

Chapter 3

Basic Data on the ICT Field

Section 1 Economic size of the ICT industry

1. ICT Industry Trends

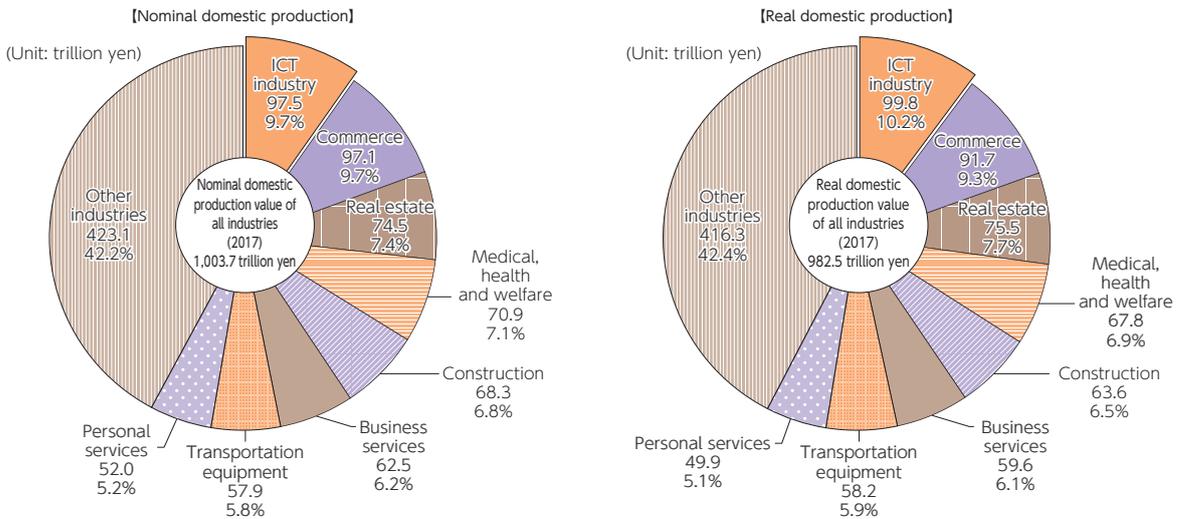
(1) Domestic production value

- ICT industry's production value was 97.5 trillion yen, making it the largest industry

The ICT industry's nominal domestic production value in 2017 was 97.5 trillion yen, accounting for 9.7 percent of all industries and making it the largest industry in the country (Figure 3-1-1-1). It had reached 116.6 trillion yen in 2000, however, its production value cooled off

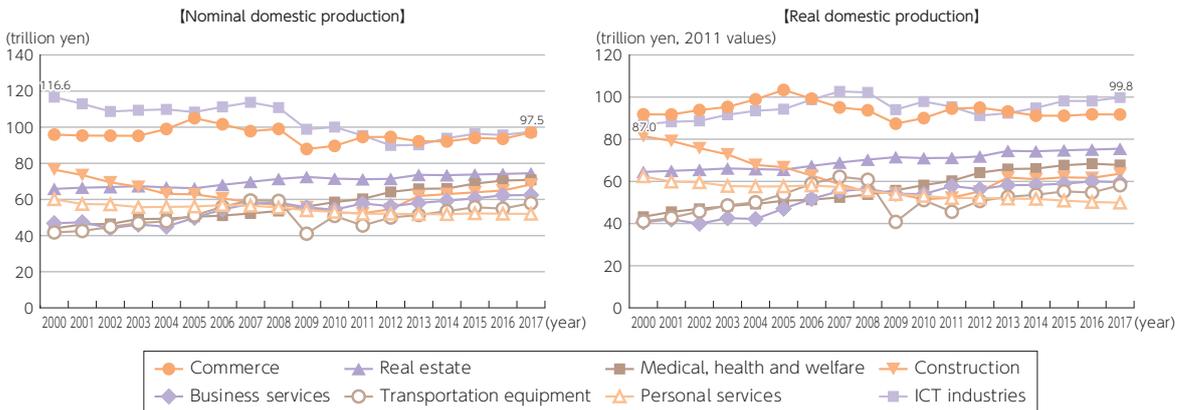
for several years in response to the collapse of the IT bubble. The industry started growing again from 2005 and reached 113.8 trillion yen in 2007, but its production value plummeted to 98.9 trillion yen in 2009 due to the 2008-9 global financial crisis. Even after 2010 it continued to slide, dropping to 89.9 trillion yen in 2012. However, since 2013 signs of recovery finally started to appear. (Figure 3-1-1-2).

Figure 3-1-1-1 Domestic production values of major industries (based on nominal domestic production and real domestic production) (breakdown) (2017)



(Source) "Study on Economic Analysis of ICT," MIC (2019)

Figure 3-1-1-2 Changes in domestic production values of major industries (based on nominal domestic production and real domestic production)



(Source) "Study on Economic Analysis of ICT," MIC (2019)

In 2017 the ICT industry's real domestic production value based on constant 2011 values was 99.8 trillion yen and accounted for 10.2% of all industries. In contrast to the nominal values, it has increased since 2000 and reached 102.7 trillion yen in 2007. It decreased to 91.3 trillion yen in 2012, but signs of recovery could be seen from 2013.

(2) Gross Domestic Product (GDP)

- The nominal GDP of the ICT industry in 2017 was 43.9 trillion yen and accounted for 8.6 percent of all industries

The nominal GDP of the ICT industry rose in 2017 by 0.9 percent year-on-year to 43.9 trillion yen. Looking at the size of nominal GDP of the main industries shows that the ICT industry's nominal GDP accounts for 8.6 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 2011 values accounted for 9.5% of the real GDP of all industries (Figure 3-1-1-3).

Looking at the growth rate in 2016-2017, ICT industry rose by 2.0% year-on-year, and is the third highest after the transportation equipment (9.2%) and construction

(4.4%) industries (Figure 3-1-1-4).

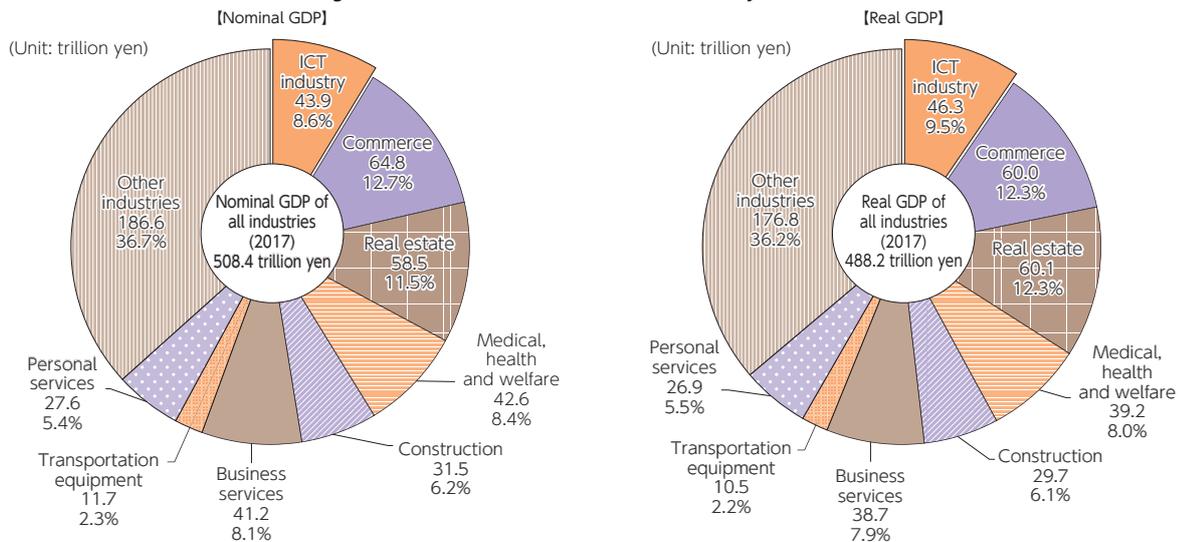
Similar to the nominal domestic production value, the nominal GDP of the ICT-related manufacturing and ICT-related construction industries has been decreasing. On the other hand, the Internet-related services industry has grown rapidly.

(3) Employment

- ICT industry employment totaled 3.99 million in 2017 and accounted for 5.8 percent of total employment in all industries, which is a 15.9% decrease from 2000

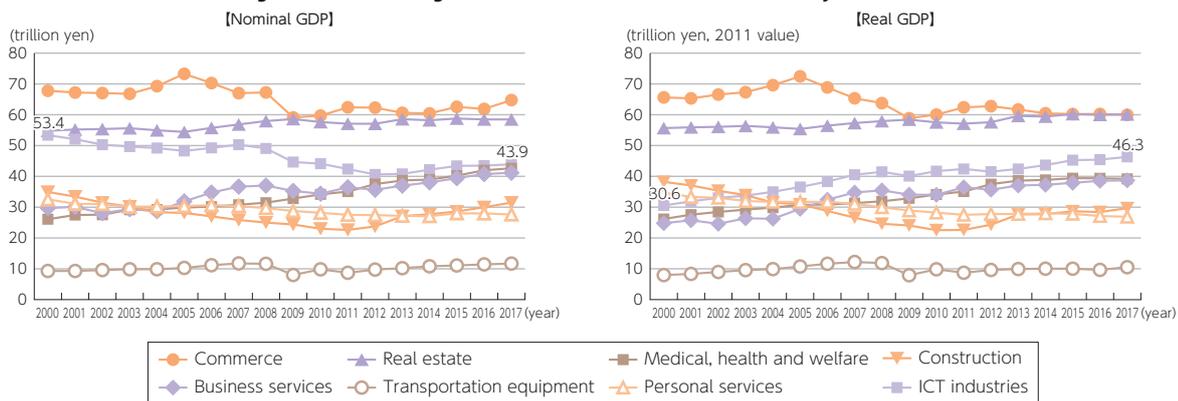
The ICT industry employed 3.99 million people in 2017 (up 0.1 percent from the previous year), and accounted for 5.8 percent of total employment in all industries. Compared with 2016, Internet-related services (up 3.4% from the previous year), communications (up 2.4%), and information services (up 1.6%) were steadily growing. However, video, audio and text information production (down 4.0%), broadcasting (down 1.8%), ICT-related services (down 1.5%), and ICT-related manufacturing (down 0.9%) decreased (Figure 3-1-1-5).

Figure 3-1-1-3 Nominal GDP and real GDP of major industries



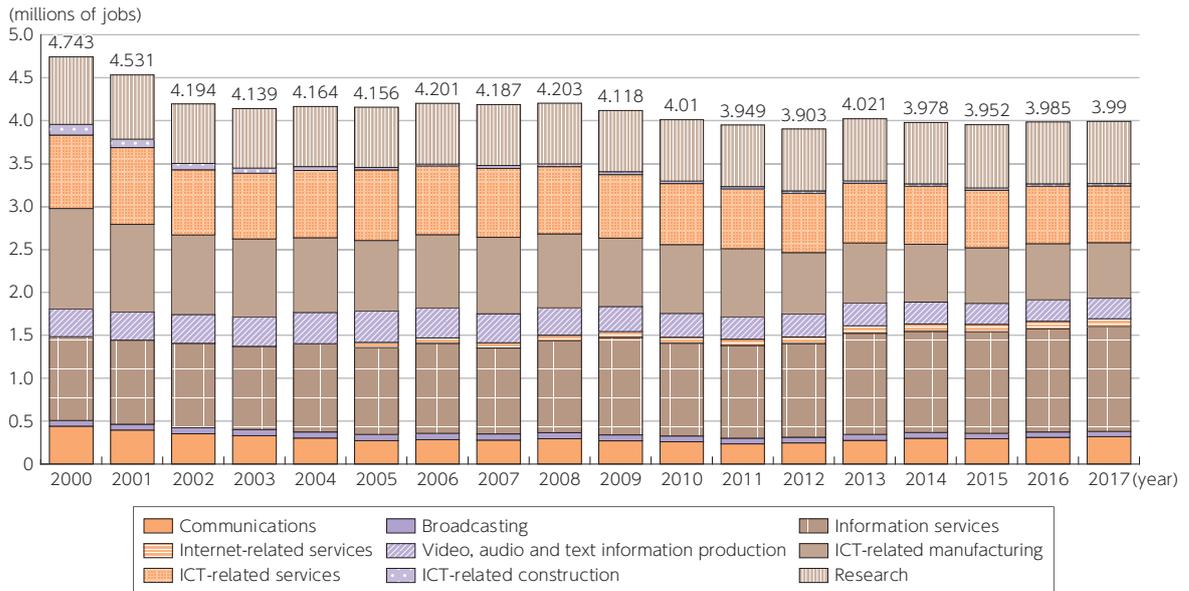
(Source) "Study on Economic Analysis of ICT," MIC (2019)

Figure 3-1-1-4 Changes in the nominal GDP and real GDP of major industries



(Source) "Study on Economic Analysis of ICT," MIC (2019)

Figure 3-1-1-5 Changes in employment in the ICT industry



(Source) "Study on Economic Analysis of ICT," MIC (2019)

2. ICT industry contributions to the national economy

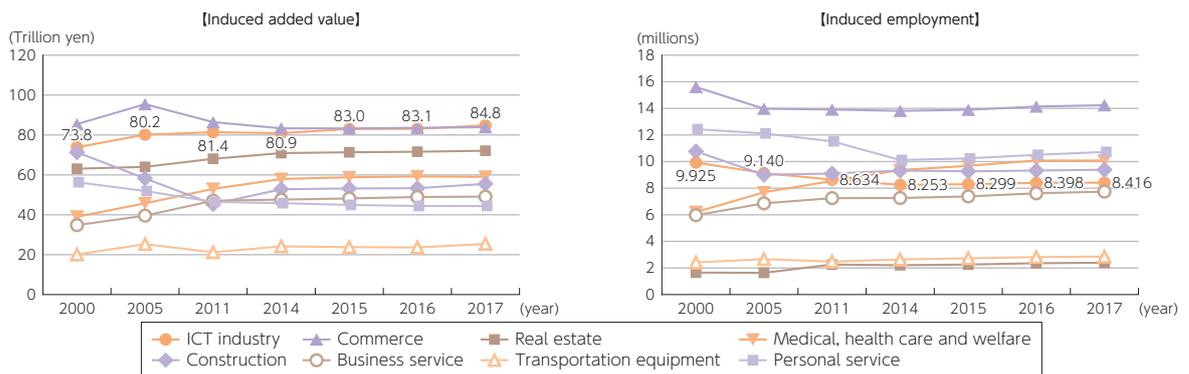
(1) ICT industry's economic spillover effects

- 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) in those industries. The economic spillover effects⁵⁴ of the ICT industry were estimated to be

84.8 trillion yen in induced added value, and 8.416 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 (2.859 million jobs), which is recognized as one of broad industries. (Figure 3-1-2-1).

Figure 3-1-2-1 Changes in economic spillover effects (induced added value and jobs) from major industries' production activities



(Source) "Study on Economic Analysis of ICT," MIC (2019)

3. Trade in the ICT field

(1) Technology trading

- The ICT industry posted a surplus in technology exports⁵⁵ in FY 2017

The received value from Japan's technology exports in FY 2017 totaled 3.8844 trillion yen, to which the ICT industry contributed 512.3 billion yen, or 13.2 percent.

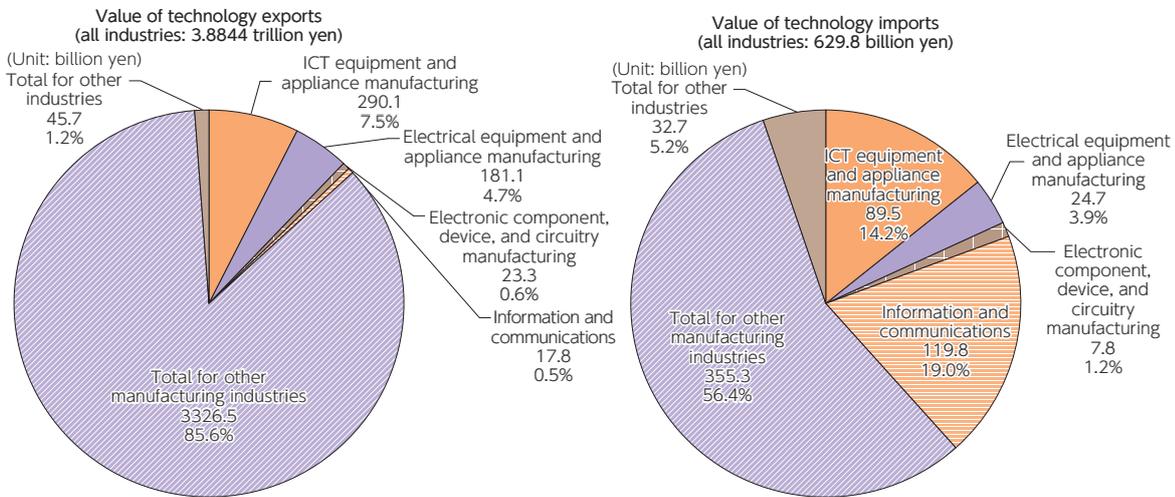
On the other hand, the cost of technology imports was 629.8 billion yen, of which 241.7 billion yen came out of the ICT industry, or 38.4 percent. While the total of technology trading, together with the ICT industry, posted export surpluses, on the other hand the Information and

⁵⁴ 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.

communications posted import surpluses. ICT equipment and appliance manufacturing sector accounted for the largest share of the ICT industry's technology ex-

ports, while Information and Communications account for the largest of share of imports. (Figure 3-1-3-1).

Figure 3-1-3-1 Technology trading by industry (FY 2017)



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

4. Research and development in the ICT field

(1) Research and development spending

- The ICT industry⁵⁶ spent 3.7117 trillion yen on research in FY 2017, accounting for 26.9 percent of all corporate research spending

According to the "Survey of Research and Development", Japan's total scientific and technological research spending (i.e., research spending) in FY 2017 stood at 19.0504 trillion yen (the combined research spending by enterprises, nonprofit organizations, public agencies,

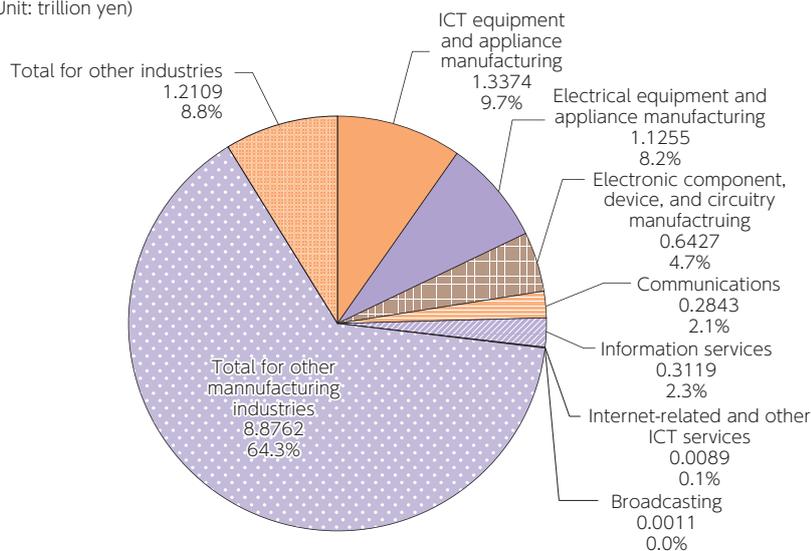
universities, etc.).

Corporate research spending, which accounts for about 70 percent of all research spending, was 13.7989 trillion yen. Of this amount, 3.7117 trillion yen (26.9 percent) was spent on research by the ICT industry. The ICT equipment and appliance manufacturing sector was the largest research spender in the ICT industry (Figure 3-1-4-1).

Figure 3-1-4-1 Breakdown of corporate research spending by industry (FY 2017)

(corporate research spending: 13.7989 trillion yen)

(Unit: trillion yen)



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

⁵⁵ 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.

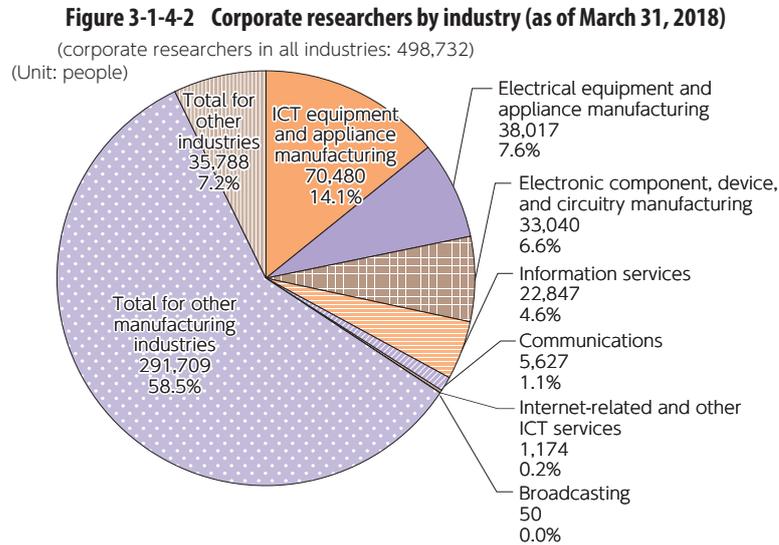
⁵⁶ ICT industry here refers to the ICT equipment and appliance manufacturing segment, the electrical equipment and appliance manufacturing segment, the electronic component, device, and circuitry manufacturing segment, and the information and communications segment (including information services, communications, broadcasting, Internet-related services, and other ICT sectors).

(2) Number of researchers

- The ICT industry employed 171,235 researchers, or 34.3 percent of all corporate researchers in Japan

There were 866,950 researchers in Japan as of March 31, 2018 (the total of all researchers at enterprises, non-profit organizations, public agencies, universities, etc.).

171,235 people (34.3 percent of all corporate researchers) out of 498,732 corporate researchers (about 58 percent of all researchers) are in the ICT industry. The ICT equipment and appliance manufacturing sector had the most researchers of any ICT industry sector (Figure 3-1-4-2).



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

5. Current 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 2018 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

- 5,467 enterprises were engaged in ICT business operations with sales in excess of 49 trillion yen

Sales attributed to ICT business operations in FY 2017 totaled 49.7496 trillion yen (total sales by all enterprises were 66.5058 trillion yen). By sector, the telecommunications sector accounted for 35.2 percent of all sales (up 0.1 percentage points from the previous year), the software sector 31.1 percent (up 0.1 points), and the data

processing and information sector 12.9 percent (up 0.8 points) (Figure 3-1-5-1).

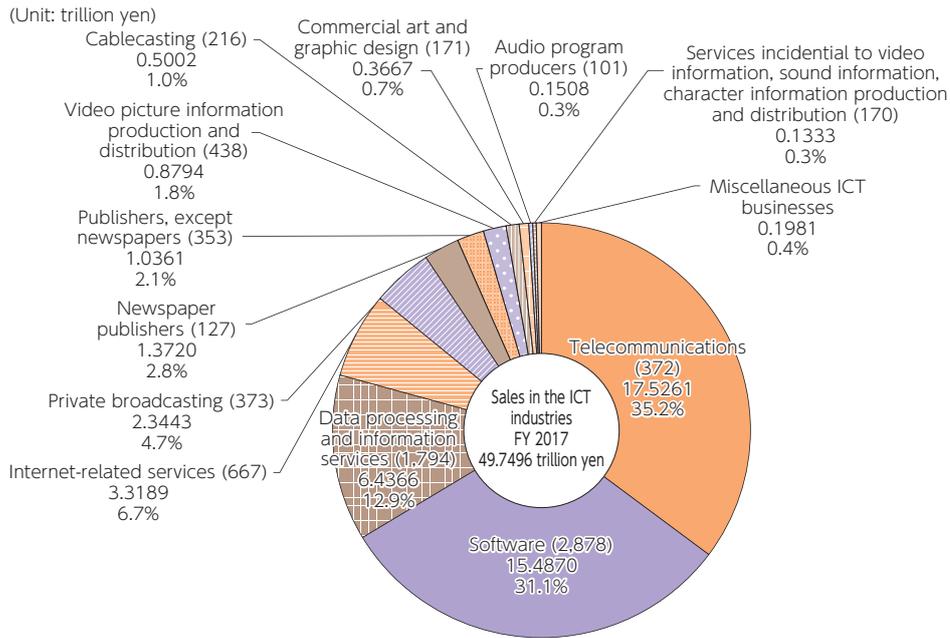
The number of enterprises engaging in ICT business operations (irrespective of whether ICT business operations are the enterprise's mainstay operations) stood at 5,467. Operating profits were 6.2755 trillion yen, ordinary income was 6.9263 trillion yen, and the enterprises held 10,304 subsidiaries and 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 information production and distribution, and sound information production, where enterprises capitalized at less than 50 million yen accounted for more than 40 percent of all enterprises in each respective sector (Figure 3-1-5-2).

Figure 3-1-5-1 ICT industry sales

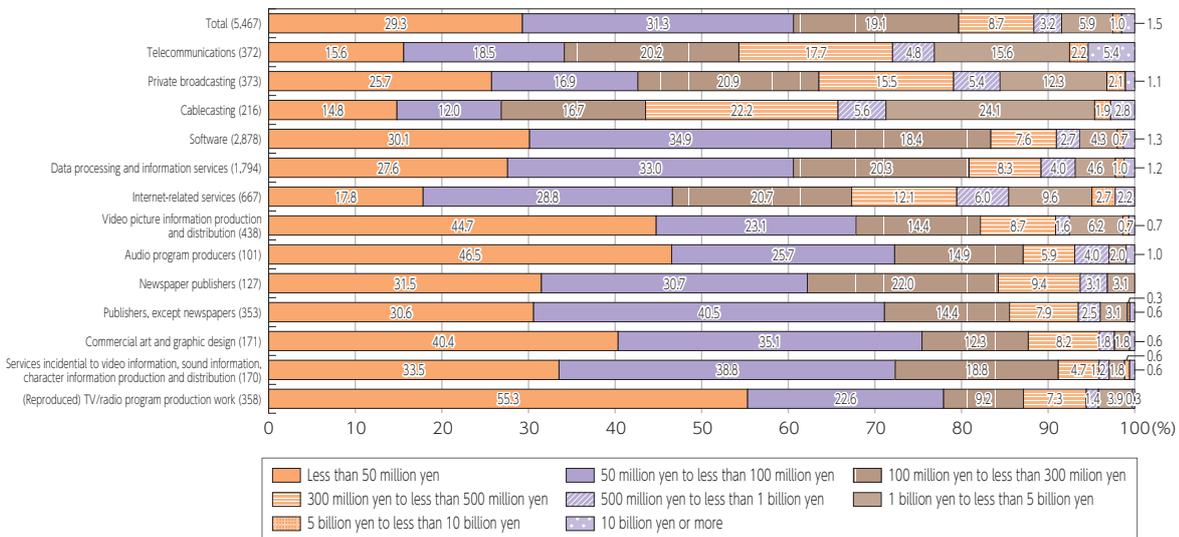


(Notes) *1 Figures in parentheses are the number of companies.

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

(Source) "2018 Basic Survey on the Information and Communications Industry," MIC / METI

Figure 3-1-5-2 Breakdown of ICT industry enterprises by capital size



(Source) "2018 Basic Survey on the Information and Communications Industry," MIC / METI

6. Telecommunication market trends

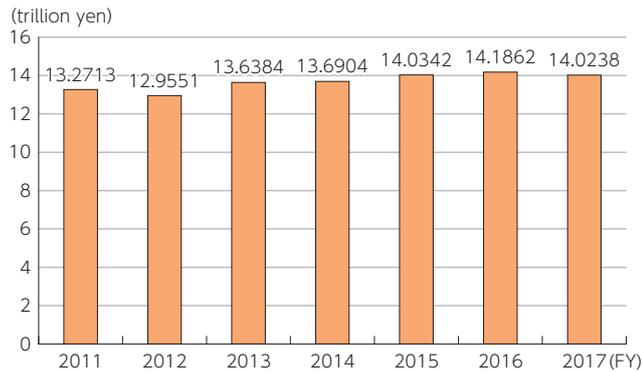
(1) Market size

- Mobile communications accounted for more than 50 percent of sales in the telecommunications sector, while, by service category, the data transmission services' share is increasing year by year

Sales in the telecommunications sector in FY 2017 (Figure 3-1-6-1) were 14.0238 trillion yen (a decrease of 1.1 percent from the previous year). Fixed line communications accounted for 32.4 percent of all sales in FY

2017, and mobile communications for 52.2 percent (Figure 3-1-6-2). Looking at sales by service category shows that voice transmission services accounted for 27.6 percent and data transmission services for 56.9 percent (Figure 3-1-6-3). The average revenue per user (ARPU) among the main mobile communication service providers was 4,800 yen for NTT DOCOMO, 6,560 yen for KDDI, and 4,360 yen for SoftBank (Figure 3-1-6-4).

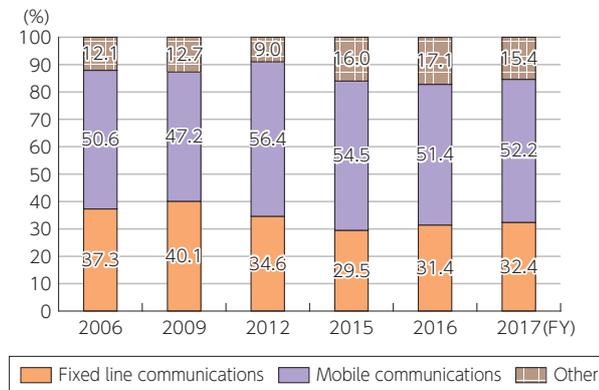
Figure 3-1-6-1 Changes in telecommunications sector sales



(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 "Basic Survey on the Information and Communications Industry," MIC / METI

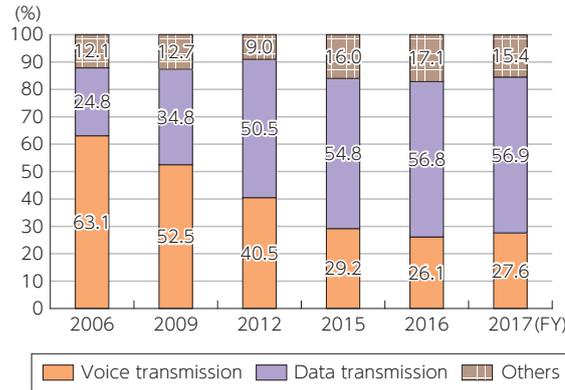
Figure 3-1-6-2 Changes in telecom carriers' sales broken down by fixed-line communications and mobile communications



(Note) Calculating excluding sales breakdown "Unknown".

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

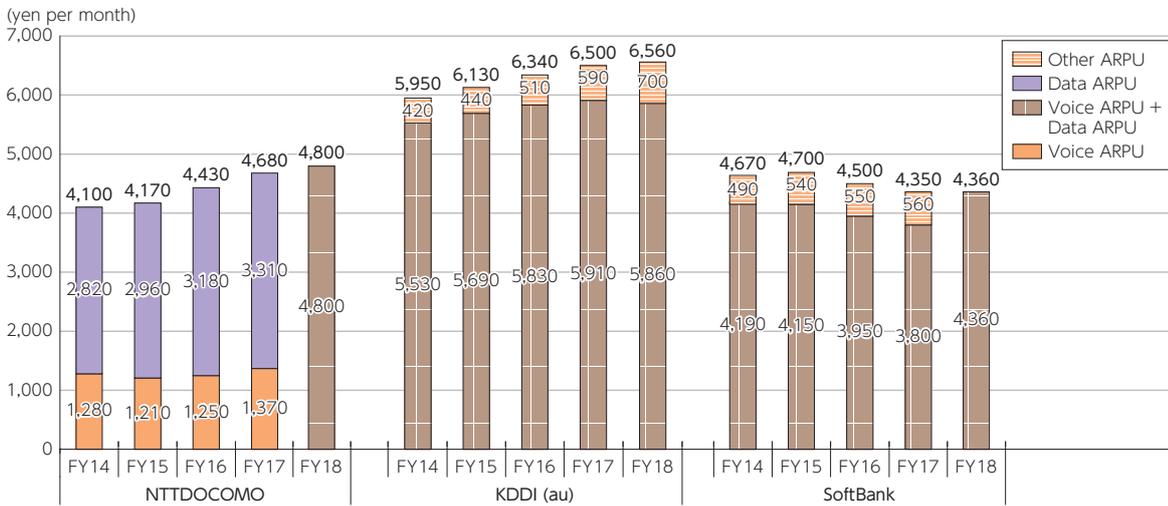
Figure 3-1-6-3 Telecom carriers' sales breakdown by voice transmission and data transmission



(Note) Calculating excluding sales breakdown "Unknown".

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

Figure 3-1-6-4 Changes in mobile ARPU in the past five years for three domestic mobile operators



(Notes) *1 Each company's ARPU is calculated and published based on each respective company's data. The figures were not calculated using the same method.

*2 The ARPU for KDDI is taken from the ARPA (Average Revenue Per Account) of each year. The figure for FY 2014 has been revised from ARPU to ARPA.

*3 The figures for NTT DOCOMO and Softbank in FY2014 were revised to unify the conditions and values for FY 2015-2017.

*4 The figures in FY2018 for NTT docomo and Softbank have changed in terms of presentation, so comparisons must be made with caution.

(Source) Prepared from the financial statements of each company

7. Broadcasting market trends

(1) Size of the broadcasting market

a. Broadcaster sales

- Broadcaster sales totaled 3.9337 trillion yen in FY 2017

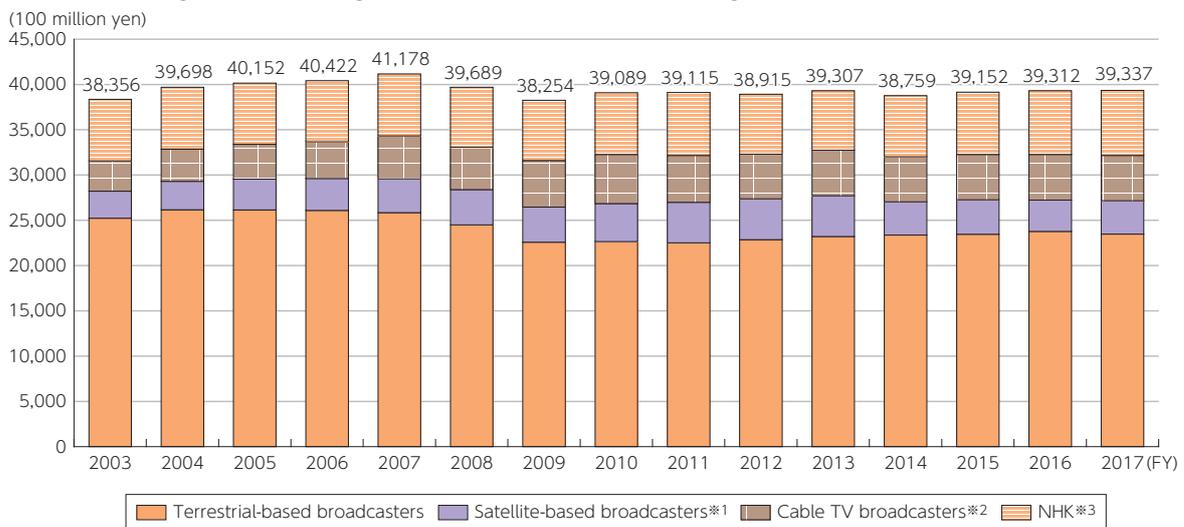
Japanese broadcasters are divided into two categories: Japan Broadcasting Corp., a public broadcaster known as NHK, which depends on license fee revenues, and private broadcasters that depend on advertisements or paid programming. Aside from these two categories, the Open University of Japan also provides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

Sales for the entire broadcasting sector, including revenues from broadcasting and non-broadcasting opera-

tions, increased from FY 2016 to 3.9337 trillion yen (by 0.1 percent up from the previous year) in FY2017. By category, terrestrial-based private broadcasters' sales were 2.3471 trillion yen (down 1.3 percent), satellite-based private broadcasters' sales were 369.7 billion yen (up 6.8 percent), and cable TV broadcasters' sales were 499.2 billion yen (down 0.8 percent). NHK's ordinary operating income was 717.7 billion yen (up 1.9 percent).

In terms of market share, terrestrial-based private broadcasters accounted for 73.0 percent (down 0.7 percentage points) of private broadcasters' sales. (Figure 3-1-7-1).

Figure 3-1-7-1 Changes in and breakdown of the broadcasting sector market size (total sales)



fiscal year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
private broadcaster															
Terrestrial-based broadcasters	25,229	26,153	26,138	26,091	25,847	24,493	22,574	22,655	22,502	22,870	23,216	23,375	23,461	23,773	23,471
(Community broadcasters included in total above*4)	141	140	140	144	148	150	123	116	120	115	124	127	126	136	136
Satellite-based broadcasters*1	2,995	3,158	3,414	3,525	3,737	3,905	3,887	4,185	4,490	4,510	4,491	3,661	3,809	3,463	3,697
Cable TV broadcasters*2	3,330	3,533	3,850	4,050	4,746	4,667	5,134	5,437	5,177	4,931	5,030	4,975	5,003	5,031	4,992
NHK*3	6,803	6,855	6,749	6,756	6,848	6,624	6,659	6,812	6,946	6,604	6,570	6,748	6,879	7,045	7,177
total	38,356	39,698	40,152	40,422	41,178	39,689	38,254	39,089	39,115	38,915	39,307	38,759	39,152	39,312	39,337

(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 11.8099 trillion yen, nearly 60 percent of which was attributable to video content, about 36 percent to text-based content, and about 6 percent to audio-based content

The Japanese content market was valued at 11.8099 trillion yen in 2017. By content segment, video content accounted for nearly 60 percent of the market, text-based content, 36 percent, and audio-based content, 6 percent.⁵⁷ (Figure 3-1-8-1).

The overall size of the content market has been increasing since 2013. The size of each content segment stayed flat until 2012, however, after 2013 the video content segment expanded while the text-based content segment contracted (Figure 3-1-8-2).

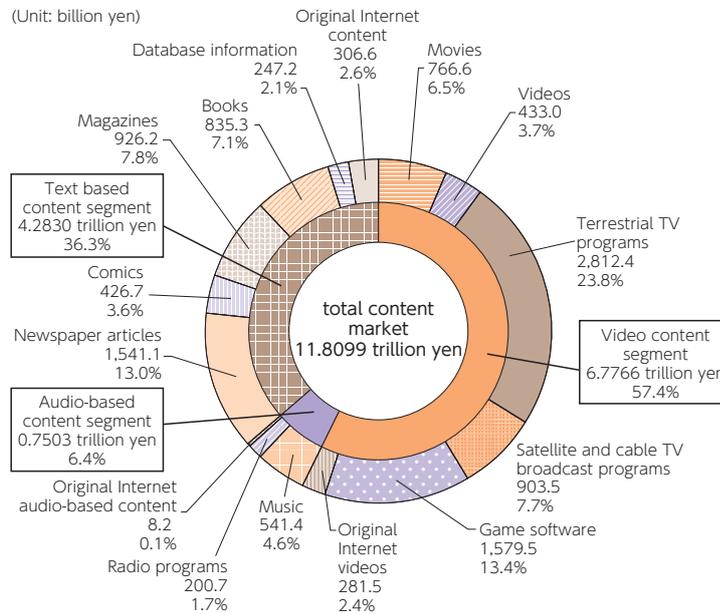
(2) Trends in the online content market

- The market for online content, which is consumed via the Internet on computers and mobile phones, was 3.6784 trillion yen, accounting for 31.1 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 3.6784 trillion yen. By content segment, the video content segment accounted for 61.5 percent of the online content market, the text-based content segment accounted for 29.7 percent, and the audio-based content segment had 8.7 percent. (Figure 3-1-8-3).

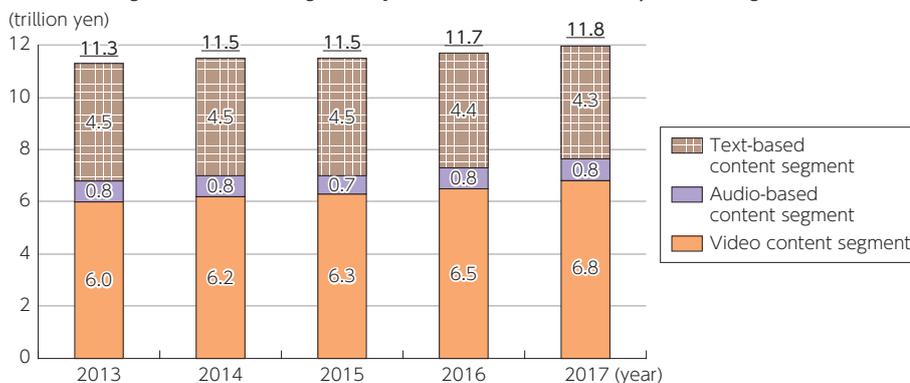
The online content market has been growing steadily since 2013. The market size by content segment shows that the video content segment has been driving the expansion of the online content market (Figure 3-1-8-4).

Figure 3-1-8-1 Breakdown of Japan's content market (2017)



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

Figure 3-1-8-2 Changes in Japan's content market size (by content segment)

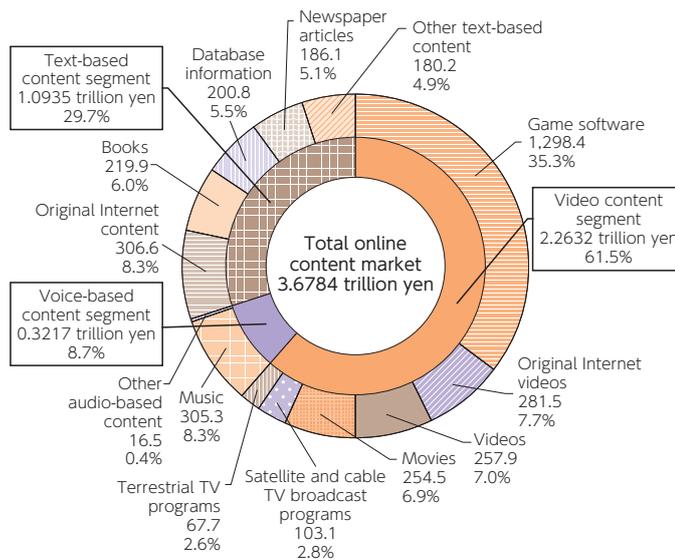


(Source) "Survey on the Production and Distribution of Media Content," Institute for Information and Communications Policy, MIC

⁵⁷ 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.

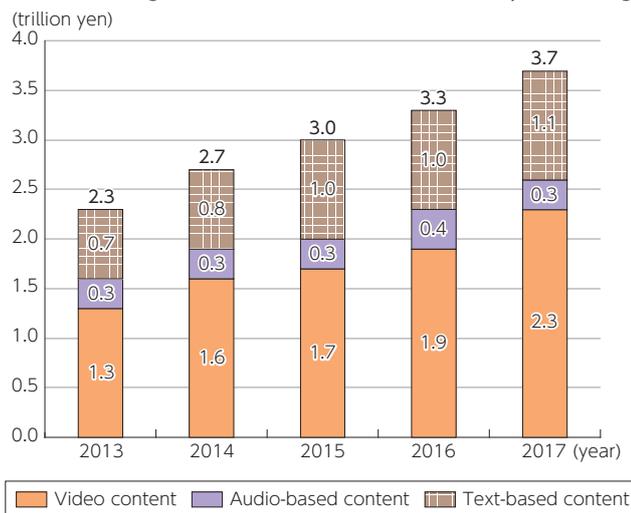
Figure 3-1-8-3 Breakdown of the online content market (2017)

(Unit: billion yen)



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

Figure 3-1-8-4 Changes in the online content market size (by content segment)



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

(3) Trends in the broadcast content market

- The export value of Japanese broadcast content was 44.45 billion yen in FY 2017

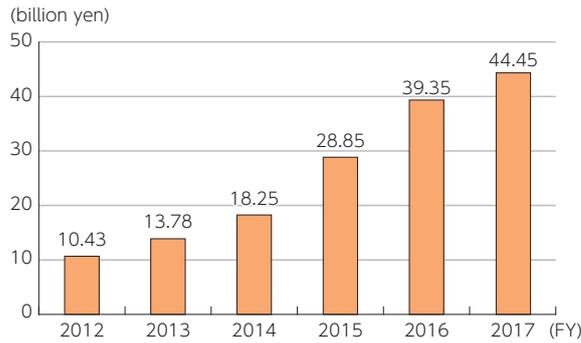
The export value of Japanese broadcast content in FY 2017 was 44.45 billion yen (Figure 3-1-8-5). Looking at the composition of the export value of Japanese broadcast content, the total of program broadcast rights, Internet distribution rights, and merchandising rights account for more than 90 percent. Especially, export value of Internet distribution rights and merchandising rights have shown significant growth since 2012. The export value of program broadcast rights includes cases in which program broadcast rights and Internet distribution rights are sold as a set, so Internet distribution has a high impact on the overall exports. Looking at the export value of Japanese broadcast content by entity, the combined total of "NHK", "main commercial broadcast stations" and "production, etc." covers over 90 percent.

When the comparison is limited to just the export value of program selling rights, then the ratio of broadcasting entities become higher.

- Anime accounts for over 80 percent of the export value for the program category, this is followed by drama programs and variety shows. Asia accounts for nearly 60 percent of exports, followed by North America and Europe

Looking at the broadcast content export value by program category finds that anime accounts for 80 percent of the total, this is followed by drama programs and variety shows (Figure 3-1-8-6). The largest export market for broadcast content was Asia, with over 50 percent, followed by North America, Europe, and Central America. This shows that Japanese broadcast contents are exported across the world, particularly to Asia. When the comparison is limited to just the export value of program selling rights, the ratio to Asia is much higher.

Figure 3-1-8-5 Export value of Japanese broadcast content



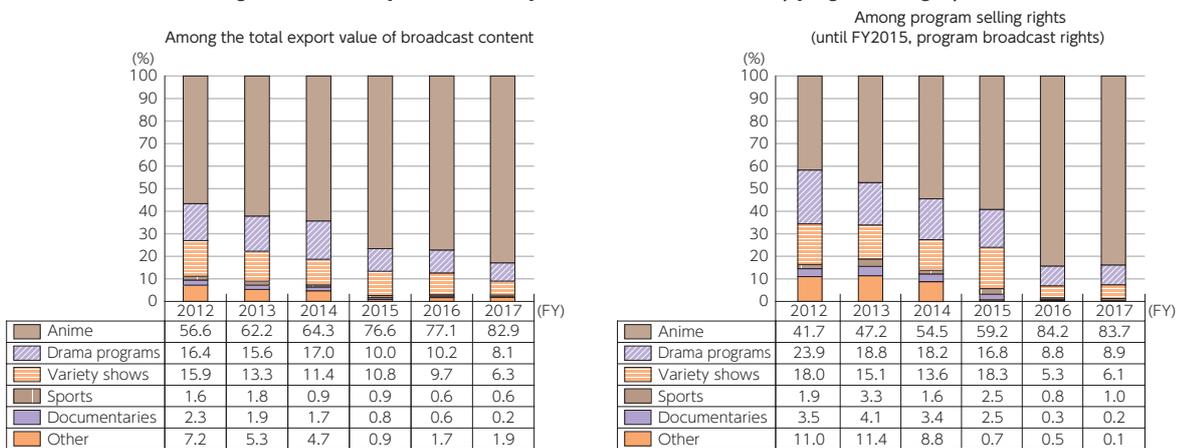
(Notes) *1 Export value of broadcast content: program broadcast rights, Internet distribution rights, video and DVD rights, format and restaging rights, merchandising rights, and similar rights.

*2 Calculated based on questionnaire responses by 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 "Survey on the State of Overseas Expansion of Broadcast Content" MIC

Figure 3-1-8-6 Export value of Japanese broadcast content by program category



(Notes) *1 Figures for FY 2015 and later have been calculated by excluding unidentified figures.

*2 Unidentified figures in FY2016 include all values for "digital gaming rights", and shows the mass amount of approximately 10 billion yen.

*3 Figures for FY 2017 includes the values provided by the Japan Foundation project.

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

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 was nearly 80 percent, in contrast the rate for fixed line telephones was just over 60 percent

The ownership rate for ICT devices (households) in 2018 was 79.2 percent for “smartphones”, which is included in “mobile devices”(95.7 percent), and exceeds that of “computers” (74.0 percent). The rate for “fixed-line telephones” was 64.5 percent (Figure 3-2-1-1).

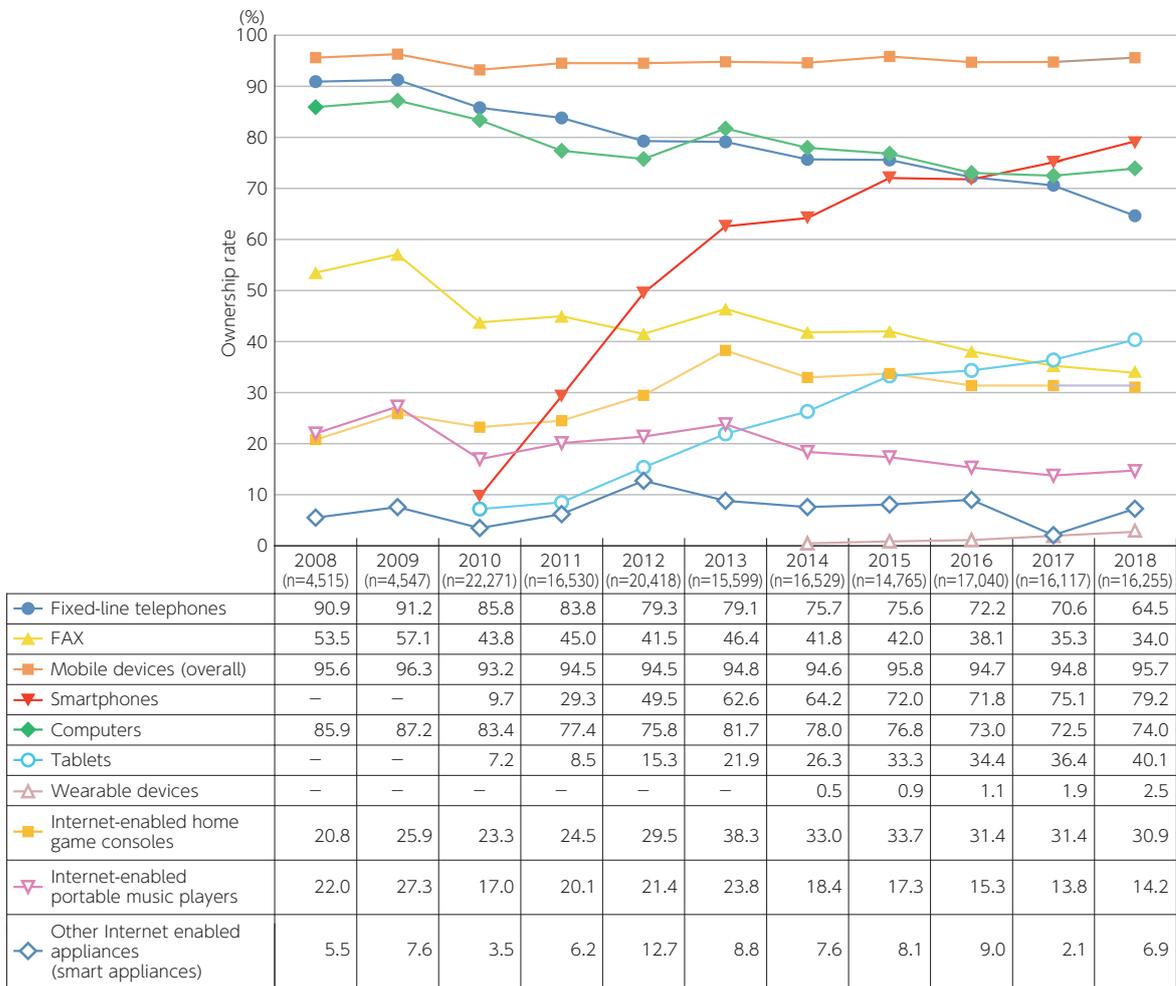
(2) Internet usage

a. Internet usage rate (individuals)

- Usage of the Internet via smartphones exceeds the usage via computers

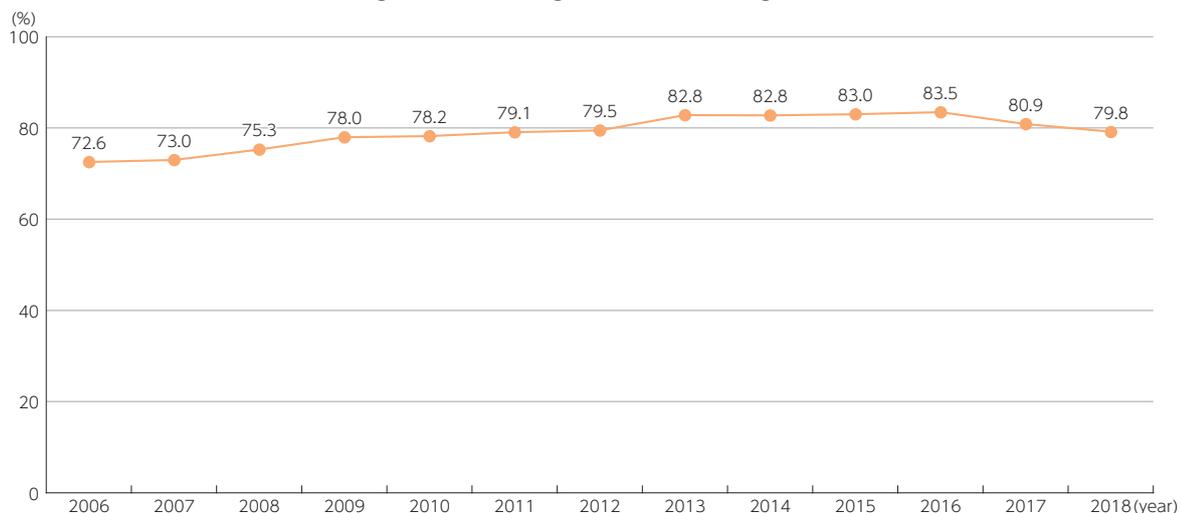
The Internet usage rate (individuals) in 2018 was 79.8 percent (Figure 3-2-1-2). Looking at the Internet usage rate by devices, “smartphones” (59.5 percent) exceeded “computers” (48.2 percent) by 11.3 points (Figure 3-2-1-3).

Figure 3-2-1-1 Changes in ownership rates for ICT devices (households)



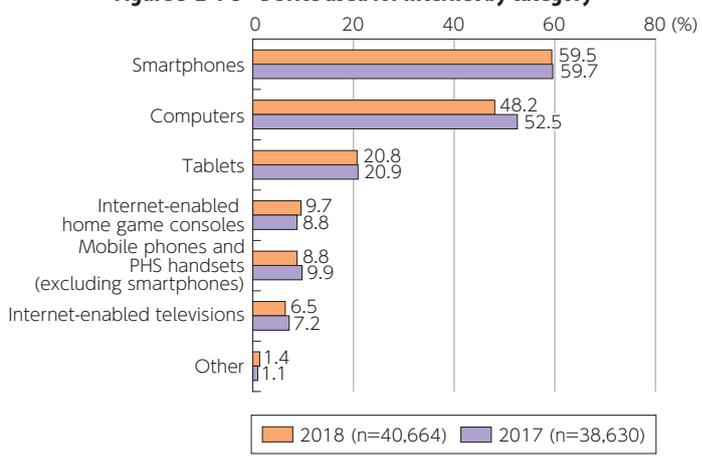
(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-2 Changes in the Internet usage rate



(Source) "Communications Usage Trend Survey," MIC

Figure 3-2-1-3 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) "Communications Usage Trend Survey," MIC

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 purpose for using the Internet was “sending and receiving email”, the number of users varies by age groups for “using social networking services,” and “using video posting / sharing sites” (Figure 3-2-1-4).

(3) Challenges for secure Internet usage

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

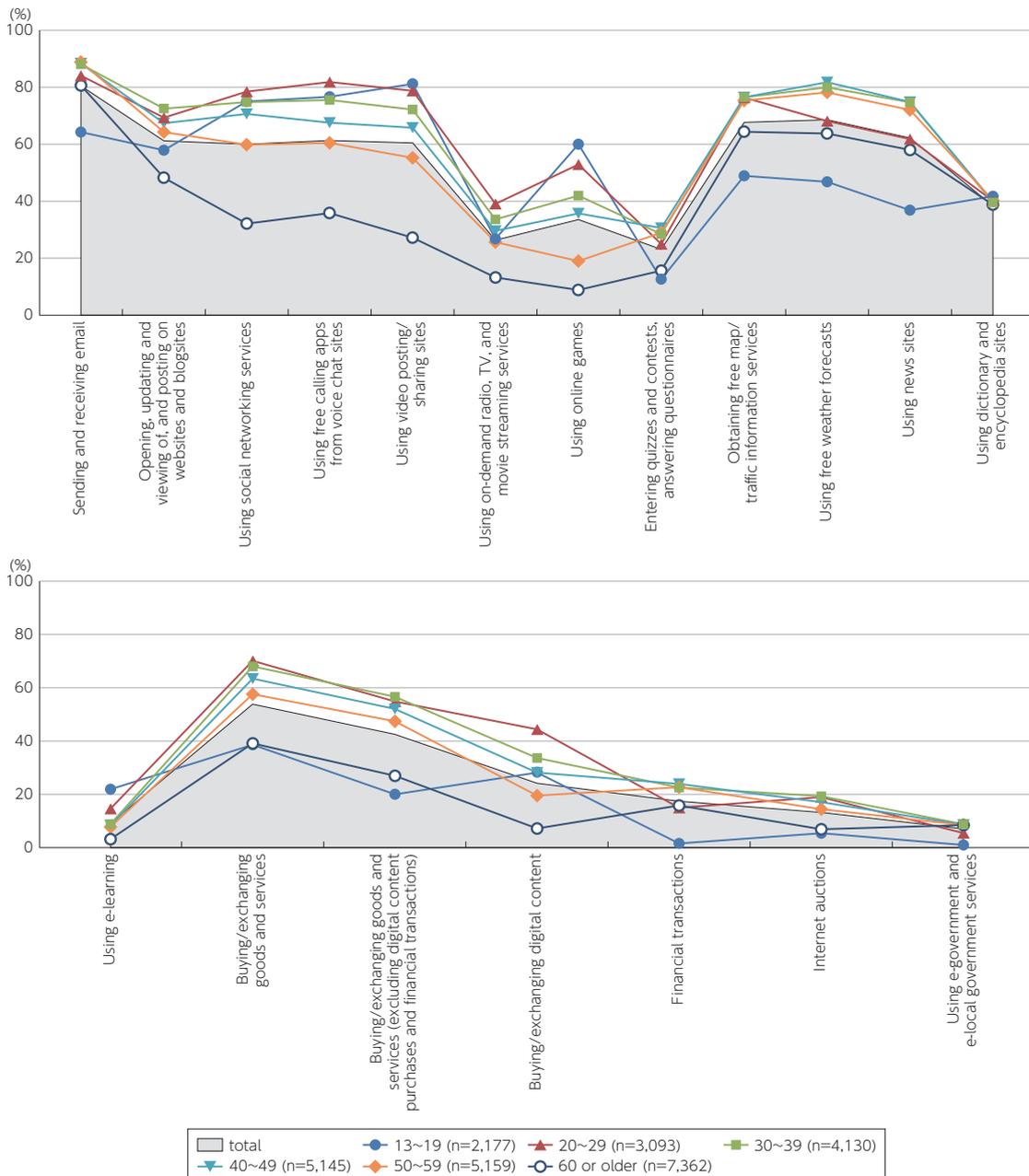
- Individuals are concerned about leaks of personal information, and enterprises are concerned about computer virus infections

The percentage of individuals (aged 12 and older) who feel concerned about their Internet usage is 70.7 percent including both respondents who said they “feel

concerned” and respondents who said that they “feel rather concerned” (Figure 3-2-1-5). Among more specific concerns that they had about using the Internet, 84.6 percent cited “leak of personal information and Internet use history”. This was followed, in descending order, by “computer virus infections” (65.7 percent) and “concern about fraudulent email or fraud using the Internet” (48.3 percent). “Concern about the reliability of electronic payment methods” (37.8 percent) increased by 4.6 percentage points over the previous year (Figure 3-2-1-6).

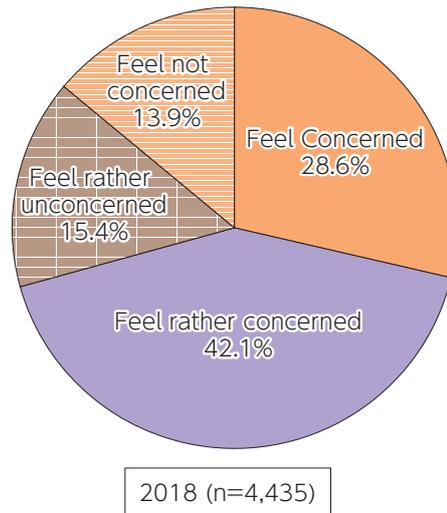
Among enterprises, the most common response at 47.2 percent cited “concern about virus infections” as a problem when using ICT networks (the Internet and internal LANs) (Figure 3-2-1-7).

Figure 3-2-1-4 Applications / purpose for using the Internet by age group (multiple answers)



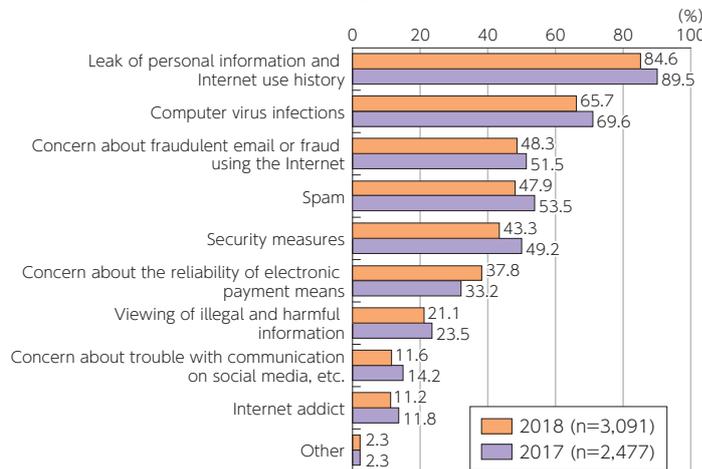
(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-5 Responses of individuals regarding concerns about using the Internet



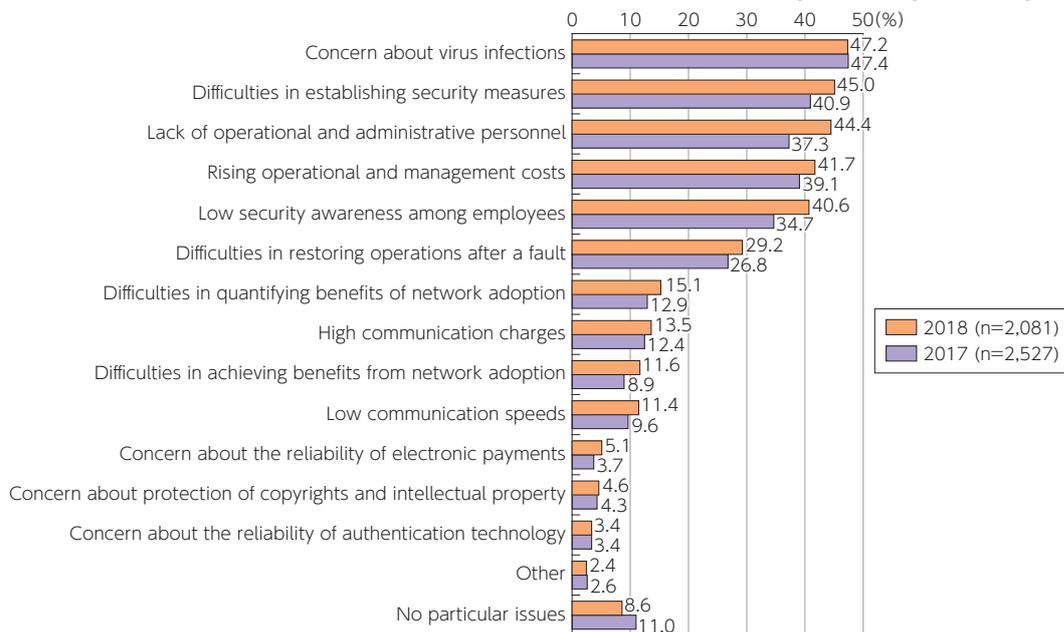
(Source) "Communications Usage Trend Survey," MIC

Figure 3-2-1-6 Types of concerns about using the Internet (multiple responses accepted)



(Source) "Communications Usage Trend Survey," MIC

Figure 3-2-1-7 Issues associated with use of information-communication networks in enterprises (multiple answers permitted)



(Source) "Communications Usage Trend Survey," MIC

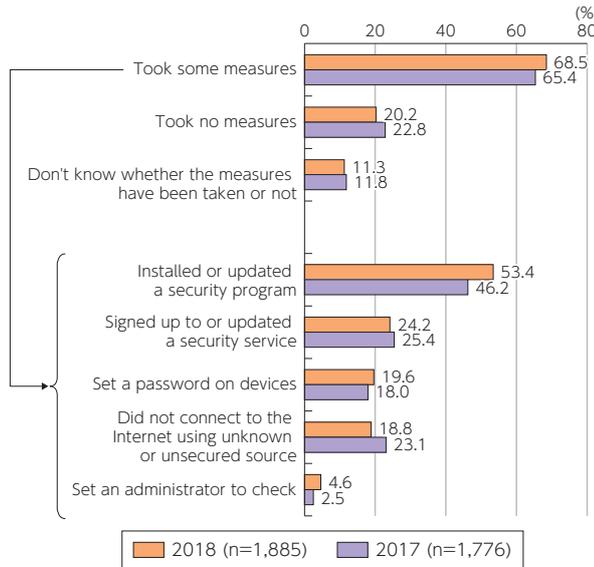
b. Information security measures

- Almost 70 percent of households and almost all enterprises have implemented some form of information security protective measures

Looking at the state of information security protective measures taken by households that use the Internet shows that 68.5 percent of households have taken some form of security. The leading security measures were “installed or updated a security program” (53.4 percent) and “signed up or updated a security service” (24.2 percent) and “signed up or updated a security service” (24.2 percent) (Figure 3-2-1-8).

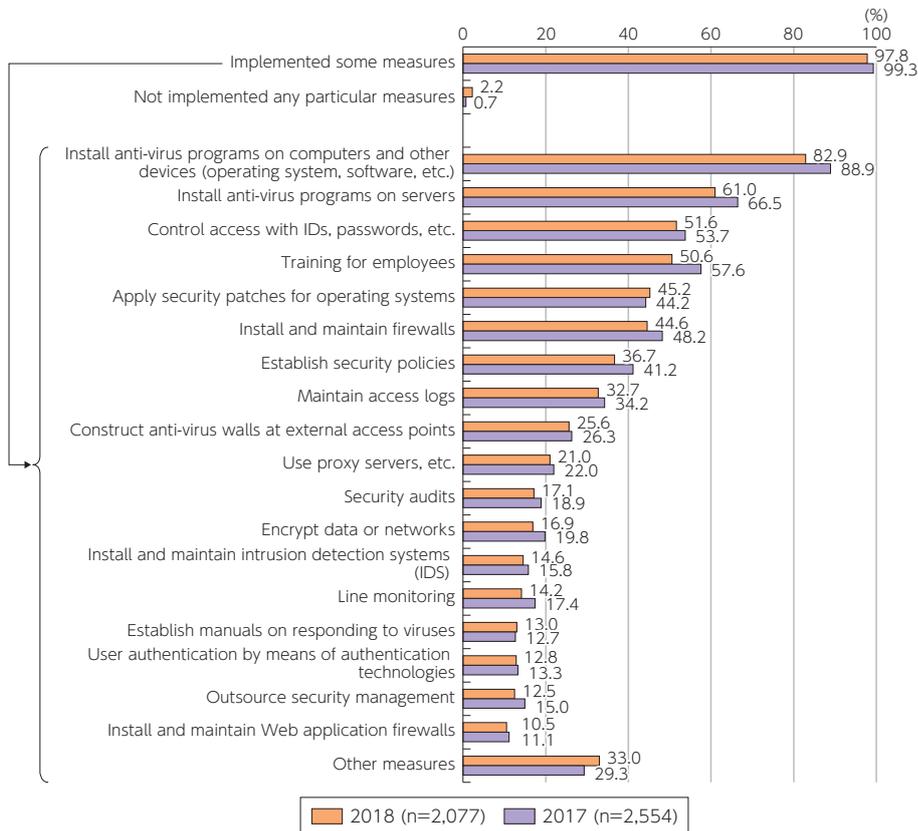
Looking at the state of information security measures implemented by enterprises that use an ICT network, it shows that 97.8 percent of enterprises have implemented some form of security. The leading security measure was to “install anti-virus programs on PCs and other devices (operating system, software, etc.),” which 82.9 percent of enterprises have implemented. This was followed by the measure of “install anti-virus programs on servers” (61.0 percent) (Figure 3-2-1-9).

Figure 3-2-1-8 Implementation of information security measures by households (multiple answers permitted)



(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-9 Implementation of information security measures by enterprises (multiple answers permitted)



(Source) “Communications Usage Trend Survey,” MIC

(4) Trends of enterprises using cloud services

a. Use of cloud services

- The percentage of enterprises using cloud services was nearly 60 percent in 2018

Looking at the state of cloud service usage in 2018, 58.7 percent of enterprises answered they had used cloud services either partially or extensively, which is a significant rise of 1.8 percent from the previous year

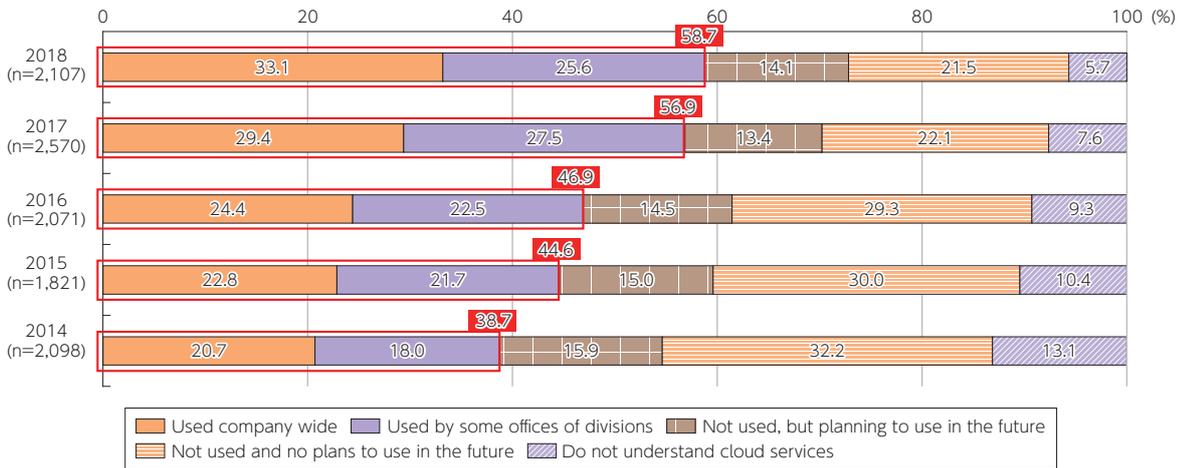
when it stood at 56.9 percent. (Figure 3-2-1-10)

b. Effectiveness of cloud services

- Many enterprises recognize cloud services as being effective

Among the enterprises that do use cloud services, 83.2 percent responded that they found it to be “very beneficial” or “somewhat beneficial” (Figure3-2-1-11).

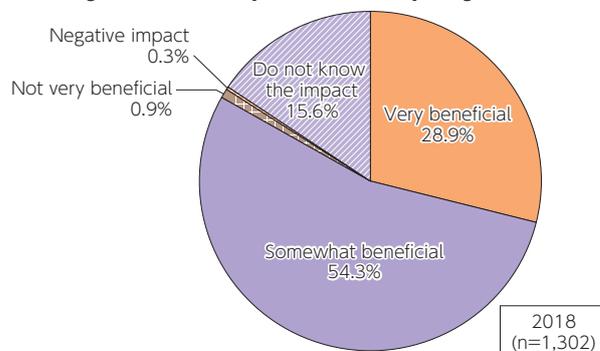
Figure 3-2-1-10 Use of cloud services



	number of enterprises	number of enterprises (after weight adjustment)	State of cloud service usage							Do not understand cloud services	N/A
			Used			Not used					
			used company wide	Used by some offices or divisions	Not used, but planning to use in the future	Not used and no plans to use in the future					
All	2,119	2,119	1,236	697	539	751	297	453	119	13	
[Industry classification]											
Construction	299	91	59	39	20	29	16	14	2	0	
Manufacture	371	567	307	172	135	236	96	141	22	1	
Transportation and Postal services	316	194	98	48	50	82	24	58	12	1	
Wholesale and Retail	296	452	287	165	122	134	63	72	24	6	
Finance and Insurance	134	25	20	11	10	5	2	3	0	—	
Real estate	132	31	22	16	6	7	3	4	1	1	
ICT	243	105	89	63	26	15	11	4	1	—	
Services, others	328	654	354	183	171	241	83	158	56	3	

(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-11 Impact of cloud computing services



(Source) “Communications Usage Trend Survey,” MIC

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 storage and data sharing”, as cited by 53.1 percent of respondents, this is followed, by “email” with 52.2 percent and “server applications” with 51.0 percent. Very advanced use of cloud services, such as utilizing it for “sales support” or “production management”, is still rather limited (Figure 3-2-1-12).

(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 sys-

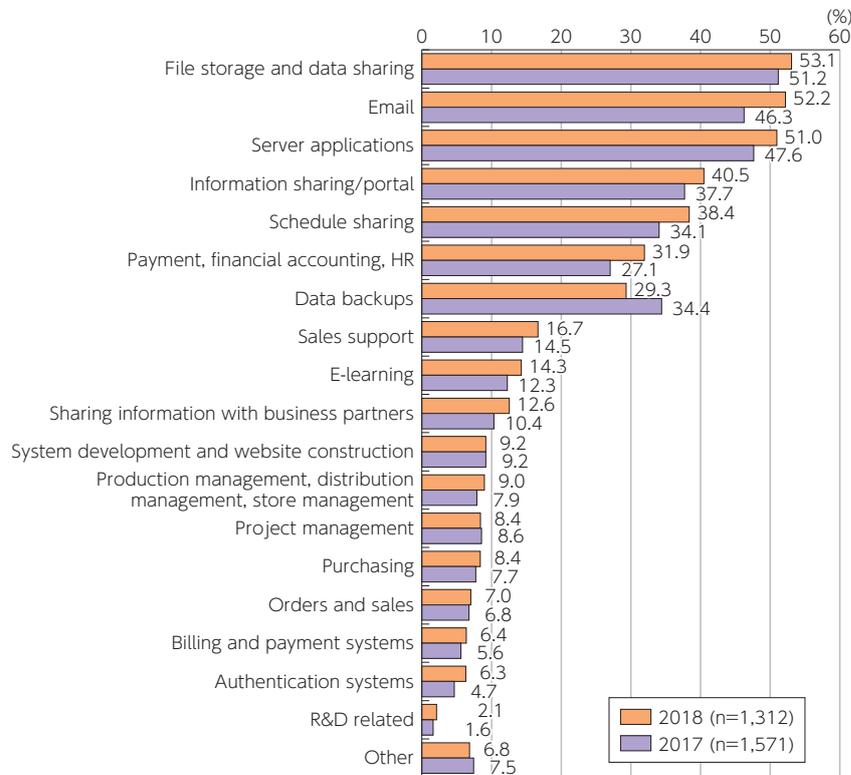
tems and services, for example, in order to collect and analyze digital data, accounted for 12.1 percent of enterprises. We can see that if enterprises that are planning to introduce these kinds of systems and services in the future are included, then this accounts for 20 percent of the total, (Figure 3-2-1-13).

b. Purpose behind collecting and analyzing digital data

- About 70 percent of enterprises collect and analyze digital data to raise job performance and improve business processes

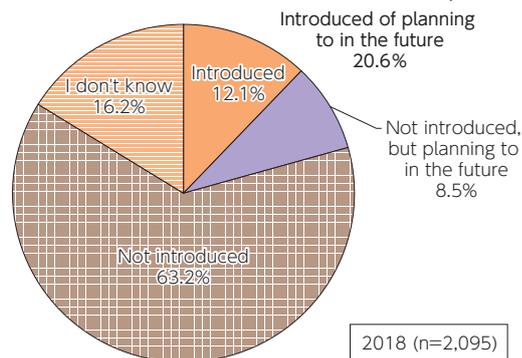
Looking at the purpose for collecting and analyzing digital data, the most frequent answer was “to raise job performance and improve business processes” with 73.8 percent, this was followed by “to improve customer services” (43.2 percent) and, “for the optimization of projects” (23.9 percent) (Figure 3-2-1-14).

Figure 3-2-1-12 Breakdown of cloud service usage



(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-13 Current state of the introduction of IoT/AI systems and services



(Source) “Communications Usage Trend Survey,” MIC

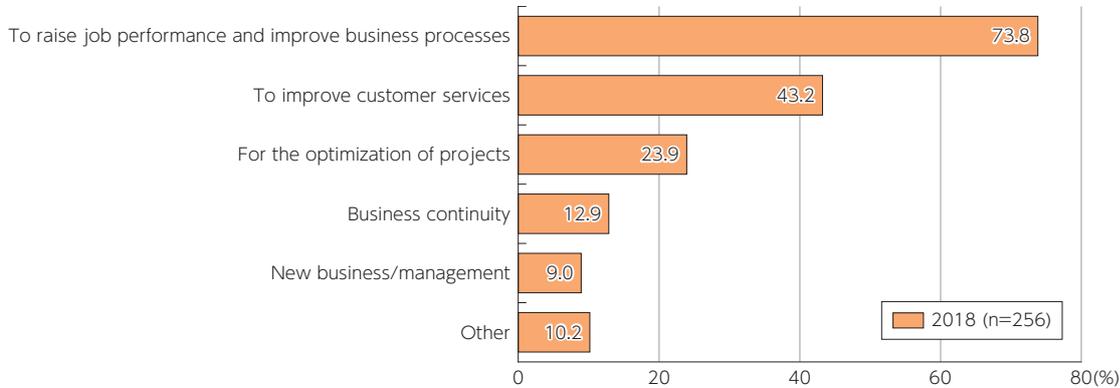
c. Impact of introducing IoT/AI systems and services

- About 70 percent of enterprises recognized that there had been positive impacts from IoT/AI systems and services

Looking at the impact of IoT/AI systems and services,

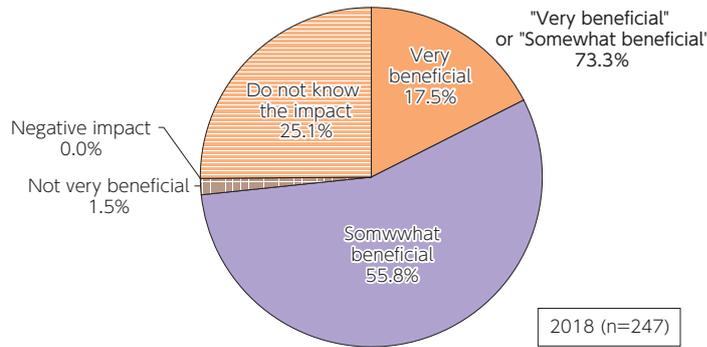
enterprises that responded it had been “very beneficial” or “somewhat beneficial” totaled 73.3 percent of all enterprises (Figure 3-2-1-15).

Figure 3-2-1-14 Purpose behind collecting and analyzing digital data



(Source) “Communications Usage Trend Survey,” MIC

Figure 3-2-1-15 Impact of introducing IoT/AI systems and services



(Source) “Communications Usage Trend Survey,” MIC

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 0ABJ-IP phone services have steadily increased

Subscriptions to fixed communications (including NTT East and West subscription telephone services (including ISDN), non-NTT telephone services,⁵⁸ and CATV telephone services but excluding 0ABJ-IP phone services) have been declining, while those for mobile communications (mobile phones and PHS handset services) and 0ABJ-IP phone services have been growing steadily. Subscriptions to 050-IP phone services have been flat in recent years.

There were about 9.0 times more mobile communications subscriptions than fixed communications subscriptions (Figure 3-2-2-1).

(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 services⁵⁹ at the end of FY 2018 stood at 40.25 million (up 1.5 percent from the previous year). Subscriptions to mobile ultra-high-speed broadband services was 136.64 million for 3.9G and 4G (LTE) services (up 13.2 percent), and 66.24 million for BWA services (up 13.8 percent) (Figure 3-2-2-2). 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.

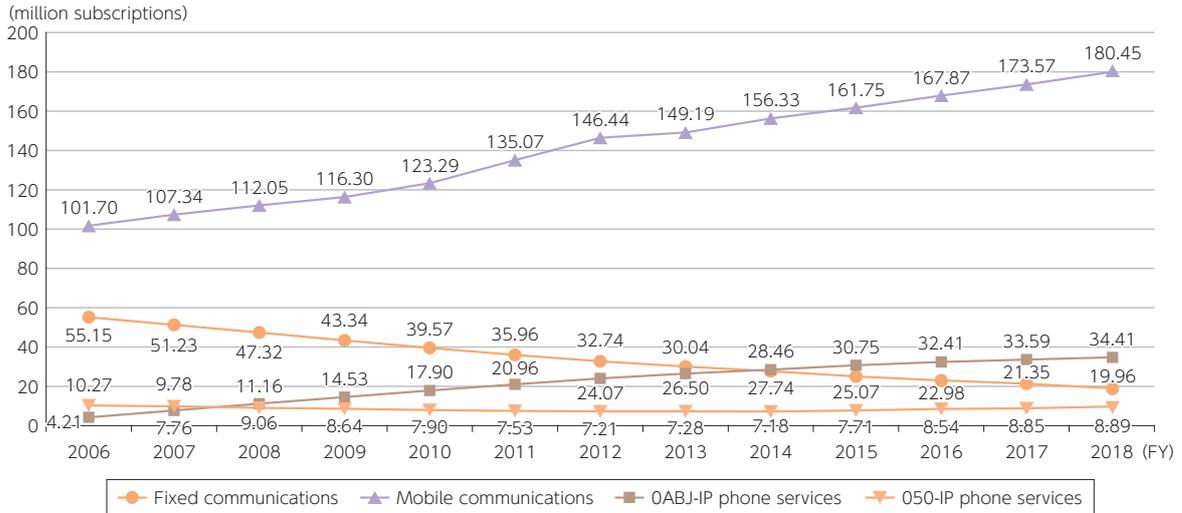
b. Mobile communications

- 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 communications⁶⁰ (mobile

⁵⁸ 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.

⁵⁹ Figures for subscriptions to fixed-line broadband services cover FTTH, DSL, cable TV, and FWA services.

Figure 3-2-2-1 Changes in subscriptions for voice communication services



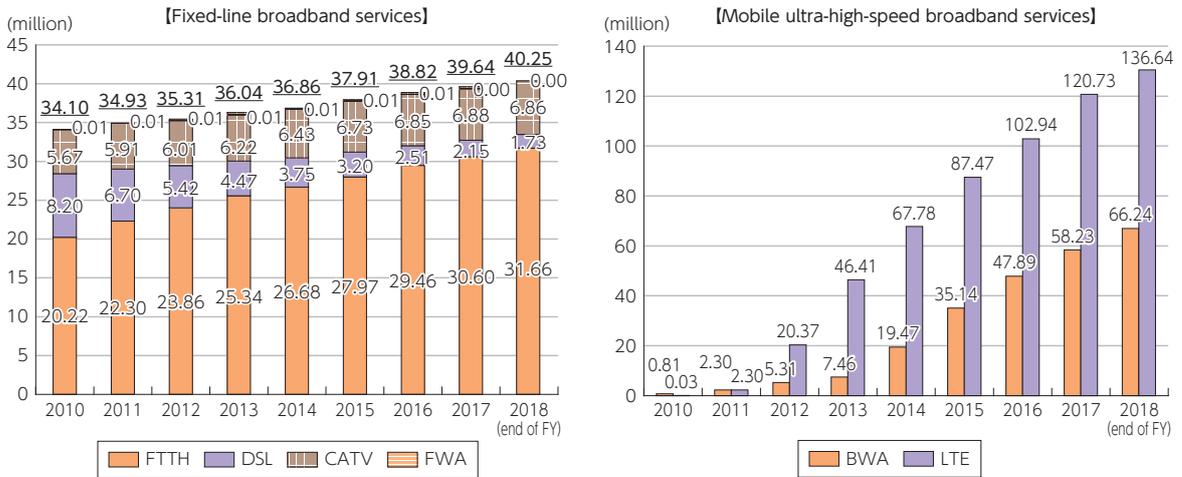
(Notes) *1 Subscriptions for mobile communications cover mobile phones, PHS services and BWA.

*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 "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2018 Q4 (End of March))," MIC

Figure 3-2-2-2 Changes in broadband service subscriptions



(Notes) Figures of the past years are different from those in last years publication due to amendments by the target enterprises

(Source) Prepared from "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2018 Q4 (End of March))," MIC

phones, PHS handsets, and BWA) at the end of FY 2018 totaled 180.45 million (an increase of 4.0 percent from the previous year). Net growth in comparison to the end of FY2017 was 6.88 million subscriptions, which demonstrates a continuing upward trend (Figure 3-2-2-3).

By carrier (Group), the market share for mobile communication subscriptions was 37.9 percent for NTT DOCOMO (down 0.8 percentage points), 27.4 percent for the KDDI Group (up 0.2 percentage points), and 23.1 percent for the SoftBank Group (±0) (Figure 3-2-2-4). By carrier (Group), market share for MVNO services was

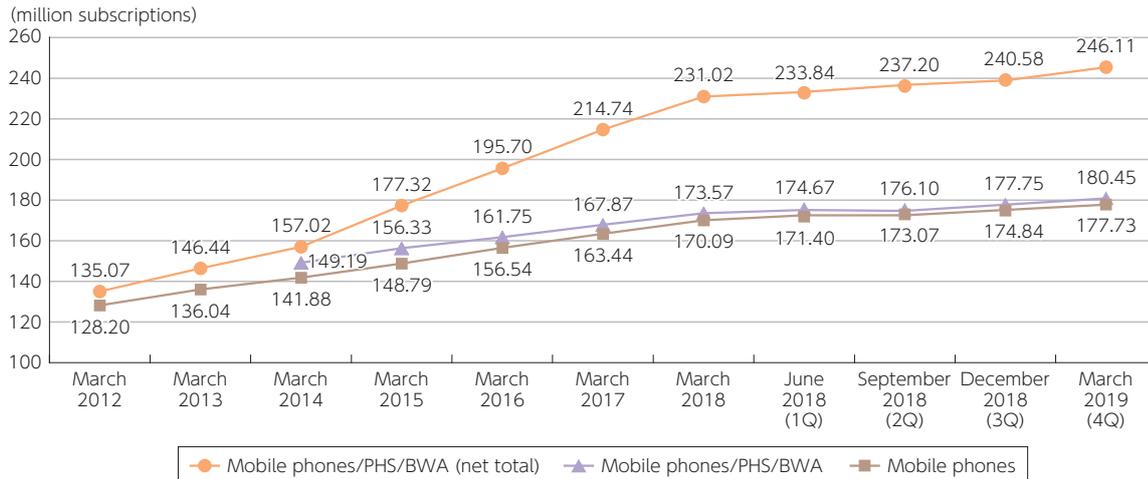
5.6 percent for NTT DOCOMO MVNO (up 0.2 percentage points from the previous year), 3.4 percent for the KDDI Group MVNO (up 0.6 percentage points), and 2.6 percent for the SoftBank Group MVNO (up 0.2 percentage points)

Subscriptions for MVNO services⁶¹, out of subscriptions for mobile communications (mobile phones, PHS handsets, and BWA), continue to increase, and reached 20.94 million in FY 2018 (an increase of 14.0 percent). (Figure 3-2-2-5)

⁶⁰ Figures after adjusting for internal group transactions.

⁶¹ Figures after subtracting subscriptions to MVNOs that are MNOs.

Figure 3-2-2-3 Changes in mobile phone subscriptions

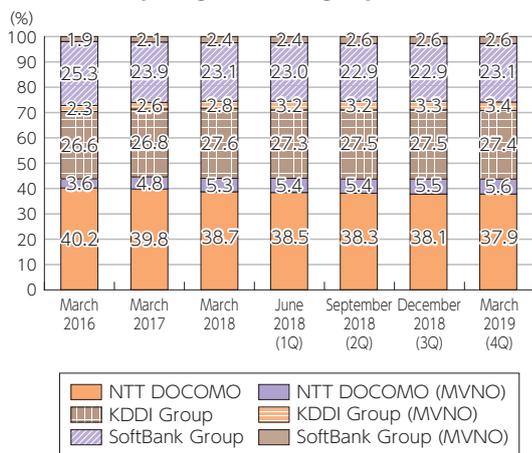


(Notes) *1 'After adjusting for internal group transactions' refers to adjustments made to count 1 mobile phone device as 1 contract and not 2 contracts so as not to diverge from reality, such as when an MNO receives mobile phone or BWA services as an MVNO from another MNO in the same group and provides 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 "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2018 Q4 (End of March)), MIC

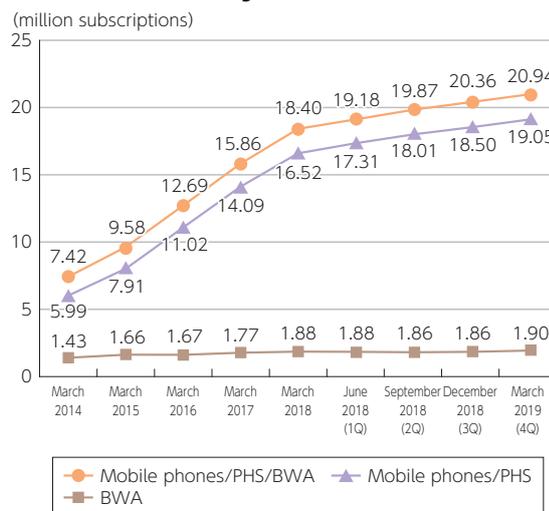
Figure 3-2-2-4 Changes in market share for carriers in mobile communication subscriptions (after adjusting for internal group transactions)



(Note) KDDI Group market share includes KDDI, Okinawa Cellular, and UQ Communications; Softbank Group market share includes Softbank, Y!Mobile, and Wireless City Planning.

(Source) Prepared from "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2018 Q4 (End of March)), MIC

Figure 3-2-2-5 Changes in subscriptions for MVNO services (excluding MVNOs that are MNO)



(Source) Prepared from "Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share (FY2018 Q4 (End of March)), MIC

(2) Telecommunication usage

a. State of traffic

(i) Internet traffic

- The total download traffic of broadband service subscribers in Japan reached an average of 11.0 Tbps as of November 2018, a 23.3 percent increase from the same month in the year before

(a) Changes in traffic by broadband subscribers

Traffic by the broadband service subscribers of ISP9⁶² continues to grow, with download traffic (A1 OUT) reaching a monthly average of 7281.8 Gbps in Novem-

ber 2018 (a 21.8 percent increase from the same month the year before). Download traffic (A1 OUT) is 7.8 times larger than upload traffic (A1 IN: 929.1 Gbps), thus, most traffic is download traffic (Figure 3-2-2-6).

(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)s⁶³(B1), the traffic exchanged with domestic ISPs without passing through

⁶² The total for nine cooperating ISPs, namely the Internet Initiative Japan (IIJ), NTT Communications, NTT Plala Inc. K-Opticom (changed its name to OPTAGE Inc. as of April, 2019), KDDI, Jupiter Telecommunications Co., Ltd., SoftBank Corp., NIFTY Corporation, and BIGLOBE Inc.

major domestic IX (B2), and the traffic exchanged with overseas ISPs(B3). In all three types, data inflow has ex-

ceeded outflow (Figure 3-2-2-6).

Figure 3-2-2-6 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 IXs and ISP9 [Gbps]		(B2) Traffic exchanged between domestic ISPs and ISP9 without passing through major domestic IXs [Gbps]		(B3) Traffic exchanged between overseas ISPs and ISP9 [Gbps]		(X) Share of nine cooperating ISPs
		in	out	in	out	in	out	in	out	in	out	in	out	in	out	
2017	5	1,406	8,027	36.1	206.4	954.8	5,452.9	1,390.0	597.1	590.5	179.1	3,207.1	685.2	1,283.1	322.6	67.93%
	11	1,160	8,903	29.6	227.1	779.1	5,980.2	1,428.9	688.1	690.6	157.1	3,591.1	661.6	1,437.5	362.5	67.17%
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	35.3	277.0	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%

(Notes) *1 The total for nine cooperating ISPs, namely the Internet Initiative Japan (IIJ), NTT Communications, NTT Plala Inc., K-Opticom (changed its name to OPTAGE Inc. in April, 2019), KDDI, Jupiter Telecommunications Co., Ltd., SoftBank Corp., NIFTY Corporation, and BIGLOBE Inc.

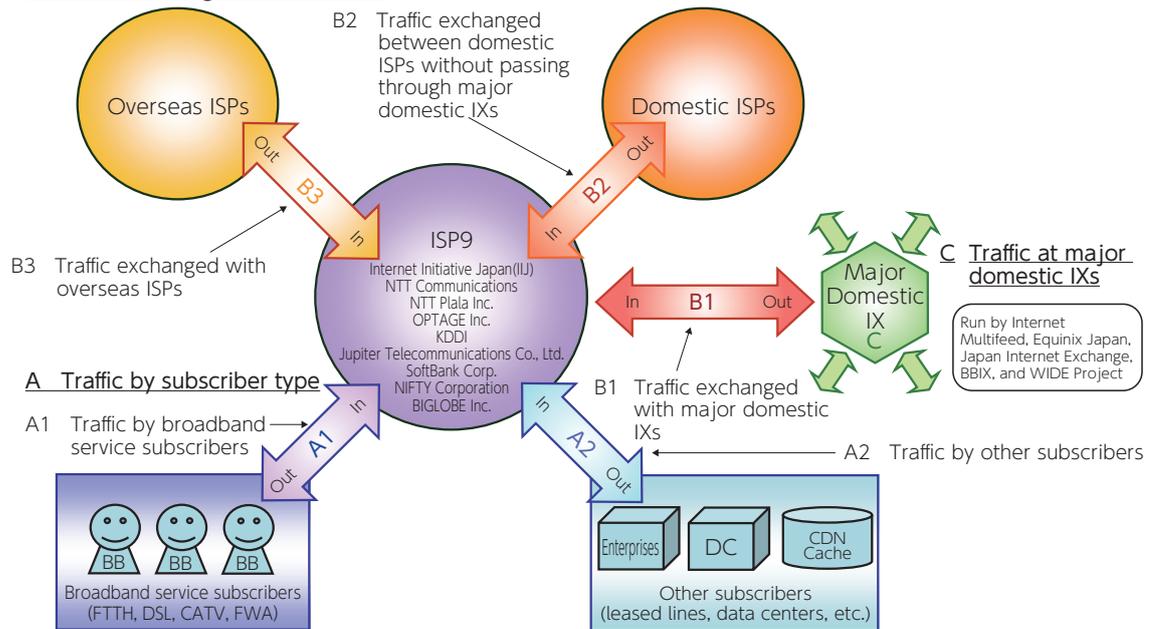
*2 The total traffic by broadband service subscribers in Japan (estimated), the traffic per broadband service subscriber (estimated). For A1 and A2 columns, *In* stands for uploads and *Out* stands for downloads.

*3 Total traffic by 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]

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 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.

*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 "Aggregation and Provisional Calculation of Internet Traffic in Japan (Announcement of aggregate results as of November 2018)," MIC

⁶³ The total for IXs run by Internet Multifeed, Equinix Japan, Japan Internet Exchange, BBIX, and WIDE Project.

(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 broadband subscriptions in Japan. This estimate found that traffic internet, on average, was approximately 11.0 Tbps during November 2018. This is a 23.3 percent increase from the same month a year ago, and demonstrates a continuing rise in internet traffic (Figure 3-2-2-6).

(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 commu-

nications, 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, Soft-Bank, 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 December 2018, mobile communication traffic increased about 1.3 times over the last year, and has reached an average of 2911.2 Gbps (Figure 3-2-2-7).

Figure 3-2-2-7 Transitions in the monthly average mobile communications traffic in Japan

Tabulated Month	June 2017			September 2017			December 2017			March 2018			June 2018			September 2018			December 2018		
	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total	up	down	total
Average (Gbps)	266.9	1,724.2	1,991.1	289.3	1,910.4	2,199.7	315.3	1,998.9	2,314.2	335.9	2,209.8	2,545.7	346.4	2,366.5	2,712.8	373.5	2,564.4	2,937.9	375.8	2,535.4	2,911.2

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

3. Provision and use of broadcasting services

- Subscriptions to NHK terrestrial, NHK-BS, WOWOW and cable TV services in FY 2017 increased from the previous year

Subscriptions to all broadcasting services increased

in FY 2017, except for 110° East CS, 124/128° East CS broadcasts (Figure 3-2-3-1).

Figure 3-2-3-1 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 PerfectTV contracts.

*5 124/128° East CS subscribers are the sum of Sky PerfectTV 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. Promoting online 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 1.5% (867 types) of all types of procedures (57,668 types), which had more than 0.1 million filings in a year, accounted for 98% (approximately 2.1 billion) of the sum of procedure filings. In particular, the online usage rate for 57 types of procedures under improvement promotions⁶⁴, which are frequently used by citizens and enterprises,

has steadily been rising (about 208.27 million procedures out of all 431.33 million procedure filings were filed online, an online usage rate is 48.3%, and an increase of 2.6 percentage points from the previous fiscal year) (Figure 3-2-4-1).

(2) Promoting online governance by local governments

a. Use of online procedures

- The usage rate for local government procedures which were selected for online-usage promotion increased over the previous fiscal year

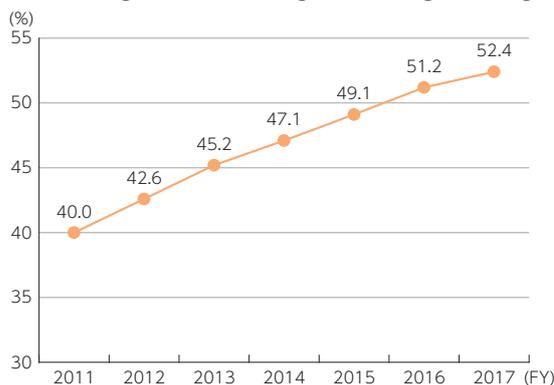
The online usage rate of local government administrative procedures⁶⁵ was 52.4 percent in FY 2017 (Figure 3-2-4-2).

Figure 3-2-4-1 Changes in the online usage of improvement promotion procedures

FY	Procedure filings (unit: million)	Filings done online (unit: million)	Online usage rate (unit: %)
2017	431.33	208.27	48.3
2016	417.87	191.07	45.7

(Source) "Online of Inventory Results of Administrative Procedures" Cabinet Secretariat and MIC

Figure 3-2-4-2 Changes in the usage of local government procedures selected for online-usage promotion



FY	Total procedure filings for the year	Filings done online	Online usage rate [%]
2011	337,590,000	135,031,153	40.0
2012	349,000,000	148,496,598	42.6
2013	367,327,000	165,922,189	45.2
2014	368,733,000	173,807,766	47.1
2015	384,473,000	188,831,889	49.1
2016	389,170,000	199,207,981	51.2
2017	390,757,000	204,740,838	52.4

(Notes) *1 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.

*2 The figure for FY 2016 was revised due to a miscalculation.

(Source) "State of Online Use of Procedure, Notification etc. by Local Public Entities in FY 2017," MIC

Section 3 Radio Spectrum Usage Trends

1. Usage and number of radio stations

(1) Radio stations

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

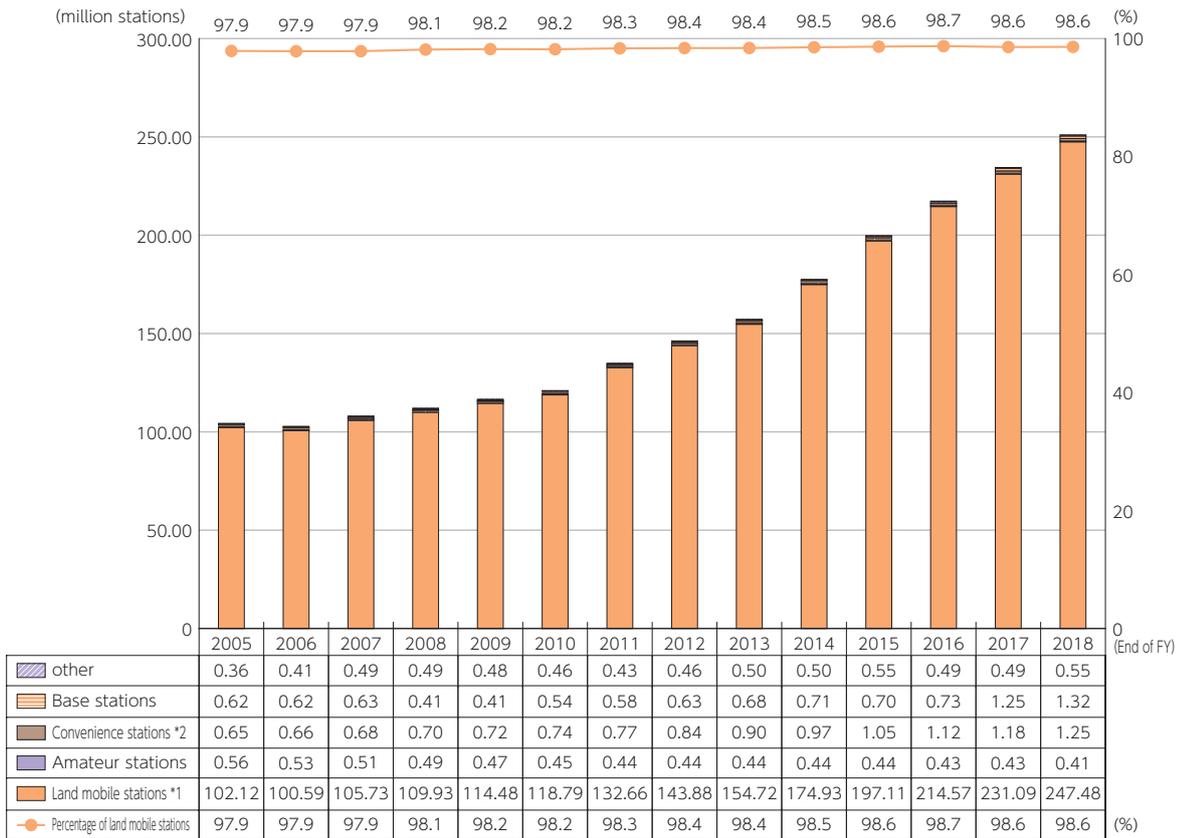
The number of radio stations (excluding PHS and wireless LAN handsets and other radio stations for which no license is required) at the end of FY 2018 in-

creased by 7.1 percent from a year earlier to 251.01 million, including 247.48 million mobile phones and other land mobile stations. Mobile phones and other mobile land stations accounted for 98.6 percent of all radio stations. The number of convenience stations climbed by 5.6 percent to 1.25 million (Figure 3-3-1-1).

⁶⁴ Improvement promotion procedures are frequently used procedures that are filed 1 million or more times a year by citizens or enterprises or that are mainly used iteratively or continuously by enterprises even if annual filings are less than 1 million.

⁶⁵ The targeted procedures are those selected for online-usage promotion under the E-Local Government Online Usage Advancement Policy.

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



(Notes) *1 "Land mobile stations" 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 stations" refers to a radio station used for simple radio communications.

2. Radio surveillance to eliminate interference with key radio communications

- There were 412 reports of interference with key radio communications in FY 2018, and 1,344 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 key 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 key radio communications with a system that can receive interference re-

ports 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 2018, there were 1,813 reports of radio interference or obstructions of all kinds, 436 fewer (down 19.4 percent) than the previous year. Among these, there were 412 reports of interference with key radio communications, 110 fewer (down 21.1 percent) than the previous year. In response to these reports, 1,946 actions⁶⁶ were taken in FY 2018 (Figure 3-3-2-1).

In FY 2018, 4,694 illegal radio stations were detected, 76 less (down 1.6 percent) than the previous year. In response, 1,334 actions¹⁸ were taken in FY 2018, a decrease of 124 actions (down 8.4 percent) from the previous year. These actions included 208 indictments (15.5 percent of all actions) and 1136 directives (84.5 percent of all actions).

⁶⁶ The number of actions includes incomplete actions remaining from the previous fiscal year.

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

