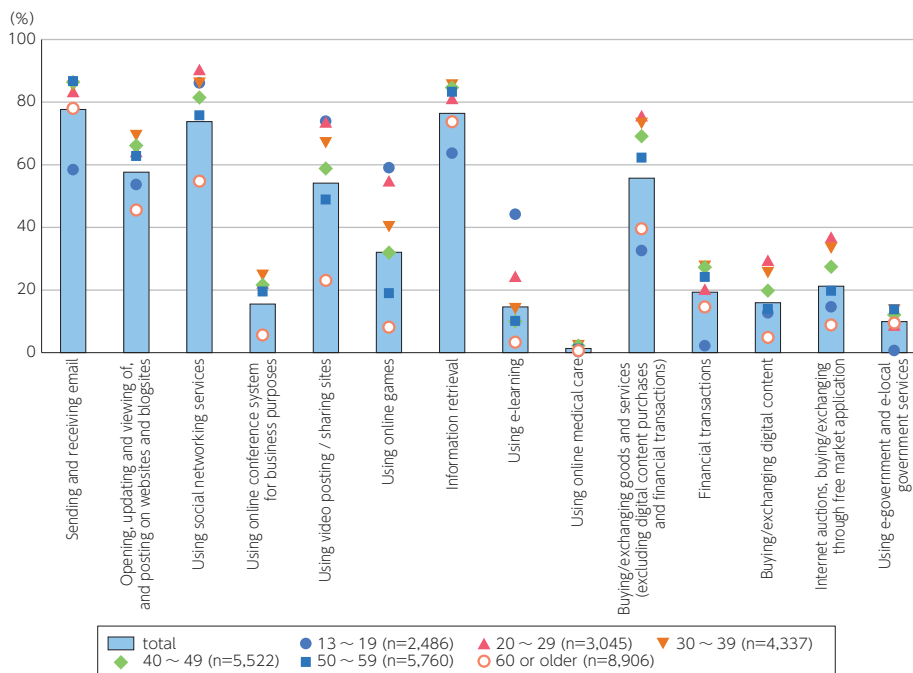
b. Purpose for using the Internet

- "Sending and receiving email" was the most common purpose for using the Internet

While among all age groups, the most common pur-

pose for using the Internet was "sending and receiving email", the number of users varies by age groups for "using video posting / sharing sites" and "using online games" (Figure 4-2-1-4).

Figure 4-2-1-4 Applications / purpose for using the Internet by age group (multiple answers) (2020)



(Source) MIC "Communications Usage Trend Survey"

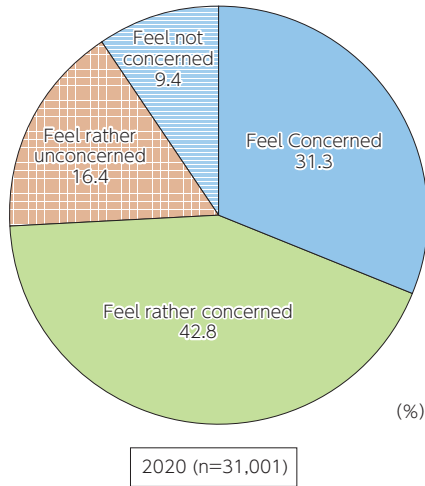
(3) Challenges for secure Internet usage

a. Concerns about Internet usage and issues with usage of ICT networks

- Individuals are concerned about leaks of personal information, and enterprises are concerned about computer-virus infections

The percentage of individuals (aged 12 and older) who feel concerned about their Internet usage is 74.2 percent including both respondents who said they "feel concerned" and respondents who said that they "feel rather concerned" (Figure 4-2-1-5). Among more specif-

Figure 4-2-1-5 Responses of individuals regarding concerns about using the Internet



(Source) MIC "Communications Usage Trend Survey"

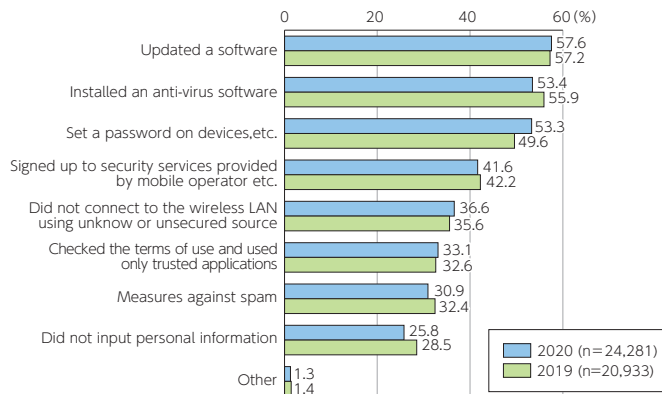
b. Information security measures

- Almost all enterprises have implemented some form of information security protective measures

Looking at the state of information security protective measures taken by individuals that use the Internet shows that the leading security measures were "Updated a software" (57.6 percent) and "Installed an anti-virus software" (53.4 percent) (Figure 4-2-1-7).

Looking at the state of information security measures implemented by enterprises that use an ICT network, it shows that 98.2 percent of enterprises have implemented some form of security. The leading security measure was to "install anti-virus programs on PCs and other devices (operating system, software, etc.)," which 84.0 per-

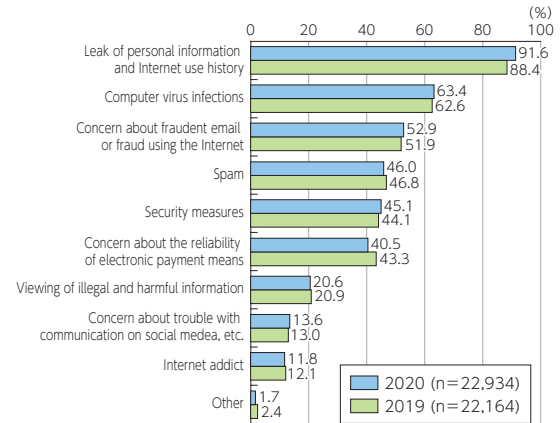
Figure 4-2-1-7 Implementation of information security measures by individuals (multiple answers)



(Source) MIC "Communications Usage Trend Survey"

ic concerns that they had about using the Internet, 91.6 percent cited "leak of personal information and Internet use history". This was followed, in descending order, by "computer virus infections" (63.4 percent) and "concern about fraudulent emails or fraud over the Internet" (52.9 percent). "Concern about the reliability of electronic payment means" (40.5 percent) decreased by 2.8 percentage points over the previous year (Figure 4-2-1-6).

Figure 4-2-1-6 Types of concerns about using the Internet (multiple answers)



(Source) MIC "Communications Usage Trend Survey"

cent of enterprises have implemented. This was followed by the measure of "install anti-virus programs on servers" (63.7 percent) (Figure 4-2-1-8).

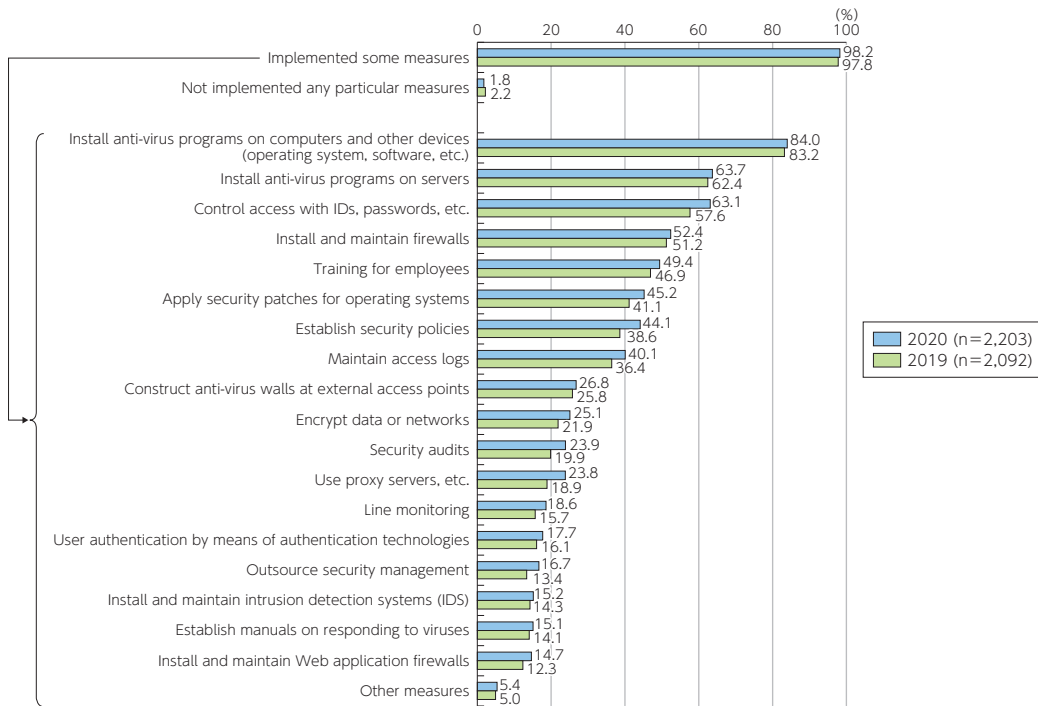
(4) Trends of enterprises using cloud services

a. Use of cloud services

- The percentage of enterprises using cloud services was nearly 70 percent

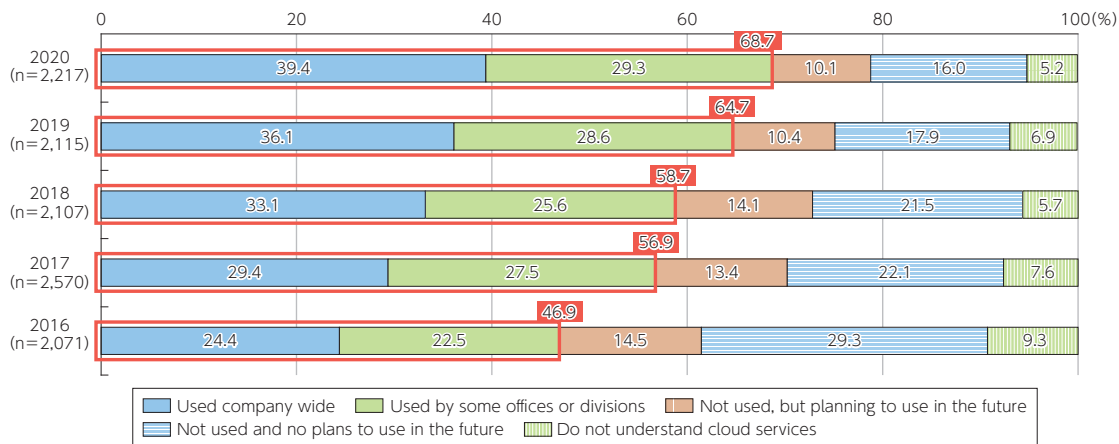
Looking at the state of cloud service usage, 68.7 percent of enterprises answered they had used cloud services either partially or extensively, which is a significant rise of 4.0 percentage points from the previous year when it stood at 64.7 percent (Figure 4-2-1-9).

Figure 4-2-1-8 Implementation of information security measures by enterprises (multiple answers)



(Source) MIC "Communications Usage Trend Survey"

Figure 4-2-1-9 Use of cloud services



	number of enterprises	number of enterprises (after weight adjustment)	State of cloud service usage							
			Used	Used company wide	Used by some offices or divisions	Not used	Not used, but planning to use in the future	Not used and no plans to use in the future	Do not understand cloud services	N/A
All	2,223	2,223	1,522	873	649	580	225	355	114	7
[Industry classification]										
Construction	340	96	73	48	25	21	13	8	2	-
Manufacture	372	590	401	223	178	167	72	94	20	3
Transportation and Postal services	352	203	116	57	59	67	23	44	19	1
Wholesale and Retail	338	475	340	191	150	107	41	66	24	3
Finance and Insurance	137	27	22	15	7	5	3	2	0	-
Real estate	134	32	28	19	9	4	2	3	0	-
ICT	254	110	101	74	27	8	6	3	-	0
Services, others	296	690	442	246	196	200	66	134	48	-

(Source) MIC "Communications Usage Trend Survey"

b. Effectiveness of cloud services

- Many enterprises recognize cloud services as being effective

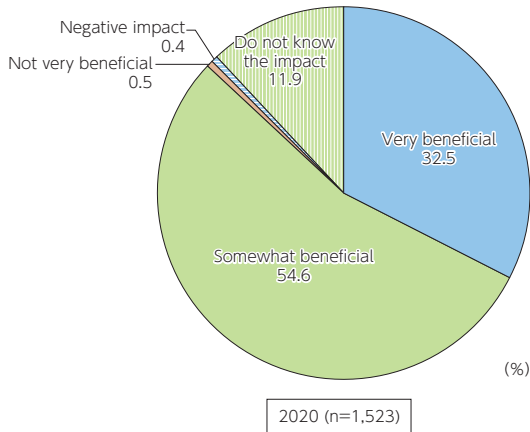
Among the enterprises that do use cloud services, 87.1 percent responded that they found it to be “very beneficial” or “somewhat beneficial” (Figure 4-2-1-10).

c. Breakdown of cloud service usage

- The most frequently used cloud service is “file storage and data sharing”

The most frequently used cloud service is “file stor-

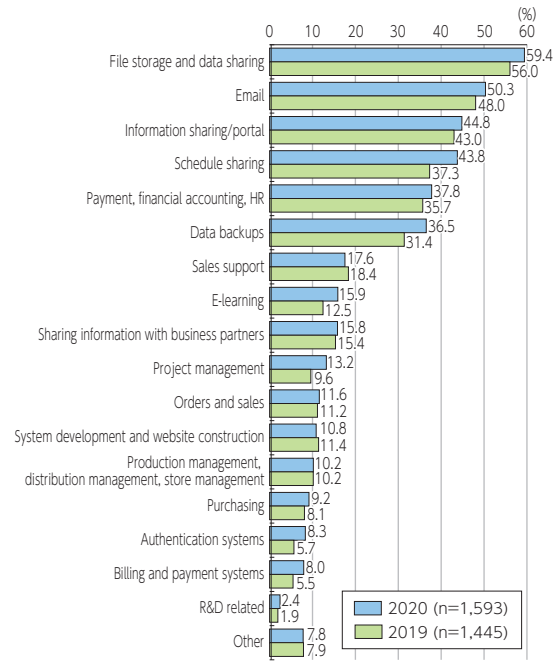
Figure 4-2-1-10 Impact of cloud computing services



(Source) MIC “Communications Usage Trend Survey”

age and data sharing”, as cited by 59.4 percent of respondents, this is followed, by “email” with 50.3 percent and “information sharing/portal” with 44.8 percent. Very advanced use of cloud services, such as utilizing it for “sales support” or “production management”, is still rather limited (Figure 4-2-1-11).

Figure 4-2-1-11 Breakdown of cloud service usage



(Source) MIC “Communications Usage Trend Survey”

(5) Introduction and usage of IoT/AI systems and services by enterprises

a. Introduction of IoT/AI systems and services

- Approximately 20 percent of enterprises have introduced, or are planning to introduce, IoT/AI systems and services.

Enterprises that have already introduced IoT/AI systems and services, for example, in order to collect and analyze digital data, accounted for 12.4 percent of all enterprises. We can see that if enterprises that are planning to introduce these kinds of systems and services in the future are included, then this accounts for 20 percent of the total (Figure 4-2-1-12).

b. Purpose behind collecting and analyzing digital data

- About 80 percent of enterprises collect and analyze digital data to raise job performance and improve business processes

Looking at the purpose for collecting and analyzing

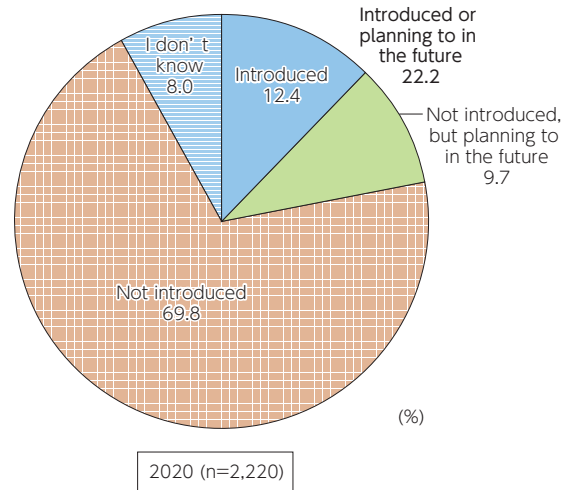
digital data, the most frequent answer was “to raise job performance and improve business processes” with 81.3 percent, this was followed by “to improve customer services” (33.7 percent) and “for the optimization of projects” (22.6 percent) (Figure 4-2-1-13).

c. Impact of introducing IoT/AI systems and services

- About 70 percent of enterprises recognized that there had been positive impacts

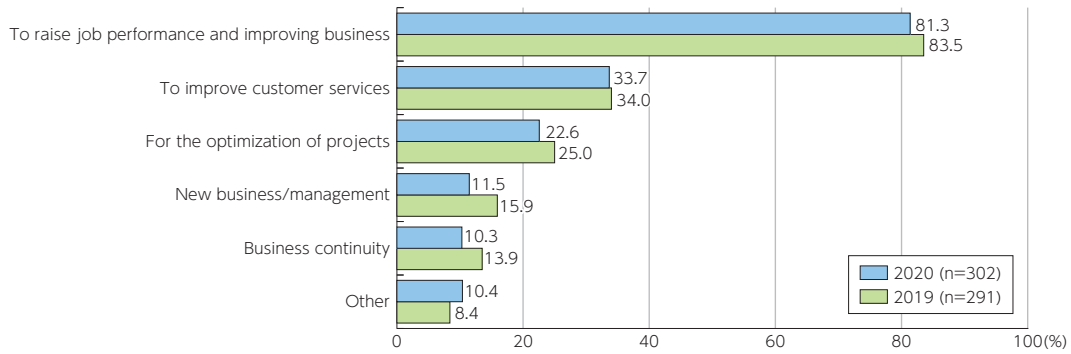
Looking at the impact of IoT/AI systems and services, enterprises that responded it had been “very beneficial” or “somewhat beneficial” totaled 81.1 percent of all enterprises (Figure 4-2-1-14).

Figure 4-2-1-12 Current state of the introduction of IoT/AI systems and services



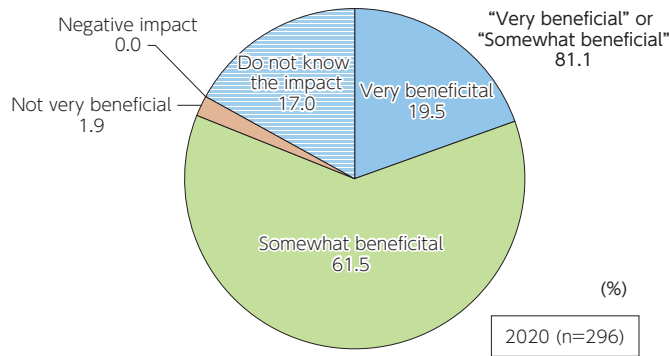
(Source) MIC "Communications Usage Trend Survey"

Figure 4-2-1-13 Purpose behind collecting and analyzing digital data



(Source) MIC "Communications Usage Trend Survey"

Figure 4-2-1-14 Impact of introducing IoT/AI systems and services



(Source) MIC "Communications Usage Trend Survey"

2. State of provision and usage of telecommunication services

(1) State of provision of telecommunication services

a. Overview

(i) Subscriptions to voice communication services

- Subscriptions to fixed communications are on a downward trend while subscriptions to mobile communications and OABJ-IP phone services have steadily increased

Subscriptions to fixed communications (including NTT East and West subscription telephone services (including ISDN), non-NTT telephone services,⁵ and CATV telephone services but excluding OABJ-IP phone services) have been declining, while those for mobile communications (mobile phones, PHS and BWA) and OABJ-IP phone services have been growing steadily. Subscriptions to 050-IP phone services have been flat in recent years.

There were about 11.4 times more mobile communications subscriptions than fixed communications subscriptions (Figure 4-2-2-1).

(ii) Broadband usage

- Subscriptions to mobile ultra-high-speed broadband services have leaped dramatically year on year

The number of subscriptions to fixed line broadband services⁶ at the end of FY 2020 stood at 42.68 million (up by 3.6 percent from the previous year). Subscriptions to mobile ultra-high-speed broadband services was 154.37 million for 3.9G and 4G (LTE) services (up by 1.1 percent from the previous year), and 75.05 million for BWA services (up by 5.4 percent from the previous year) (Figure 4-2-2-2). Trends for the net increase in the number of

subscriptions to FTTH and DSL show that DSL continues to decrease while FTTH continues to increase.

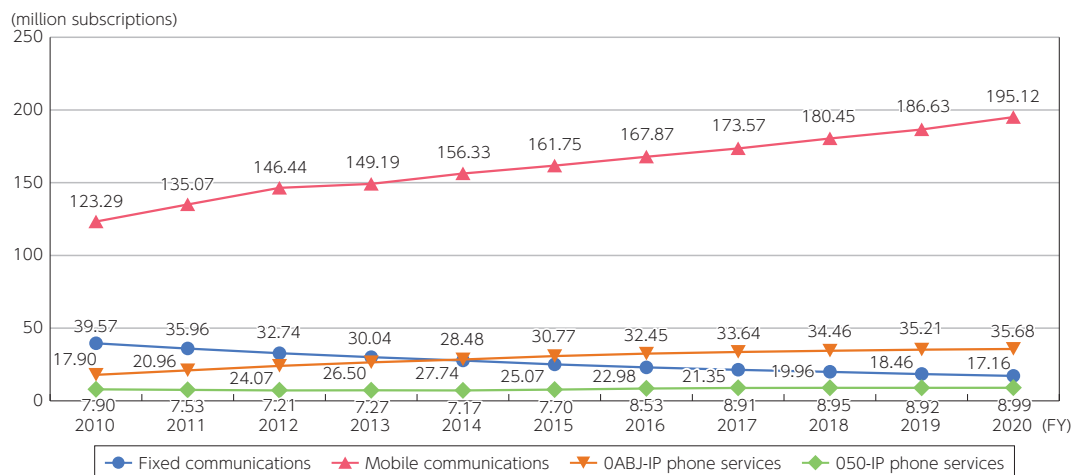
b. Mobile communications

- Subscriptions to mobile communication services have risen each year. The proportion of subscriptions to MVNO services across all mobile communication subscriptions also surged

Subscriptions to mobile communications⁷ (mobile phones, PHS and BWA) at the end of FY 2020 totaled 195.12 million (up by 4.5 percent from the previous year). Net growth in comparison to the end of FY 2019 was 8.49 million subscriptions, which demonstrates a continuing upward trend (Figure 4-2-2-3).

By carrier, the market share for mobile communication subscriptions was 36.9 percent for NTT Docomo (down by 0.4 percentage points from the same month a year before), 27.1 percent for the KDDI Group (down by 0.5 percentage points from the same month a year before), and 21.1 percent for SoftBank (down by 0.7 percentage points from the same month a year before) and 1.5 percent for Rakuten Mobile (up by 1.5 percentage points from the same month a year before) (Figure 4-2-2-4). By carrier, market share for MVNO services was 5.5 percent for NTT Docomo MVNO (down by 0.2 percentage points from the same month a year before), 3.8 percent for the KDDI Group MVNO (± 0.0 percentage points from the same month a year before), and 4.1 percent for SoftBank MVNO (up by 0.4 percentage points from the same month a year before).

Figure 4-2-2-1 Changes in subscriptions for voice communication services



(Notes)

* 1 Subscriptions for mobile communications cover mobile phones, PHS services and BWA.

* 2 Figures for mobile communications from FY 2013 onward are 'after adjusting for internal group transactions.' After adjusting for internal group transactions' refers to adjustments made to count 1 mobile phone device as 1 contract and not 2 contracts, so as not to diverge from the actual state, when an MNO receives mobile phone or BWA services as an MVNO from another MNO in the same group and provides these services together with its own services to 1 mobile phone device.

* 3 Figures of the past years are different from those in last year's publication due to amendments by the target enterprises.

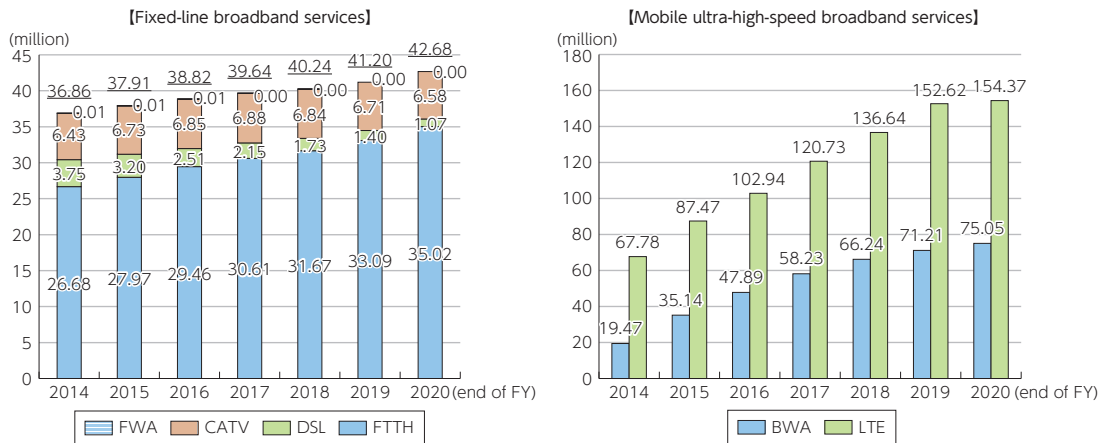
(Source) Prepared from MIC "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2020 Q4 (End of March))"

⁵ Non-NTT services are subscriber phone services provided by telecom carriers other than NTT East and West and cover direct subscriber telephone, ISDN services, new-type non-NTT telephone, and ISDN services.

⁶ Figures for subscriptions to fixed-line broadband services cover FTTH, DSL, cable TV, and FWA services.

⁷ Figures after adjusting for internal group transactions.

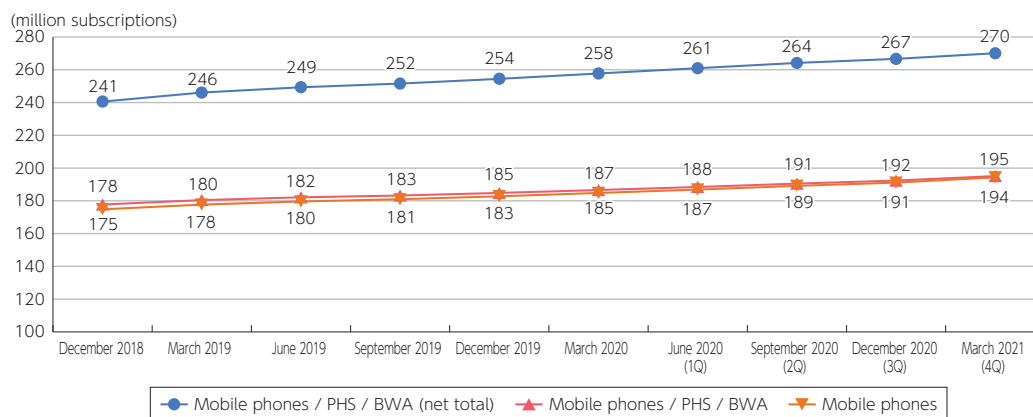
Figure 4-2-2-2 Changes in broadband service subscriptions



(Note) Figures for past years are different from those in last year's publication due to amendments by target enterprises.

(Source) Prepared from MIC "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2020 Q4 (End of March))"

Figure 4-2-2-3 Changes in mobile communications subscriptions



(Notes)

* 1 After adjusting for internal group transactions' refers to adjustments made to count 1 mobile phone device as 1 contract and not 2 contracts so as not to diverge from reality, such as when an MNO receives mobile phone or BWA services as an MVNO from another MNO in the same group and provides these services together with its services in 1 mobile phone device.

* 2 Figures of the past years are different from those in last year's publication due to amendments by target enterprises.

(Source) Prepared from MIC "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2020 Q4 (End of March))"

Subscriptions for MVNO services⁸, out of subscriptions for mobile communications (mobile phones, PHS handsets, and BWA), continue to increase, and reached 26.12 million in FY 2020 (an increase of 5.6 percent) (Figure 4-2-2-5).

(2) Telecommunication usage

a. State of traffic

(i) Internet traffic

- The total download traffic of fixed-broadband service subscribers in Japan reached an average of 19.9 Tbps as of November 2020, 56.7 percent increase from the same month in the year before

(a) Changes in traffic by fixed-broadband subscribers

Traffic by the fixed-broadband service subscribers of

ISP⁹ continues to grow, with download traffic (A1 OUT) reaching a monthly average of 12,885.5 Gbps in November 2020 (a 49.1 percent increase from the same month the year before). Download traffic (A1 OUT) is 8.4 times larger than upload traffic (A1 IN: 1542.7 Gbps), thus, most traffic is download traffic (Figure 4-2-2-6).

(b) Changes in traffic exchanged between ISPs

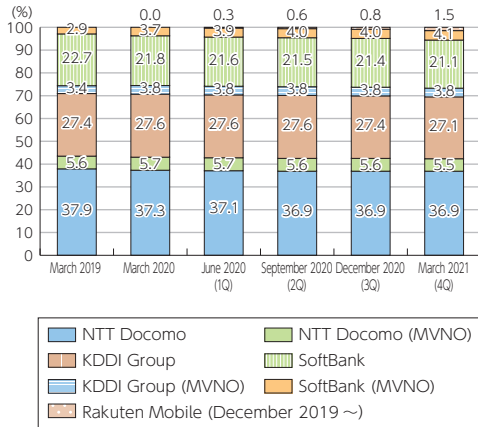
Data inflow has exceeded outflow in all three types of traffic between ISPs: the traffic exchanged with major domestic internet exchanges (IX)s¹⁰ (B1), the traffic exchanged with domestic ISPs without passing through major domestic IX (B2), and the traffic exchanged with overseas ISPs (B3) (Figure 4-2-2-6).

⁸ Figures after subtracting subscriptions to MVNOs that are MNOs.

⁹ The total for nine cooperating ISPs, namely the Internet Initiative Japan (IIJ), NTT Communications, NTT Plala Inc., OPTAGE Inc., KDDI, Jupiter Telecommunications Co., Ltd., SoftBank Corp., NIFTY Corporation, and BIGLOBE Inc.

¹⁰ The total for IXs run by Internet Multifeed, Equinix Japan, Japan Internet Exchange, BBIX, and WIDE Project.

Figure 4-2-2-4 Changes in market share for carriers in mobile communication subscriptions (after adjusting for internal group transactions)



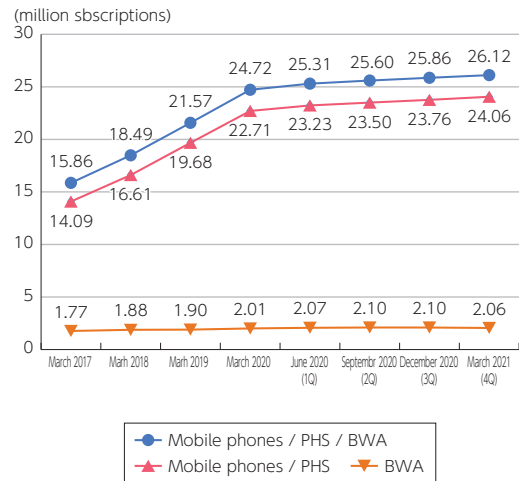
- (Notes)
- * 1 KDDI Group market share includes KDDI, Okinawa Cellular, and UQ Communications.
 - * 2 The market share of MVNO services is added up for each MNO group that provides the service, and is indicated by appending "(MVNO)" after the MNO group name.
 - * 3 Rakuten Mobile market share is as an MNO. MVNO services provided by Rakuten Mobile are included in NTT Docomo (MVNO) and KDDI Group (MVNO).

(Source) Prepared from MIC "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2020 Q4 (End of March))"

(c) Estimations for Internet traffic in Japan

MIC have estimated the total download traffic by broadband service subscribers in Japan from A1 — the traffic of ISP9 broadband service subscribers (DSL, FTTH, CATV, FWA) — and the percentage of the nine ISP's subscriptions among all fixed-broadband subscriptions in Japan. This estimate found that traffic circulating on the internet, on average, was approximately 19.9 Tbps during November 2020. This is a 56.7 percent increase from the same month a year ago, and demonstrates a continuing rise in internet traffic (Figure 4-2-2-6).

Figure 4-2-2-5 Changes in subscriptions for MVNO services (excluding MVNOs that are MNO)



(Source) Prepared from MIC "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2020 Q4 (End of March))"

(ii) Mobile communication traffic

- Mobile communication traffic increased at a rate of about 1.3 times over the last year

The rapid increase in traffic, particularly data communications, in recent years is a significant factor in radio spectrum congestion in the frequencies assigned to mobile communication systems. In view of this, five mobile communications carriers (NTT Docomo, KDDI, SoftBank, UQ Communications, and Wireless City Planning) worked together to tabulate and analyze data on the volume of mobile communication traffic (non-voice traffic). They found that, as of September 2020, mobile communication traffic increased about 1.3 times over the last year, and has reached an average of 4491.8 Gbps (Figure 4-2-2-7).

Figure 4-2-2-6 Estimates for Internet traffic in Japan*1*2

[Traffic estimates]

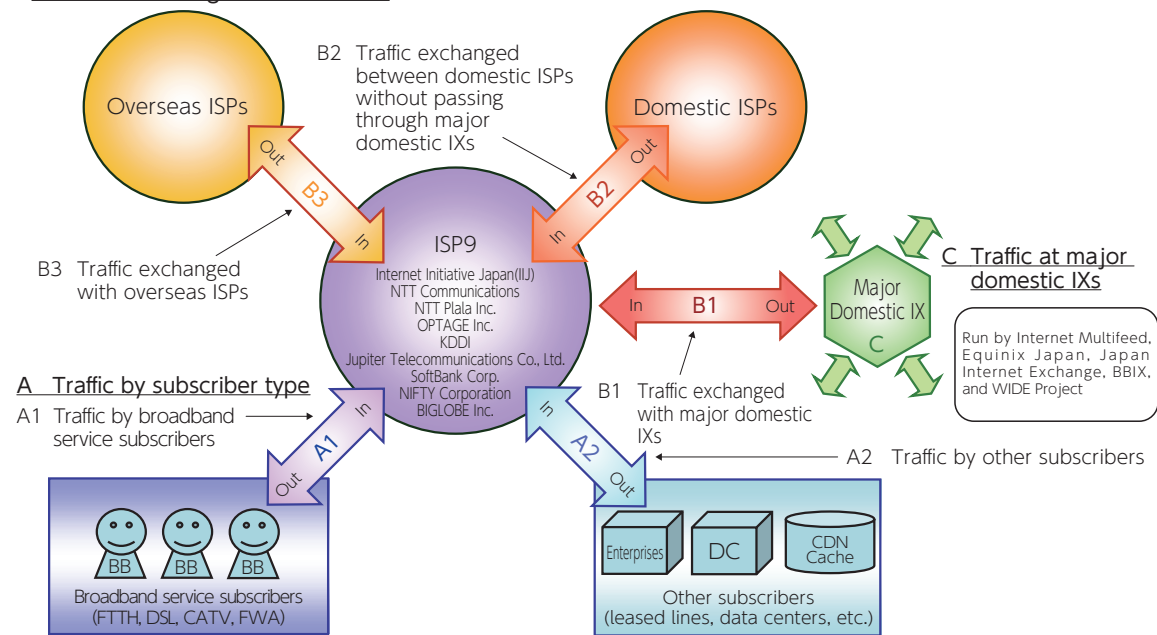
Year	Month	Total traffic by broadband service subscribers in Japan (estimated) [Gbps] ³		Traffic per broadband service subscriber (estimated) [kbps]		(A1) Traffic by broadband service subscribers (DSL, FTTH, CATV, FWA etc.) [Gbps]		(A2) Traffic by other subscribers (leased lines, data centers, etc.) [Gbps]		(B1) Traffic exchanged between major domestic Ix and ISP5 [Gbps]		(B2) Traffic exchanged between domestic ISPs and ISP9 without passing through major domestic Ix [Gbps]		(B3) Traffic exchanged between overseas ISPs and ISP9 [Gbps]		(X) Share of nine cooperating ISPs *4
		in	out	in	out	in	out	in	out	in	out	in	out			
2018	5	1,309	10,289	33.2	261.1	870.1	6,837.9	1,441.9	726.4	736.8	214.7	3,864.7	559.4	1,746.4	452.6	66.46%
	11	1,401	10,976	35.1	275.1	929.1	7,281.8	1,921.4	867.5	964.9	283.4	4,848.6	710.5	1,669.2	400.9	66.34%
2019	5	1,563	12,086	38.7	298.9	1,016.7	7,859.6	2,159.4	948.9	950.2	289.4	5,519.1	848.9	1,671.0	408.5	65.03%
	11	1,571	12,650	38.4	309.2	1,073.0	8,641.0	2,323.4	956.5	994.1	290.8	6,232.5	901.2	1,995.5	540.9	68.31%
2020	5	2,321	19,025	56.1	460.2	1,534.3	12,575.6	2,968.1	2,420.1	1,610.7	328.6	10,065.5	1,353.3	2,945.8	724.5	66.10%
	11	2,373	19,821	56.2	469.4	1,542.7	12,885.5	2,787.3	2,552.4	1,502.0	290.5	9,380.0	1,535.1	2,603.5	593.5	65.01%

(Notes)

- * 1 The total for nine cooperating ISPs, namely the Internet Initiative Japan (IIJ), NTT Communications, NTT Plala Inc., OPTAGE Inc., KDDI, Jupiter Telecommunications Co., Ltd., SoftBank Corp., NIFTY Corporation, and BIGLOBE Inc.
- * 2 The total traffic by fixed-broadband service subscribers in Japan (estimated), the traffic per broadband service subscriber (estimated). For A1 and A2 columns, *In* stands for uploads and *Out* stands for downloads.
- * 3 Total traffic by fixed-broadband service subscribers in Japan was estimated from the traffic of broadband service subscribers of the nine cooperating ISPs (A1) and the share of all subscriptions of the nine cooperating ISPs (X).
- * 4 Estimation by linear interpolation using the data of "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share".

[Types of traffic] (Fixed-broadband service related)

B Traffic exchanged between ISPs



- * 1 A1 includes the following types of traffic:
 - Some traffic on public wireless LAN services from some ISP carriers
 - Some traffic on femtocell services from some mobile communications carriers
- * 2 A2 includes the following types of traffic. It was defined from November 2016 that traffic by CDN cache and traffic by customer ISPs connecting with cooperating ISPs which provide transit are handled as A2.
 - Datacenters of cooperating ISPs, CDN cache, other internal traffics
- * 3 B2 includes traffic exchanged via the following:
 - Private peering with domestic ISPs
 - Transit provided by domestic ISPs
 - Public peering at other domestic IXs other than major domestic IXs
- * 4 B3 includes traffic exchanged via the following; however, it was defined from November 2016 that among the traffic, the traffic at domestic connection points are handled as B2.
 - Private peering with overseas ISPs
 - Transit provided by overseas ISPs
 - Public peering at overseas IXs.

(Source) Prepared from MIC "Aggregation and Provisional Calculation of Internet Traffic in Japan (Announcement of aggregate results as of November 2020)"

Figure 4-2-2-7 Transitions in the monthly average mobile communications traffic in Japan

Tabulated Month	March 2019			June 2019			September 2019			December 2019			March 2020			June 2020			September 2020		
	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total
Average(Gbps)	404.6	2680.6	3085.2	423.1	2926.9	3350.1	447.4	3082.3	3529.8	450.3	3180.2	3630.5	484.2	3630.1	4114.3	513.5	3723.8	4237.3	528.3	3963.5	4491.8

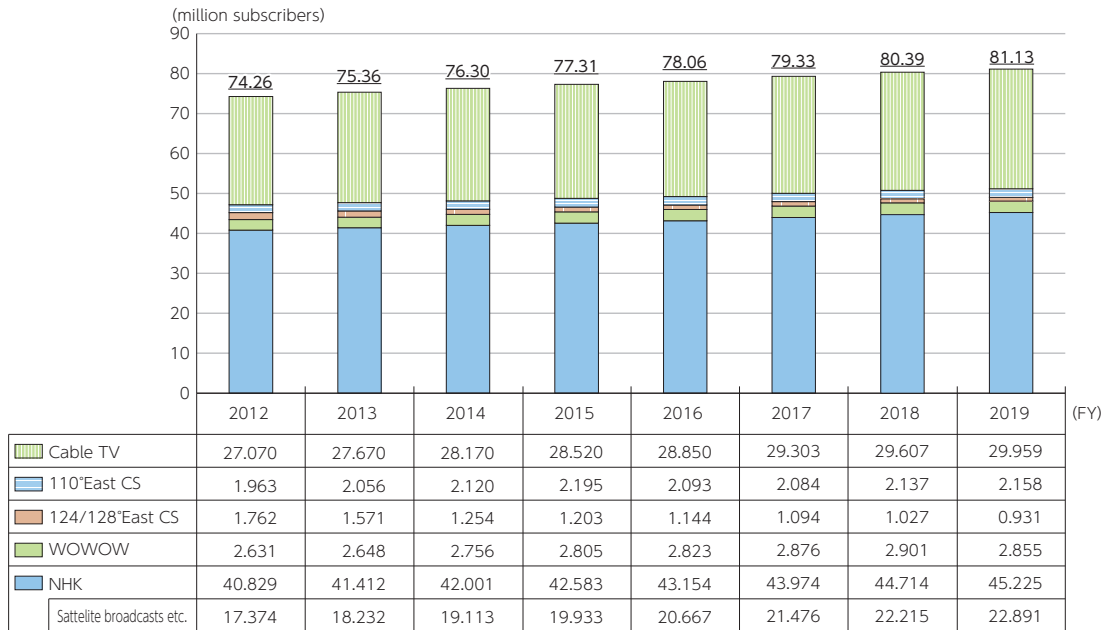
(Source) Prepared from MIC "Information and Communications Statistics Database"

3. State of provision and usage of broadcasting services

- Subscriptions to NHK terrestrial, NHK-BS, 110° East CS and cable TV services in FY 2019 increased from the previous year
- Subscriptions to all broadcasting services increased

in FY 2019, except for WOWOW and 124/128° East CS broadcasts (Figure 4-2-3-1).

Figure 4-2-3-1 Subscribers to broadcasting services



(Notes)

- * 1 NHK terrestrial subscribers are includes all types of NHK subscription contracts.
- * 2 NHK-BS subscribers are the sum of NHK satellite contracts.
- * 3 WOWOW subscribers are the sum of WOWOW contracts.
- * 4 110° East CS subscribers are the sum of Sky PerfecTV contracts.
- * 5 124/128° East CS subscribers are the sum of Sky PerfecTV premium contracts.
- * 6 Up until FY 2010, cable TV subscribing households is the sum of households that subscribe to business enterprises which provided independent broadcasting services with facilities licensed under the former licensing scheme. From 2011 onwards, it represents the number of subscribing households to registered business enterprises with wired telecommunication facilities providing independent broadcasting services (Both exclude broadcasts using IP multicasts).

(Source) Prepared using materials from Japan Electronics and Information Technology Industries Association, materials from Japan Cable Laboratories, materials from NHK, and "State of Satellite Broadcasting" and "State of Cable Television" from MIC

4. State of informatization in government services

(1) Promoting e-government

- Promotion of e-government based on the inventory of administrative procedures

In order to improve the convenience of overall administrative services, the Cabinet Secretariat conducted a detailed survey on government administrative procedures (inventory survey). The results show that about 4.1% (2,565 types) of all types of procedures (62,253 types), which had more than 0.01 million filings in a year, accounted for 99% (approximately 2.5 billion) of the

sum of procedure filings.

(2) Promoting online governance by local governments

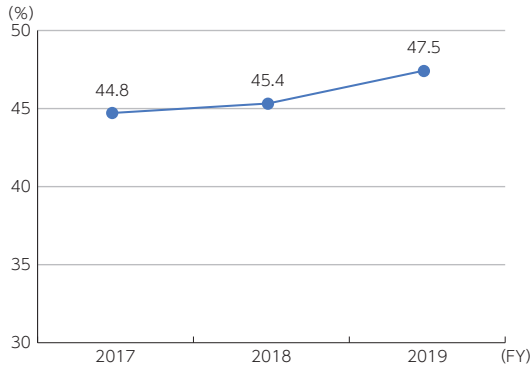
a. Use of online procedures

- The online usage rate of procedures prioritized by local governments for online availability increased over the previous fiscal year

The online usage rate of local government administrative procedures¹¹ was 47.5 percent in FY 2019 (Figure 4-2-4-1).

¹¹ The targeted procedures are those selected for online-usage promotion under the E-Local Government Online Usage Advancement Policy.

Figure 4-2-4-1 Changes in the online usage of procedures prioritized by local governments for online availability



FY	Total procedure filings for the year	Filings done online	Online usage rate [%]
2017	460,861,000	206,524,000	44.8
2018	473,848,000	214,937,000	45.4
2019	472,618,000	224,346,000	47.5

(Note) The total yearly filings are an estimate for the entire country calculated based on the total number of filings and the populations in the jurisdictions of local governments that had already placed the targeted procedures online.

(Source) MIC "State of Online Use of Procedure, Notification etc. by Local Public Entities in FY 2019"

Section 3 Radio Spectrum Usage Trends

1. State of Usage and number of radio stations

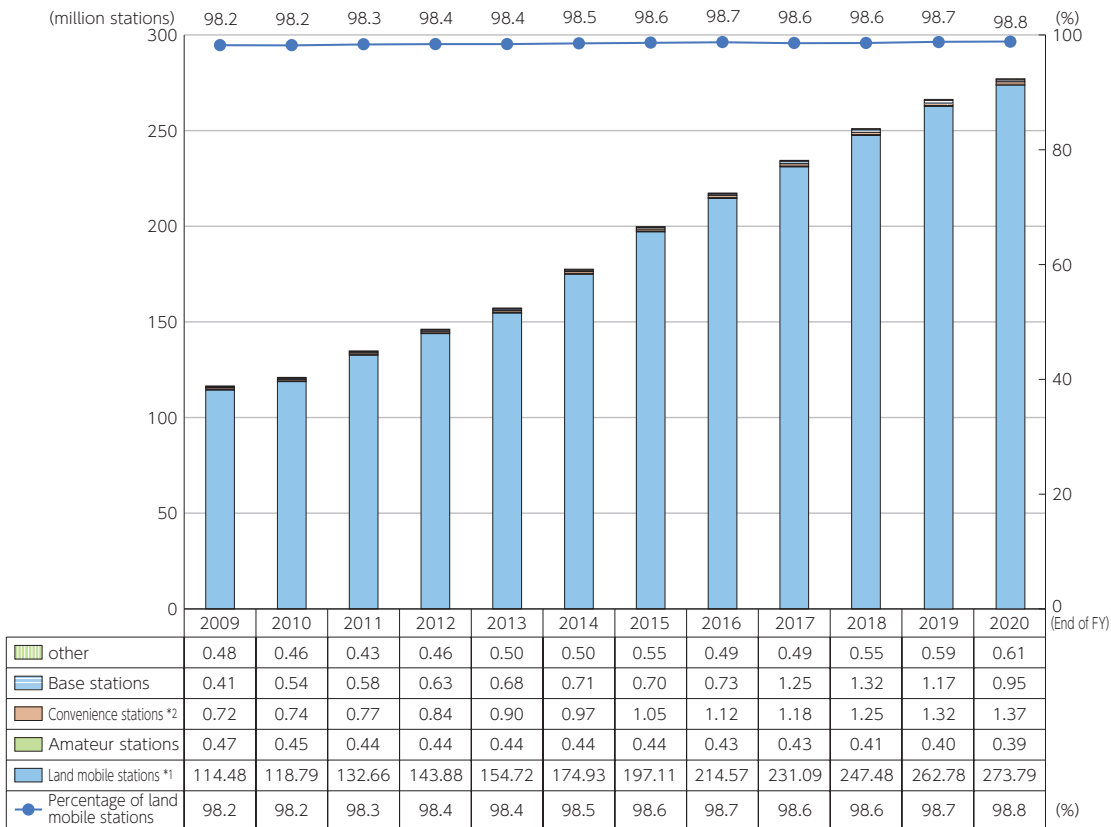
(1) Radio stations

- The number of radio stations in Japan has increased steadily since 2006

The number of radio stations (excluding PHS and wireless LAN handsets and other radio stations for which no license is required) at the end of FY 2020 increased by 4.1 percent from a year earlier to 277.11 million,

including 273.79 million mobile phones and other land mobile stations. Mobile phones and other mobile land stations accounted for 98.8 percent of all radio stations. The number of convenience stations climbed by 3.1 percent from the previous year to 1.37 million (Figure 4-3-1-1).

Figure 4-3-1-1 Changes in the number of radio stations



(Notes)

* 1 "Land mobile station" refers to a radio station that is operated either while in motion on land or while stationary in an unspecified location (such as mobile phones).

* 2 "Convenience station" refers to a radio station used for simple radio communications.

2. Radio monitoring to eliminate interference with important radio communications

- There were 429 reports of interference with important radio communications in FY 2020, and 643 actions were taken against illegal radio stations

In the interests of eliminating radio interference and obstructions and maintaining a favorable radio spectrum usage environment, officials at the 11 Regional Bureaus of Telecommunications and elsewhere use illegal radio station search vehicles and sensor stations installed in towers and on building rooftops in major urban areas nationwide. These investigate the sources of radio signals that interfere with fire and emergency services radio, aeronautical and maritime radio, mobile phones, and other important radio communications. Officials also crack down on illegal radio stations and undertake public awareness activities to ensure more people use the radio spectrum properly.

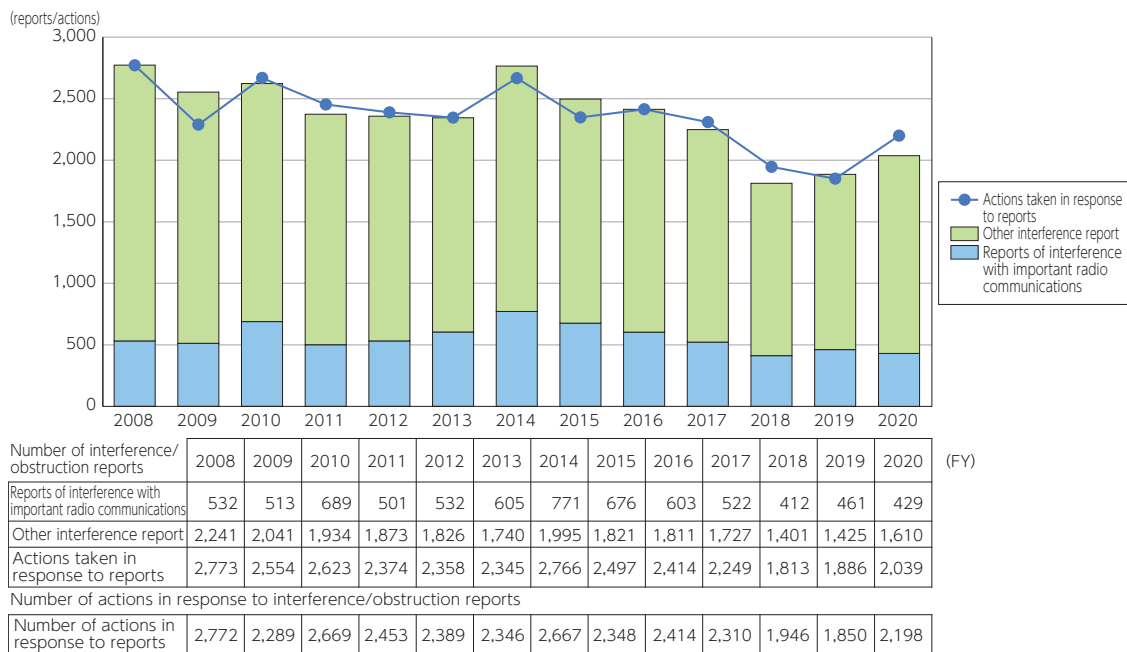
Since FY 2010, radio authorities have been working to promptly eliminate interference with important radio communications with a system that can receive interfer-

ence reports around the clock. Radio authorities also monitor shortwave radio and cosmic radio waves from international radio surveillance facilities registered with the International Telecommunication Union (ITU).

In FY 2020, there were 2,039 reports of radio interference or obstructions of all kinds, 153 more (up by 8.1 percent from the previous year). Among these, there were 429 reports of interference with important radio communications, 32 less (down by 6.9 percent from the previous year). In response to these reports, 2,198 actions¹² were taken in FY 2020 (Figure 4-3-2-1).

In FY 2020, 6,765 illegal radio stations were detected, 228 more (up by 3.5 percent from the previous year). In response, 643 actions¹² were taken in FY 2020, a decrease of 604 actions (down by 48.4 percent from the previous year). These actions included 62 indictments (9.6 percent of all actions) and 581 directives (90.4 percent of all actions).

Figure 4-3-2-1 Changes in the number of radio station interference / obstruction reports and the number of actions taken in response



¹² The number of actions includes incomplete actions remaining from the previous fiscal year.