

Preface

On the Publication of the 2024 White Paper on Information and Communications in Japan



Minister for Internal Affairs and Communications
MATSUMOTO Takeaki

松本 剛明

In this White Paper, we present the current state of information and communications, as well as digital technologies.

Special Feature 1 in Part 1 focuses on the **“The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake”**.

Immediately after the earthquake, communication and broadcasting infrastructure were damaged, and public and private sectors collaborated to swiftly restore services. **Media, including broadcasting, played a significant role** in promptly and accurately disseminating information to the affected areas and contributed to addressing dis-/mis-information. **Information sharing through social media** was also widespread. Additionally, **communication infrastructure and digital technologies were utilized in rescue and recovery efforts**. This topic reaffirms the importance of information and communications and digital technologies, and outlines efforts to **strengthen communication and broadcasting infrastructure based on the challenges and lessons learned**.

Next, Special Feature 2 in Part 1 focuses on **“Living in Harmony with Evolving Digital Technologies”**.

The rapid advancement of technologies, including AI, has a significant impact on society and the economy. **Generative AI, in particular, affects all areas from industry to daily life**, presenting new opportunities while also posing risks. To **ensure the safe and secure use of AI**, we aim to **lead international discussions** on AI governance, interoperability in a borderless digital space, and the responsible use of generative AI, balancing the expansion of opportunities with risk mitigation.

This topic also covers the history of progress in the field such as the **metaverse and robotics**, and challenges and countermeasures related to the intensified spread of dis-/mis-information and the increasing influence of big tech companies.

Looking towards the future, we explore necessary initiatives for **enhancing Japan's international competitiveness, ensuring the healthiness in the information space** with consideration for freedom of expression, realizing Beyond 5G, and promoting international cooperation and rule-making.

Part 2 **analyzes the data on the latest market trends in the information and communications field**, and it summarizes the current state and future direction of information and communications policies.

Based on the analysis of this White Paper, the Ministry of Internal Affairs and Communications will continue to make every effort to advance the development of optical fiber and mobile base stations based on the **“Infrastructure Development Plan for a Digital Garden City Nation”**, **promote communication infrastructure** with large capacity, low latency, and low power consumption using cutting-edge technologies such as Photonics Electronic Convergence technology, lead the formation of international rules, including the dissemination and expansion of the **“Hiroshima AI Process”**, and **address dis-/mis-information for the benefit of the public**.

In the expanding global market for information and communications and digital technologies, we will **support the activities of related industries in Japan, ensure high-quality access at appropriate costs through universal service**, and strive to provide the public with diverse and accurate information without interruption.

I would like to express my sincere gratitude to the citizens in the cooperation of the information and communications administration. I hope that this White Paper will be widely used by everyone to help further deepen their understanding of information and communications, as well as digital technologies.

July 2024

Outline of the 2024 White Paper on Information and Communications in Japan

Part 1 Special Feature 1	The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake
Chapter 1	The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake
	➤ A summary of damages, initiatives to restore, and supports to recovery in the area of communication, broadcasting, radio and postal services
Chapter 2	The Roles which the Information and Communications Took and Challenges
	➤ An analysis of media usage by citizens and government during earthquakes (including social media) compared to past disasters
	➤ A summary of emerging issues and required responses in the future (disaster-resistant communication infrastructure, initiatives to address dis-/mis-information etc.)
Part 1 Special Feature 2	Living in Harmony with Evolving Digital Technologies
Chapter 3	History of Digital Technologies
	➤ A summary of history of evolving digital technologies (technologies utilizing Information Communication Technology (ICT) such as AI, the metaverse, robot and mobility (automated driving))
Chapter 4	Issues and Current Responses to Digital Technologies
	➤ A summary of effects of digital technologies, such as AI, to society and economy, and responses to challenges in other countries (ensuring safety and security of AI, responding to dis-/mis-information, strengthening international competitiveness) etc.
Chapter 5	Penetration of Digital Technologies
	➤ An introduction of the current utilization status of digital technologies by citizen and corporation, and the examples of utilization by each corporation
Chapter 6	Toward Living Further in Harmony with Digital Technologies
	➤ A summary of the future initiatives toward utilizing healthily and living in harmony (promoting utilization of digital technologies to strengthen industrial competitiveness and solve social issues, ensuring the healthiness of information circulation in digital space, realizing communication networks to support digital technologies, formulating and applying rules for safe, secure and reliable use, and promoting international cooperation etc.)
Part 2	Current Status and Challenges for Information and Communications
Chapter 1	Trends in the ICT market
	➤ A summary and analysis of the overall condition of the ICT industry in Japan and other countries (e.g., GDP of information and communications industry, and the volume of exports and imports of ICT goods and services) and the status of each markets (e.g., telecommunications, broadcasting contents and applications)
	➤ A summary and analysis of the utilization of digital technologies in citizen's lives, corporate activities and the public sector in Japan and other countries
Chapter 2	ICT policy initiatives in the MIC
	➤ A summary of cross-departmental initiatives in ICT fields (e.g., promotion of the Vision for a Digital Garden City Nation), the policies implemented by the MIC, and the future directions in each policy area (telecommunications, radio and broadcasting policies etc.).

2024 White Paper on Information and Communications in Japan

General Table of Contents

Part 1

Special Feature 1 The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake	
Chapter 1 The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake	2
Section 1 Summary of the 2024 Noto Peninsula Earthquake	2
Section 2 Status of communication, broadcasting and postal services etc.	4
Chapter 2 The Roles which the Information and Communications Took and Challenges	13
Section 1 Information gathering and dissemination related to the disaster	13
Section 2 Highlighted issues and responses in the future	26
Special Feature 2 Living in Harmony with Evolving Digital Technologies	
Chapter 3 History of Digital Technologies	33
Section 1 History of development of AI and impacts of generative AI	33
Section 2 Evolving technologies along with the progress of AI	38
Chapter 4 Issues and Current Responses to Digital Technologies	42
Section 1 Issues and current initiatives along with the advancement of AI	42
Section 2 Responses to AI by country	50
Section 3 Trends in discussion on other digital technologies	55
Chapter 5 Penetration of Digital Technologies	57
Section 1 Status of use by the citizens and corporations	57
Section 2 Current situation and new trends of utilization	64
Chapter 6 Toward Living Further in Harmony with Digital Technologies	75
Section 1 Issues and necessary initiatives to live further in harmony with digital technologies	75

Part 2

Chapter 1 Trends in the ICT Market	88
Section 1 Trends in the ICT industry	88
Section 2 Trends in the telecommunication field	98
Section 3 Trends in the broadcasting and content field	109
Section 4 Trends in radio wave usage in Japan	119
Section 5 Trends related to ICT equipment and devices in Japan and overseas	123
Section 6 Trends in platforms	131
Section 7 Trends in the market of ICT services and contents and application services	134
Section 8 Trends in the data center market and cloud services market	140
Section 9 Trends in AI	144
Section 10 Trends of cybersecurity	146
Section 11 Trends in digital usage	149
Section 12 Trends in postal service and correspondence delivery business	171
Chapter 2 ICT policy initiatives in the MIC	176
Section 1 Promotion of comprehensive ICT policies	176
Section 2 Trends in telecommunications business policies	178
Section 3 Trends in radio policy	188
Section 4 Trends in broadcasting policy	197
Section 5 Trends in cybersecurity policy	204
Section 6 Promotion of ICT usage	212
Section 7 Trends in ICT technology policy	221
Section 8 Promotion of international strategies for ICT	229
Section 9 Promotion of postal administration	242

Appendix

Additional notes	250
References	253

Introduction

This is the 52nd edition of the White Paper on Information and Communications in Japan, which has been published by the Ministry of Internal Affairs and Communications (MIC) annually since 1973. The White Paper's objective is to introduce the current state of information and communications in Japan and related policy trends.

The White Paper consists of two parts. The first part includes two special features. The first feature, "The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake", summarizes the damage to telecommunications and broadcasting infrastructure in the 2024 Noto Peninsula earthquake, recovery efforts, the role played by ICT, and the issues that emerged and future efforts. The second feature, "Living in Harmony with Evolving Digital Technologies", touches on the new possibilities and risks that AI and other technologies bring to society and the economy, and looks at the prospects for sound utilization of these technologies.

The second part describes the current status and challenges of information and communications. This part consists of Chapter 4, "Trends in the ICT market", with statistical information on domestic and overseas market trends surrounding ICT, and Chapter 5, "The status of ICT policy at the MIC", with a summary of the status of ICT policy at the MIC.

The data of this White Paper can be downloaded from the following page of the MIC website.

<https://www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2024/2024-index.html>

Past white papers can be downloaded from the following pages.

https://www.soumu.go.jp/johotsusintokei/wp_eng.html

Legend

- ◆ "Year" refers to a calendar year from January to December, while "fiscal year" (hereinafter referred to as FY) refers to a "budget year" from April to March of the following year.
- ◆ "Inc.," "CO., Ltd." etc. are omitted from the name of enterprises in principle.
- ◆ The following symbols are used for supplementary units:
 - 10 hundred quintillion (10^{21}) fold ...Z (Zetta)
 - 1000 quadrillion (10^{18}) fold ...E (exa)
 - 1,000 trillion (10^{15}) fold ...P (peta)
 - 1 trillion (10^{12}) fold ...T (tera)
 - 1 billion (10^9) fold ...G (giga)
 - 1 million (10^6) fold ...M (mega)
 - 1,000 (10^3) fold ...k (kilo)
 - One tenth (10^{-1}) fold ...d (deci)
 - One hundredth (10^{-2}) fold ...c (centi)
 - One thousandth (10^{-3}) fold ...m (milli)
 - One millionth (10^{-6}) fold ...μ (micro)
- ◆ Units are rounded up to the nearest whole number in principle. The total of the breakdown and the value of the total column may not agree due to rounding.
- ◆ Total of composition ratios (%) may not be 100 due to unit rounding.
- ◆ Maps in these materials do not show the entire territory of the country.
- ◆ Figures, etc., without attribution are the Ministry of Internal Affairs and Communications (hereinafter referred to as MIC) materials.

This white paper is provisional translation.

Main Contents



2024 White Paper on Information and Communications in Japan

Table of Contents

Part 1

Special Feature 1 The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake

Chapter 1

The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake 2

Section 1 Summary of the 2024 Noto Peninsula Earthquake 2

Section 2 Status of communication, broadcasting and postal services etc. 4

1. Damages to communication infrastructure 4
 - (1) Fixed communications 4
 - (2) Mobile communications (mobile phone etc.) 5
 - (3) Others 7
2. Damages to broadcasting network 8
 - (1) Terrestrial broadcasting 8
 - (2) Radio broadcasting 8
 - (3) Cable broadcasting 8
3. Damages to postal offices etc. 9
4. Initiatives to ensure communication tools 9
 - (1) Operation of mobile and portable base stations, mobile power supply vehicles, and generators 9
 - (2) Utilization of mobile base stations 10
 - (3) Utilization of satellite communication services 10
 - (4) Lending of communication devices 11
 - (5) Public Safety Mobile System (Formerly: Public Safety LTE) 11
 - (6) Other initiatives by telecommunication operators 12
 - (7) Dispatch of liaison personnel to the affected areas 12
5. Supports etc. for necessary initiatives for recovery activities 12

Chapter 2

The Roles which the Information and Communications Took and Challenges 13

Section 1 Information gathering and dissemination related to the disaster 13

1. How the information was gathered and collected related to the disaster 13
 - (1) Information gathering related to evacuation center 13
 - (2) Utilization of Suica for evacuee information management 14
 - (3) Establishment of a database for disaster victims 14
 - (4) Visualization of damage using various data 15
2. How the information was disseminated related to the disaster 18
 - (1) Information dissemination during disasters 18
 - (2) Information gathering and dissemination after disasters 19
3. How the citizens gathered the information related to the disaster 20
 - (1) Actions for confirming safety 20
 - (2) Information gathering actions immediately after the earthquake 21
 - (3) Encountering unverified information 22

4. Other examples to utilize information and communications	24
(1) Utilization of drones and robots	24
(2) Online provision of public services	25
Section 2 Highlighted issues and responses in the future	26
1. Communication	26
(1) Strengthening mobile base stations and optical fiber	26
(2) Achieving intercarrier roaming in emergencies	26
(3) Expanding the use of satellite communications	26
2. Broadcasting	27
3. Postal services	27
4. Response to dis-/mis-information	27
Column Response to dis-/mis-information related to the disaster	28

Special Feature 2 Living in Harmony with Evolving Digital Technologies

Chapter 3

History of Digital Technologies 33

Section 1 History of development of AI and impacts of generative AI	33
1. History of development of AI	33
(1) The first to third AI booms and the AI winters	34
2. Impacts of generative AI	35
(1) Rapid progress and dissemination of generative AI	35
(2) Economic effects by generative AI	37
Section 2 Evolving technologies along with the progress of AI	38
(1) Virtual spaces (the metaverse and digital twin)	38
(2) Robotics	39
(3) Autonomous driving technology	41

Chapter 4

Issues and Current Responses to Digital Technologies 42

Section 1 Issues and current initiatives along with the advancement of AI	42
1. Issues of generative AI	42
(1) Summary of major LLMs	43
(2) Domestically developed LLMs	44
2. Issues caused by generative AI	45
(1) Challenges and countermeasures for the circulation and spread of dis-/mis-information	45
(2) Discussion on intellectual property rights including copyright	48
Section 2 Responses to AI by country	50
1. Trends in international discussion	50
(1) Hiroshima AI Process	50
(2) Movements of the OECD/GPAI/UNESCO	50
(3) AI Safety Summit	51
(4) Developments in the United Nations	51
2. Trends in creation of legal rules and guidelines by country	52
(1) European Union (EU)	52
(2) The U.S.	52
(3) The UK	53
(4) Japan	54
Section 3 Trends in discussion on other digital technologies	55
1. Trends in discussion on the metaverse, robotics and automated driving	55

(1) Metaverse	55
(2) Robotics	55
(3) Autonomous driving technology	56
2. Trends in discussion to ensure cybersecurity	56

Chapter 5

Penetration of Digital Technologies	57
--	----

Section 1 Status of use by the citizens and corporations	57
---	----

1. Generative AI	57
(1) Questionnaire to the general public	57
(2) Questionnaire to corporates	59
2. Metaverse	61
(1) Questionnaire to the general public	61
(2) Questionnaire to corporates	61
3. Robotics	62
4. Automated driving	63

Section 2 Current situation and new trends of utilization	64
--	----

1. Generative AI driving business transformation	64
(1) Trends in the introduction of generative AI in companies and public organizations	64
(2) Trends in Utilization Across Various Fields and Industries	64
(3) Utilization in public sector	67
2. Expectations for solving social issues through advanced technology utilization	69
(1) Metaverse	69
(2) Robotics	71
(3) Autonomous Driving	73

Chapter 6

Toward Living Further in Harmony with Digital Technologies	75
---	----

Section 1 Issues and necessary initiatives to live further in harmony with digital technologies	75
--	----

1. Promotion of use of digital technologies to strengthen industrial competitiveness and solve social issues	75
(1) Initiatives to strengthen AI development capabilities	75
(2) Initiatives for utilizing digital technologies to solve social issues	76
(3) Efforts for improving market environment and user protection through enhanced transparency	76
2. Ensuring the healthiness of information circulation in digital space, improving the literacy and developing human resource	77
(1) Efforts to ensure the healthiness of information circulation in the digital space	77
(2) Efforts to improve literacy	78
(3) Human resource development in the era of generative AI	79
3. Realization of communication network which is a foundation of digital technologies	79
(1) Efforts toward the realization of Beyond 5G	79
(2) Realization of communication networks for autonomous driving	80
4. Creation and application of rules and international cooperation to ensure safe, secure and reliable use	81

Column Towards a future of collaboration and coexistence with AI and robots (convivial relationships) ...	83
--	----

Part 2

Current Status and Issues in the Information and Communications

Chapter 1

Trends in the ICT Market	88
Section 1 Trends in the ICT industry	88
1. Size of the ICT market	88
2. Gross Domestic Product (GDP) of the ICT industry	89
3. IT investment	90
4. Exports and imports in the ICT field	91
5. Trend of R&D in the ICT field	93
(1) Situation of research and development expenditure	93
(2) Situation of persons employed in research and development	94
(3) Patent situation	95
(4) Trends in research and development of major domestic and international companies in the ICT field	95
(5) Example of research and development of new technologies in the ICT field: IOWN Optical and Wireless Network fusion device	96
Section 2 Trends in the telecommunication field	98
1. Trends in the domestic and overseas telecommunications market	98
2. Current status of the telecommunications field in Japan	99
(1) Market size	99
(2) Number of carriers	99
(3) Infrastructure development status	99
(4) The status of traffic	101
(5) The status of use of broadband	101
(6) Satellite communications	102
(7) Status of voice communication service subscription contracts	102
(8) International comparison of communication charges	104
(9) Status of occurrence of telecommunications service accidents	104
(10) Complaints and consultations regarding telecommunications services and consultations on illegal and harmful information	104
3. New trends in the communications field	107
(1) Web3	107
(2) NTN (Non-Terrestrial Network)	107
Section 3 Trends in the broadcasting and content field	109
1. Broadcasting	109
(1) Size of the broadcasting market	109
(2) Number of operators	110
(3) Status of the provision of broadcasting service	111
(4) Status of NHK	112
(5) Utilization of broadcasting services	113
(6) Ensuring the safety and reliability of broadcasting equipment	114
2. Content market	115
(1) Size of Japan's content market	115
(2) Advertising	116
(3) Trends in overseas exports of Japan's broadcast content	118
Section 4 Trends in radio wave usage in Japan	119
1. Major use by frequency band	119
2. Trends in the number of radio stations	120

3. Radio wave monitoring to eliminate obstruction of important radio communication etc.	121
Section 5 Trends related to ICT equipment and devices in Japan and overseas	123
1. Trends in the ICT equipment market in Japan and overseas	123
(1) Market size	123
(2) Market trends by equipment type	124
2. Trends in the ICT device market in Japan and overseas	126
(1) Market size	126
(2) Market trends by device	127
3. Trends in the import and export of ICT equipment and devices by country	129
4. Trends in the semiconductor market	130
Section 6 Trends in platforms	131
1. Market trends	131
2. Trends in major platform providers	133
Section 7 Trends in the market of ICT services and contents and application services	134
1. Social media service	134
2. E-commerce	134
3. Searching services	135
4. Video streaming, music streaming and e-book	135
5. New trends in the market of ICT services and contents and application services	136
(1) Alternative data	136
(2) Metaverse	137
(3) Digital twin	138
Section 8 Trends in the data center market and cloud services market	140
1. Data centers	140
2. Cloud services	141
3. Edge computing	142
Section 9 Trends in AI	144
1. Market overview	144
2. Trends in AI by country	145
Section 10 Trends of cybersecurity	146
1. Market overview	146
2. Current status of cybersecurity	147
(1) The increasing threat of cybersecurity	147
(2) Economic losses caused by cybersecurity issues	148
(3) Trends in wireless LAN security	148
(4) Adoption status of sender domain authentication technologies	148
Section 11 Trends in digital usage	149
1. Trends in digital usage in the daily life of the citizens	149
(1) Information and communication devices and terminals	149
(2) Internet	150
(3) Utilization of digital services	153
2. Trends in utilization in corporate activities	160
(1) The Status of digitalization in each country's companies	160
(2) Telework and online meetings	163
3. Trends in digital usage in administration	166
(1) Usage of electronic administrative services (electronic applications, electronic tax filing, electronic notifications)	166
(2) Promotion of digital government in Japan	166
Section 12 Trends in postal service and correspondence delivery business	171
1. Postal service	171
(1) Japan Post Group	171

(2) Japan Post Co., Ltd.	171
(3) Japan Post Bank Co., Ltd.	173
(4) Japan Post Insurance Co., Ltd.	174
2. Correspondence delivery service	175
(1) Sales of correspondence delivery business	175
(2) Number of correspondence delivery service providers	175
(3) Correspondence delivery handling performance	175

Chapter 2

ICT policy initiatives in the MIC	176
--	-----

Section 1 Promotion of comprehensive ICT policies	176
--	-----

1. Current status and issues	176
(1) Progress of declining birthrate, aging population, and population decrease	176
(2) Frequent and severe disasters, aging social infrastructure	176
(3) Increasing complexity of international situations	176
2. Initiatives to promote comprehensive ICT policies	177
(1) Promoting efforts to realize the Vision of Digital Garden City Nation	177

Section 2 Trends in telecommunications business policies	178
---	-----

1. Summary	178
(1) Initiatives so far	178
(2) Future challenges and directions	178
2. Examination of telecommunications policy in response to changes in the market environment	178
3. Creation of a fair competitive environment	179
(1) Analysis and verification of the telecommunications market	179
(2) Establishment of interconnection rules and other regulations	179
4. Development and maintenance of digital infrastructure	180
(1) Promotion of optical fiber development	180
(2) Decentralization of data centers and submarine cables	181
(3) Ensuring the provision of broadband services	181
5. Ensuring the safety and reliability of telecommunications infrastructure	182
(1) Establishment of technical standards for telecommunications infrastructure development	182
(2) Ensuring communication services during emergencies	182
(3) Analysis and verification of telecommunications accidents	183
6. Creation of a safe and secure usage environments in telecommunication services	183
(1) Ensuring governance in the telecommunications sector	183
(2) Establishing consumer protection rules in the telecommunications sector	184
(3) Protection of secrecy of communication and user information	185
(4) Measures against illegal and harmful information	185
7. Mediation and arbitration by the Telecommunications Dispute Settlement Commission	186
(1) Functions of the Telecommunications Dispute Settlement Commission	186
(2) Commission Activities	187

Section 3 Trends in radio policy	188
---	-----

1. Summary	188
(1) Initiatives so far	188
(2) Future challenges and directions	188
2. Radio policy toward expansion of digital businesses	188
(1) Examination of promoting effective use of radio waves for expanding digital business	188
3. Spread and development of 5G and B5G	189
(1) Promotion and deployment of 5G based on the Infrastructure Development Plan for a Digital Garden City Nation	189
(2) Beyond 5G	191

4. Promotion of advanced radio use system	191
(1) Advancement of wireless LAN	191
(2) Non-Terrestrial Networks	192
(3) Advanced road traffic systems	192
(4) Public Safety Mobile System (Formerly: Public Safety LTE)	193
(5) Spatial transmission wireless power transfer system	194
5. Promotion of expansion of radio systems overseas	194
6. Development of radio wave usage environment	195
(1) Promotion of measures for electromagnetic environment protection for human health	195
(2) Promotion of measures against electromagnetic interference	195
(3) Prevention of radio wave interference and disruption	196
Section 4 Trends in broadcasting policy	197
1. Summary	197
(1) Initiatives so far	197
(2) Future challenges and directions	197
2. Examination of future vision of broadcasting institution in the digital age	198
3. Future vision of public broadcasting	198
4. Strengthening of the foundation of broadcasting businesses	199
(1) Efforts related to AM radio broadcasting	199
(2) Addressing issues in satellite broadcasting	199
5. Promotion of the production and distribution of broadcasting contents	199
(1) Promotion of production and distribution of broadcasting content	199
(2) Overseas expansion of broadcasting content	200
6. Promotion of broadcasts for people with the audiovisual disabilities	201
7. Improvement to the resilience of broadcasting networks and enhancement of disaster resistance	202
(1) Optical fiber installation for cable networks	202
(2) Support for initiatives by broadcasters	202
Section 5 Trends in cybersecurity policy	204
1. Summary	204
(1) Initiatives so far	204
(2) Future challenges and directions	204
2. Ensuring safety and reliability of information and communications networks	205
(1) Promotion of comprehensive IoT botnet countermeasures	205
(2) Promotion of proactive cybersecurity measures by telecommunications operators	205
(3) Initiatives for supply chain risk measures	206
(4) Initiatives to ensure the safety of cloud services	206
(5) Initiatives related to trust services	207
3. Improvement of ability to handle cyberattacks autonomously	208
(1) Initiatives for developing security personnel	208
(2) Building an integrated cybersecurity intelligence and human resource development platform (CYNEX)	209
4. Promotion of international collaboration	210
5. Promotion of awareness raising	210
(1) Initiatives for telework security	210
(2) Formation and promotion of locally rooted security communities (Regional SECURITY)	210
(3) Appropriate promotion of sharing and disclosure of information related to cyberattack damages	211
(4) Initiatives related to wireless LAN security	211
Section 6 Promotion of ICT usage	212
1. Summary	212
(1) Initiatives so far	212
(2) Future challenges and directions	212

2. Promotion of DX to contribute to stimulate local areas and economy	212
(1) Examination for the realization of vibrant local communities	212
(2) Discovery and development of ICT startups	214
(3) Promotion of telework	214
3. Responses to address the new issues along with the advancement of digital space	215
(1) Promoting the spread of AI and addressing risks	215
(2) Organizing issues related to the utilization of the metaverse and other technologies	215
(3) Comprehensive measures to address dis-/mis-information on the Internet	216
4. Realization of data distribution society toward the stimulation of Japan	217
(1) Development of disaster information systems	217
(2) Promotion of ICT utilization in the medical field	218
(3) Promotion of ICT utilization in the education field	218
(4) Promotion of cashless payments	218
(5) Promotion of safe and reliable cloud services	218
5. Creation of the safe and secure environment of ICT usage	219
(1) Improvement of support for digital utilization by the elderly and others	219
(2) Promotion of ICT literacy for a wide range of generations	219
(3) Establishment of a safe internet environment for the youth	219
(4) Support for research and development towards information barrier-free	219
(5) Improvement of information accessibility	220
(6) Provision of telephone relay services as public infrastructure	220
Section 7 Trends in ICT technology policy	221
1. Summary	221
(1) Initiatives so far	221
(2) Future challenges and directions	221
2. Beyond 5G	221
(1) Implementation of the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund Program	221
(2) Promotion of intellectual property and standardization activities for Beyond 5G	222
(3) Trends in Japan and overseas surrounding Beyond 5G	223
(4) Formulation of a new information and communication technology strategy	224
3. AI technologies	224
(1) Strengthening the development capability and risk response capability of LLMs	225
(2) Research and development for advanced multilingual translation technology	225
4. Quantum technologies	226
(1) Trends in quantum security and network policy	226
(2) Research and development of quantum cryptographic communication technology	226
5. Remote sensing technologies	227
6. Space ICT	227
7. Supports for ICT startups	228
Section 8 Promotion of international strategies for ICT	229
1. Summary	229
(1) Initiatives so far	229
(2) Future challenges and directions	229
2. Expansion of digital infrastructures overseas	229
(1) Overseas promotion support tools by the MIC	229
(2) Fund Corporation for the Overseas Development of Japan's ICT and Postal Services (JICT)	230
(3) Efforts for overseas expansion in each field	231
3. Contribution to formulation of international rules on the digital economy	232
(1) Data Free Flow with Trust (DFFT)	232
(2) Response to discussions on international rules in cyberspace	232
(3) Promotion of trade liberalization in the ICT sector	232
(4) Promotion of strategic international standardization	233

4. Economic security in the digital field	233
5. International cooperation in multilateral frameworks	233
(1) G7/G20	233
(2) Hiroshima AI Process	234
(3) Asia-Pacific Economic Cooperation (APEC)	235
(4) Asia-Pacific Telecommunity (APT)	235
(5) Association of South-East Asian Nations (ASEAN)	235
(6) International Telecommunication Union (ITU)	236
(7) United Nations	237
(8) World Trade Organization (WTO)	237
(9) Organisation for Economic Co-operation and Development (OECD)	237
(10) GPAI	238
(11) ICANN	238
6. International cooperation in bilateral relationships	238
(1) Policy cooperation with the U.S.	238
(2) Cooperation with Europe	239
(3) Cooperation with Asian-Pacific countries	240
(4) Cooperation with countries in Central and South America	241
(5) Cooperation with other regions	241
Section 9 Promotion of postal administration	242
1. Summary	242
(1) Initiatives so far	242
(2) Future challenges and directions	242
2. Promotion of postal administration	242
(1) Ensuring universal service in postal business	242
(2) Contribution of post offices to local communities	243
(3) Utilization of data acquired and held by post offices	245
(4) Response to new initiatives by Japan Post Insurance and Japan Post Bank	245
(5) Review of operations at the Organization for Postal Savings, Postal Life Insurance and Post Office Network for the refund of fixed-term postal savings deposited before postal privatization	246
3. Promotion of postal administration in the international field	247
(1) Response to the Universal Postal Union (UPU)	247
(2) Support for overseas deployment of Japanese postal infrastructure	247
(3) Global Postal Strategy Task Force	248
4. Trends in correspondence delivery	248

Part 1

Special Feature 1

**The Status of Information and Communications
related to the 2024 Noto Peninsula Earthquake**

Special Feature 2

**Living in Harmony with Evolving Digital
Technologies**

Chapter 1

The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake

Section 1 Summary of the 2024 Noto Peninsula Earthquake

The earthquake that occurred in the Noto region of Ishikawa Prefecture at 4:10 p.m. on January 1, 2024, with a magnitude of 7.6 and a depth of 16 km, caused widespread damage. The cities of Wajima City and Shika Town experienced seismic intensity of 7, while Nanao City, Suzu City, Anamizu Town, and Noto Town experienced seismic intensity of 6 strong. Additionally, a tsunami of 80 cm was observed in Kanazawa, Ishikawa Prefecture, and tsunamis were observed along the coast of the Sea of Japan from Hokkaido to Kyushu. In the seismic activity area of this earthquake, 1,558 earthquakes with a seismic intensity of 1 or higher were observed from 4:00 p.m. on January 1 to January 31.¹

The earthquake resulted in 260 deaths, 3 missing persons, 1,314 people injured and significant damages to

123,808 homes (excluding undefined classification, etc.). There were extensive disruptions to utilities, including power outages for approximately 44,160 households and water supply interruptions for approximately 136,440 households (as of May 28).²

The Noto region, which suffered significant damage, is characterized by low mountains and hilly terrain, leading to significant disruptions in transportation networks, hindering relief and recovery efforts. There were 440 occurrences of landslides, and many major roads leading to the northern part of the Noto Peninsula became impassable, resulting in the isolation of 33 areas (with a maximum of 3,345 people) as of January 5 (all resolved by February 13).³

Figure 1-1-1-1 Summary of the status of damages

○Human damages

	Death	Missing	Severely or slightly injured
The number	260	3	1,314

○Status of evacuation shelters

Prefecture	The number of evacuation shelters	The number of people in evacuation shelters
Ishikawa	252	3,319

○Lifeline damages

	Max. households	Status of recovery
Electricity	Approximately 44,160	Hokuriku Electric Power Transmission & Distribution Company implements safety measures : Approximately 270 households
Water supply	Approximately 136,440	Water outage in approximately 2,030 households

○Housing damages

Prefecture	House damage					Total
	Completely destroyed	Half destroyed	Flooding above floor	Flooding below floor	Partly damaged	
Ishikawa	8,108	16,504	6	5	56,295	80,918
Niigata	106	3,089		14	20,272	23,481
Toyama	245	756			17,799	18,800
Others		12			597	609
Total	8,459	20,361	6	19	94,963	123,808

* The number of housing damage (number of disaster victim certificates issued) in Niigata City, as stated in the public documents of Niigata Prefecture, is not reflected in this table.

* Information labeled as "unclassified" in the public information of Toyama Prefecture regarding housing damage is not reflected in this table.

* The number of deaths in Ishikawa Prefecture is based on the public documents of Ishikawa Prefecture.

(Source) Prepared based on materials by the Cabinet Office etc.

¹ According to the January 2024 Earthquake and Volcano Monthly Report (Disaster Prevention Edition) by the Japan Meteorological Agency, there was 1 earthquake with a seismic intensity of 7, 2 earthquakes with a seismic intensity of 6 lower, 8 earthquakes with a seismic intensity of 5 upper, 7 earthquakes with a seismic intensity of 5 lower, 45 earthquakes with a seismic intensity of 4, 159 earthquakes with a seismic intensity of 3, 395 earthquakes with a seismic intensity of 2, and 941 earthquakes with a seismic intensity of 1. The number of earthquakes with a seismic intensity of 1 or higher may be revised based on subsequent investigations.

² Materials by the Cabinet Office etc.

³ Cabinet Office, Recovery and Reconstruction Support Headquarters (3rd meeting) (March 1, 2024) Handout <https://www.bousai.go.jp/updates/r60101notojishin/pdf/r60101notojishin_hukkyuhonbu03.pdf>

In response to the disaster, the Japanese government established a “Special Disaster Response Headquarters” at 5:30 p.m. on January 1 immediately after the earthquake,⁴ and based on the implementation policy regarding disaster emergency measures etc., various ministries collaborated to swiftly gather information, assess the extent of the damage, rescue people, prevent further damage, establish sanitary conditions in evacuation centers, secure essential supplies for evacuees, restore utilities and transportation, and provide accurate information to affected residents.⁵

The MIC also established a disaster response headquarters (Chaired by Director-General of Minister’s Secretariat in the MIC) at 4:10 p.m. on the same day, and later upgraded it to an emergency disaster response headquarters (Chaired by Minister for Internal Affairs and Communications) at 10:40 p.m., taking measures to assess the damage, provide emergency response, and implement recovery measures.

The earthquake had a significant impact on the infor-

mation and communication infrastructure, causing disruptions in communication networks and power outages, affecting the use of smartphones and other communication devices, and leading to the suspension of television broadcasts in the Hokuriku region.

Efforts were made by telecommunication companies, local governments, and government agencies to restore the information and communication infrastructure through the use of mobile power sources, and in addition to the television and radio, social media platforms were utilized for confirming the safety of individuals and providing support to disaster victims. However, challenges arose, including the circulation and dissemination of so-called dis-/misinformation mainly on social media.

Although the situation continues to evolve, this report aims to document the role of information and communication in the response to the earthquake based on the situation up to May 2024.

⁴ Elevated to emergency disaster response headquarters at 10:40 p.m. on January 1.

⁵ https://www.bousai.go.jp/updates/r60101notojishin/pdf/r60101notojishin_kaigi01.pdf

Section 2 Status of communication, broadcasting and postal services etc.

1. Damages to communication infrastructure

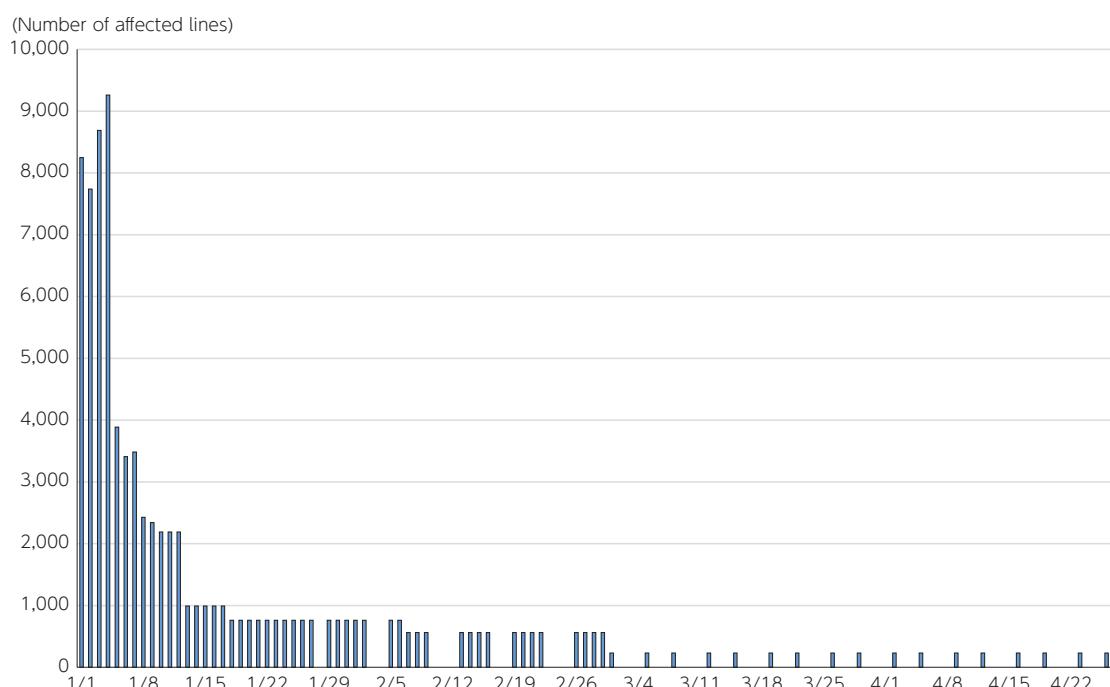
(1) Fixed communications

Regarding fixed-line communications, services were unavailable mainly in Wajima City, Suzu City, and Shika Town in Ishikawa Prefecture. According to NTT West, this earthquake caused power outages at communication buildings, and landslides and other factors damaged relay transmission routes and cables, resulting in large-scale service disruptions. This affected up to 7,860 fixed telephone lines and approximately 1,500 fixed internet lines.¹

To resume services, efforts were made to supply power to communication buildings using mobile power sup-

ply vehicles and generators, repair damaged cables, install new cables in severed sections, and restore core facilities by rerouting through unaffected relay transmission routes. Additionally, satellite phones and portable satellite phones were deployed to ensure communication for the affected people.² As of the end of May, restoration has progressed, leaving only a part of Wajima City in Ishikawa Prefecture (approximately 180 analog telephone lines and 40 Hikari (fiber-optic) telephone lines) still in need of recovery.³

Figure 1-1-2-1 Number of affected fixed telephone and fixed internet lines (based on damage reports)



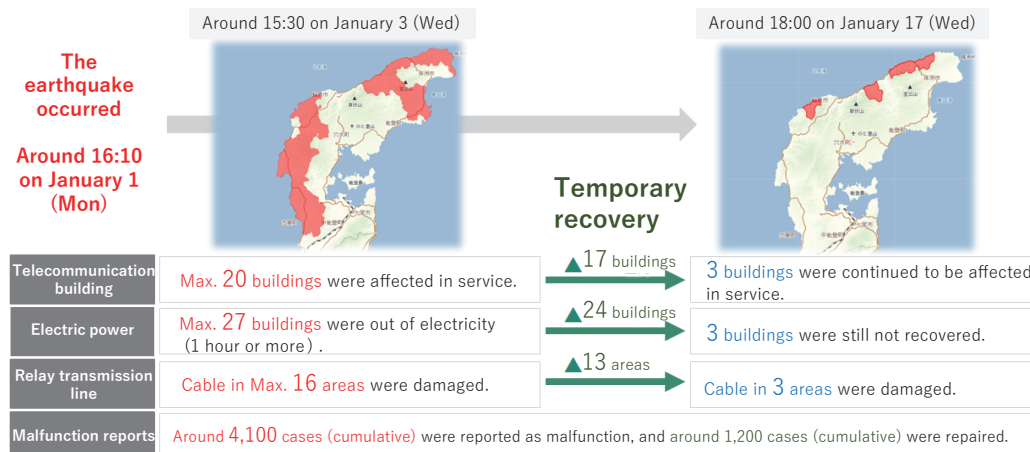
¹ Damages to the communications buildings. In addition, 149 SoftBank landline telephone lines were affected.

² NTT West "Support and Guidance for Customers Affected and Evacuated due to the Effects of the 2024 Noto Peninsula Earthquake" <<https://www.ntt-west.co.jp/share/shien.html>> (accessed April 30, 2024)

Up to 8 satellite mobile phones and portable satellite phones were deployed and operated at a total of 25 locations, but the deployment was discontinued due to the restoration of communication services at the locations. (As of 8:00 p.m., March 22, 2024)

³ MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (104th report) (May 28, 2024)

Figure 1-1-2-2 Emergency restoration status of NTT West's communication facilities (as of January 17)



(Source) NTT West

In addition, the CATV access service, which holds approximately 17% of the fixed ultra-high-speed broadband market in Ishikawa Prefecture⁴, had significant damage occurred to the center facilities and transmission lines⁵. As of April 12, partial restoration of the main lines has

been achieved in some areas of Suzu City (Noetsu Cable Net) and Wajima City (Wajima City Cable Television), but the situation continues to be characterized by ongoing transmission line disruptions.

(2) Mobile communications (mobile phone etc.)

Mobile phone services were also affected by prolonged power outages and transmission route disruptions caused by landslides. A total of 839 mobile phone base stations (799 in Ishikawa Prefecture) operated by NTT DOCOMO, KDDI, SoftBank, and Rakuten Mobile was reported outages (as of January 3)⁶ (Figure 1-1-2-3, 1-1-2-4).

Despite challenges such as road disruptions due to landslides and liquefaction, and traffic congestion on main roads leading to the affected areas (Figure 1-1-2-5), mobile phone operators deployed mobile base sta-

tion vehicles, portable satellite antennas, and portable generators. KDDI, SoftBank, and Rakuten Mobile completed emergency restoration by January 15, and NTT DOCOMO by January 17, except for areas inaccessible due to landslides (For these inaccessible areas, emergency restoration was carried out within a few days after access became possible, and as of the end of March, NTT DOCOMO and KDDI had completed restoration except for some areas in Wajima City in Ishikawa Prefecture (Hegurajima).).

⁴ MIC (August 2023), "FY2022 Annual Report on Market Verification in the Telecommunications Business Field", <https://www.soumu.go.jp/main_content/000900509.pdf>

⁵ For details on the damage to cable television, see 2. Damage to broadcast networks in Section 2, Chapter 1.

⁶ MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (13th report) (January 3, 2024)

Figure 1-1-2-3 Changes in the number of mobile phone base stations out of service (based on damage reports)

(The number of base stations out of service)

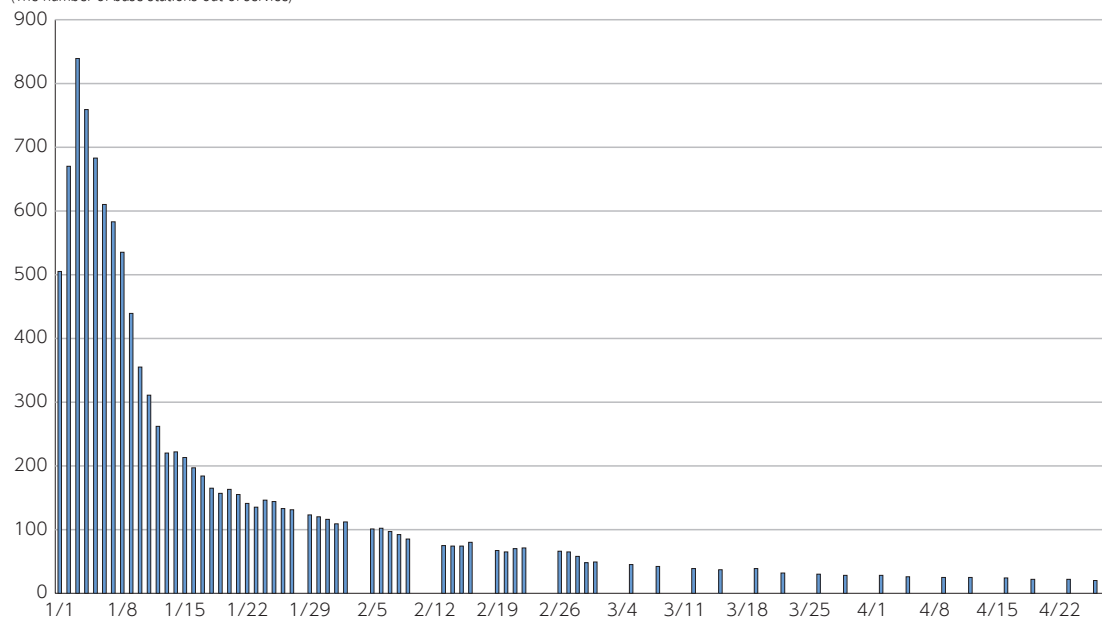
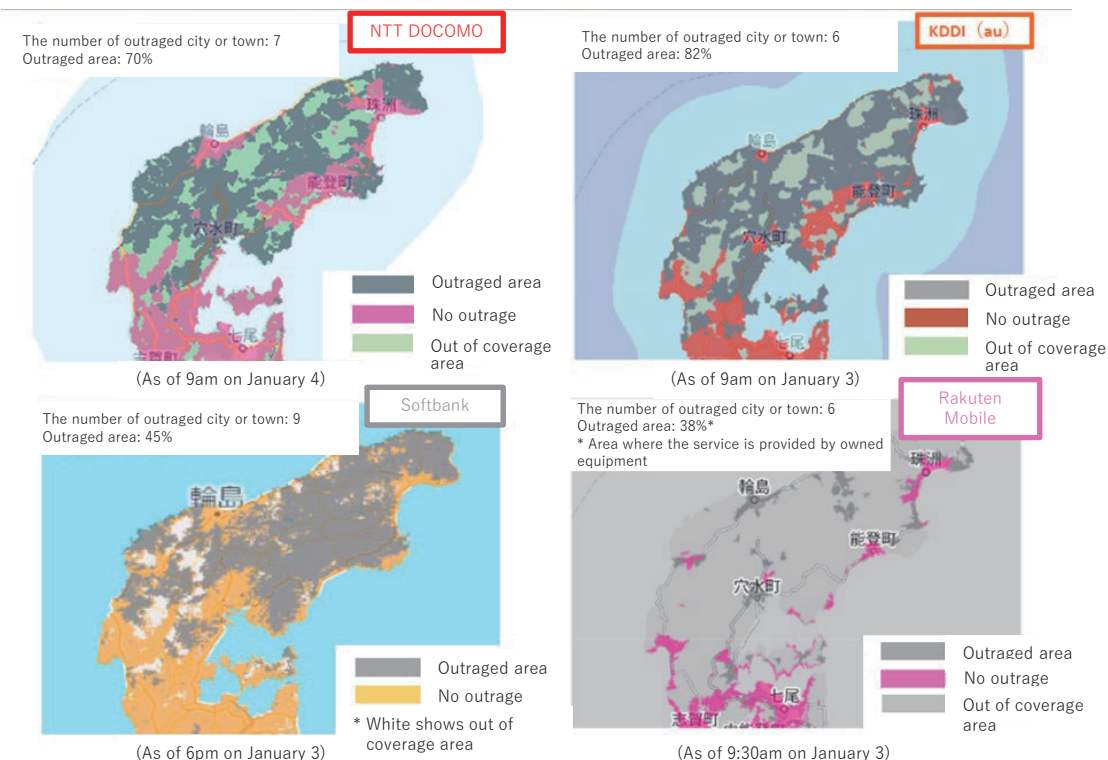


Figure 1-1-2-4 Status of mobile phone area disruptions (at the peak of area disruptions)



(Source) Prepared based on press releases of each companies

Figure 1-1-2-5 Damage to the communication infrastructure (mobile phones) (damage or replacement of optical fibers)

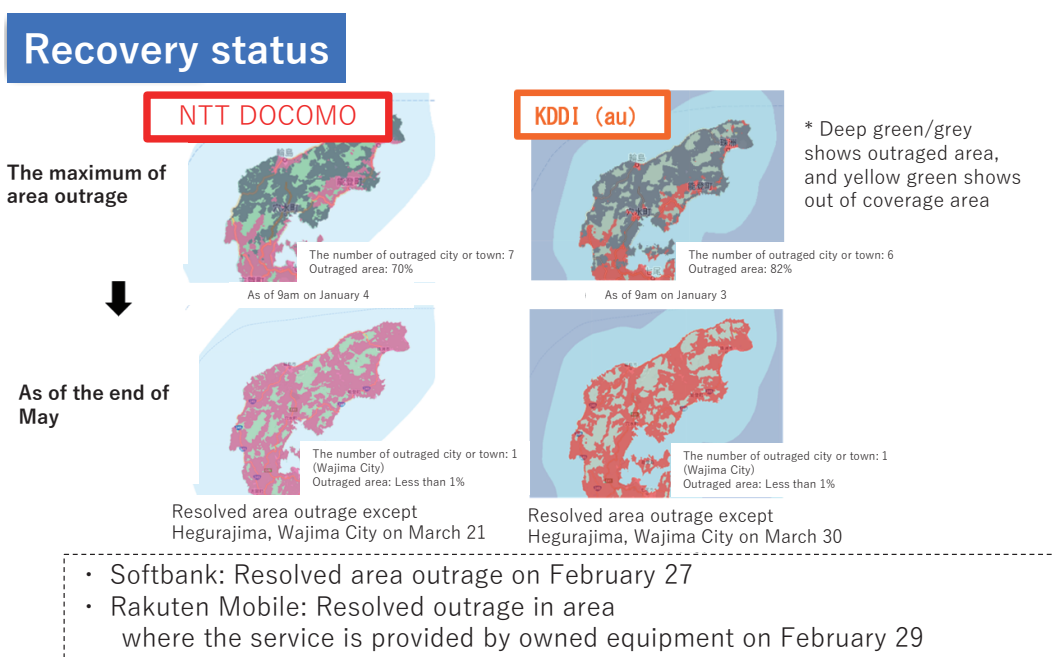


(Source) NTT West⁷

Efforts are being steadily made to achieve full recovery of the base stations, alongside emergency restoration. As of the end of May, 97% of the base stations in the six cities and towns in the northern part of the Noto Peninsula

have returned to their original functionality. Efforts for comprehensive recovery across the disaster-affected areas are ongoing (Figure 1-1-2-6).

Figure 1-1-2-6 Status of the restoration of communication infrastructure (mobile phones) (as of the end of May)



(Source) Prepared based on press releases of each company



Figure (related data) Changes in the number of outages and restoration rates of mobile phone base stations (Kumamoto Earthquake and Noto Peninsula Earthquake)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00008>
(Data collection)

(3) Others

A Disaster prevention administrative radio

Regarding the disaster prevention administrative radio, it was reported that damage occurred in the municipalities of Suzu City, Anamizu Town, and Shika Town in Ishikawa Prefecture. In Suzu City, which suffered significant damage, some of the sound amplification substa-

tions were lost due to the tsunami, and multiple incidents of substation stoppage occurred due to the outage of the mountaintop relay station. As of May 8, the mountaintop relay station on Mt. Nekogatake is still out of operation⁸.

⁷ Cabinet Office, Recovery and Reconstruction Support Headquarters (2nd meeting) (February 16, 2024) NTT West handout <https://www.bousai.go.jp/updates/r60101notojishin/pdf/r60101notojishin_hukkyuhonbu02.pdf>

⁸ MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (101th report) (May 8, 2024)

B Private communication system (MCA radio)

As for MCA radio used by government agencies as a resilient communication method, no abnormalities were observed in the domestic service area. However, two of the

emergency broadcast substations installed in Nakanoto Town, Ishikawa Prefecture, were initially reported to have stopped, but subsequent recovery has been confirmed.

2. Damages to broadcasting network

(1) Terrestrial broadcasting

The terrestrial television broadcasting was affected by widespread and prolonged power outages, resulting in continuous service disruptions. Following the disaster, each station operated on emergency power sources, but except for relay stations where fuel was delivered by Self-Defense Force helicopters, due to fuel depletion, there were service disruptions for NHK and four private broadcasters (Hokuriku Broadcasting, Ishikawa TV, TV Kanazawa, and Hokuriku Asahi Broadcasting) in some areas of Wajima City in Ishikawa Prefecture, impacting approximately 2,130 households.

Subsequently, some relay stations that secured access routes were restored. However, in areas where access to relay stations was difficult due to road damage and land-

slides, continuous fuel supply was challenging, leading to prolonged service disruptions in certain regions.

In response to the inability to receive terrestrial television broadcasts in some areas, NHK initiated temporary measures from January 9, utilizing the BS103 channel of satellite broadcasting (BS) to air local and national news from the Kanazawa Broadcasting Station as part of large-scale disaster response^{9,10}.

The service disruptions for NHK and the four private broadcasters were resolved on January 24, when commercial power was restored (although some stations continued to operate on emergency power)¹¹. As of March 22, all areas have fully recovered.

(2) Radio broadcasting

Radio broadcasts also experienced prolonged outages due to equipment damage and power outages. On the day of the disaster, NHK and FM Ishikawa's Hakui FM station in Hakui City, Ishikawa Prefecture, went off the air due to damage to the transmission antenna, affecting about 20,000 households. However, it was restored by January 2 with the installation of a temporary antenna. In some areas of Wajima City, Ishikawa Prefecture, battery depletion of emergency power sources led to outages, affecting approximately 14,000 households for Hokuriku Broadcasting's Wajima AM station, 6,000 households for the Wajima FM supplementary station, and 700 households for NHK's Wajima Town FM station^{12,13}.

All stations reported that outages were resolved when

commercial power was restored on January 24 (although some continued to operate on emergency power).

As of March 22, all stations had been fully restored.

For community broadcasting, which provides services in all or part of the city, word, town or village, "Radio Nanao" in Nanao City, Ishikawa Prefecture, experienced outages due to power outages and depletion of emergency power immediately after the earthquake, affecting about 23,000 households. However, broadcasting resumed on January 2. "Radio Nanao" has a disaster agreement with Nanao City, and the city used an emergency interrupt broadcasting system to provide disaster victim support information through radio broadcasts^{14,15}.

(3) Cable broadcasting

As for cable broadcasting, Wajima City, Nanao City and Noto Town which are directly managed by local governments, Suzu City, and Anamizu Town which falls within the service area of Nouetsu Cablenet, and as well Shika Town which falls within the service area of Kanazawa Cable, there were instances of transmission disruption due to power outages, depletion of backup power, and the collapse of utility poles due to landslides.

While emergency restoration was generally complet-

ed by the end of March, some areas, particularly in Wajima City and Suzu City, required further response and recovery efforts following road damage, which were addressed from April onwards.

The northern part of the Noto Peninsula faces challenges due to its unique topography, making it difficult for terrestrial television broadcasting waves to reach, thus increasing its reliance on cable television which posed the issue of early recovery of cable TV. In re-

⁹ Temporary response to the use of satellite broadcasting following the Noto Peninsula earthquake (January 9, 2024) <<https://www.nhk.or.jp/info/otherpress/pdf/2023/20240109.pdf>>

¹⁰ Regarding the expansion of emergency use of satellite broadcasting following the Noto Peninsula earthquake (January 11, 2024) <<https://www.nhk.or.jp/info/otherpress/pdf/2023/20240111.pdf>>

¹¹ MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (55th Report) (January 24, 2024)

¹² MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (1st report to 90th report) (January 1 to March 22, 2024)

¹³ "Ishikawa Prefecture's Commercial Broadcasters and NHK: Relay Station Affected by Noto Peninsula Earthquake," Visual Communications Journal, January 22, 2024

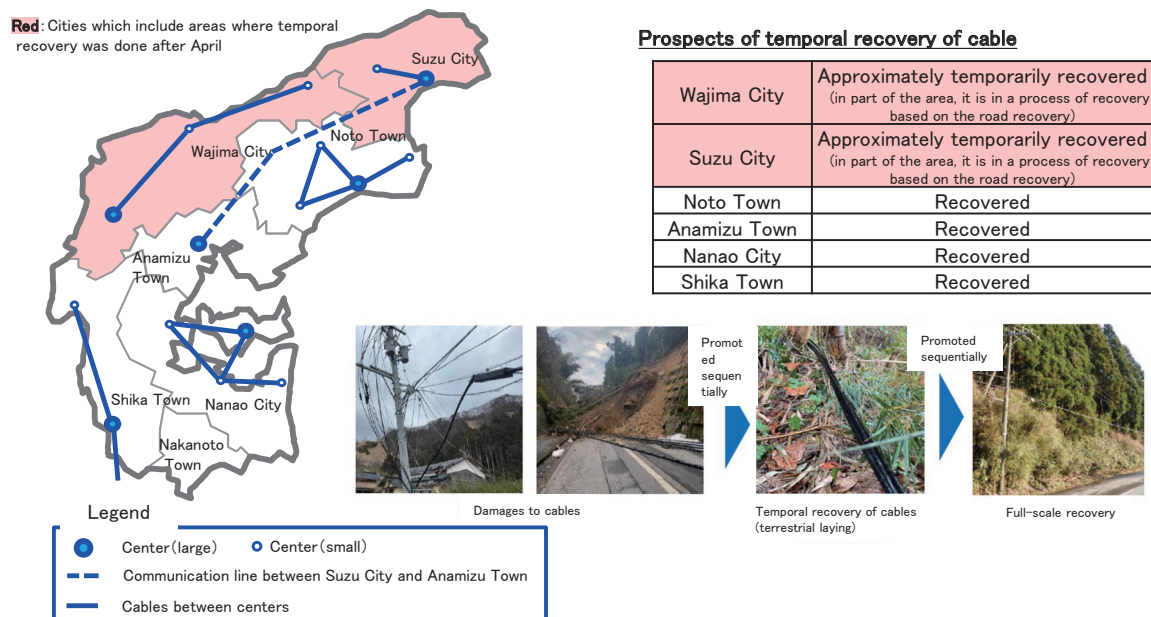
¹⁴ MIC, Regarding the damage situation in the 2024 Noto Peninsula Earthquake (17th Report) (January 4, 2024)

¹⁵ "Noto Peninsula Earthquake: What is the Situation of Local Media? ~ "Radio Nanao", Ishikawa Prefecture ~ [Researcher's Perspective] #527," NHK Bunken Blog, February 22, 2024, NHK Broadcasting Culture Research Institute. <<https://www.nhk.or.jp/bunken-blog/100/491948.html>>

sponse to this situation, the MIC has increased the subsidy rate for restoration projects, expanded local financial measures, and significantly reduced the burden on local governments and operators. Additionally, support

has been provided based on the damage situation, including making the installation of transmission lines to temporary housing eligible for subsidies.

Figure 1-1-2-7 Restoration and efforts status of cable television (as of April 23)



3. Damages to postal offices etc.

Due to the effects of the earthquake, including the collapse of postal facilities, water supply disruptions, and equipment failures, up to 117 post offices (including temporary post offices) in Ishikawa and Niigata prefectures suspended counter services. Additionally, delays and suspensions in postal and logistics operations occurred in these regions. Subsequently, through the shared use of facilities from other companies and the

utilization of mobile postal offices, services such as receiving mail at some counters, using financial services, and delivering mail to individual households have gradually resumed. As of May 28, counter services have resumed at 85 post offices, and ATM services have resumed at 25 offices in the Okunoto region, with 20 of them also reopening savings and insurance counters, and one reopening only the savings counter.

4. Initiatives to ensure communication tools

Since the Great East Japan Earthquake in 2011, telecommunication companies have been implementing various measures to ensure communication in the event of a disaster, such as strengthening measures against

power outages and transmission line disruptions. In response to the Noto Peninsula Earthquake, efforts to secure communication channels were taken. Here are some of the measures that were implemented.

(1) Operation of mobile and portable base stations, mobile power supply vehicles, and generators

To address disruptions caused by landslides and prolonged power outages immediately after the disaster, each mobile phone service provider operated maximum approximately 100 mobile and portable base stations

and utilized a total of maximum approximately 200 mobile power supply vehicles and generators in collaboration with the government and private sector.

Figure 1-1-2-8 Number of operational mobile and portable base stations, mobile power supply vehicles, and generators etc. (at maximum capacity)

Operator	Mobile power supply vehicles	Portable generators	Mobile base stations	Portable base stations	Portable satellite antenna
NTT West NTT docomo KDDI (au) Softbank Rakuten Mobile	25 cars	177 units	70 units	34 units	112 units

(2) Utilization of mobile base stations

NTT DOCOMO and KDDI jointly operated a ship-based mobile base station to provide coverage to coastal areas in part of Wajima City, where restoration via land routes was challenging. This involved installing mobile phone base station equipment on a vessel, utilizing the “Kizuna,” a submarine cable laying ship owned by the NTT DOCOMO Group¹⁶.

Additionally, SoftBank deployed a drone-based wireless base station capable of long-duration flights by providing wired power from ground-based power supply equipment. Equipped with a wireless relay device, the drone delivers signals to devices from the air, effectively complementing the communication coverage area¹⁷ (Figure 1-1-2-9).

Figure 1-1-2-9¹⁸ Ship-based base stations and drone base stations



(Source) NTT DOCOMO, Softbank¹⁸

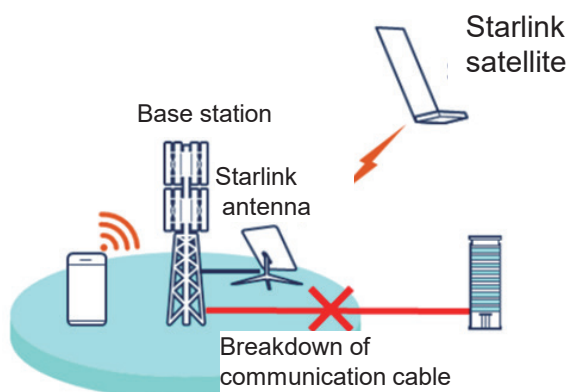
(3) Utilization of satellite communication services

Related to the Noto Peninsula Earthquake, many areas experienced a loss of communication services due to transmission line disruptions and power outages at mobile phone base stations. To address this issue and facilitate emergency restoration, SpaceX's low Earth orbit satellite communication service, Starlink, was widely utilized. KDDI, in particular, used Starlink antennas to connect to mobile phone base stations as a substitute for fiber optic and other communication cables that were

severed by landslides. This allowed the restoration of communication by using satellite links as backhaul lines (Figure 1-1-2-10).

In addition to KDDI, NTT DOCOMO and SoftBank also provided Starlink equipments to evacuation centers and Disaster Medical Assistance Teams (DMAT), enabling internet communication via Wi-Fi¹⁹. A total of 660 Starlink units were provided to evacuation centers and other locations by KDDI, SoftBank, and NTT DOCOMO.

Figure 1-1-2-10²⁰ Image of utilization of Starlink's backhaul link for emergency restoration (KDDI)



(Source) KDDI²⁰

¹⁶ NTT DOCOMO, KDDI, Regarding the Implementation of “Shipboard Base Station” Operations in Response to the 2024 Noto Peninsula Earthquake (January 6, 2024) <https://www.docomo.ne.jp/info/news_release/detail/20240106_00_m.html?icid=CRP_INFO_news_release_2024_01_17_00_to_CRP_INFO_news_release_detail_20240106_00_m>

¹⁷ Softbank, We Want to Quickly Deliver Peace of Mind to Disaster-stricken Areas. The Current Situation in Noto and the Path to Early Recovery of the Communication Network as Seen by the Person in Charge (January 12, 2024) <https://www.softbank.jp/sbnews/entry/20240112_02?page=02#page-02>

¹⁸ Cabinet Office, Recovery and Reconstruction Support Headquarters (3rd meeting) (March 1, 2024) Materials distributed by NTT DOCOMO and Softbank <https://www.bousai.go.jp/updates/r60101notojishin/pdf/r60101notojishin_hukkyuhonbu03.pdf>

¹⁹ Four Carriers Explained the Status of Area Restoration After the Noto Peninsula Earthquake: What Are the Factors that Are Making “Full-scale Restoration” Difficult? ITmedia Mobile (January 19, 2024) <<https://www.itmedia.co.jp/mobile/articles/2401/19/news120.html>>

²⁰ MIC, Roundtable on Information and Communications Infrastructure and its Utilization for the Realization of Vibrant Local Communities, Working Group on the Usage Environment of Digital Infrastructure to Support the Utilization of Digital Technology in Local Communities (2nd Meeting) (March 11, 2024), “Examples of Utilization of Satellite Broadband “Starlink” for Local Communities, Industry, and Disaster Prevention (KDDI)”, <https://www.soumu.go.jp/main_content/000934326.pdf>

(4) Lending of communication devices

The Noto Peninsula Earthquake significantly impacted communication services such as telephone and internet services, and in mainly severely affected areas, satellite mobile phone was utilized. The MIC lent up to 102 satellite phones, which were stockpiled for disaster response,

to affected local governments and other entities free of charge. Mobile phone operators also lent devices and satellite equipment free of charge, with NTT DOCOMO providing a total of 1,520 mobile devices and KDDI and Soft-Bank lending approximately 660 satellite devices.

(5) Public Safety Mobile System (Formerly: Public Safety LTE)

Since FY2019, the MIC has been working on the realization of Public Safety Mobile System, as a wireless system utilizing mobile phone technology for joint use by public safety agencies at disaster sites. During the demonstration period in FY2023, the Public Safety Mobile

System's demonstration terminals were utilized in the earthquake.

Specifically, demonstration terminals were lent to all 11 fire departments in Ishikawa Prefecture and used in emergency activities (**Figure 1-1-2-11**).

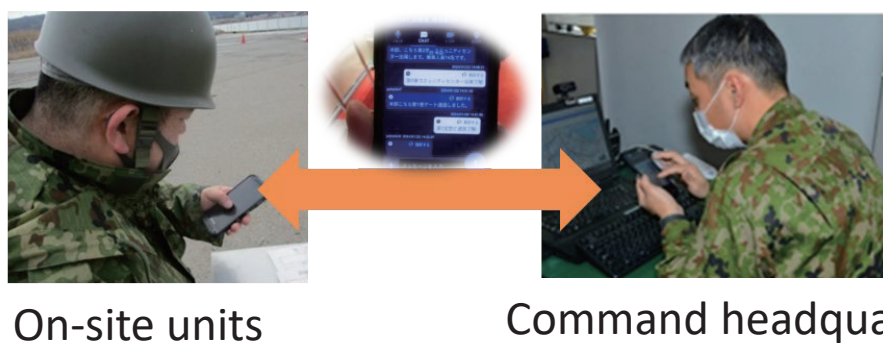
Figure 1-1-2-11 Utilization in emergency activities



In addition, the demonstration terminals were also provided to the Self-Defense Forces (SDF) that were engaged in activities in the disaster-affected areas. The deployed units used the terminals for internal communi-

cation, information sharing, and coordination during missions such as transportation, water supply, bathing support, and accommodation assistance (on ships) (**Figure 1-1-2-12**).

Figure 1-1-2-12 Use for command, communication, and information sharing between units



(6) Other initiatives by telecommunication operators

A Disaster message services

During disasters, NTT East, NTT West, NTT DOCOMO, KDDI, SoftBank, and Rakuten Mobile provided di-

saster message services.

B Provision of free internet connection services

NTT DOCOMO, KDDI, SoftBank, Wire and Wireless, and Rakuten Mobile provided free public wireless LAN²¹ using the disaster unified SSID “00000JAPAN” (five zero

Japan)²² in Ishikawa, Niigata, Toyama, and Fukui Prefectures from January 1²³.

(7) Dispatch of liaison personnel to the affected areas

Related to the earthquake, various ministries, local public organizations, and others dispatched their staffs to the affected municipalities.

The MIC has established the “MIC/Disaster Telecom Support Team (MIC-TEAM)²⁴” to provide support for disaster response in the field of information and communication, aiming to ensure communication means in the event of a large-scale natural disaster or potential occurrence by gaining the detailed status of disaster damages, providing technical supports for early recovery

and disaster responses, and smoothing communication between related government agencies and operators. In response to the Noto Peninsula Earthquake, the staffs in the MIC and the Regional Bureau of Telecommunications etc. were dispatched to the Ishikawa Prefecture Disaster Response Headquarters from January 1 to the end of May, with a total of approximately 133 personnel dispatched, to provide detailed support activities for ensuring and early restoring communication services.

5. Supports etc. for necessary initiatives for recovery activities

The government has compiled an emergency response package called the “Support Package for the Lives and Livelihoods of Disaster Victims” (Decision by the 2024 Noto Peninsula Earthquake Emergency Disaster Response Headquarters. Hereinafter referred as to Support Package.) to address the necessary measures for “Rebuilding Lives,” “Rebuilding Livelihoods,” and “Disaster Recovery,” which were in January 25. The Support Package includes measures related to information and communication, such as “Countermeasures against Dis-/mis-information on the Internet” and “Restoration of Broadcasting and Communication Facilities.” Based on the Support Package, the use of the reserve budget for FY2023 was approved by the Cabinet²⁵. As a result, the disaster response support project for the provision and expansion of satellite mobile phones to six municipalities severely affected by the disaster and satellite internet equipments to evacuation centers was implemented by the MIC and the Regional Bureau of Tele-

communications etc. As part of the “Countermeasures against Dis-/mis-information on the Internet,” (1) activities to strengthen public awareness to prevent disaster victims from being deceived by dis-/mis-information, (2) promotion of measures to facilitate the response to dis-/mis-information by platform operators, and (3) follow-up on appropriate response requests to platform operators based on terms of use and other regulations have been implemented. Additionally, under the “Restoration of Broadcasting and Communication Facilities” projects such as disaster-resistant reinforcement through the optical conversion of cable television networks, promotion of high-quality wireless environment development, support for the relocation of transmission stations, disaster recovery projects for ground-based broadcasting, and the temporary lending of equipment for emergency broadcasting stations have been carried out.

²¹ “Free access to 00000JAPAN following the 2024 Noto Peninsula Earthquake” (Wireless LAN Business Promotion Association) <<https://www.wlan-business.org/archives/43065>> The service ended on April 23rd.

²² This is an initiative to make public wireless LAN services, which are normally provided by telecommunications companies for a fee, available free of charge in the event of a disaster. The providers are companies certified by the Wireless LAN Business Promotion Association (Wi-Biz).

²³ NTT DOCOMO started opening the service from 8pm on January 1, KDDI/Wire & Wireless and Softbank did it from 9pm on the same day, and Rakuten Mobile did it from 10am on January 2.

²⁴ MIC-Telecom Emergency Assistance Members

²⁵ Concerning the Use of Contingency Funds Based on the Package to Support the Lives and Livelihoods of Victims of the 2024 Noto Peninsula Earthquake (Ministry of Finance) <https://www.mof.go.jp/policy/budget/budget_workflow/budget/fy2023/nt240126.pdf>

The Roles which the Information and Communications Took and Challenges

Section 1 Information gathering and dissemination related to the disaster

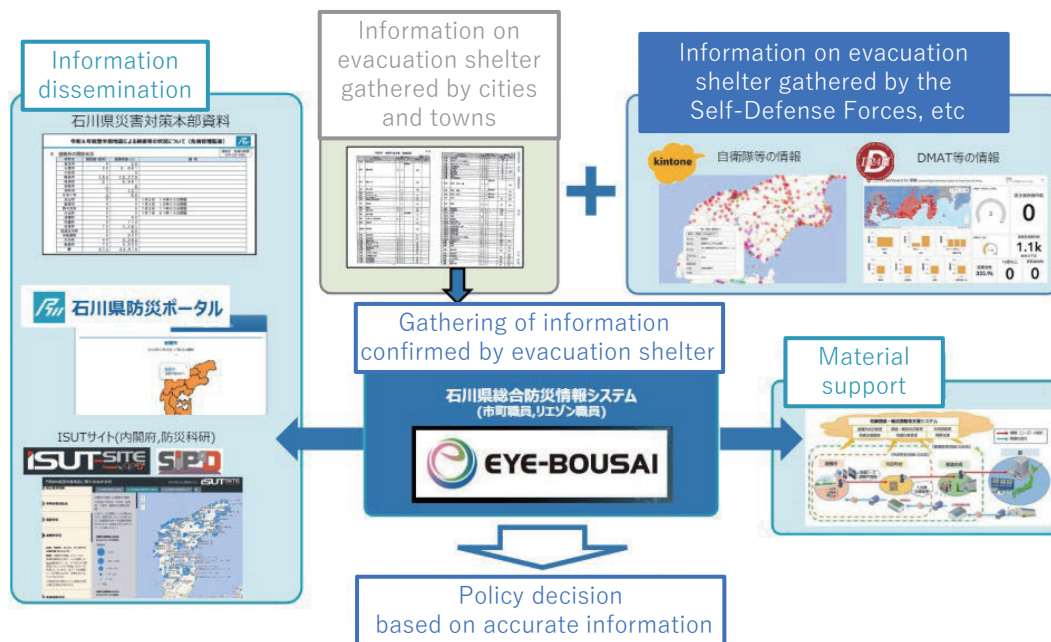
1. How the information was gathered and collected related to the disaster

(1) Information gathering related to evacuation center

In the Noto Peninsula Earthquake, the access routes to remote areas of Okunoto were partially cut off due to road disruptions, leading to numerous instances of voluntary evacuations and isolated communities. Additionally, municipal employees were also affected by the disaster, making it difficult to accurately assess the situation at evacuation shelters. In response, Ishikawa Prefecture established a platform to consolidate evacuation shelter information collected by municipalities, the

Self-Defense Forces, and the Disaster Medical Assistance Teams (DMAT). This platform commenced operations on January 14 and began full-scale operation on January 17, assigning IDs to each evacuation shelter to facilitate integration with other systems (Figure 1-2-1-1). This allowed for the accurate assessment of evacuation shelter information and facilitated a transition to demand-driven support for the procurement of supplies.

Figure 1-2-1-1 Image of a shelter data aggregation and visualization application



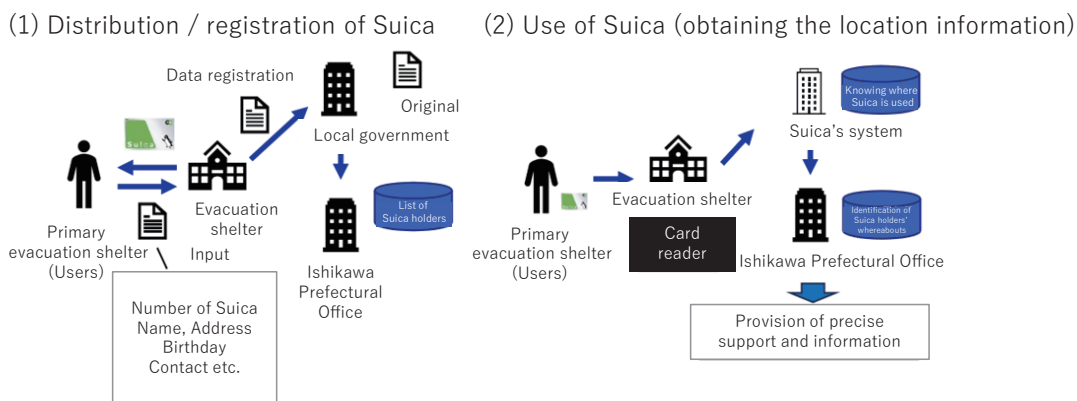
(Source) Material of Ishikawa Prefecture Governor's press conference (January 13, 2024)

(2) Utilization of Suica for evacuee information management

Ishikawa Prefecture distributed Suica cards with unique IDs to evacuees at primary evacuation shelters, linking personal information such as name, address, date of birth, and contact details to the system. When evacuees visited shelters or received supplies, they could use the distributed Suica cards with card readers installed at the shelters to provide accurate information

on their needs and facilitate demand-driven supply support (**Figure 1-2-1-2**). While the Digital Agency had been promoting the use of My Number cards for evacuee information management, the unavailability of card readers prevented their use in the aftermath of the earthquake¹.

Figure 1-2-1-2 Obtaining evacuee information with the use of Suica



(Source) Digital Agency "Initiatives to obtain information on victims by utilizing digital technology in the 2024 Noto Peninsula Earthquake"

(3) Establishment of a database for disaster victims

On February 19, Governor HATA Hiroshi of Ishikawa Prefecture announced the establishment of a disaster victim database for approximately 120,000 residents across the six municipalities in the Noto region. Given the extensive damage and the potential for displaced vic-

tims to move across municipalities, the database, containing information on the whereabouts of victims and their specific care needs, is being utilized to provide oversight and support for victims across municipal boundaries.

¹ Summary of Press Conference by Minister for Digital Transformation KONO (January 26, 2024) Digital Agency <<https://www.digital.go.jp/speech/minister-240126-01>>

(4) Visualization of damage using various data

A Remote sensing

Data observed by satellites is one of the crucial pieces of information for early confirmation and analysis of the disaster-affected areas. Various private companies, including space venture companies, are advancing the publication, provision, and analysis of satellite information. For instance, Axelspace published data observed by its Earth observation platform “AxelGlobe,” which is developed and operated using a constellation of small optical satellites, on a special page². They also announced the provision of this data free of charge to gov-

ernment agencies, local governments, and media organizations. Similarly, QPS Research Institute announced that it will provide observation data from its small SAR satellite “QPS-SAR” to government agencies and media organizations, and sequentially provided images for disaster response upon request³. Data from both companies is also included in the “Disaster Cross-View of the 2024 Noto Peninsula Earthquake” by the National Research Institute for Earth Science and Disaster Resilience (NIED)⁴.

Figure 1-2-1-3 Analysis image of crustal movement with data observed by satellites

解析結果【速報】

2.5次元解析結果 NEW

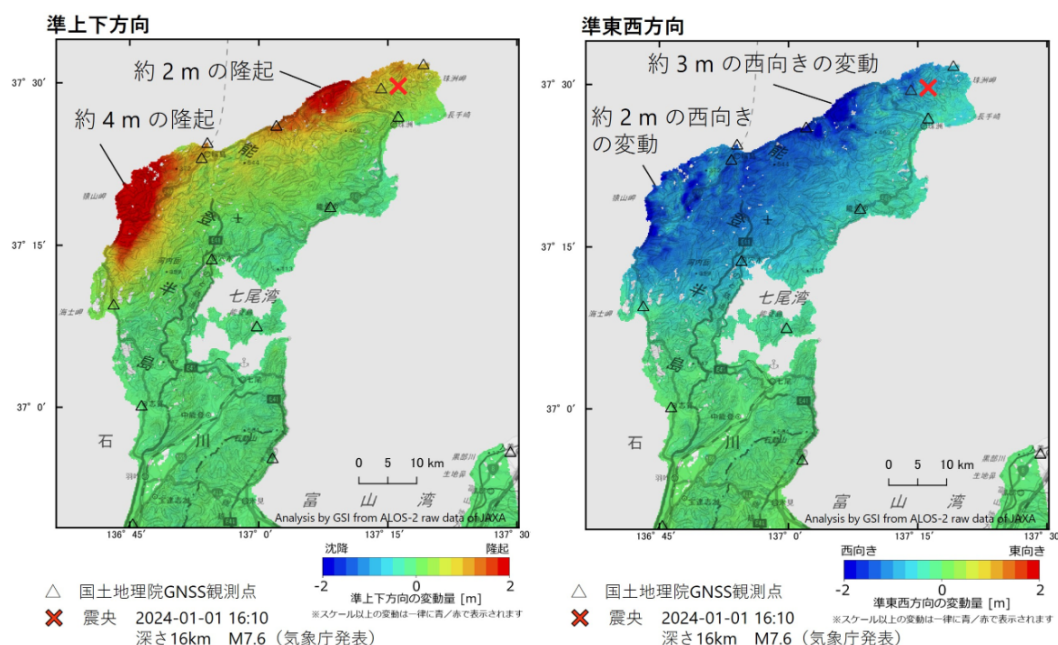


図1 2.5次元解析結果による変動量(2.5次元解析とは)【地理院地図で閲覧】

観測毎の2.5次元解析結果: [1月1日及び2日観測](#)、[1月9日及び12日観測](#)、[1月3日及び15日観測](#)

(Source) Geospatial Information Authority of Japan⁵

² Axel Globe “The 2024 Noto Peninsula Earthquake Special Page” <<https://www.axelglobe.com/ja/the-noto-hanto-earthquake-in-2024>>

³ QPS Research Institute “Providing Satellite Images of the 2024 Noto Peninsula Earthquake Area” <<https://i-qps.net/news/1614/>>

⁴ National Research Institute for Earth Science and Disaster Prevention “Disaster Prevention Cross-view on the 2024 Noto Peninsula Earthquake” <<https://xview.bosai.go.jp/view/index.html?appid=41a77b3dcf3846029206b86107877780>>

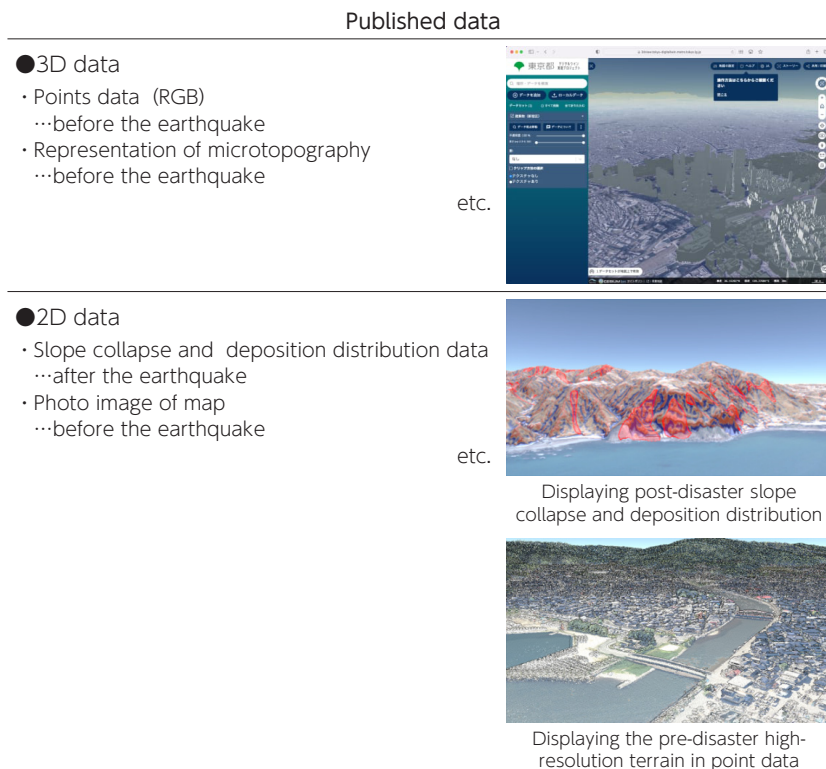
⁵ Geospatial Information Authority of Japan “Crustal movement accompanied with the 2024 Noto Peninsula Earthquake by analyzing observed data of “Daichi 2” (updated on January 19, 2024)” <<https://www.gsi.go.jp/uchusokuchi/20240101noto.html>>

B Visualization of damages using geospatial data

Efforts were also made to visualize the damage situation of the earthquake using geospatial data such as point cloud data and slope collapse/deposition distribution data. In February, the Tokyo Metropolitan Government published geospatial data related to the damage situation of the Noto Peninsula Earthquake on the To-

kyo Digital Twin 3D Viewer (**Figure 1-2-1-4**). This Tokyo Digital Twin 3D Viewer can be viewed on a web browser without any special software, allowing users to see pre- and post-disaster terrain data and damage-related data in three dimensions, and to overlay them for comparison.

Figure 1-2-1-4 Data published in the Tokyo Digital Twin 3D Viewer



(Source) Tokyo Metropolitan Government⁶

⁶ Press release by Tokyo Metropolitan Government “Visualization of the damage situation of the Noto Peninsula Earthquake using the Tokyo Digital Twin 3D Viewer” (February 2, 2024)

C Data held by postal offices

Efforts were also made using data held by post offices.

Japan Post, based on a request for cooperation from Ishikawa Prefecture, matched the list of missing persons with the resident data held by post offices, contributing to the refinement of the missing persons list. Additionally,

at the request of Ishikawa Prefecture, Japan Post sent direct mail to those who had moved out of the disaster-affected areas based on the change of address notifications submitted to post offices, encouraging them to register their information with the disaster-affected municipalities (Figure 1-2-1-5).

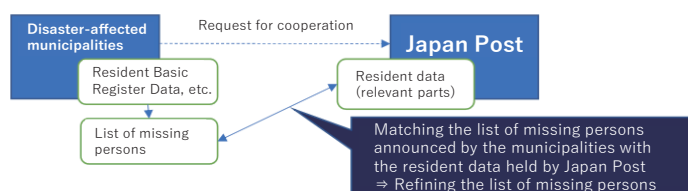
Figure 1-2-1-5 Initiatives to utilize data etc. held by postal offices

[Reference] Cooperation with Disaster-Affected Municipalities Utilizing Data Held by the Post Office

While collaborating with the government and related organizations, we will develop initiatives to cooperate with disaster-affected municipalities based on their requests

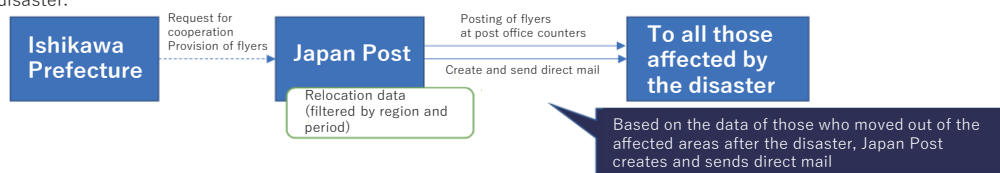
[Confirmation of Information on Missing Persons (Early January)]

- Based on cooperation requests from affected municipalities, we matched the list of missing persons made public with the resident data held by the post office. By aggregating this information within the municipalities, we refined the list of missing persons.



[Cooperation for Promoting Information Registration (February Term)]

- In the affected municipalities, measures are being implemented to encourage evacuees to register their information with the municipalities, with the aim of providing various support information, such as the issuance of disaster certificates. To promote information registration, Ishikawa Prefecture has requested cooperation from Japan Post.
- At Japan Post, in addition to posting flyers related to information registration at post office counters, direct mail is created and sent to those who have submitted a change of address form to the post office and have moved out of the affected areas after the disaster.



(Source) Japan Post Press Release (March 4, 2024)

2. How the information was disseminated related to the disaster

(1) Information dissemination during disasters

A Earthquake Early Warning

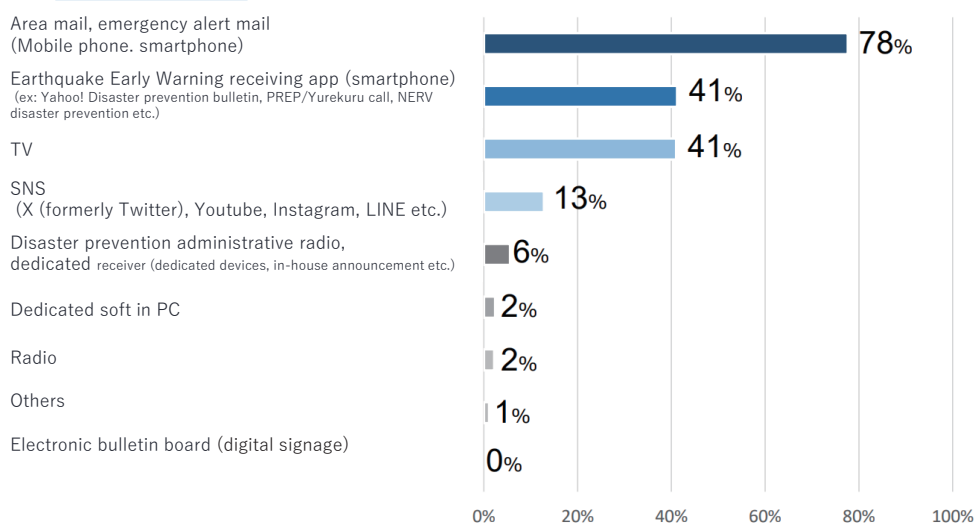
On January 1 at 4:10 p.m., the earthquake occurred, prompting the Japan Meteorological Agency to issue an Earthquake Early Warning (EEW) for 21 prefectures ranging from the Tohoku region to the Kinki region. Including this instance, the total number of EEWs issued

in January was 20. According to a survey by the Japan Meteorological Agency, 78% of people who received the EEW did so via area mail or emergency alert mail on their mobile phones or smartphones⁷ (Figure 1-2-1-6).

Figure 1-2-1-6 Ways to obtain the EEW

Q5. How did you obtain the Earthquake Early Warning. (multiple answer is allowed.)

n = 10,449人



(Source) Japan Meteorological Agency "Preliminary survey on emergency earthquake early warning for the earthquake in the Noto region of Ishikawa Prefecture that observed a maximum seismic intensity of 7 at around 16:10 on January 1, 2024 - Breaking version -" (March 28, 2024)

Additionally, 61% of those who saw or heard the EEW took some form of action. The actions taken included "bracing themselves on the spot," "trying to get earth-

quake information via TV, radio, or mobile phone," and "being cautious of falling objects around them."

B Evacuation calls during the disasters (television)

During the disaster, especially when a major tsunami warning was issued, NHK implemented the "calls to protect lives" that have been developed and trained since the Great East Japan Earthquake. This was the first full-scale operation of these calls. Immediately after the major tsunami warning was issued, NHK continuously called out in strong tones using various expressions and phrases that appealed to the emotions of viewers, such as "Protect Your Life," "Remember the Great East Japan Earthquake," and "Call Out to Those Around You, 'a

Tsunami is Coming, Flee to Higher Ground."

Additionally, Sun TV broadcasted pre-recorded multilingual evacuation calls when a tsunami warning was issued for the northern part of Hyogo Prefecture. The content included messages in Japanese and sign language, as well as English, Korean, Chinese, Vietnamese, Nepali, Tagalog, and Portuguese. Speakers of each language appeared in turn, repeatedly urging viewers with both voice and handwritten signs to "escape immediately to protect your life from the coming tsunami."

⁷ Preliminary survey on emergency earthquake early warning for the earthquake in the Noto region of Ishikawa Prefecture that observed a maximum seismic intensity of 7 at around 16:10 on January 1, 2024 - Breaking version -2024.3.28 Announcement (Japan Meteorological Agency) <<https://www.data.jma.go.jp/cew/data/nc/shiryo/pre-survey/2024/20240101-ishikawa-brief.pdf>>

(2) Information gathering and dissemination after disasters

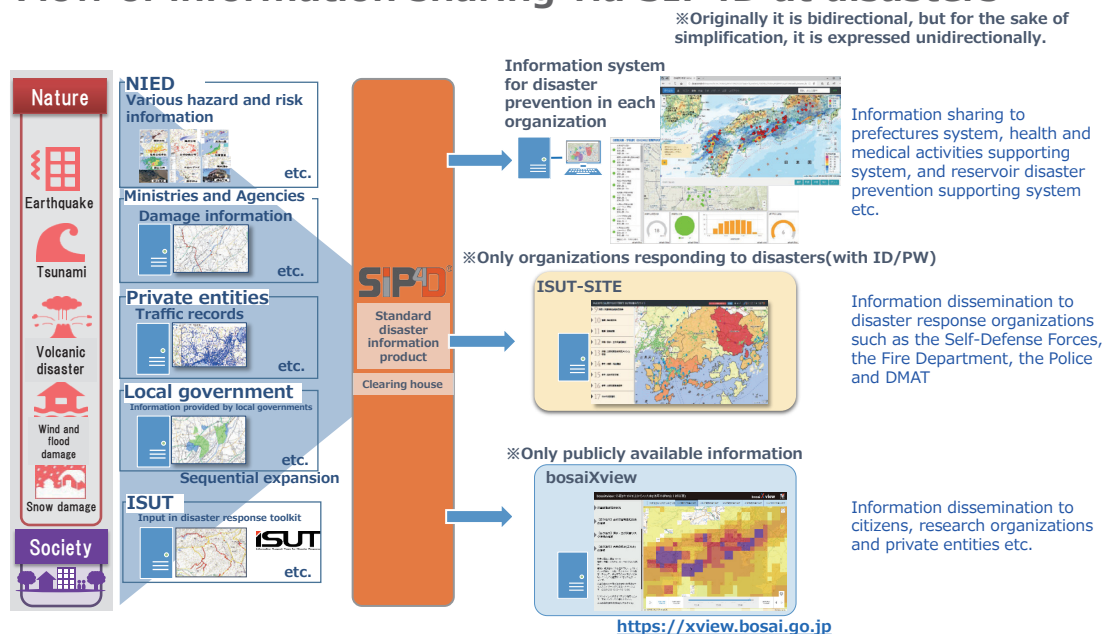
A Disaster Cross-View

The National Research Institute for Earth Science and Disaster Resilience (NIED) launched the “Disaster Cross-View for the 2024 Noto Peninsula Earthquake” on January 1. This platform aggregates and disseminates essential disaster response information shared through

networks like SIP4D (Shared Information Platform for Disaster Management). The Cross-View provides integrated information on road conditions, life support locations, activities of NPOs, and the communication status of various mobile phone carriers.

Figure 1-2-1-7 Information sharing related to disasters via SIP4D

Flow of information sharing via SIP4D at disasters



(Source) National Research Institute for Earth Science and Disaster Resilience “2023 4th Disaster Resilience Co-creation Research Meeting “2024 Noto Peninsula Earthquake” Reporting meeting (March 5, 2024)”⁸

B Information gathering and dissemination by media (disaster situation map)

During the earthquake, newspapers collected photos and information and linked them to maps for public dissemination.

On January 1, Yomiuri Shimbun published the initial version of the “Disaster Situation Map for the 2024 Noto Peninsula Earthquake” on its website. The “Damage Captured by Reporters” section allows users to view photos and descriptions of the disaster areas taken by

reporters, linked to a 3D map showing the locations where the photos were taken. The “Damage Classified by Aerial Photos” section visualizes the damage to over 300 buildings, landslides, and fires based on aerial photos taken on January 2, focusing on the coastal areas of Wajima City and Suzu City in Ishikawa Prefecture. The map was updated continuously until January 8, summarizing the first week after the earthquake.

C Information gathering and dissemination by private companies (Noto Peninsula Earthquake Connect Map)

Since the spread of COVID-19, private companies and civic tech organizations have increasingly engaged in information collection and dissemination. This trend continued related to the earthquake, with efforts to aggregate and disseminate information for disaster victims. Code for Kanazawa, a general incorporated associ-

ation, published the “Noto Peninsula Earthquake Connect Map” as open data on January 7. This map compiled information on “Places with Internet Connectivity” provided by citizens. The registration of new data was halted on February 2 as the internet connection environment improved.

⁸ USUDA Yuichiro (Disaster Prevention Information Center/Disaster Prevention Information Research Division, National Research Institute for Earth Science and Disaster Prevention) Material “About ISUT’s efforts – Information sharing via SIP4D, bosaiXview, ISUTSITE

Figure 1-2-1-8 Noto Peninsula Earthquake Connect Map



(Source) General incorporated association Code for Kanazawa

3. How the citizens gathered the information related to the disaster

To investigate how people utilized information and communication tools to obtain earthquake-related information, a nationwide survey was conducted targeting the citizens.

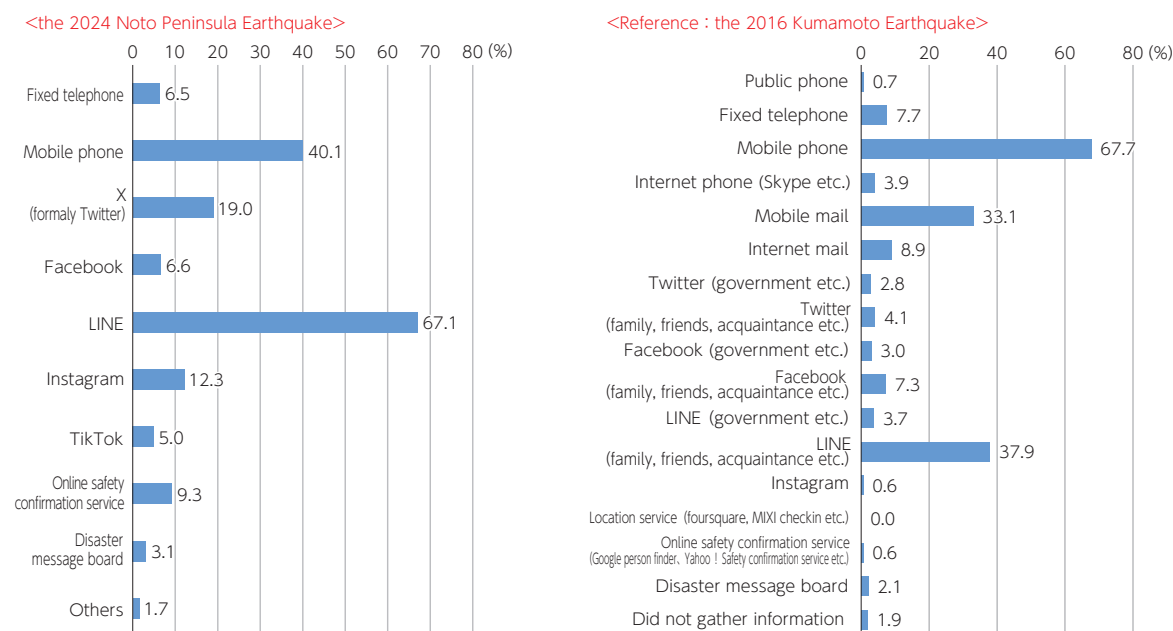
(1) Actions for confirming safety

First, when asked how they confirmed the safety of family, friends, and acquaintances at the time when the Noto Peninsula Earthquake occurred, the most common response was LINE (67.1%), followed by mobile phones (40.1%) and X (formerly Twitter) (19.0%). In a survey

conducted by the MIC regarding the Kumamoto Earthquake on "methods used for confirming safety," 37.9% of respondents mentioned LINE, indicating that LINE has become a well-established communication tool.

conducted by the MIC regarding the Kumamoto Earthquake on "methods used for confirming safety," 37.9% of respondents mentioned LINE, indicating that LINE has become a well-established communication tool.

Figure 1-2-1-9 How to confirm the safety of family, friends and acquaintances etc.



*Among all respondents, the methods used by those who answered "conducted safety confirmation" (n=604) were aggregated.

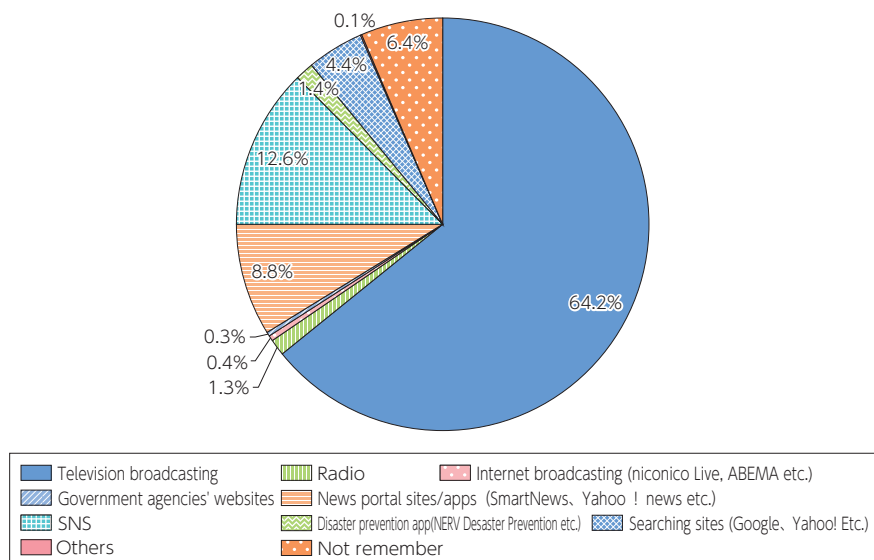
(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"
MIC(2017) "Survey on the status of ICT utilization during the Kumamoto Earthquake"

(2) Information gathering actions immediately after the earthquake

Next, when asked which media they first accessed after noticing the earthquake, 64.2% of respondents mentioned television broadcasts (NHK and commercial

channels combined), which was higher than other options.

Figure 1-2-1-10 Media firstly accessed after noticing the earthquake



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Media firstly accessed after noticing the earthquake (by detailed media)

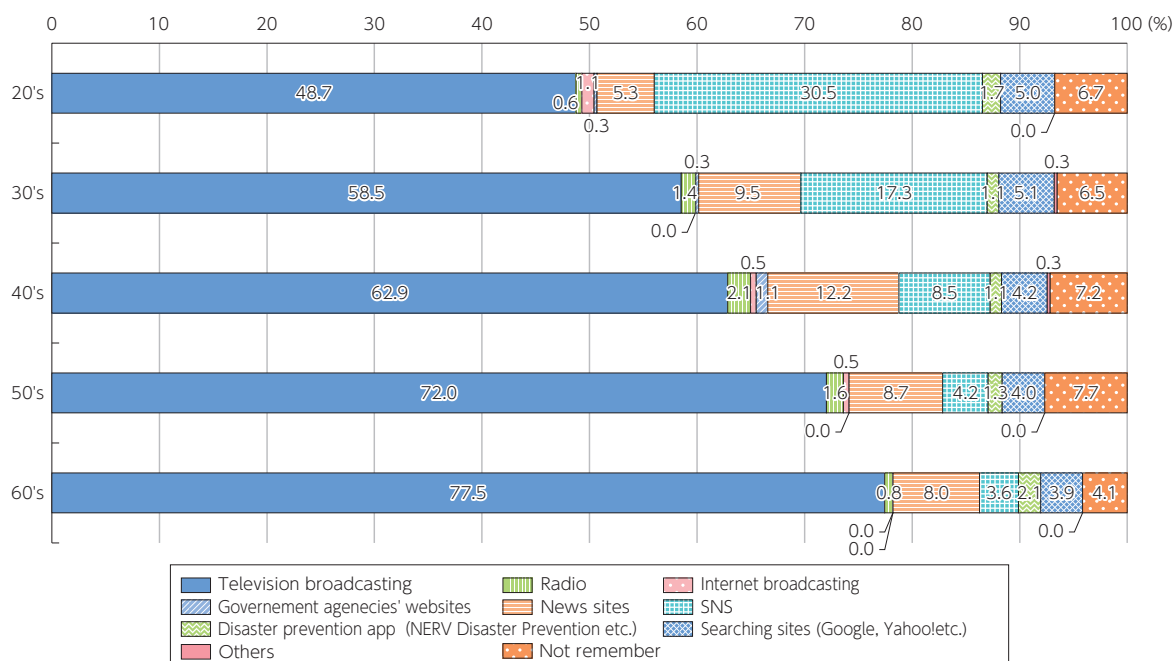
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00025>

(Data collection)

Looking at the data by age group, television broadcasts were the most accessed across all age groups, with the percentage increasing with age. Among those in

their 20s, a high percentage also mentioned SNS (30.5%), with X (formerly Twitter) being the most common.

Figure 1-2-1-11 Media firstly accessed after noticing the earthquake by age



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Utilized source of information (by purpose, select three options in the order of usefulness)
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00027>
 (Data collection)



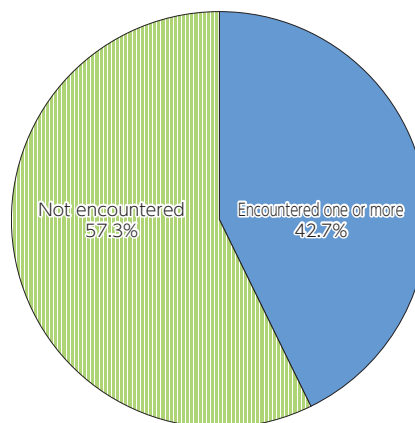
Figure (related data) Utilized source of information (by purpose, whether to feel the earthquake)
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00028>
 (Data collection)

(3) Encountering unverified information

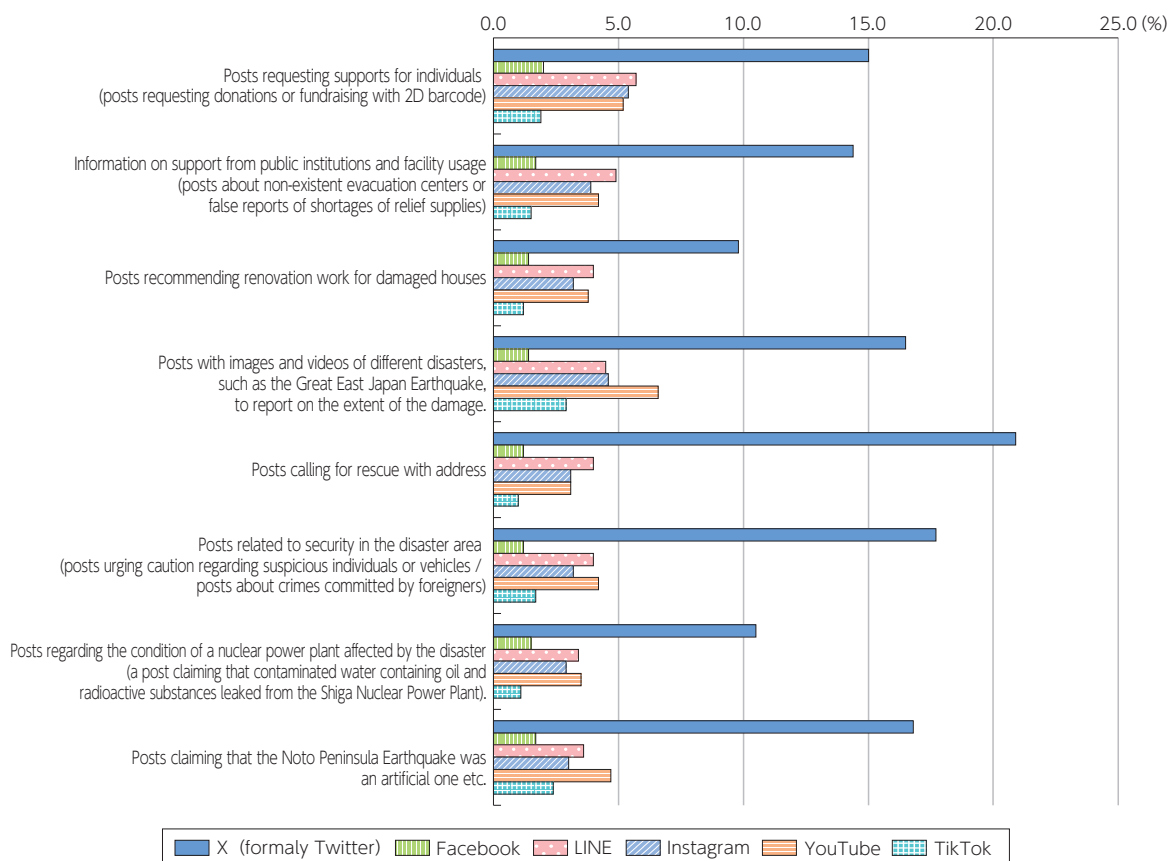
While SNS such as X (formerly Twitter) contributed to safety confirmation and information collection, especially among younger people, these platforms also saw the spread of unverified information, causing confusion.

The percentage of respondents who encountered at least one piece of unverified information on SNS was 42.7%, with X (formerly Twitter) having the highest percentage.

Figure 1-2-1-12 Percentage of encountering unverified information on SNS



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

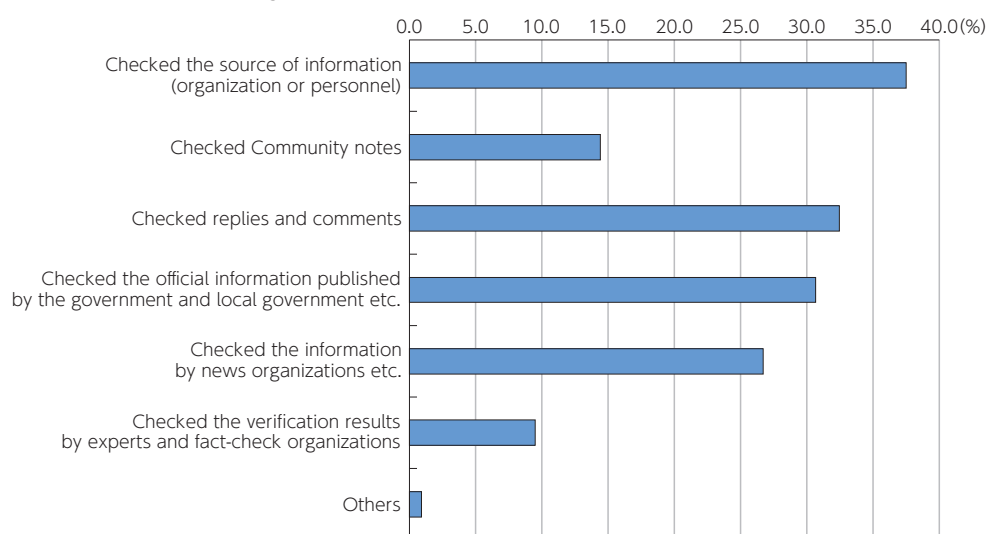
Figure 1-2-1-13 Unverified information to encounter by SNS

(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Next, when asked how they felt about the reliability of the information they encountered, approximately 65% of respondents across various categories answered that they "could not determine its authenticity." Among them, about 30-40% attempted to verify the information.

Furthermore, when those who actually tried to verify

the authenticity of the information were asked about their methods, the highest percentage (37.6%) said they "checked the source of the information (organization or individual)." About 30% confirmed the information through official sources or news organizations.

Figure 1-2-1-14 How to check unverified information

(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Among those who encountered such information, 25.5% admitted to sharing it with acquaintances or disseminating it to a broader audience. The reasons given for this included “believing the information would be

useful to others,” “finding the information interesting,” and “wanting to alert others to the possibility that the information might be incorrect.”



Figure (related data) Reasons why to disseminate the unverified information

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00032>
(Data collection)

4. Other examples to utilize information and communications

(1) Utilization of drones and robots

In the earthquakes, drones and robots were utilized for assessing damage, conducting rescue operations, and transporting supplies.

NiX JAPAN and KDDI Smart Drone, upon request from Hakui City in Ishikawa Prefecture, conducted an

emergency inspection of bridge damage using drones on January 17. The use of drones allowed for comprehensive imaging even in narrow spaces, enabling immediate confirmation of damage to components such as bearings, piers, and abutments.

Figure 1-2-1-15 Utilizing drones for emergency inspection of bridges



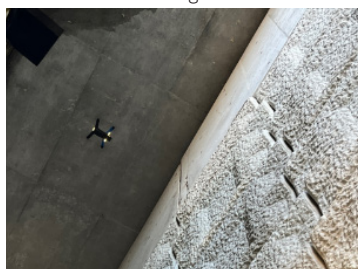
Staffs of KDDI SmartDrone controlling drones



Staffs of NiX JAPAN checking real-time video shot by drone



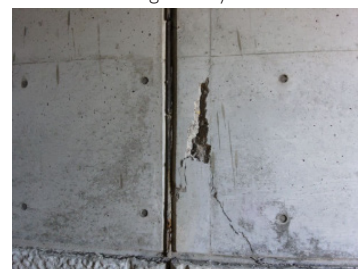
A part of abutment and bearing shot by drone



Skydio 2+ flying to inspect A part of abutment shot by



A machine to control drone (screen for checking the spots of inspection)



A part of abutment shot by drone

(Source) NiX JAPAN

Additionally, the Japan UAS Industrial Development Association (JUIDA), upon request from Wajima City on January 4, collaborated with five companies including Blue Innovation to conduct initial disaster support activities such as search and damage assessment and supply transportation using drones within the city⁹. For instance, starting January 8, with the cooperation of Aeronext and ACSL, drones were used to deliver medical supplies to shelters in isolated areas. These efforts confirmed the usefulness of drones in rapid initial re-

sponse at actual disaster sites. However, challenges for future rapid deployment were identified, including issues with obtaining flight permits in designated emergency airspace, functional challenges such as difficulties with weather and long-duration flights, and personnel shortages.

Furthermore, in the disaster area, robot dogs were introduced by the Japan Ground Self-Defense Force to assist in reconnaissance of evacuation routes and guiding evacuees to secondary shelters.

⁹ News release by Blue Innovation and others “Regarding the initial disaster support activities of five drone-related companies related to the 2024 Noto Peninsula Earthquake” <https://www.blue-i.co.jp/news/release/pdf/20240208release_bi.pdf>

Figure 1-2-1-16 Guidance support for disaster victims by robot dogs



(Source) Official account in X of Japan Ground Self-Defense Force (January 17, 2024)

(2) Online provision of public services

A Remote services for disaster victims

As an online service for disaster victims, various municipalities provided online applications for disaster certificates, with 5,575 applications submitted by January 21.

Additionally, online medical consultations were offered to connect evacuees in shelters with their primary care physicians. NTT DOCOMO, in cooperation with Ishikawa Prefecture, the Ishikawa Medical Association,

the Ishikawa Pharmacists Association, the Ministry of Health, Labour and Welfare, and the MIC, implemented online medical consultations and prescription systems to maintain the community between evacuees and their local doctors in Noto, ensuring the continuation of regional healthcare even in environments away from their homes.

B Remote support for affected municipalities

Remote support initiatives were also conducted for affected municipalities by other municipalities. As part of damage assessment support, Kumamoto City, Hamamatsu City, the NTT East Japan Group, ESRI Japan, and the NTT West Japan Group collaborated to conduct housing damage assessment surveys using drones and 360-degree cameras in Suzu City, Ishikawa Prefecture.

The images obtained were used to support damage assessment from remote locations.

Additionally, a system called “Proxy Donations,” where other municipalities accept donations on behalf of the affected municipalities through hometown tax intermediary sites, was widely utilized.

Section 2 Highlighted issues and responses in the future

1. Communication

(1) Strengthening mobile base stations and optical fiber

In the Noto Peninsula Earthquake, power outages and transmission line disruptions caused mobile base stations to be non-functional for extended periods. To fortify mobile base stations against future disasters, it is necessary to consider measures such as extending the lifespan of the batteries installed in these stations, in-

stalling solar panels, and utilizing satellite connections.

Additionally, the disruption of transmission lines also rendered fixed internet services unusable. To prevent future disruptions caused by the collapse of utility poles and the severing of optical fibers, it is essential to promote the underground installation of these fibers.

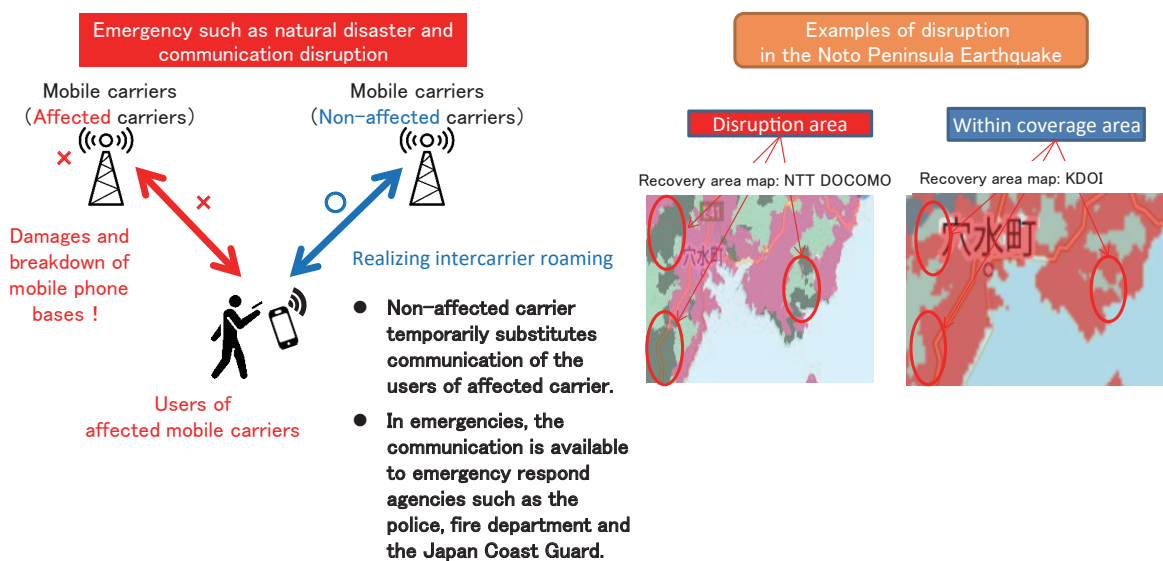
(2) Achieving intercarrier roaming in emergencies

“Intercarrier Roaming,” which allows mobile phone users to temporarily use another mobile carrier’s network, is one strategy to ensure continuous communication services related to natural disasters or communication failures.

The MIC has been holding the “Study Group on Intercarrier Roaming in Emergency Situations” since September 2022. The working group has reported that in areas where only some mobile carriers experienced ser-

vice disruptions related to the earthquake, intercarrier roaming could provide a complementary solution (**Figure 1-2-2-1**). The study group is also conducting technical examinations and verifications with the aim of introducing Full Intercarrier Roaming, which allows general calls, data communication, and callbacks from emergency respond agencies, as well as a roaming method that temporarily enables only emergency calls in case of core network failures, by the end of FY2025.

Figure 1-2-2-1 Image of achieving intercarrier roaming in emergencies



(Source) Study Group on Intercarrier Roaming in Emergency Situation (11th meeting) Excerpt material 11-3

(3) Expanding the use of satellite communications

Satellite communications, which can efficiently cover remote islands, maritime areas, and mountainous regions, are considered useful as a means of communication during emergencies, including natural disasters. In the Noto Peninsula Earthquake, SpaceX’s low Earth orbit satellite communication service “Starlink” was widely utilized for emergency restoration. Additionally, there

are plans to provide satellite direct communication services that enable the use of satellite communications from mobile phones (smartphones). To further expand the use of satellite communications, efforts are being made to examine technical conditions related to the frequencies used and to secure the necessary frequencies.

2. Broadcasting

In response to the recent Noto Peninsula Earthquake, broadcasters played a crucial role in delivering accurate information to the affected individuals. However, challenges such as power outages and transmission line disruptions leading to service interruptions also became apparent. In preparation for future events, it is necessary to strengthen broadcast networks by implementing measures such as power outage countermeasures for center facilities, enhancing monitoring capabilities for transmission lines, and promoting the shared use and

common facilities of relay stations. Additionally, measures such as optical and multiple-wire conversion of cable networks should be implemented to enhance the resilience of broadcast networks. The MIC is conducting discussions on challenges in relay station shared use involving terrestrial broadcasters and considering the institutional arrangement of broadcasting in the digital era by further examining the significance and role of broadcasting.

3. Postal services

Efforts are being considered to utilize data held by the post office, such as by installing drive recorders on delivery vehicles to selectively collect and analyze information on the road conditions in the Okunoto region. This information would be used to aid in the post office's

delivery planning. If requested by local governments or other entities, the road condition data obtained through this initiative may also be provided to contribute to the region's reconstruction, with necessary measures such as anonymization being taken into consideration.

4. Response to dis-/mis-information

In the Noto Peninsula Earthquake, the circulation and spread of dis-/mis-information on the Internet became a significant issue, exacerbated by the increased use of social media by the public. The MIC issued a warning about dis-/mis-information on the Internet through social media on January 2, the day after the disaster. Additionally, the MIC requested major social media platform operators to take appropriate actions based on their terms of use¹.

Furthermore, to ensure the healthiness of information circulation in the digital space, the MIC has been holding a "Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space" since November 2023. The group is considering comprehensive measures, including institutional aspects, to address the circulation and spread of dis-/mis-information, with plans to publish a summary of their findings by the summer of 2024².

¹ Refer to Column 1 "Response to dis-/mis-information related to the disaster".

² Regarding the study committee on how to ensure the healthiness of information circulation in the digital space also refer to Section 6 "Promotion of ICT utilization" in Chapter 2, Part II.

Column Response to dis-/mis-information related to the disaster

1. The situation of the circulation and spread of dis-/mis-information on the Internet regarding the 2024 Noto Peninsula Earthquake

(1) About dis-/mis-information related to the Noto Peninsula Earthquake

In the Noto Peninsula Earthquake, while SNS contributed as a means of information gathering and safety confirmation, it has been pointed out that dis-/mis-information that could hinder prompt rescue activities and smooth recovery and reconstruction efforts¹ circulated on SNS.

According to X (Twitter Japan), the main posts on X (formerly Twitter) containing dis-/mis-information about the Noto Peninsula Earthquake included approximately 100,000 posts mentioning the earthquake as an “artificial earthquake,” about 200 posts regarding “thieves” (appearing in the area), about 350 posts related to “support requests” (soliciting fake donations), and about 21,000 posts related to “rescue requests.”²

Additionally, the Japan Fact-Check Center (JFC) has been continuously verifying and fact-checking the large amount of dis-/mis-information spread regarding the Noto Peninsula Earthquake. On January 27, 2024, they organized and published trends on what becomes a topic at each stage from disaster occurrence to recovery and reconstruction³. They classified five types of disinformation that spread during disasters and published fact-check articles such as “The claim that ‘19,800 liters of oil started leaking from the Shika Nuclear Power

Plant into the sea’ is false” and “The site calling for donations in cryptocurrency is false.”

According to the analysis of posts on X (formerly Twitter)⁴ by the disaster situation summary system D-SUMM⁵ (developed and trial-released by the National Institute of Information and Communications Technology, hereinafter referred as to NICT), the number of reports seeking rescue within 24 hours after the Noto Peninsula Earthquake (1,091 out of a total of 16,739 reports) doubled compared to the number of reports related to the 2016 Kumamoto Earthquake (573 out of a total of 19,095 reports). Among these 1,091 posts, 254 posts were detected with contradictory reports, and 104 were estimated to be disinformation⁶. The system analyzes 10% of Japanese posts on X, but related to the Kumamoto Earthquake, only one post out of 573 rescue requests was considered disinformation, indicating that more disinformation was posted on SNS related to the Noto Peninsula Earthquake⁷.

During disasters, it is crucial to reliably obtain disaster and evacuation information. To obtain accurate information, it is useful to refer to government and municipal websites, broadcasts backed by reporting and editing, and information from fact-checking organizations.

(2) Characteristics of dis-/mis-information related to the Noto Peninsula Earthquake

Associate Professor SHIBUYA of the Graduate School of Information Science and Technology at the University

of Tokyo has pointed out the following characteristics of dis-/mis-information d the Noto Peninsula Earthquake.

A X (formerly Twitter)

While there were posts made with good intentions, there were also duplicate posts related to requests for rescue, which were believed to be for the purpose of increasing views, as well as false requests for rescue and posts

requesting money transfers for fraudulent purposes.

Furthermore, it was characteristic that about 90% of the users who made duplicate posts were estimated to be non-Japanese language users.

¹ NHK “‘Unscrupulous and annoying’ What is the reality of the series of fake rescue requests after the Noto Peninsula earthquake?”, March 12, 2024, <<https://www3.nhk.or.jp/news/html/20240312/k10014383261000.html>>

² X, “About X’s efforts against dis-/mis-information” (Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space (15th Meeting) Material 15-2-3), March 28, 2024, <https://www.soumu.go.jp/main_content/000938666.pdf>

³ Japan Fact Check Center, “Noto Peninsula Earthquake, disinformation that changes immediately after the occurrence [Fact Check Summary]”, January 27, 2024, <<https://www.factcheckcenter.jp/fact-check/disasters/earthquake-factcheck-list/>>

⁴ It is a summary system in which AI is used to automatically extract, organize, and present reports related to disasters for each municipality (such as “fires are occurring”) from posts on X (formerly Twitter). It was open for testing from 2016 until the end of FY2023. If there is a post that contradicts the report, it will be automatically flagged as a possible false news. Posts on X (formerly Twitter) to be analyzed accounts amounts to 10% of Japanese posts.

⁵ TORIZAWA Kentaro, Fellow, the NICT “Introduction to initiatives and studies at the NICT” Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space, Materials presented in the study group (April 15, 2024), <https://www.soumu.go.jp/main_content/000942562.pdf>

⁶ According to the NICT, checks such as posting non-existent addresses and matching content mentioned in reports about hoaxes, etc. are conducted to identify false rumors. It is important to note that the estimates may be wrong, as they are not determining whether or not it is a hoax on the spot.

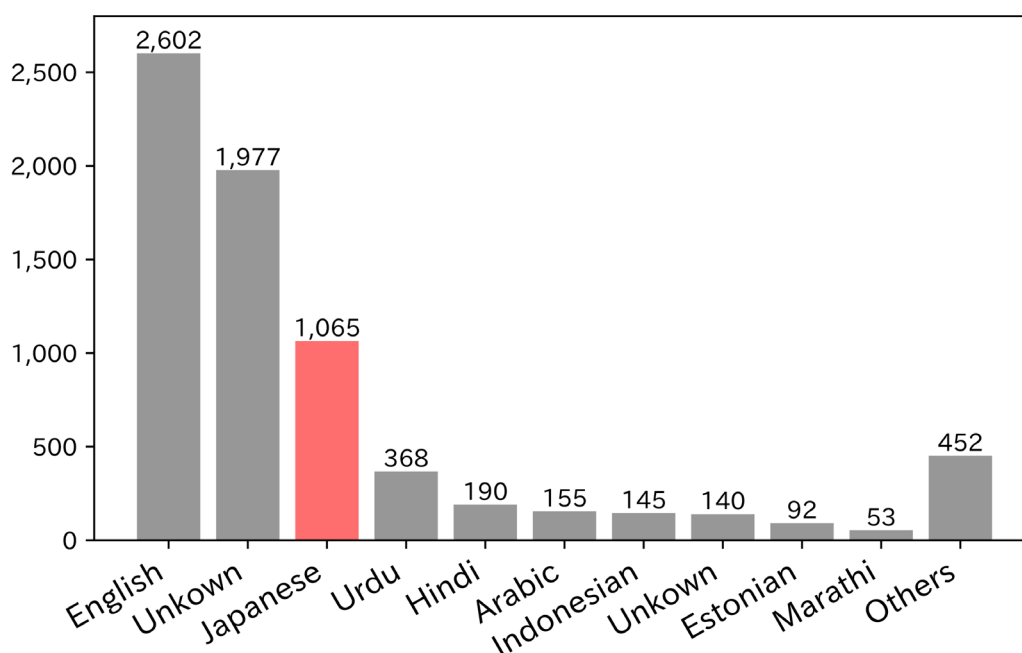
⁷ “Rapid raise of false rumors from 1 to 104...Researchers lament over “fake waves” on SNS about Noto Peninsula Earthquake”, February 27, 2024, <<https://newsswitch.jp/p/40645>>

Figure 1 Status of the circulation of dis-/mis-information by pattern

		Intention, motivation					
		Financial		Ideology		Psychological	Unclear
		Number of views	Request for transfer/remittance, unclear, others			Goodwill	
Category of dis-/mis-information	Falsehood/fabrication	Rescue Crimes/public safety Damage Earthquake mechanism Donation Nuclear power	Rescue Damage Donation	Donation Crimes/public safety Nuclear power Earthquake mechanism	Rescue Donation	Rescue Damage	Rescue Nuclear power
	Information connection to generate misunderstanding	Rescue Damage Accident in Haneda Airport	Donation	Earthquake mechanism Accident in Haneda Airport	Damage	Rescue	Earthquake mechanism Accident in Haneda Airport
	Scam	Rescue Damage Accident in Haneda Airport		Nuclear power			Rescue Nuclear power
	Conspiracy theory	Damage Accident in Haneda Airport		Earthquake mechanism Nuclear power Accident in Haneda Airport			Earthquake mechanism Accident in Haneda Airport
	Rumor	Damage Crimes/public safety Earthquake mechanism Nuclear power Accident in Haneda Airport		Donation Nuclear power Crimes/public safety Accident in Haneda Airport Earthquake mechanism			Nuclear power Accident in Haneda Airport
	Fake science	Crimes/public safety Nuclear power Earthquake mechanism		Crimes/public safety Nuclear power Earthquake mechanism			Earthquake mechanism

(Source) SHIBUYA Yuya, NAKAZATO Tomoka "Reports on the situation of circulation of dis-/mis-information in the digital space in the 2024 Noto Peninsula Earthquake"

Figure 2 Characteristics of posts related to the disaster in X: duplicate posts



(Source) SHIBUYA Yuya, NAKAZATO Tomoka "Reports on the situation of circulation of dis-/mis-information in the digital space in the 2024 Noto Peninsula Earthquake"

B X: Community Notes

The Community Notes feature was created in X from 2021 onwards to obtain more accurate information, and it allows users to provide background information to tweets that may cause misunderstandings. It is expected to play a role in fact-checking uncertain information. In

relation to the Noto Peninsula Earthquake, many Community Notes were created, and the number of people who participated for the first time in creating Community Notes reached its highest related to the Noto Peninsula Earthquake.

2. Response by the MIC

In light of the circulation and spread of dis-/mis-information on social media, Prime Minister KISHIDA Fumio, during a press conference on January 2, the day after the earthquake, called for restraint, stating, “The dissemination of malicious dis-/mis-information about the damage situation is absolutely unacceptable. Please refrain from doing so.” On the same day, the MIC issued a warning against dis-/mis-information on its social media accounts. Additionally, the MIC shared this warning with major social media platform operators⁸ and requested that they continue to take appropriate actions based on their terms of service.

The warning issued by the MIC on X (formerly Twitter) received approximately 1.8 million views, garnering significant attention compared to other posts⁹. It also received numerous reactions on Facebook and Instagram (Figure 3).

On January 4, during a press conference, the Prime Minister reiterated the request to major social media platform operators to continue taking appropriate actions based on their terms of service. On January 5, the MIC began requesting daily reports from platform operators to monitor their responses to the above requests. The reports were to include: (1) the number of posts deleted and accounts suspended after the earthquake; (2) the main content of the posts targeted in (1); (3) the presence and number of responses to disinformation

identified through fact-checking; (4) the response status to external requests for deletion of disinformation; (5) the presence and content of any enhancements to the response system for disinformation, (6) the status of cooperation among platform operators (information sharing, etc.); and (7) the status of cooperation with various government agencies.

Additionally, immediately after the disaster, the MIC requested broadcasters to warn viewers about dis-/mis-information. The MIC also called on social media platform operators and the media to alert information recipients.

Furthermore, on January 15, two weeks after the earthquake, the MIC issued another warning on its social media accounts, introducing examples of uncertain posts on the Internet in addition to warnings about dis-/mis-information.

Based on the “Package for Supporting the Lives and Livelihoods of Disaster Victims” (decided by the Noto Peninsula Earthquake Emergency Disaster Response Headquarters on January 25, 2024), the MIC, in collaboration with the Government Public Relations Office, published web advertisements to warn the four affected prefectures¹⁰ on January 31. On February 9, the MIC, again in collaboration with the Government Public Relations Office, published newspaper advertisements to issue warnings.

Figure 3 Warning issued by the MIC



⁸ LINE Yahoo, X (formerly Twitter), Meta, Google

⁹ As of January 19, 2024. Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space (6th meeting) Material 6-4, January 19, 2024 <https://www.soumu.go.jp/main_content/000923727.pdf>

¹⁰ Niigata Prefecture, Toyama Prefecture, Ishikawa Prefecture, Fukui Prefecture

3. Response by platform operators

(1) Platform operators

On January 5, following the request for daily reports on actions taken based on their terms of service, LINE Yahoo strengthened its monitoring efforts, deleting clear disinformation and other violating posts, and issued warnings about dis-/mis-information on social media related to disasters. X (formerly Twitter) labeled unrelated content as spam and suspended accounts for suspicious support requests using QR codes. Meta reported deleting posts in response to reports and sharing information through the “Disaster Support Hub”¹¹ on Facebook. Google reported establishing a system for intensive monitoring on YouTube for a certain period and implementing measures to make reliable information more accessible.

The MIC, through the “Study Group on Ensuring the Healthiness of Information Circulation in the Digital Spaces,” confirmed and analyzed the efforts of each operator. To utilize this information for future policies and specific measures to ensure the healthiness of information circulation in digital spaces, the MIC conducted hearings with platform operators from February to March 2024. The following points were raised regarding the response to the spread of dis-/mis-information related to the Noto Peninsula Earthquake¹²:

- While some operators provided responses on the overall number of posts deleted, hidden, or accounts suspended by businesses in Japan, the overall number of moderation actions taken in Japan was unclear for almost all operators.

(2) Broadcasters

In the Noto Peninsula Earthquake, the spread of dis-/mis-information on social media became a significant issue as stated above.

In response, broadcasters reported that claims about the earthquake being “Artificial” were scientifically baseless disinformation, warned about false rescue requests, and called for calm responses. Broadcasters

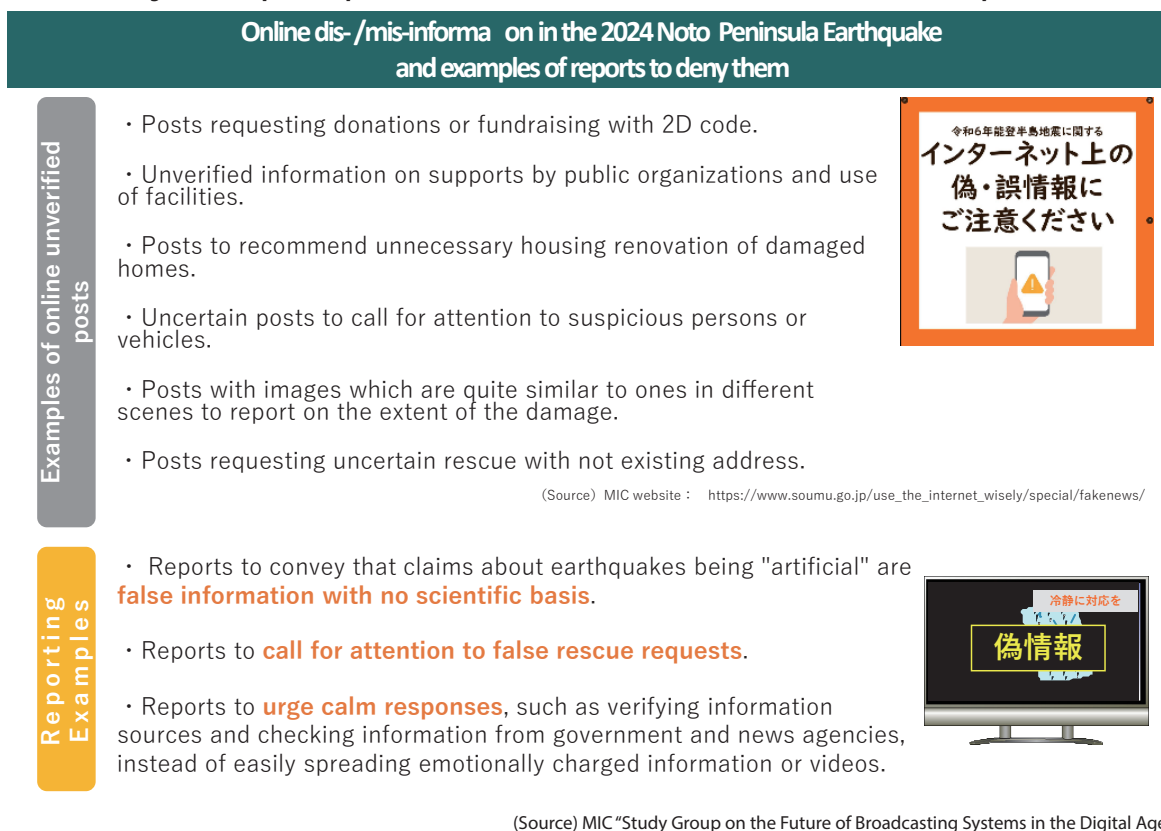
- While some operators provided responses on the number of posts deleted based on clear errors identified by fact-checking organizations, the coordination with fact-checking organizations and the number of posts deleted through moderation was unclear for almost all operators.
- There are insufficient transparency and accountability in the efforts of businesses in Japan to address the overall trend of moderation responses, stakeholder collaboration, and coordination with fact-checking organizations and traditional media in terms of assessing and responding to the healthiness of information circulation related to disasters in Japan, as well as the impact and risks on individual decision-making autonomy, rights infringement, social disruption, and other real-world implications.

The spread of dis-/mis-information related to the Noto Peninsula Earthquake hindered swift rescue and recovery efforts, posing a serious problem. With the advancement of AI technology, the generation of sophisticated fake images and the spread of dis-/mis-information are expected to increase significantly. Social media platform operators are expected to fulfill their social responsibility to reduce the spread of dis-/mis-information by implementing content moderation, such as deleting problematic posts, to ensure the proper circulation of information.

have a responsibility to widely report facts including disaster information in accordance with program guidelines stating “to Report Facts Accurately” as stipulated by the Broadcasting Act and played an important role in providing accurate information to disaster victims related to the Noto Peninsula Earthquake.

¹¹ Facebook functions that allow you to report your safety, request support, obtain and share disaster-related information, etc.

¹² MIC, 22nd Meeting of the Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space, Material 22-1-1 “Platform Operators Hearing Summary (Draft)” June 10, 2024, <https://www.soumu.go.jp/main_content/000951295.pdf>

Figure 4 Examples of reports about dis-/mis-information related to the Noto Peninsula Earthquake¹³

4. Future response to dis-/mis-information in disasters

For future disaster response, it is suggested that measures should focus on: (1) early warnings and public awareness, as well as response and mitigation of dissemination and impact; (2) tailoring responses based on the characteristics and trends of easily disseminated information; and (3) strengthening and promoting responses and measures according to the roles of various stakeholders¹⁴.

Furthermore, it is important to consider the response of not only platformers to circulate information but also information recipients, as research has shown that 77.5% of individuals who encounter disinformation are un-

aware of being deceived, particularly among those aged 50s and 60s¹⁵. Initiatives such as promoting fact-checking activities and enhancing digital literacy are crucial. Discussions are ongoing in the "Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space" regarding the fundamental principles in the process of information circulation including information dissemination, information reception, and information transmission, the roles of stakeholders, and specific measures to ensure the healthiness of information circulation in the digital space.

¹³ 24th meeting of the Study Group on the State of the Broadcasting System in the Digital Age, Material 24-2 "Status of the broadcasting field in the 2024 Noto Peninsula Earthquake" (March 5, 2020), <https://www.soumu.go.jp/main_content/000931153.pdf>

¹⁴ 17th meeting of the Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space, Material 17-1-2 "Trends in the spread of information and expected responses and countermeasures for each stakeholder," April 17, 2024, <https://www.soumu.go.jp/main_content/000946374.pdf>

¹⁵ YAMAGUCHI Shinichi, "How to prevent the spread of disinformation related to disasters: Take a breath and check carefully. From the case of the Noto Peninsula Earthquake," March 14, 2024, <<https://www.nippon.com/ja/in-depth/d00987/>>

History of Digital Technologies

Technological advancements have extended human capabilities and enhanced what we can achieve. Artificial Intelligence (AI), which replicates human intellectual activities through computers, has continued to evolve over its 70-plus years of development and is increasingly permeating business activities and daily life. Generative AI, which saw rapid adoption around 2022, is a remarkable example of this evolution. Generative AI can autonomously perform a wide range of tasks by generating text and images like a human, bringing significant transformations to various businesses, including advertising, marketing, and content creation. In our daily lives, natural language interfaces are becoming more prevalent, with smart speakers and chatbots integrating seamlessly into our routines and significantly altering our lifestyles. Furthermore, AI is expected to advance even further when combined with other technologies and services such as XR (Extended Reality) and robotics. For instance, XR technology using generative AI can provide immersive virtual environments, creating new value experiences in education and entertainment. AI-equipped robots are also making significant contributions across various fields, from manufacturing

to caregiving, by automating tasks and supporting people's lives.

These technologies, which utilize Information Communications Technologies (ICT) / digital such as AI and XR (hereinafter referred as to digital technologies), are anticipated to further transform our social and economic activities. However, the evolution of these technologies also brings challenges and risks. The rapid advancement of generative AI has raised concerns about privacy violations, data breaches, and the spread of dis-/mis-information, prompting global discussions on regulations and rules. As the potential and risks of digital technologies, especially generative AI, garner unprecedented attention, it is crucial to address these challenges and risks while advancing the development and utilization of digital technologies to benefit society as a whole, including business activities and daily life. In light of this understanding, the 2024 White Paper on the Information and Communications in Japan features a special section that reviews the evolution, current status, challenges, and future prospects of digital technologies. It also discusses the necessary measures to “live in harmony” with digital technologies.

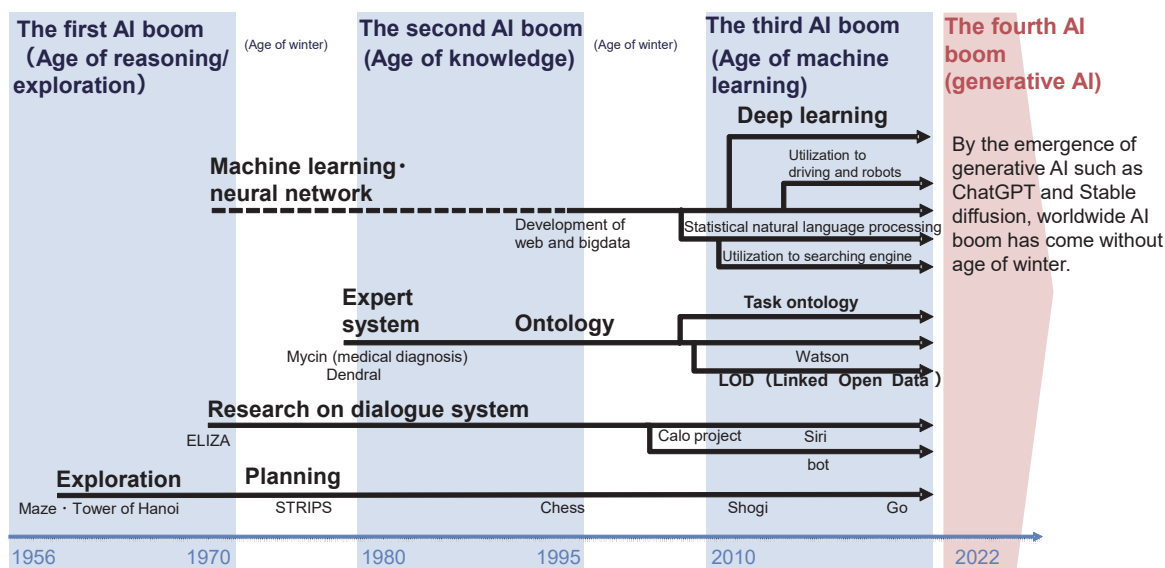
Section 1 History of development of AI and impacts of generative AI

1. History of development of AI

The history of AI began in the 1950s and has experienced several cycles of booms and winters. The first AI boom, which started with exploration and reasoning, led to the incorporation of technologies such as speech recognition in the second AI boom. The third AI boom in-

troduced innovative technologies such as deep learning, paving the way for practical AI applications to permeate society. The rapid proliferation of generative AI around 2022 marked the onset of what is now referred to as the fourth AI boom (**Figure 1-3-1-1**).

Figure 1-3-1-1 Overview of technology of AI and big data



(1) The first to third AI booms and the AI winters

A The first AI boom (from late 1950s to 1960s): the era of reasoning and search

The term “Artificial Intelligence” was proposed by J. McCarthy, a university professor in the U.S., at the Dartmouth Conference held in 1956. The concept of artificial intelligence was established, and the term AI became recognized among scientists. From the 1960s, research and development in AI became active, focusing on “Reasoning” and “Search.” “Reasoning” involves representing and executing human thought processes using symbols, while “Search” involves investigating procedures and options to achieve a goal and finding the optimal

solution. Problems were described in a form suitable for computers, and solutions were presented using methods such as search trees. However, due to limitations in computational power and data processing capabilities of computers at the time, modeling human intelligence was difficult. Consequently, AI of that era could only solve simple puzzles and mazes, known as “Toy Problems,” and faced challenges in practical application, leading to the first AI winter.

B The second AI boom (from 1980s to 1990s): the era of knowledge

In the 1980s, with the advancement of computer performance and the emergence of expert systems¹, AI research and development became active again in various countries. However, the amount of data required for computer learning was enormous, and the performance of computers at the time could not handle it. As a result,

AI could only mimic a portion of expert knowledge and could not address complex problems. Additionally, it required significant effort to manually describe learning data in a way that computers could understand. Consequently, AI research faced another winter.

C The third AI boom (from 2000s to present): the era of machine learning

In the 1990s, websites were made public, and in the 2000s, networks began to spread to households, leading to a dramatic increase in data circulation. This made it possible to obtain large amounts of data for research. Furthermore, improvements in computational processing power enabled the handling of vast amounts of information (big data), which significantly contributed to the evolution of machine learning, leading to the current

third AI boom². One of the methods of machine learning, deep learning, is a technology that develops the concept of neural networks, which simulate the workings of the human brain. Deep learning has enabled capabilities such as image recognition, natural language processing, and simulations. Its applications have expanded to include identifying human faces from camera images and optimizing autonomous driving in robots^{3,4}.

¹ Expert system: A computer system that has specialized knowledge of a particular problem and can reason and make decisions like an expert.

² KAMEDA Kenji, “Why did the third AI boom occur? (Part 1) The three waves that caused the third AI boom,” BIZ DRIVE, February 28, 2018, NTT East Japan, <<https://business.ntt-east.co.jp/bizdrive/column/dr00074-001.html>> (accessed on March 22, 2024)

³ KAMEDA Kenji, “Why did the third AI boom occur? (Part 3) What is deep learning that changed the common sense of AI?,” BIZ DRIVE, April 16, 2018, NTT East Japan, <<https://business.ntt-east.co.jp/bizdrive/column/dr00074-003.html>> (accessed on March 22, 2024)

⁴ NTT East Japan, “Introduction to deep learning | Explanation of the mechanism, what can be done, and the introduction process,” August 3, 2022, <<https://business.ntt-east.co.jp/content/cloudsolution/column-306.html>> (accessed on March 22, 2024)

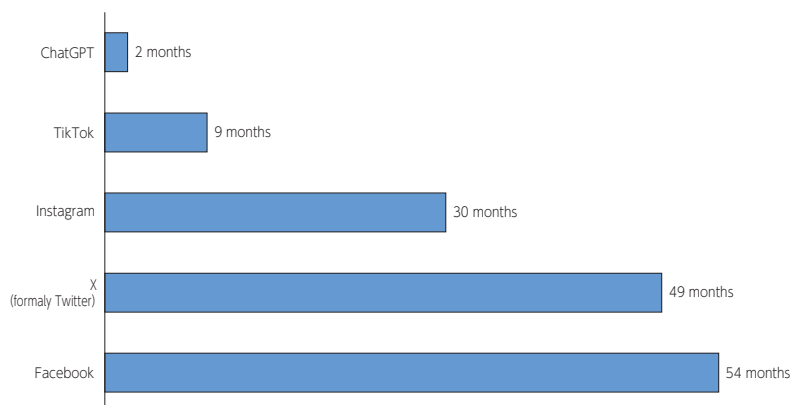
2. Impacts of generative AI

(1) Rapid progress and dissemination of generative AI

The advent of deep learning as a foundational technology has led to a significant improvement in AI performance, giving rise to AI that can autonomously generate various types of content. “Generative AI” is a collective term for AI technologies that can autonomously generate text, images, sound, and more. This field gained particular attention following the announcement of the conversational AI “ChatGPT” by OpenAI in 2022. ChatGPT

acquired one million users in just five days and surpassed 100 million users within two months of its release, demonstrating an astonishing rate of user expansion compared to previous online services and platforms (**Figure 1-3-1-2**). In addition to OpenAI, numerous companies, ranging from major corporations to startups, have announced the development of generative AI, sparking a global race in AI development.

Figure 1-3-1-2 Period to take in order to acquire one million users in each service

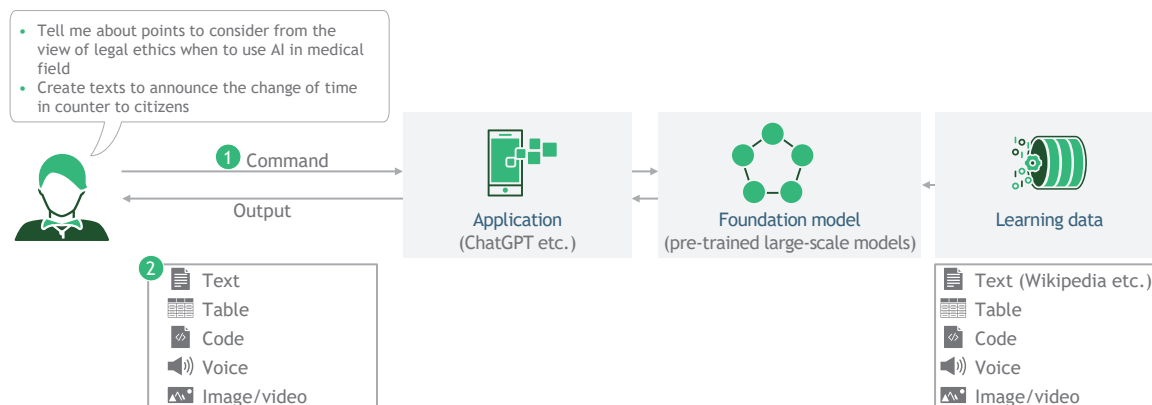


(Source) Prepared based on Reuters etc.

Generative AI allows for easy utilization without the need for user adjustments or skills, enabling natural language instructions to be given for the generation of di-

verse outputs in various formats, including text, images, and videos (multimodal) (Figures 1-3-1-3 and 1-3-1-4).

Figure 1-3-1-3 Overview of generative AI



- ① Easy to give **natural language** instructions (universal use without user-side adjustments or learning)
- ② Obtain **various forms of output** (text/table/code/voice/image/video)

(Source) Analysed based on Boston Consulting Group, Bommasani et al. “On the Opportunities and Risks of Foundation Models,” “Center for Research on Foundation Models,” Center for Research on Foundation Models, 2021

Figure 1-3-1-4 Patterns and functions in major generative AI services

Major services	Functions
Text generative AI	
ChatGPT/GPT-4 (OpenAI) Bard (Google) Bing Chat (Microsoft) Copilot (Microsoft)	<ul style="list-style-type: none"> • Enquiry, summary, calculation, change in the way to tell, translation, knowledge discovery etc. • Creation of dialogue contexts mixing with searching • Support of programming etc.
Video generative AI	
StableDiffusion Midjourney Adobe Firefly Gen-2	<ul style="list-style-type: none"> • Creation of images, partial image editing, automatic image coloring, line art extraction • Creation of video
Sound generative AI	
MusicGen Synthesizer V So-Vits-SVC	<ul style="list-style-type: none"> • Creation of music and effect sounds • Creation of voice • Conversion of voice, conversion of language in voice
Others	
—	<ul style="list-style-type: none"> • Creation of 3D objects • Creation of molecular structure etc.

(Source) Prepared based on publicly available materials

Several factors contribute to the current AI boom. Firstly, the development and scaling of deep learning and transformer models have significantly improved model accuracy in tasks such as natural language processing and image generation. The emergence of foundational models and large language models (LLMs), trained on vast amounts of data, has eliminated the need for retraining models for new tasks, simplifying development and usage while enabling AI to handle more complex tasks, thereby increasing its recognized utility. Additionally, advancements in cloud computing and GPUs⁵ have expanded computational resources, and the open-sourcing of AI development has made it accessible to general developers and companies, facilitating broader

application across various fields. Moreover, the provision of user-friendly interfaces and APIs (Application Programming Interfaces) has made AI interactions more intuitive and accessible, allowing users to obtain information and perform tasks more easily. The high versatility and multimodal capabilities of AI, enabling it to handle various data formats and inputs and process multiple tasks simultaneously, have further enhanced its utility. Efforts to align AI behavior with human intentions and values (so-called AI alignment) have also progressed, fostering environments where AI collaborates with humans, promoting AI adoption across many industries^{6,7} (Figure 1-3-1-5).

Figure 1-3-1-5 Technical factors laying in generative AI boom

Factor	Details
Emergence of large-scale language models and foundational models	A model capable of understanding and generating human language. It learns from large amounts of text data and can generate natural text.
Open sourcing	The source code is publicly available, allowing anyone to access, use, and improve it for free, promoting the spread of technology and innovation.
User interface (UI)	It offers an intuitive and user-friendly interface, designed to enable non-technical users to easily operate AI tools.
Provision by API	It facilitates the integration of AI functions into other applications through a programming interface, allowing for diverse development.
High versatility and multimodal functionality	It has the ability to handle multiple modes, including text, images, and audio, enabling the processing and generation of various types of data.

(Source) Prepared based on publicly available materials

⁵ Graphics Processing Unit. Originally developed for graphics processing, its high parallel processing capabilities make it suitable for large-scale computational processing such as deep learning in AI.

⁶ Center for Research and Development Strategy in Japan Science and Technology Agency, "New Trends in Artificial Intelligence Research 2," July 2023, <<https://www.jst.go.jp/crds/pdf/2023/RR/CRDS-FY2023-RR-02.pdf>> (accessed on March 22, 2024)

⁷ SHIOZAKI Junichi, "The Future Landscape Changed by Generative AI," Nomura Research Institute, December 2023, <<https://www.nri.com/jp/knowledge/report/1st/2023/souhatsu/1201>> (accessed on March 22, 2024)

(2) Economic effects by generative AI

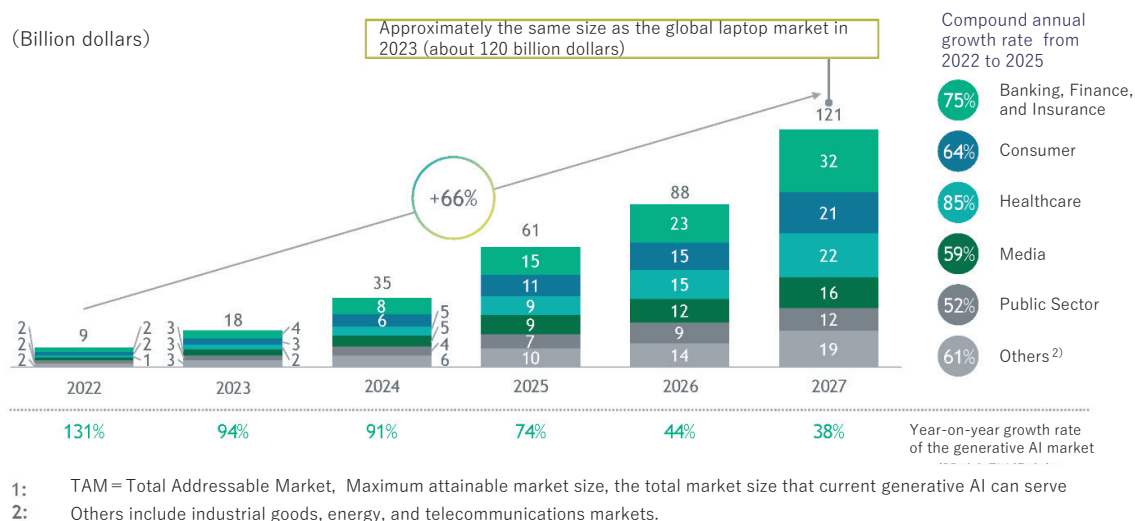
The advent of generative AI has significantly impacted our intellectual activities, enabling transformations in various work domains, including content creation, customer support, and construction, as well as work domains which were previously challenging for traditional AI to apply. It is said that “the emergence of generative AI is arguably one of the most significant revolutions in human history. The greatest risk for companies is not utilizing it due to security concerns; rather, they should aim to become generative AI-first companies in the next era.”⁸

According to a paper published by OpenAI and the University of Pennsylvania on March 17, 2023, 80% of

workers will have at least 10% of their tasks affected by large language models, and 19% of workers will see 50% of their tasks impacted. The influence of LLMs is predicted to be particularly significant in high-wage professions and industries with high entry barriers, such as data processing, insurance, publishing, and funds. On the other hand, generative AI also has the potential to unlock significant business opportunities. According to an analysis by the Boston Consulting Group, the market size for generative AI is expected to reach 120 billion dollars by 2027. The largest markets will be “Finance, Banking, and Insurance,” followed by “Healthcare” and “Consumer” (Figure 1-3-1-6).

Figure 1-3-1-6 Market size of generative AI (estimated)

The anticipated market size for generative¹⁾AI is expected to reach 120 billion dollars by 2027.



(Source) Boston Consulting Group “The CEO’s Roadmap on Generative AI” (March 2023)

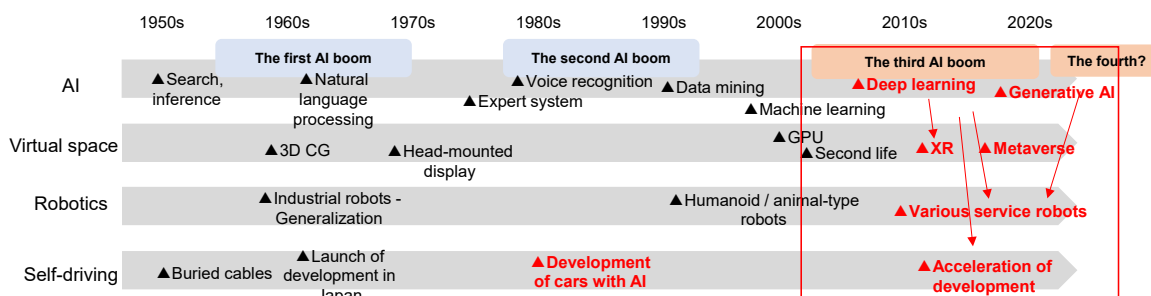
⁸ According to Shota Imai, who has majored in Technology Management Strategy at the Graduate School of Engineering at the University of Tokyo, “We are no longer at the stage of debating whether generative AI is useful or not. We are at a turning point where if we do not use it, we could be left several times behind our competitors in no time. In the software industry, generative AI has already achieved overwhelming improvements in productivity.” (Interview conducted on March 11, 2024)

Section 2 Evolving technologies along with the progress of AI

The evolution of AI, as reviewed in the previous section, is also influencing other technologies. Particularly, the development of deep learning during the third AI boom has contributed to the development of virtual

space services using XR, service robots, autonomous driving, and more. The advent of generative AI further supports the advancement of these technologies (**Figure 1-3-2-1**).

Figure 1-3-2-1 Changes in evolving technologies along with the progress of AI



(Source) Prepared based on publicly materials

The functions that AI performs in actual services can be broadly categorized into three types: “Identification,” “Prediction,” and “Execution.” The application of these functions spans various industrial sectors, such as manufacturing and transportation. For example, in the case of autonomous driving, it combines various functions like image recognition, voice recognition, situational judgment, and route analysis in a manner suitable for

the transportation sector to achieve practical implementation¹. Similarly, in robotics, multiple functions are combined to achieve practical implementation (**Figure 1-3-2-2**).

Here, we will discuss the trends in virtual spaces (the metaverse and digital twin), robotics, and autonomous driving, which are further advancing in practical implementation by incorporating generative AI.

Figure 1-3-2-2 Functional area of practical implementation of AI

Identification	Accuracy of prediction	Execution
<ul style="list-style-type: none"> ●Voice recognition ●Image recognition ●Video recognition ●Language analysis 	<ul style="list-style-type: none"> ●Numerical prediction ●Matching ●Intention prediction ●Need prediction 	<ul style="list-style-type: none"> ●Expression generation ●Design ●Optimization of behavior ●Automation of work

(Source) MIC (2016) “Research survey on the effects on employment and work style by evolution of ICT”¹

(1) Virtual spaces (the metaverse and digital twin)

The metaverse is a virtual world created on the Internet, where users can interact with others through avatars that represent themselves. Although it is a virtual space, services that link the metaverse with the real world are being tested, such as purchasing items in the metaverse that are later delivered to the user’s home. Additionally, there is growing anticipation for its use as a virtual workspace in B2B applications².

Another concept is the “Digital Twin,” which involves recreating elements of the real world in a virtual space based on data collected from the real world. While both the metaverse and digital twin exist in virtual spaces, the

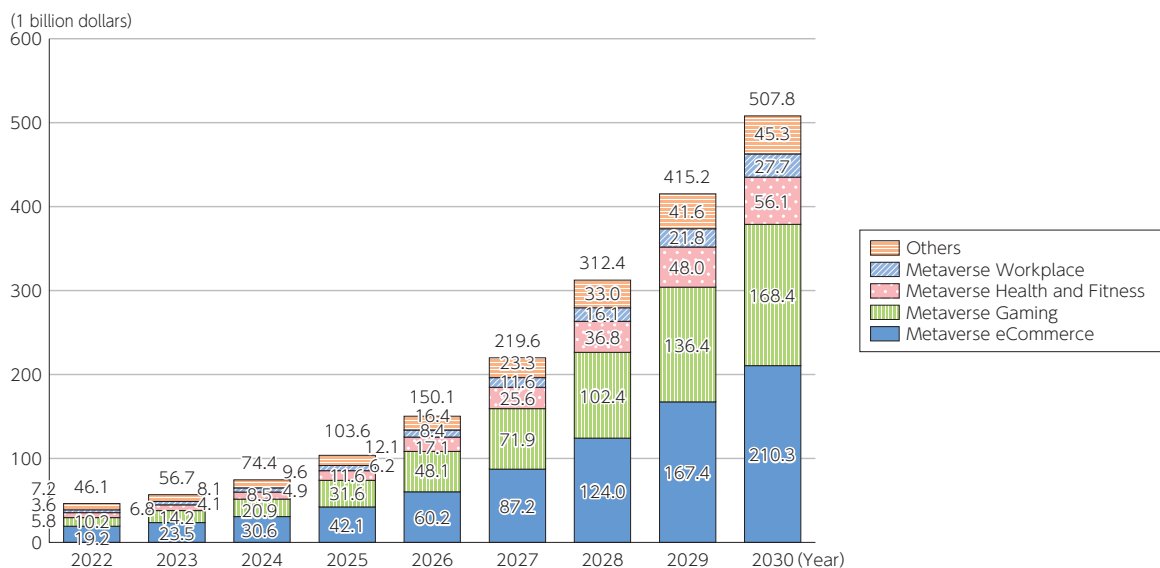
key difference lies in their purpose and content. The metaverse does not necessarily replicate real-world elements and is often used for communication, gaming, and social interaction through avatars in a virtual environment. In contrast, a digital twin is a solution designed to simulate real-world scenarios, making it useful for conducting simulations that are difficult to perform in the real world³.

The market size of the metaverse is projected to expand from 46.1 billion dollars in 2022 to 507.8 billion dollars by 2030 (**Figure 1-3-2-3**).

¹ MIC, “Report on Research and Study on the Impact of ICT Evolution on Employment and Work Styles,” March 2016, <https://www.soumu.go.jp/johotsusintokei/linkdata/h28_03_houkoku.pdf>

² Nikkei X Trend, “What is the Metaverse? Will it Really Spread? Eight Points to Understand the Basics,” April 14, 2022, <<https://xtrend.nikkei.com/atcl/contents/skillup/00008/00020/>> (accessed on March 22, 2024)

³ MIC, “The 2023 White Paper on Information and Communications in Japan” <<https://www.soumu.go.jp/johotsusintokei/whitepaper/r05.html>>

Figure 1-3-2-3⁴ Market size of the metaverse(Source) Statista ⁴

By utilizing generative AI, certain processes in the creative activities within the metaverse, such as automatic generation of 2D images and 3D models, as well as program creation support, can be simplified. This is expected to lower the technological and knowledge barriers, leading to an expansion of users. Additionally, the

use of machine learning techniques such as Generative Adversarial Networks (GAN) enables individuals without design experience to create their own avatars and more, potentially giving rise to a vast economic sphere within the virtual space.

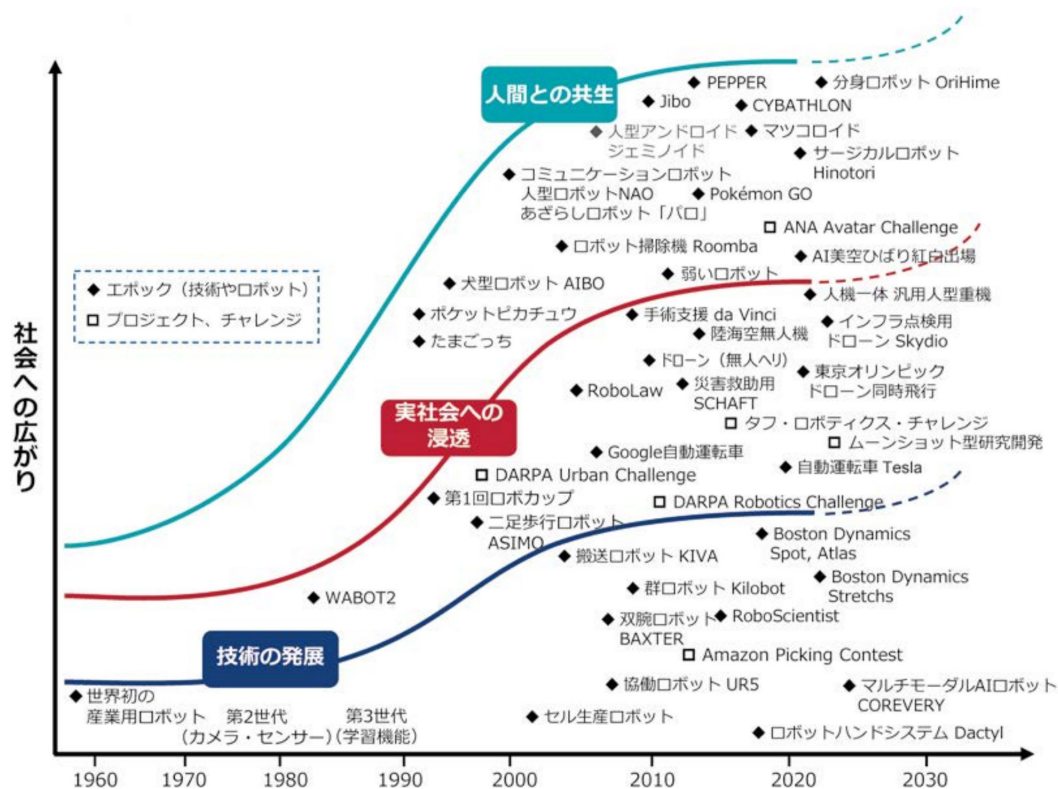
(2) Robotics

The development of robots began in the 1960s for industrial use, serving as substitutes for human assistance and dangerous tasks in industrial and military applications. Since the 1990s, robots have been developed and utilized not only for industrial purposes in factories but

also for service applications in general society, such as caregiving, cleaning, and delivery. In personal and household settings, various robots like cleaning robots and companion robots have become more widespread (Figure 1-3-2-4).

⁴ <https://www.statista.com/outlook/amo/metaverse/worldwide>

Figure 1-3-2-4 Trend of research and development of robotics

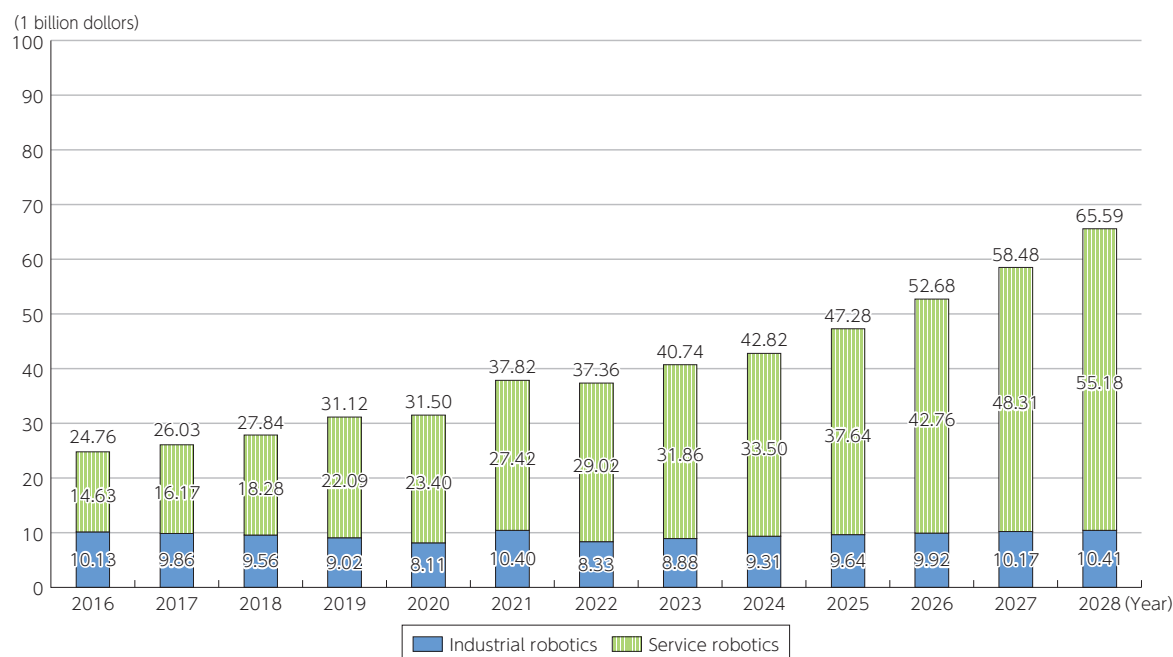


(Source) Center for Research and Development Strategy, Japan Science and Technology Agency Overview report of research and development in the field of systems and information science(2023)

The global robot market is expected to see significant revenue growth, reaching 42.82 billion dollars by 2024. Among various segments, service robotics is projected to dominate with a market size of 33.5 billion dollars in

2024. This field is expected to grow at a compound annual growth rate (CAGR) of 11.25% from 2024 to 2028, reaching an estimated market size of 65.59 billion dollars by 2028 (Figure 1-3-2-5).

Figure 1-3-2-5 Market size of robotics



(Source) Statista "Statista Market Insights"⁵

⁵ <https://www.statista.com/outlook/tmo/robotics/worldwide>

The expansion of robot development and utilization has progressed in tandem with the advancement of AI. Robots are considered intelligent mechanical systems with three key elements: sensors (perception/recognition), intelligence/control systems (decision-making), and actuators (action). By combining deep learning-based AI with reinforcement learning, the recognition capabilities of robots have significantly improved, allowing them to collect and analyze large amounts of data from cameras and sensors. AI is already being used in production sites for quality inspection and predictive maintenance of equipment. The practical application of caregiving and customer service robots is also advancing. Voice recognition and natural language generation technologies have enabled natural interactions between humans and household robots.

Furthermore, there are attempts to use generative AI

(3) Autonomous driving technology

In autonomous driving technology, AI is utilized in the three processes of perception, decision-making, and action by the system. AI processes information from cameras and sensors installed in vehicles to recognize the surrounding environment and safely navigate the vehicle, avoiding pedestrians and obstacles. Generated AI is also used for prediction and decision-making, considering the behavior of vehicles and pedestrians ahead and determining how the vehicle should be controlled based on this information. AI also plays a crucial role in supporting safe driving in vehicles.

Furthermore, the learning capabilities of generated

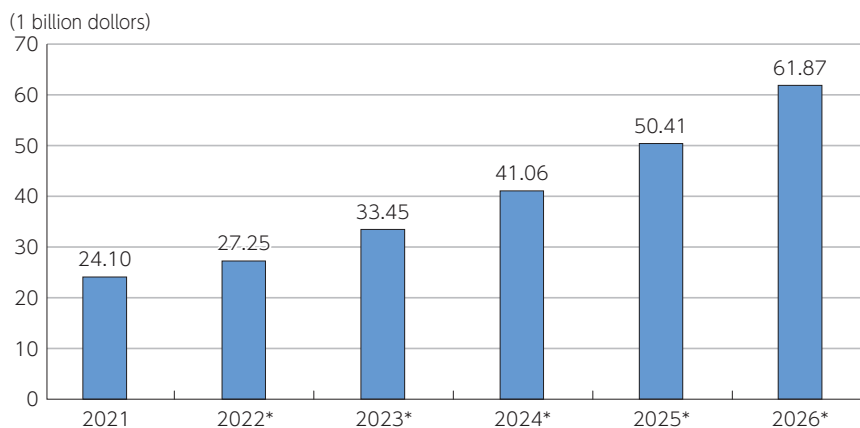
as action-generating AI for decision-making and actuators. This involves interpreting multimodal information such as language and images, allowing robots to understand the surrounding environment from camera footage and perform physical actions to achieve user commands. However, challenges remain in the physical movements of robots, and research on tactile feedback, soft hardware development, and safe force control is crucial. It is expected that it will take more time for practical implementation in society^{6,7}.

Typically, programming is required to operate robots, but in the future, if generative AI can program itself through dialogue with humans, it is anticipated that robots will be able to understand human language and be programmed instantly, leading to a future where robots can be controlled more intuitively.

AI enable advanced route optimization, and its speech recognition technology is also utilized, allowing drivers to give commands to the vehicle using their voice^{8,9}. The realization of fully autonomous driving in the future will require not only image recognition but also the recognition of other modalities such as voice, enabling communication with passengers. As a result, there is a growing trend of integrating generated AI into vehicles.

The global market size of autonomous driving vehicles exceeded 24 billion dollars in 2021. The market is expected to continue growing, reaching a size of approximately 62 billion dollars by 2026 (**Figure 1-3-2-6**).

Figure 1-3-2-6 Market size of autonomous driving technology



The year with * means the prediction.

(Source) Statista¹⁰

⁶ NIKKEI Tech Foresight, "Infrastructure models will be multimodal and integrated with robots: 24-year outlook," January 24, 2024, <<https://www.nikkei.com/prime/tech-foresight/article/DGXZQOUC239XV0T20C24A1000000>> (accessed on March 22, 2024)

⁷ SHINDO Tomonori, "Editor-in-Chief's Outlook for 2024 (No. 11) Will Robots Change with Large-Scale Language Models? - Robots and AI in 2024 -," Nikkei xTECH, January 19, 2024, <<https://xtech.nikkei.com/atcl/nxt/column/18/02668/112800011/>> (accessed on March 22, 2024)

⁸ NEC, "Examples of AI technology used in automobiles, such as autonomous driving, and future challenges," <<https://www.nec-solutioninnovators.co.jp/ss/mobility/column/07/index.html>> (accessed on March 26, 2024)

⁹ Jidouten LAB, "Autonomous Driving and AI (Latest 2023 Edition)," July 7, 2023, <https://jidouten-lab.com/u_35766> (accessed on March 26, 2024)

¹⁰ <https://www.statista.com/statistics/428692/projected-size-of-global-autonomous-vehicle-market-by-vehicle-type/>

Chapter 4

Issues and Current Responses to Digital Technologies

Section 1 Issues and current initiatives along with the advancement of AI

The development of AI has brought convenience to our lives, but it also comes with risks and challenges that need to be considered. In the past, using inappropriate or biased data for training AI models has led to increased bias and errors, resulting in decreased reliability of predictions. Many traditional machine learning models have also been criticized for being black boxes (lack of transparency), making it difficult to understand their in-

ternal workings and potentially causing issues in critical decision-making scenarios. Additionally, as generative AI rapidly develops and becomes more widespread, specific challenges and risks have become apparent. Below is an overview of the risks and challenges associated with generative AI from both a technical and social/economic perspective.

1. Issues of generative AI

The “AI Business Guidelines (Version 1.0)” formulated by the MIC and the Ministry of Economy, Trade and Industry (hereinafter referred as to METI) in April 2024 provide examples of risks that have become apparent due to the use of generative AI, in addition to the risks associated with conventional AI (**Figure 1-4-1-1**). For instance, the risks associated with conventional AI include biased or discriminatory outputs, the occurrence of filter bubbles and echo chamber phenomena¹, and the risk of data pollution attacks (such as the degradation of AI performance and misclassification due to the mixing of learning data). Furthermore, the expansion of AI usage leading to increased computational resources resulting in higher energy consumption and environmental impact² is also highlighted. As for the risks that have become apparent due to generative AI, the guidelines mention the potential for hallucinations. Generative AI may convincingly produce disinformation not based on facts, which is referred to as “Hallucination.” While technical measures are being considered, it is not entirely suppressible. Therefore, when utilizing generative AI, it is desirable for users to keep in mind the possibility of

hallucination and verify the accuracy of the output by cross-referencing or using other means. Additionally, in the use of generated AI, there are concerns about the risk of personal and confidential information being input as prompts and then leaked through the output from the AI. There is also the risk of uncritically accepting false or misleading information, such as fake images and videos created by deepfakes, which could be used for information manipulation and propaganda. Additionally, there is a risk of perpetuating biases and amplifying prejudices present in existing information if AI-generated responses based on such information are uncritically accepted, leading to the continuation or exacerbation of unfair or discriminatory outputs (re-generating bias).

The guidelines emphasize that “the existence of these risks should not immediately hinder the development, provision, or use of AI”. Instead, they “encourage the recognition of risks, the consideration of risk tolerance and the balance with benefits, and the proactive development, provision, and use of AI to enhance competitiveness, create value, and ultimately drive innovation”.

¹ A “Filter Bubble” refers to an information environment in which an algorithm analyzes and learns from an individual internet user’s search history and click history, and the information that the individual user wants to see is displayed first, whether they want it or not, and they are isolated from information that does not match their perspective, and are isolated in a “Bubble” of their own way of thinking and values. An “Echo Chamber” refers to a phenomenon in which people with the same opinions gather together and reinforce each other’s opinions, leading them to believe that their own opinions are correct and to become unable to be exposed to diverse perspectives. For measures against these, refer to 2 in Section 1, Chapter 6.

² The guidelines also point out that introducing AI into energy management can also contribute to the environment, such as making electricity use more efficient.

Figure 1-4-1-1 Issues of generative AI

	Risks	Examples
Risks from traditional AI	Output of result that includes bias or discrimination	<ul style="list-style-type: none"> AI human resources recruitment system developed by an IT company had a defect in machine learning that discriminated against women.
	Filter bubble and echo chamber phenomena	<ul style="list-style-type: none"> The social division is caused by recommendations given by SNS, etc.
	Loss of diversity	<ul style="list-style-type: none"> If the whole society uses the same model in the same way, the derived opinions and replies might converge through LLM, losing diversity.
	Inappropriate use of personal data	<ul style="list-style-type: none"> The nontransparent use of personal data and the political use of personal data are problematic.
	Infringement on lives, bodies, and properties	<ul style="list-style-type: none"> During AI training, there is a risk of intrusion of invalid data into learning data, causing performance degradation and misclassification. In medical settings, if AI has an ethical bias for determining prioritization, fairness might be lost.
	Data poisoning attack	<ul style="list-style-type: none"> During AI training and service operation, there is a risk of intrusion of invalid data into learning data and cyberattacks aimed at the application itself.
	Black-box AI, and requirements for explanation about judgment	<ul style="list-style-type: none"> Black-box AI's judgments caused a problem as well. There is also a rising demand for transparency regarding AI's judgments.
	Energy consumption and environmental load	<ul style="list-style-type: none"> As the use of AI spreads, the demands for calculation resources also increase. As a result, data centers are enhanced, and some people are concerned about the increase in energy consumption.
Risks that have become apparent with generative AI	Misuse	<ul style="list-style-type: none"> The use of AI for fraud is also problematic.
	Leak of confidential information	<ul style="list-style-type: none"> In using AI, there is a risk that personal data or confidential information is entered as a prompt becomes leaked through output.
	Factual errors	<ul style="list-style-type: none"> Response represented by generative AI as facts contained dis/misinformation, and a lawsuit was filed against an AI developer and AI provider
	Blindly trusting disinformation and misinformation	<ul style="list-style-type: none"> Blindly trusting misinformation produced by generative AI can be a risk. Misuse of deepfakes has occurred in various countries.
	Relationship with copyright	<ul style="list-style-type: none"> The handling of intellectual property rights is an issue that needs discussed.
	Relationship with qualifications, etc.	<ul style="list-style-type: none"> There might be risks of infringement of legally prescribed licenses and qualifications caused by using generative AI.
	Reproduction of bias	<ul style="list-style-type: none"> Because generative AI creates answers based on existing information, biases contained in existing information might be amplified, continuing and enhancing unjust output containing discrimination.

(Source) Outline of "AI Guidelines for Business Appendix Ver1.0"

(1) Summary of major LLMs

The development of Large Language Models (LLMs), which form the foundation of generative AI, is being led by major tech companies such as Microsoft and Google in the U.S.

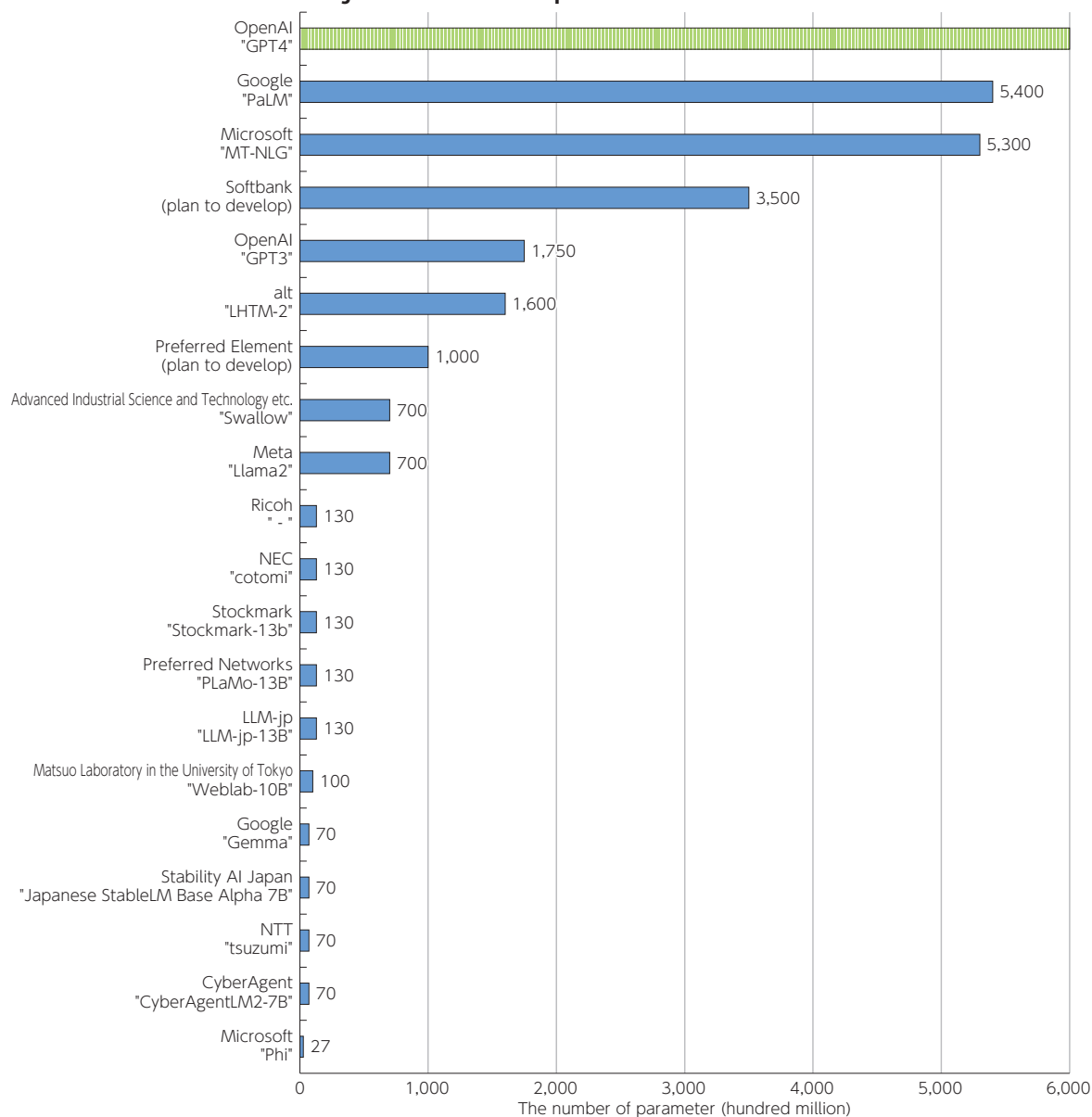
However, simply utilizing LLMs developed through closed research and development by non-Japanese entities other than Japan may lead to the black-boxing of the LLMs construction process, raising concerns about rights infringement and information leakage when utilizing LLMs. To ensure the effective utilization of LLMs

with a strong focus on the Japanese language, it is essential to have domestically developed LLMs with high transparency, where the construction process and the data used are clearly visible, providing a sense of security³. Some Japanese companies are already independently working on LLMs development, and here we will introduce the trends in this area.

In contrast to the LLMs developed by Big Tech companies, there is a tendency in Japan to develop medium-sized LLMs (Figure 1-4-1-2).

³ National Institute of Advanced Industrial Science and Technology press release "Development of world-class generative AI begins using AIST's computational resource ABCI - AIST, Tokyo Institute of Technology, and LLM-jp (hosted by the National Institute of Informatics) cooperate -" (October 17, 2023), <https://www.aist.go.jp/aist_j/news/pr20231017.html> (accessed on March 22, 2024)

Figure 1-4-1-2 Number of parameters of each model



(Source) Prepared based on companies' websites and news articles etc.⁴

(2) Domestically developed LLMs

A Domestically developed LLMs by the NICT⁵

In July 2023, the NICT announced the development of a large-scale language model with 40 billion parameters using 350GB of high-quality Japanese web text with minimal noise. The LLM developed by the NICT has not undergone fine-tuning or reinforcement learning, and while its performance level is not comparable to ChatGPT, it has reached a level where it can facilitate Japanese language interactions. The NICT plans to further expand the scale of learning texts, focusing on Japanese, and is also working on pre-training a model with 179 bil-

lion parameters similar to GPT-3. Additionally, the NICT is aiming to improve both positive and negative aspects in the construction of larger pre-training data and language models, as well as enhancing existing applications and systems such as WISDOM X and MICSUS. (As of May 2024, the NICT is continuing its development efforts, including the development of multiple LLMs with up to 311 billion parameters, and researching the impact of parameter and learning data differences on performance).

⁴ The number of parameters for OpenAI's "GPT4" is undisclosed.

⁵ NICT, "Prototype of a large-scale language model (generative AI) specialized for Japanese ~ Developing a 40 billion parameter generative large-scale language model trained only on Japanese web data ~" July 4, 2023 <<https://www.nict.go.jp/press/2023/07/04-1.html>> (accessed on March 22, 2024)

B “CyberAgentLM” LLMs in Japanese developed by CyberAgent^{6,7}

In May 2023, CyberAgent announced the development of LLMs in Japanese with a maximum of 6.8 billion parameters. In November 2023, they released a higher-performance model with 7 billion parameters and 32,000 token support, named “CyberAgentLM2-7B,” along with

a chat-tuned version called “CyberAgentLM2-7B-Chat.” These models are capable of processing approximately 50,000 characters equivalent to Japanese text. They are provided under the Apache License 2.0 for commercial use.

C “tsuzumi” LLMs in Japanese developed by Nippon Telegraph and Telephone Corporation (NTT)

In November 2023, NTT announced the development of “tsuzumi,” a lightweight Japanese language model with world-class processing capabilities ranging from 6 to 7 billion parameters. “tsuzumi” addresses the challenge of reducing costs for learning and tuning in cloud-based LLMs. It supports both English and Japanese and

is capable of modalities such as visual and auditory processing, allowing for specialized tuning for specific industries or corporate organizations. Commercial services for “tsuzumi” began in March 2024, and future plans include enhancing tuning capabilities and gradually implementing multimodal features⁸.

2. Issues caused by generative AI

In addition to the constraints faced by generative itself, there are many social and economic challenges associated with the advancement and proliferation of generative AI. Various tech companies, platform operators,

industry organizations, and governments both domestically and internationally are working on measures to address these issues.

(1) Challenges and countermeasures for the circulation and spread of dis-/mis-information

The term “Deepfake” is a combination of “Deep Learning” and “Fake,” and it refers to audio, images, or video content that is synthesized using AI technology to falsely represent as genuine or truthful, depicting speech or actions that individuals have not actually made. In recent years, the use of deepfakes for informa-

tion manipulation and criminal activities has been increasing worldwide, and efforts to address this issue are being made from various quarters. However, the situation presents a cat-and-mouse game, with ongoing challenges in effectively combating deepfakes.

A Challenges posed by deepfakes

(A) Circulation and spread of AI-generated dis-/mis-information

With advancements in generative AI, it has become possible to create highly realistic text, images, audio, and video, making it feasible to produce convincing dis-/mis-information. Using deepfake technology, it is easy to create videos that make it appear as though real people are saying things they never actually said. In Japan, for instance, a fake video of Prime Minister KISHIDA created by using generative AI was spread on social media⁹. Additionally, related to the Noto Peninsula Earthquake on January 1, 2024, numerous posts on social media linked footage from the 2011 Great East Japan Earthquake’s Tsunami and the 2021 Atami Landslide to the Noto Peninsula Earthquake, leading to widespread viewing and dissemination¹⁰. In 2020, disinformation claiming a connection between COVID-19 and 5G signals led to the destruction of mobile phone base sta-

tions¹¹, demonstrating the societal impact of such disinformation.

The proliferation of various digital services like social media has enabled anyone to become an information disseminator, resulting in a vast amount of information and data circulating on the Internet. In this information-overloaded society, the attention and time we can devote to consuming information are scarce compared to the volume of information available. This scarcity gives rise to what is known as the attention economy, where information that can easily capture the recipient’s attention is prioritized, often driven by economic incentives such as advertising revenue. This structure can lead to the spread of dis-/mis-information and exacerbate online outrage.

The spread of dis-/mis-information is a global issue. In January 2024, the World Economic Forum identified

⁶ CyberAgent, “CyberAgent releases Japanese LLM (large-scale language model) with up to 6.8 billion parameters to the public - Providing a commercially available model trained with open data -” May 17, 2023, <<https://www.cyberagent.co.jp/news/detail/id=28817>> (accessed on March 22, 2024)

⁷ CyberAgent, “Version 2 of our unique Japanese LLM (large-scale language model) released to the public - Providing a commercially available chat model with 32,000 tokens -” November 2, 2023, <<https://www.cyberagent.co.jp/news/detail/id=29479>> (accessed on March 22, 2024)

⁸ NTT, “NTT’s commercial service using its unique large-scale language model “tsuzumi” will begin in March 2024” November 1, 2023, <<https://group.ntt.jp/newsrelease/2023/11/01/231101a.html>> (accessed on March 22, 2024)

⁹ The video featured a voice that sounded just like the Prime Minister making obscene remarks, and the logo of a commercial news channel was displayed, giving the impression as if Prime Minister Kishida was being broadcast live as an emergency report. Yomiuri Shimbun Online, “Fake video of Prime Minister KISHIDA spread on social media using generative AI...NTV’s logo misused: “We cannot forgive this,”” November 4, 2023, <<https://www.yomiuri.co.jp/national/20231103-OYT1T50260/>>

¹⁰ Nikkei Online Edition, “Fake video of Noto Peninsula Earthquake spread on social media, also soliciting remittances,” January 2, 2024, <<https://www.nikkei.com/article/DGXZQOCA020JZ0S4A100C2000000/>> (accessed on March 22, 2024)

¹¹ Nikkei Online Edition, “European 5G base station destruction, the shadow culprit is the hoax of “spreading coronavirus”” April 25, 2020, <<https://www.nikkei.com/article/DGXMZ058443970U0A420C2XR1000/>>

“Disinformation” as one of the most severe risks expected over the next two years, warning that it could exacerbate social and political divisions¹². Notably, 2024 will see national elections in over 50 countries, including the U.S., Bangladesh, Indonesia, Pakistan, and India. Already,

there have been instances of deepfake videos related to the Indonesian presidential election and fake audio impersonating the U.S. President Biden before the U.S. presidential primaries, highlighting the use of generative AI for information manipulation (**Figure 1-4-1-3**).

Figure 1-4-1-3 Examples of information manipulation by deepfakes made by generative AI

Date	Country and Region	Content
February, 2021	Japan	•When a strong earthquake with a seismic intensity of 6+ struck Miyagi and Fukushima prefectures, a doctored image of then-Chief Cabinet Secretary KATO Katsunobu, making it appear as if he was smiling during a press conference, circulated.
March, 2022	Ukraine	•After the Russian invasion of Ukraine, a fake video was circulated on social media, showing President Zelensky calling for the Ukrainian army to surrender.
September, 2022	Japan	•When Typhoon No. 15 made landfall, fake images claiming that many houses in Shizuoka Prefecture were submerged were spread on Twitter (now X).
March, 2023	The U.S.	•Using image-generating AI, a fake image of former President Trump being arrested was created and circulated on Twitter (now X).
May, 2023	The U.S.	•A fake image depicting an explosion near the Pentagon spread on social media (SNS), causing the Dow Jones Industrial Average to temporarily drop by more than 100 points.
November, 2023	Japan	•A fake video depicting Prime Minister KISHIDA Fumio making sexually suggestive remarks spread on social media (SNS).
November, 2023	Argentina	•During the Argentine presidential election, fake videos allegedly created using AI circulated on social media (SNS).
January, 2024	Taiwan	•During the Taiwan presidential election, a fake video was created and posted, making false claims about President Tsai Ing-wen's personal life.
January, 2024	The U.S.	•A spoof call imitating President Biden's voice urged voters to refrain from voting in the upcoming presidential primary in New Hampshire over the weekend.

(Source) Prepared based on BBC News Japan(2024)¹³ etc.

(B) Other use of AI for criminal activities

The use of AI for criminal activities is on the rise, extending beyond information manipulation. The same AI used in the ChatGPT, an automated conversational program developed by the US-based OpenAI, has been exploited to create “BadGPT” or “FraudGPT” - illicit chatbots that mass-produce phishing scam emails. These hacking tools began to surface on dark web sites a few months after OpenAI released ChatGPT in November 2022. It's estimated that within 12 months of ChatGPT's release, phishing scam

emails increased by 1,265%, resulting in an average of around 31,000 phishing attacks per day¹⁴.

Furthermore, AI's image generation capabilities have been misused for extortion. Criminals are using AI to transform commonly shared images on social media into inappropriate content, which they then use to blackmail victims. The Federal Bureau of Investigation (FBI) has issued warnings, noting that victims, including minors, have been targeted by such activities¹⁵.

¹² World Economic Forum “How to navigate an era of disruption, disinformation, and division” January 15, 2024, <<https://jp.weforum.org/agenda/2024/01/no-wo-ri-rutameni-fo-ramu-sa-dhia-zahidhi/>>
NHK NEWS WEB ““Disinformation” becomes the most serious risk. Report before the Davos Conference” January 11, 2024, <<https://www3.nhk.or.jp/news/html/20240111/k10014317071000.html>> (accessed on 22 March, 2024)

¹³ BBC NEWS Japan, “[U.S. presidential election 2024] Automated voice call impersonating Biden disrupts primary election in New Hampshire,” January 23, 2024 <<https://www.bbc.com/japanese/68065455>> (accessed on February 28, 2024)

¹⁴ “[Focus] Welcome to the era of generative AI “bad GPT””, “Dow Jones US Corporate News”, March 1, 2024 issue

¹⁵ Federal Bureau of Investigation, “Malicious Actors Manipulating Photos and Videos to Create Explicit Content and Sextortion Schemes”, <<https://www.ic3.gov/Media/Y2023/PSA230605>> (accessed on February 28, 2024)

B Measures against information manipulation and criminal use of deepfakes

(A) European Union (EU)

The European Union (hereinafter referred as to EU) is at the forefront of legal regulations concerning disinformation. The “Digital Services Act”¹⁶ (hereinafter referred as to DSA), which came into effect in November 2022¹⁷, mandates very large online platforms (VLOPs¹⁸) to conduct risk assessments (including those related to disinformation) and implement risk mitigation measures. Companies that violate these regulations can face penalties of up to 6% of their global annual revenue. The European Commission (hereinafter referred as to EC), the EU’s executive body, initiated a formal investigation in December 2023 into X (formerly Twitter) for potentially not complying with the DSA, particularly in rela-

tion to the spread of illegal content and the effectiveness of countermeasures against information manipulation on the platform, in light of the spread of illegal content related to terrorist attacks by Hamas and others against Israel¹⁹. The EC is focusing on the effectiveness of features like “Community Notes,” which allow third parties to add annotations to posts anonymously. In March 2024, the European Parliament passed the final draft of the “AI Act,”²⁰ a comprehensive legal framework for AI, which includes some regulations on deepfakes. The AI Act was formally approved by the EU Council in May 2024 and is expected to be fully applicable by around 2026.

(B) The UK

In the UK, the “Online Safety Act 2023,”²¹ which came into effect in October 2023, includes provisions for a six-month prison sentence for those who knowingly transmit disinformation online with the intent to cause psy-

chological or physical harm to the recipient. If it is proven that the perpetrator intended to cause distress, anxiety, humiliation, or sought sexual gratification, the maximum sentence can be up to two years in prison.

(C) The U.S.

In the U.S., the Biden administration announced in July 2023 that it had secured voluntary commitments from seven leading AI companies, including Google, Meta Platforms, and OpenAI²², to improve AI safety and transparency²³. In September 2023, an additional eight companies, including IBM, Adobe, and NVIDIA²⁴, joined this commitment²⁵. These 15 companies are promoting the development of technologies to identify AI-generated content, such as “Digital Watermarks” that can indicate authenticity²⁶. Some states in the U.S. have specific regulations concerning the use of deepfakes for purposes like pornography and election activities. For example, nine states, including California, Texas, Illinois, and

New York, have criminalized the distribution of non-consensual deepfake pornography. Texas and California also have laws regulating the use of deepfakes in political campaigns. At the federal level, laws have been enacted requiring federal agencies like the Department of Defense and the National Science Foundation to strengthen research on disinformation, including deepfakes²⁷. However, under Section 230 of the “Communications Decency Act” of 1996, providers are generally not held responsible for third-party content, although the Biden administration is considering legislative changes to hold platform operators accountable for dis-/mis-information.

(D) Japan

In Japan, the MIC has been holding discussions since November 2023 on ensuring the healthiness of information circulation in the digital space in the “Study Group on Ensuring the Healthiness of Information Circulation

in the Digital Space”, with plans to publish a summary by the summer of 2024²⁸.

Technological measures include the development of the Originator Profile (OP) technology, which links in-

¹⁶ The law began to apply to VLOPs, etc. from August 2023, and to all regulated businesses from February 2024.

¹⁷ European Commission, “The Digital Services Act package”, <<https://digital-strategy.ec.europa.eu/en/policies/digital-services-actpackage>> (accessed on February 28, 2024)

¹⁸ Abbreviation for Very large online platform. Among online platform services, there are 45 million users within the EU (10% of the EU population) refers to the above services.

¹⁹ European Commission, “PRESS RELEASE18 December, Commission opens formal proceedings against X under the Digital Services Act”, <https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6709> (accessed on February 28, 2024)

²⁰ European Commission, “AI Act”, <<https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>> (accessed on February 28, 2024)

²¹ Legislation.gov.uk, “Online Safety Act 2023”, <<https://www.legislation.gov.uk/ukpga/2023/50/enacted>> (accessed on March 2, 2024)

²² Amazon, Anthropic, Google, Inflection, Meta Platforms, Microsoft, OpenAI

²³ The White House, “FACT SHEET: Biden-Harris Administration Secures Voluntary Commitments from Leading Artificial Intelligence Companies to Manage the Risks Posed by AI”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/21/factsheet-biden-harris-administration-secures-voluntary-commitments-from-leading-artificial-intelligence-companies-to-manage-the-risks-posed-by-ai/>> (accessed on March 8, 2024)

²⁴ Adobe, Cohere, IBM, NVIDIA, Palantir, Salesforce, Scale AI, Stability

²⁵ The White House, “FACT SHEET: Biden-Harris Administration Secures Voluntary Commitments from Eight Additional Artificial Intelligence Companies to Manage the Risks Posed by AI”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/12/fact-sheet-biden-harris-administration-secures-voluntary-commitments-from-eight-additional-artificial-intelligence-companies-to-manage-the-risks-posed-by-ai/>> (accessed on March 8, 2024)

²⁶ “US companies agree to develop AI video identification system; President Biden announces, ‘Measures to be taken’”, NHK News, July 22, 2023

²⁷ Passed in December 2020. FY2021 National Defense Authorization Act and the Identifying Outputs of Generative Adversarial Networks Act (IOGAN Act) are related to the defense budget for FY2021.

²⁸ MIC “Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space”, <https://www.soumu.go.jp/main_sosiki/kenkyu/digital_space/index.html>

formation content such as news articles and advertisements to the originator's information. This technology is expected to have several effects: it will make impersonation and alterations visible, allowing web users to view highly transparent content; it will make it more difficult to generate advertising revenue from fake news or easy attention-grabbing content; it will reduce the infringement of rights and interests of legitimate web media and content distributors; and by clarifying the identity of web content publishers where ad spaces are placed, advertisers will be able to place ads with confidence.²⁹

The National Institute of Informatics (hereinafter referred to as NII) has been engaged in research on coun-

termeasures against fake technologies from an early stage. In September 2021, they developed a tool called "SYNTHETIQ VISION: Synthetic video detector" that automatically determines whether a face image generated by AI is fake (**Figure 1-4-1-4**). This tool allows users to upload an image they want to verify to a server, and the tool determines whether it is fake or not. The NII is also developing more advanced deepfake countermeasure technologies, such as "Cyber Vaccine," which is expected to provide not only authenticity judgments but also information on where alterations have been made^{30,31}.

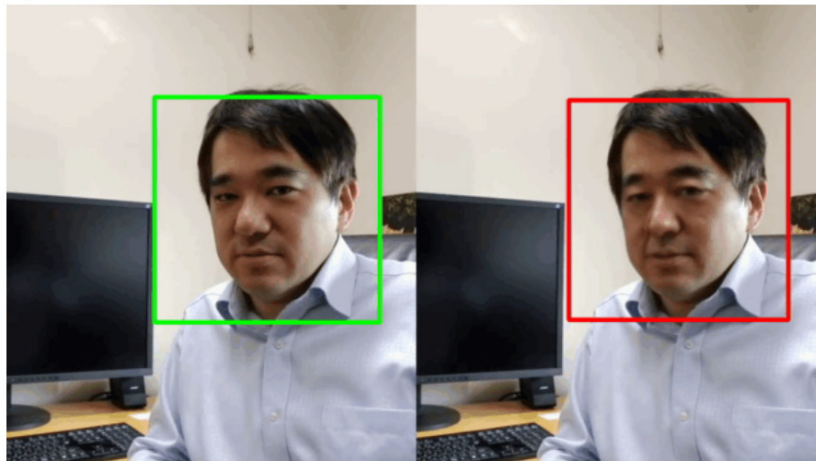
Figure 1-4-1-4 SYNTHETIQ VISION

SYNTHETIQ VISION

SYNTHETIQ VISION API can be used to detect forgery of human face.

Example of detection result:

- Left: Real
- Right: Fake



(Source) Global Research Center for Synthetic Media, National Institute of Informatics³²

(2) Discussion on intellectual property rights including copyright

The outputs of generative AI primarily include text, images, and music/audio. These are developed using "Machine Learning" techniques that learn features from large amounts of data and generate appropriate results based on prompts (inputs). During this process, there are issues related to the development and learning stages, such as whether collecting and duplicating data to create training datasets and using these datasets for

training AI (trained models) infringe on the rights of the original data creators. Additionally, when generating images or other content using generative AI, or when uploading and publishing generated images or selling reproductions (such as illustration collections), there is a risk of infringing on the rights of existing content creators if the generated content is similar to existing works (issues related to the generation and usage stages).

²⁹ <https://originator-profile.org/ja-JP/>

³⁰ "Breakthrough Special Feature 1 - Unmanned Defense 2 - [Part 4: Deepfake Countermeasures] - Tools to Detect Deepfakes, Vaccines to Automatically Repair Tampering," Nikkei Electronics, January 20, 2024 issue

³¹ However, these measures also have the issue of the accuracy of the authenticity determination tool. According to OpenAI, the probability that the company's independently developed determination tool correctly determines that documents created by generative AI (mainly ChatGPT) are created by AI is 26%, and conversely, there is a 9% probability of a "False Positive" where documents written by humans are mistakenly determined to be created by generative AI. Therefore, this level of accuracy is not actually an effective judgment tool, and the company has stopped offering the tool. In the future, it is highly likely that the AI for generating text, images, voice, etc. and the judgment tools for these will compete with each other and both technologies will improve, so even if such technology is used, it is considered difficult to accurately distinguish fake information.

³² <https://www.syntheticq.org/>

A Issues related to intellectual property rights including copyright with the advancement and spread of generative AI

The issues of copyright and portrait rights infringement related to generative AI are gaining international attention, leading to numerous lawsuits. In the U.S., in November 2022, a class-action lawsuit was filed against Microsoft, GitHub, and OpenAI, alleging that the open-source code used for training GitHub Copilot might infringe on programmers' copyrights³³. Additionally, in July 2023, three American authors filed a lawsuit against OpenAI and Meta Platforms, claiming damages for the unauthorized use of their works in ChatGPT's machine learning. As a result of this lawsuit, OpenAI announced that instead of removing copyrighted works from its training data, it would cover the legal costs if sued for copyright infringement³⁴.

Media organizations such as newspapers and news agencies are cautious about using AI. In July 2023, the Associated Press (AP) announced a partnership with OpenAI to explore ways to use generative AI in news reporting. However, by August, they decided not to use

AI for creating distributable content. On the other hand, the New York Times filed a lawsuit against OpenAI and Microsoft for the unauthorized use of articles by AI, marking the first lawsuit by a news organization³⁵. In Japan, newspapers and news agencies have also expressed concerns about the unauthorized use of articles by generative AI and have called for fundamental legal reforms.

In Japan, in response to concerns raised by rights holders and AI developers about infringement of intellectual property rights including copyright due to the rapid development and spread of generative AI technology, the Legal System Session, Copyright Subcommittee, Cultural Affairs Council compiled a report on "AI and Copyright" in March 2024³⁶. Additionally, in May 2024, the "Interim Report on Intellectual Property Rights Review Committee for the AI Era" was published by the Intellectual Property Rights Review Committee for the AI Era³⁷.

B Measures against the risk of infringement of intellectual property rights including copyright

To address the issue of copyright infringement when using generative AI, it is conceivable for both data/content rights holders and AI businesses to address the issue through mutual contracts. Technically, there are measures such as the practical implementation of electronic watermarks to indicate that the content is generated by AI, and OpenAI providing specifications to suppress the input and output of data/content that may infringe on intellectual property rights. Meanwhile, media organizations such as the New York Times, CNN, Bloomberg, Reuters, and the Nikkei have taken self-protective measures by blocking GPT bots from OpenAI and other AI businesses³⁸.

There are also initiatives to commit to legal risks of

copyright infringement while utilizing technology. In September 2023, Microsoft announced the "Copilot Copyright Commitment," taking responsibility for legal risks associated with its productivity tool "Microsoft Copilot," which incorporates large language models (LLMs). If a copyright claim is made against the output generated by Microsoft Copilot, Microsoft will take responsibility³⁹. Another way to avoid the risk of copyright infringement is to use non-copyrighted or licensed works. For example, Adobe's "Adobe Firefly" uses images with open licenses or other non-copyrighted images during the training stage, allowing commercial use of the generated images without concerns about copyright infringement.

³³ The three companies claim that GitHub Copilot uses knowledge gained from open source code and does not infringe copyright, and have asked the court to dismiss the lawsuit. Reuters, "OpenAI, Microsoft want court to toss lawsuit accusing them of abusing open-source code," <<https://www.reuters.com/legal/litigation/openai-microsoft-want-court-toss-lawsuit-accusing-them-abusing-open-source-code-2023-01-27/>> (accessed on February 27, 2024)

³⁴ Generative AI Utilization Promotion Association, "What will happen to AI copyright? A thorough explanation of copyright and legality of images and illustrations generated by generative AI, and points to be aware of" December 28, 2023, <<https://guga.or.jp/columns/ai-copyright/>> (accessed on March 2, 2024)

³⁵ Reuters, "OpenAI, Microsoft want court to toss lawsuit accusing them of abusing open-source code," <<https://www.reuters.com/legal/litigation/openai-microsoft-want-court-toss-lawsuit-accusing-them-abusing-open-source-code-2023-01-27/>> (accessed on February 27, 2024)

³⁶ "About the Concept of AI and Copyright," the Legal System Session, Copyright Subcommittee, Cultural Affairs Council (March 15, 2024), <https://www.bunka.go.jp/seisaku/bunkashingikai/chosakuken/pdf/94037901_01.pdf>

³⁷ Intellectual Property Rights Review Committee for the AI Era "Interim Report of the Intellectual Property Rights Review Committee for the AI Era" (May 2024), <https://www.kantei.go.jp/jp/singi/titeki2/chitekizaisan2024/0528_ai.pdf>

³⁸ Intellectual Property Rights Review Committee for the AI Era "Interim report of the Intellectual Property Rights Review Committee for the AI Era" (May 2024), <https://www.kantei.go.jp/jp/singi/titeki2/chitekizaisan2024/0528_ai.pdf>

³⁹ Do AI characters have copyright? What happens if you violate the law? We asked a lawyer, <<https://webtan.impress.co.jp/e/2023/12/19/46093>> (accessed on March 2, 2024)

Section 2 Responses to AI by country

In the midst of the rapid proliferation of AI, including generative AI, addressing the ethical and societal issues

that have arisen requires collaborative efforts not only domestically but also internationally.

1. Trends in international discussion

(1) Hiroshima AI Process

Discussions on the ethical and societal issues of AI have been intensifying since around 2015, and our country has been at the forefront of discussions in G7/G20 and the Organisation for Economic Co-operation and Development (hereinafter referred to as OECD), playing a significant role in formulating AI principles. In April 2016, at the G7 ICT Ministers' Meeting held in Takamatsu, Japan proposed discussions on the development principles of AI, leading to the agreement on AI principles at the OECD in May 2019, followed by the agreement on "G20 AI Principles" at the G20 Summit in June of the same year¹. From 2019 to 2020, there has been an international consensus forming around AI principles, and discussions have been transitioning to the formulation of specific institutional and regulatory frameworks to implement these principles in society. Furthermore, the rapid proliferation of generative AI in 2022 has led to an intensification of discussions on AI governance in international cooperation forums such as the G7 and within individual countries.

In April 2023, G7 Digital and Tech Ministers' Meeting in Takasaki, Gunma was held in Takasaki City, Gunma, where discussions were held on "Responsible AI and Global AI Governance" in light of the rapid proliferation and advancement of generative AI. At this meeting, the importance of interoperability between different AI governance frameworks among G7 members was con-

firmed, and a ministerial declaration consisting of six themes, including "Responsible AI and Global AI Governance," "Secure and Resilient Digital Infrastructure," and "Internet Governance," was compiled. This declaration was subsequently reflected in the discussions at the G7 Hiroshima Summit held in May, and the leaders' communiqué at the summit instructed the establishment of the Hiroshima AI Process for discussions on generative AI. Specifically, it was decided to collaborate with relevant organizations such as the OECD and the Global Partnership on AI (GPAI) and to advance investigations and deliberations in G7 working groups.

In September 2023, a ministerial-level meeting was held to discuss the development of advanced AI systems, including generative AI, based on reports drafted by the OECD in July and August. It was confirmed that transparency, disinformation, intellectual property rights, privacy, and personal information protection are priority issues. Subsequently, on October 30, the "G7 Leaders' Statement on the Hiroshima AI Process"² was issued, and International Guiding Principles and Code of Conduct for Organizations Developing Advanced AI Systems were first published. Furthermore, in December of the same year, a Comprehensive Policy Framework for the Hiroshima AI Process, including Project-Based Cooperation on AI, and Work Plan to advance Hiroshima AI Process were announced.

(2) Movements of the OECD/GPAI/UNESCO

A OECD

Many international organizations, including the OECD, the GPAI, and the UNESCO, are advancing the consideration of AI governance systems from a global perspective. Since the publication of the OECD AI Principles in May 2019, various OECD reports have been released, and projects have been promoted in collaboration with the G7, actively engaging in these activities. Additionally, in September 2023, the three organizations—the OECD, the GPAI, and the UNESCO—announced the "Global Challenge to Build Trust in the Age of Generative AI,"³ a global collaborative project aimed at advancing innovative solutions to social risks posed

by disinformation and deepfakes, based on the comprehensive framework of the G7.

At the OECD Ministerial Council Meeting held in May 2024, a side event on generative AI titled "Towards Safe, Secure, and Trustworthy AI: Promoting Inclusive Global AI Governance" was held, where Prime Minister KISHIDA announced the establishment of the "Hiroshima AI Process Friends Group,"⁴ a voluntary framework of countries and regions that support the spirit of the Hiroshima AI Process, with participation from 49 countries and regions.

B GPAI

The "Global Partnership on AI" (hereinafter referred

as to GPAI) was established in 2020 through a joint state-

¹ METI Study Group on Implementation of AI Principles, "AI Governance in Japan ver1.1", <https://www.meti.go.jp/shingikai/mono_info_service/ai_shakai_jisso/pdf/20210709_1.pdf> (accessed on March 4, 2024)

² Ministry of Foreign Affairs, "G7 Leaders' Statement on the Hiroshima AI Process" <https://www.mofa.go.jp/mofaj/ecm/ec/page5_000483.html> (accessed on March 4, 2024)

³ Global Challenge partners, "Global Challenge to Build Trust in the Age of Generative AI", <<https://globalchallenge.ai/>> (accessed on March 21, 2024)

⁴ https://www.kantei.go.jp/jp/101_kishida/statement/2024/0502speech2.html

ment by the OECD and the G7, based on a human-centered approach to realize the development and use of “Responsible AI.” The organization, with the OECD serving as its secretariat, is an international public-private partnership consisting of governments, international organizations, industries, and experts who share common values, with 29 countries currently participating. The GPAI has four working groups: “Responsible AI,”

“Data Governance,” “Future of Work,” and “Innovation and Commercialization,” where experts engage in discussions and practical research.

At the “GPAI Summit 2023,” the establishment of the GPAI Tokyo Expert Support Center, which is a new support center for the GPAI experts, was approved. This center is set to prioritize projects related to the investigation and analysis of generative AI.

C UNESCO

The United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the “UNESCO Recommendation on the Ethics of Artificial Intelligence”⁵ in 2021, supporting initiatives in various countries. In September 2023, the UNESCO published the “Guidance for Generative AI in Education and Research,”⁶ the first global guidance on generative AI in the fields of education and research. This document provides definitions and explanations of generative AI, ethical and policy is-

ssues, implications for the education sector, necessary steps for regulatory considerations, curriculum design, and learning. Given that most generative AI is primarily designed for adults, it suggests restricting its use in educational settings to those aged 13 and above. It also calls on governments to implement appropriate regulations, including data privacy protection, and to provide teacher training.

(3) AI Safety Summit

In May 2023, OpenAI announced the possibility of AI systems surpassing human expert skill levels within the next decade, naming this “Frontier AI.” Considering existential risks such as nuclear energy and synthetic biology, the company emphasized the need for international regulations rather than reactive measures. In response, the UK Prime Minister Sunak hosted the “AI Safety Summit”⁷ in Bletchley, the UK, on November 1 and 2, 2023. This summit was notable for its focus on “AI Safety,” aiming to prevent “Severe and Catastrophic Harm” caused by AI, beyond the traditional “AI Ethics” concerns of human rights and fairness.

The summit concluded with the adoption of the “Bletchley Declaration.”⁸ The UK also decided to establish the AI Safety Institute.

From May 21 and 22, 2024, the “AI Seoul Summit” was co-hosted by the Republic of Korea and the UK (with the leaders’ session held online on the 21st and the ministerial session held in person in Seoul on the 22nd). The summit deepened discussions on AI safety, promoted innovation in AI development, and addressed the equitable enjoyment of AI benefits. The summit resulted in the adoption of the “Seoul Declaration for Safe, Innovative, and Inclusive AI” and its appendix, the “Seoul Statement of Intent toward International Cooperation on AI Safety Science,” as leaders’ outcome documents. The ministerial outcome document, the “Seoul Ministerial Statement for Advancing AI Safety, Innovation and Inclusivity,” was also adopted. The next meeting is scheduled to be held in France in February 2025.

(4) Developments in the United Nations

In light of the growing interest in international governance frameworks for Frontier AI, the UK led discussions on AI at the United Nations Security Council in July 2023. In October of the same year, the UN Secretary-General António Guterres established a High-Level Advisory Body on AI, which includes Japanese members. On March 21, 2024, the UN General Assembly adopted by consensus the “Resolution Seizing the opportunities of safe, secure, and trustworthy artificial intelligence systems for sustainable development,”⁹ co-sponsored by Japan. This resolution is the first UN General Assembly resolution on safe, secure, and trustworthy AI. It promotes safe, secure, and trustworthy AI to

accelerate progress towards the “2030 Agenda for Sustainable Development” and to bridge the digital divide. The resolution encourages member states to develop and support regulatory and governance approaches related to safe, secure, and trustworthy AI. It also recommends that member states and stakeholders promote innovation for identifying, assessing, and mitigating risks during AI design and development, and establish, implement, and disclose risk management mechanisms for data preservation to ensure AI systems can address global challenges. Furthermore, it emphasizes that human rights and fundamental freedoms should be respected, protected, and promoted throughout the AI

⁵ UNESCO, “Recommendation on the Ethics of Artificial Intelligence”, <<https://unesdoc.unesco.org/ark:/48223/pf0000381137>>(accessed on March 13, 2024)

⁶ UNESCO, “Guidance for generative AI in education and research”, <<https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research>>(accessed on March 13, 2024)

⁷ GOV.UK, “About the AI Safety Summit 2023”, <<https://www.gov.uk/government/topical-events/ai-safety-summit-2023/about>> (accessed on March 12, 2024)

⁸ GOV.UK, “The Bletchley Declaration by Countries Attending the AI Safety Summit, 1-2 November 2023”, <<https://www.gov.uk/government/publications/ai-safety-summit-2023-the-bletchley-declaration/the-bletchley-declaration-by-countries-attending-the-ai-safety-summit-1-2-november-2023>> (accessed on March 12, 2024)

⁹ United Nations General Assembly, A/78/L.4 <<https://documents.un.org/doc/undoc/ltd/n24/065/92/pdf/n2406592.pdf?token=0e5FKl9eh5r1MmYPD3&fe=true>> (accessed on March 22, 2024)

system lifecycle.

This resolution reflects discussions from the Hiroshima AI Process, G7, G20, the OECD, and other forums, and although it does not have binding force under inter-

national law, its adoption by consensus signifies its political weight as the collective will of the international community.

2. Trends in creation of legal rules and guidelines by country

Currently, discussions on legal frameworks and international standards related to AI are actively taking place in various countries around the world. The year 2023 has become a significant milestone for AI policy, marked by the adoption of the EU AI Act by the European Parliament, the issuance of an executive order on AI safety in the US, and the publication of draft guidelines for AI-related businesses in Japan. Observing the regulatory movements concerning AI in each country and region,

(1) European Union (EU)

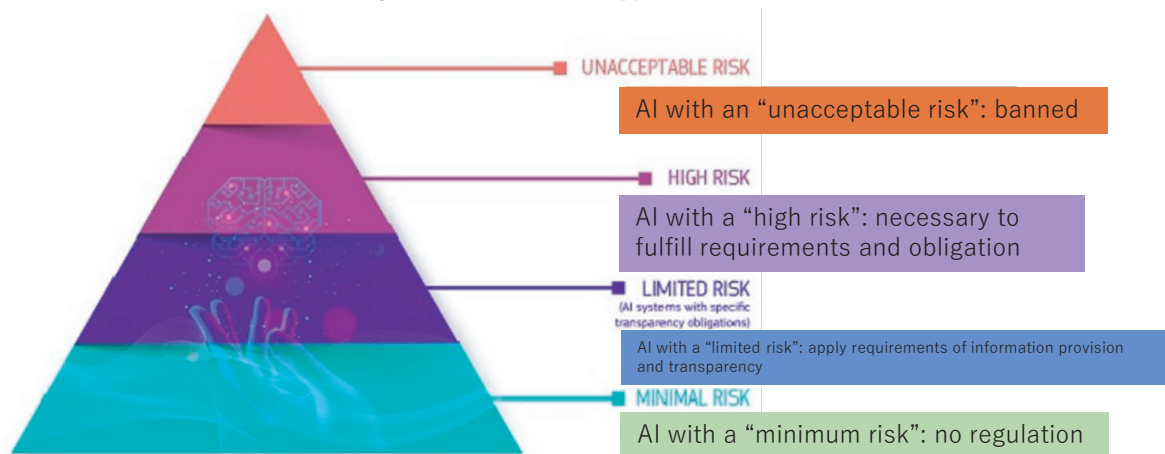
The EU, which lacks major Big Tech companies originating within its borders, has aimed to implement the strictest regulations ahead of other regions and has been discussing AI regulations since 2020. On May 21, 2024, the AI Act¹⁰, which is positioned as the world's first comprehensive AI regulation with legal binding force targeting businesses that develop, provide, and use AI systems in the European market, was established. This AI Act marks the first comprehensive AI regulation law to be established in major countries and regions, and it is expected to be gradually applied, with full implemen-

the rapid rise in interest in generative AI has necessitated a review of the governance systems that have been under consideration. In the establishment of regulations for rapidly evolving technologies, it is essential for governments to take the lead while also requiring voluntary efforts from AI businesses. This dual approach of public and private sector collaboration is currently being advanced.

tation anticipated around 2026.

The AI Act is based on a “Risk-based Approach,” which changes the regulatory content according to the level of risk¹¹. It classifies regulatory targets into four risk levels: (1) unacceptable risk; (2) high risk; (3) limited risk; and (4) minimal risk AI applications and systems, and imposes different regulations for each level. Businesses that violate these regulations may face fines of up to 35 million euros (approximately 5.6 billion yen) or 7% of their annual turnover for the most severe violations¹² (Figure 1-4-2-1).

Figure 1-4-2-1 Risk-based approach in the AI Act



(Source) Prepared based on the European Commission (2024)¹³

(2) The U.S.

The U.S., home to many Big Tech companies, has focused on protecting its own companies, prioritizing voluntary measures by the private sector over government regulations. The government steps in with regulations

only when necessary¹⁴.

In July 2023, seven leading AI development companies (including Google, Meta Platforms, and OpenAI)¹⁵ committed to voluntary measures for safe AI develop-

¹⁰ European Commission, “AI Act”, <<https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>> (accessed on March 2, 2024)

¹¹ European Parliament, “Artificial intelligence act”, <[https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698792/EPRS_BRI\(2021\)29698792_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698792/EPRS_BRI(2021)29698792_EN.pdf)> (accessed on March 12, 2024)

¹² “EU regulates AI development and operation by law...Copyright protection of learning data, fines of 5.6 billion yen for violators”, “Yomiuri News” March 13, 2024 issue

¹³ European Commission, “AI Act”, <<https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>> (accessed on March 15, 2024)

¹⁴ “AI legislation: Industry, government, and academia debate with the world” Ask an expert, “Nihon Keizai Shimbun Electronic Edition” January 1, 2024 issue

¹⁵ Amazon, Anthropic, Google, Inflection, Meta Platforms, Microsoft, OpenAI

ment. In September, an additional eight companies (including IBM, Adobe, and NVIDIA)¹⁶ agreed to these measures, as announced by the U.S. government¹⁷. These companies have established principles from the perspectives of safety, security, and reliability as part of their voluntary commitments¹⁸.

While the White House indicated that these companies would continue their efforts until mandatory regulations were introduced, President Biden announced the “Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence”¹⁹ on October 30, 2023. This executive order expands the scope of AI issues from ethical considerations to national security concerns. It includes not only Big Tech companies but also biotechnology firms and other businesses that could impact national security and the economy. The order mandates new safety assessments for AI, guidance on fairness and civil rights, and studies on AI’s impact on the labor market²⁰. It aims to establish new standards for AI safety and security, protect American privacy, and promote fairness and civil rights²¹.

Following the publication of the executive order, Vice President Harris announced the “New U.S. Initiatives to Advance the Safe and Responsible Use of Artificial Intelligence”²² at the UK AI Safety Summit in November 2023. This initiative includes the establishment of the U.S. AI Safety Institute (hereafter referred to as US AISI) within the National Institute of Standards and Technology (NIST). The US AISI, established within the National Institute of Standards and Technology (NIST),

develops guidelines, tools, benchmarks, and best practices to evaluate and mitigate harmful functionalities, conducts evaluations to identify and mitigate AI risks, including red team assessments. It also plans to develop technical guidance related to the authentication of human-generated content, electronic watermarking for AI-generated content, identification and mitigation of discrimination by harmful algorithms, ensuring transparency, and introducing privacy protection. This includes the collaboration with international counterparts such as the UK’s AI Safety Institute for information sharing and research cooperation, as well as potential partnerships with external experts from civil society, academia, and industry.

Meanwhile, the U.S. Congress is also discussing federal-level AI regulation bills. In June 2023, the Senate proposed the “SAFE Innovation Framework,” a comprehensive framework to address the rapid advancement of AI, and held nine thematic forums with industry representatives and experts by December 2023²³. The House of Representatives announced the establishment of a bipartisan task force on AI in February 2024, which will prepare a comprehensive report with principles and policy recommendations for AI policy²⁴. Although several bills regulating AI use in specific areas, such as elections, have been introduced in both chambers, none have yet passed. With the U.S. presidential election approaching in the fall of 2024, discussions on AI regulation are expected to intensify, particularly concerning issues like deepfake-driven information manipulation.

(3) The UK

The UK is considered one of the leading countries in AI research, following the U.S. and China. Although it fell to fourth place for the first time in 2023 due to the rise of Singapore in terms of private investment in the AI sector, it has maintained its position as the third in the world since 2019, following the U.S. and China²⁵. The

current Sunak administration is reluctant to implement legally binding AI regulations. Instead, it aims to promote the development of AI systems with safety considerations, thereby leading to economic growth. Consequently, it has expressed its intention not to establish strict new regulations like the EU’s AI Act for the time

¹⁶ Adobe, Cohere, IBM, NVIDIA, Palantir, Salesforce, Scale AI, Stability

¹⁷ The White House, “FACT SHEET: Biden-Harris Administration Secures Voluntary Commitments from Eight Additional Artificial Intelligence Companies to Manage the Risks Posed by AI”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/12/fact-sheet-biden-harris-administration-secures-voluntary-commitments-from-eight-additional-artificial-intelligence-companies-to-manage-the-risks-posed-by-ai/>> (accessed on March 8, 2024)

¹⁸ (1) Ensuring Safety Before System Release: The companies commit to internal and external security testing of their AI systems before their release. The companies commit to sharing information across the industry and with governments, civil society, and academia on managing AI risks. (2) Building Systems that Put Security First: The companies commit to investing in cybersecurity and insider threat safeguards to protect proprietary and unreleased model weights. The companies commit to facilitating third-party discovery and reporting of vulnerabilities in their AI systems. (3) Earning the Public’s Trust: The companies commit to developing robust technical mechanisms to ensure that users know when content is AI generated, such as a watermarking system. The companies commit to publicly reporting their AI systems’ capabilities, limitations, and areas of appropriate and inappropriate use.

The White House, “FACT SHEET: Biden-Harris Administration Secures Voluntary Commitments from Leading Artificial Intelligence Companies to Manage the Risks Posed by AI”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/21/factsheet-biden-harris-administration-secures-voluntary-commitments-from-leading-artificial-intelligence-companies-to-manage-the-risks-posed-by-ai/>> (accessed on March 8, 2024)

¹⁹ The White House, “Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence”, <<https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/>> (accessed on March 4, 2024)

²⁰ “Thinking about AI governance (5) Different responses depending on social and cultural backgrounds”, “Nihon Keizai Shimbun” morning edition, February 8, 2024

²¹ The White House, “FACT SHEET: President Biden Issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/30/fact-sheet-president-biden-issues-executive-order-on-safe-secure-and-trustworthy-artificial-intelligence/>> (accessed on March 10, 2024)

²² The White House, “FACT SHEET: Vice President Harris Announces New U.S. Initiatives to Advance the Safe and Responsible Use of Artificial Intelligence”, <<https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/01/fact-sheet-vice-president-harris-announces-new-u-s-initiatives-to-advance-the-safe-and-responsible-use-of-artificial-intelligence/>> (accessed on March 10, 2024)

²³ “U.S. Senate Leader Schumer Announces Action Framework for Formulation of AI Bill”, “JETRO Business Bulletin” June 22, 2023 issue

²⁴ “U.S. House of Representatives establishes bipartisan task force on AI”, “JETRO Business Bulletin” February 28, 2024 issue

²⁵ Tortoise media, “The Global AI Index”, <<https://www.tortoisemedia.com/intelligence/global-ai/#rankings>> (accessed on March 21, 2024)

being, opting to handle matters flexibly within the existing framework. In line with this policy, the UK government published a policy document in March 2023 titled “A pro-innovation approach to AI regulation,”²⁶ which outlines the basic framework for AI regulation in the country. This document sets forth five principles from the perspectives of security, transparency, fairness, accountability, and contestability²⁷. When addressing AI governance, the approach is described as “pro-innovation, flexible, non-statutory, proportionate, trustworthy, adaptable, clear, and collaborative.” For the time being, the government plans to encourage the implementation

(4) Japan

While Japan shares the same stance as Western countries regarding democracy and fundamental human rights, cultural and social norms differ, leading to a unique societal perception of AI. Consequently, in terms of AI governance, Japan currently favors a soft law approach that emphasizes voluntary efforts by private businesses, rather than a cross-cutting legal regulatory approach. This contrasts with Europe, which aims for legally binding hard laws. The MIC and the METI have been at the forefront of these efforts. The “AI Development Guidelines”²⁸ by the MIC’s AI Network Society Promotion Council were published in 2017, followed by the “AI Utilization Guidelines”²⁹ in 2019. Additionally, in March of the same year, guidelines based on the “Human-Centric AI Social Principles”³⁰ decided by the Cabinet Office’s Integrated Innovation Strategy Promotion Council were formulated. In July 2021, the METI published the “Governance Guidelines for the Implementation of AI Principles” (revised in January 2022)³¹, which outlines action goals for AI businesses along with practical examples. These guidelines are organized by items such as environmental and risk analysis, system design, and operation, to serve as a reference for businesses developing and operating AI.

In May 2023, the government established the “AI Strategic Council” to discuss various themes such as addressing AI risks, optimal AI utilization, and measures to strengthen AI development capabilities. The council published the “Tentative Summary of AI Issues”³² and

of these principles within the industry under existing regulations through the collaboration of various government agencies. In the future, there may be an effort to make these principles mandatory.

Additionally, on November 27, 2023, the UK’s National Cyber Security Centre (NCSC) and the U.S.’ Cybersecurity and Infrastructure Security Agency (CISA) led a joint effort with 18 countries, including Japan, to publish the “Guidelines for secure AI system development.”²⁸ These guidelines compile the necessary actions to be taken at each stage of AI design, development, deployment, operation, and maintenance.

began work on integrating guidelines from various ministries. In September of the same year, the council presented a “New AI Business Operator Guidelines Skeleton (Draft)” that included governance for generative AI. In December, the government published the “AI Business Operator Guidelines Draft,” which outlines ten principles, including considerations for human rights and countermeasures against disinformation, and prohibits the development of AI that unjustly manipulates human decision-making, cognition, or emotions. However, unlike in the West, these guidelines do not have certain legal binding force. After a public comment period, the “AI Guidelines for Business Ver 1.0” were published on April 19, 2024.

Additionally, at the AI Strategic Council meeting in December 2023, Prime Minister Kishida announced the establishment of the “AI Safety Institute” (hereinafter referred as to AISI)³⁴ in Japan, similar to institutions in the US and UK, in response to the growing international concern over AI safety. On February 14, 2024, the AISI was established under the Information-technology Promotion Agency (IPA), which is under the jurisdiction of the METI. The AISI will collaborate with similar institutions in the UK, the US, and other countries to develop standards and guidance to improve the safety of AI development, provision, and utilization, conduct research on AI safety evaluation methods, and investigate technologies and case studies related to AI safety.

²⁶ GOV.UK, “AI regulation: a pro-innovation approach”, <<https://www.gov.uk/government/publications/ai-regulation-a-pro-innovationapproach>> (accessed on March 19, 2024)

²⁷ (1) Safety, Security, and Robustness: AI systems must be robust, secure, and safe throughout their lifecycle, and risks must always be identified, assessed, and managed. (2) Appropriate Transparency and Explainability: Developers and implementers of AI systems must provide sufficient information to stakeholders about when, how, and for what purpose the AI system is being used, and must offer adequate explanations of the AI system’s decision-making processes to stakeholders. (3) Fairness: AI systems must not infringe on the legal rights of individuals or entities throughout their lifecycle, and must not be used to unfairly discriminate against individuals or produce unfair commercial outcomes. (4) Accountability and Governance: An effective governance framework must be established to ensure the monitoring of the supply and use of AI systems, and clear accountability must be maintained throughout the AI system’s lifecycle. (5) Disputability and Redress: In cases where AI decisions or outcomes are harmful or involve significant risks, those affected must be provided with opportunities to appeal and seek redress.

²⁸ National Cyber Security Centre, “Guidelines for secure AI system development”, <<https://www.ncsc.gov.uk/collection/guidelinessecure-ai-system-development>> (accessed on March 12, 2024)

²⁹ MIC, “Publication of AI Network Society Promotion Council Report 2017”, <https://www.soumu.go.jp/menu_news/s-news/01iicp01_02000067.html>

³⁰ MIC, “Publication of AI Network Society Promotion Council Report 2019”, <https://www.soumu.go.jp/menu_news/s-news/01iicp01_02000081.html>

³¹ Cabinet Office, Integrated Innovation Strategy Promotion Council Decision, “Social Principles of Human-Centric AI”, <<https://www8.cao.go.jp/cstp/aigensoku.pdf>> (accessed on March 12, 2024)

³² METI, “Governance Guidelines for the Implementation of AI Principles ver. 1.1”, <https://www.meti.go.jp/shingikai/mono_info_service/ai_shakai_jisso/20220128_report.html> (accessed on March 12, 2024)

³³ Cabinet Office AI Strategic Council “Tentative Summary of AI Issues”, <https://www8.cao.go.jp/cstp/ai/ronnen_honbun.pdf> (accessed on March 12, 2024)

³⁴ AI Safety Institute, <<https://aisi.go.jp/>> (accessed on March 12, 2024)

Section 3 Trends in discussion on other digital technologies

1. Trends in discussion on the metaverse, robotics and automated driving

(1) Metaverse

In the report compiled in July 2023 by the MIC's Study Group on the Utilization of Metaverse toward the Web3 Era, issues related to the metaverse are broadly categorized into "issues within the metaverse space" and "issues related to the outside of the metaverse space."

For issues within the metaverse space, the report identifies (1) challenges related to avatars, (2) interoperability between platforms, (3) issues during the construction and utilization of the metaverse, and (4) issues related to data acquisition and use. For issues related to the outside of the metaverse space, the report identifies (5) challenges related to user interfaces (UI) and user experiences (UX), and (6) the trends and social impacts of the metaverse. The study group has examined these issues related to from (1) to (4) and outlined directions for addressing them, including forming an international consensus on the principles of the metaverse, efforts to ensure interoperability (such as standardization), and the development of guidelines (provisional) for metaverse-related service providers. For issues related to (5) and (6), the group has outlined directions for continuous follow-up on market, technology, and user trends, and research on the relationship between the metaverse and UI/UX¹. From October 2023, the MIC has been holding a "Study Group on Realizing the Safe and Secure Metaverse" to examine issues identified in the previous re-

port that require continuous follow-up. The group aims to realize safer and more secure metaverse for users, based on the democratic values confirmed at the G7 Digital and Technology Ministers' Meeting in Gunma-Takasaki in April 2023 and the G7 Hiroshima Summit in May 2023. The group is considering the "Principles of the Metaverse (First Draft)", which consists of (1) principles for voluntary and autonomous development of the metaverse (openness and innovation, diversity and inclusiveness, literacy, community) and (2) principles for improving the trustworthiness of the metaverse (transparency and explanation, accountability, privacy, security)², with plans to compile a report by the summer of this year.

International organizations are also examining immersive technologies such as the metaverse. For example, the OECD announced the establishment of the Global Forum on Technology (GFTech)³ in December 2022 and has set up focus groups to discuss immersive technologies. Discussions in the focus group on immersive technologies began in December 2023, with plans to compile a report by the fall of 2024. The MIC is also contributing to international discussions, such as co-hosting a session with the OECD on "Pursuing a metaverse based on democratic values" at the Internet Governance Forum Kyoto, organized by the United Nation in October 2023.

(2) Robotics

Robotics has traditionally been a strong technology for our country, and particularly in the case of industrial robots, it holds a 46% share of the global market. In a country where the labor force continues to decline, there are high expectations for the use of robotics to improve productivity, address the shortage of labor, and create new industries. In 2015, our country formulated the "New Robot Strategy" and has since implemented over 30 technology development projects through public-private partnerships. While the robots themselves and the individual technologies supporting them have evolved, there is a reality that social implementation has not progressed due to the gap between the needs of robot introduction sites. In response to this situation, the New Energy and Industrial Technology Development Organization (NEDO) published the "Comprehensive Action Plan for Research and Development and Social Implementation in the Field of Robotics" in April 2023, which outlines the direction for promoting the use of robots that contribute

to solving social issues and the early start of projects to develop robot technology strategies⁴. The action plan addresses eight fields where the use of robots is expected (manufacturing, food production, facility management, retail/food service, logistics warehouses, agriculture, infrastructure maintenance management, and construction) and compiles short-term measures for accelerating social implementation by around 2030 as the "Action Plan for Accelerating Social Implementation" and medium- to long-term measures for creating impact toward the next-generation technology infrastructure by around 2035 as the "Action Plan for Building Next-Generation Technology Infrastructure."

In the future, based on the actions extracted from the robot action plan for technology development and environmental improvement, efforts will be made to advance discussions on future national projects and social implementation.

¹ MIC, "Study Group Report on Utilization of Metaverse toward the Web3 Era", <https://www.soumu.go.jp/main_content/000892205.pdf>

² MIC, "Study Group on Realizing a Safe and Secure Metaverse," <https://www.soumu.go.jp/main_sosiki/kenkyu/metaverse2/index.html>

³ OECD, Global Forum on Technology, <<https://www.oecd.org/digital/global-forum-on-technology/>>

⁴ NEDO releases "Overall action plan for research and development and social implementation in the field of robots" -Promoting the resolution of social issues through both social implementation and next-generation technology development- <https://www.nedo.go.jp/news/press/AA5_101639.html>

(3) Autonomous driving technology

The utilization of autonomous driving technology is expected to contribute to the maintenance of public transportation and logistics in regions facing population decline and aging. Efforts to expand its societal use are being sought. In the “Comprehensive Strategy for the Vision for a Digital Garden City Nation (Revised in 2023),” the government has set a goal to promote regional transportation through autonomous driving. Various relevant government ministries and agencies are collaborating to achieve the target of implementing unmanned autonomous transportation services in approximately 50 locations by FY2025, and in over 100 locations by FY2027. Additionally, in the “National Comprehensive Development Plan for Digital Lifelines” (METI), the

establishment of autonomous driving service support roads is listed as one of the Early Harvest Projects. It aims to set up priority lanes for autonomous driving vehicles of over 100 km on certain sections of the Shin-Tomei Expressway by FY2024, with the goal of realizing the operation of autonomous driving trucks. Furthermore, it aims to enable the provision of autonomous driving vehicle-based mobility services in 50 locations nationwide by FY2025, and in 100 locations nationwide by FY2027. To achieve this plan, collaborative efforts are being undertaken by the National Police Agency, the MIC, the Ministry of Land, Infrastructure, Transport and Tourism, and other relevant ministries and agencies.

2. Trends in discussion to ensure cybersecurity

To ensure that each citizen can utilize digital technology with peace of mind, it is important to ensure cybersecurity. In recent years, due to the increasing complexity of international situations, cyberattacks targeting government agencies and others have been occurring frequently in various countries, including our own. Additionally, with the emergence of technologies such as generative AI, while convenience has increased, there are also concerns about the expansion of risks through their misuse.

Traditionally, cybersecurity has mainly focused on ensuring the availability and confidentiality of systems, in other words, ensuring that systems do not stop and preventing the theft or leakage of data, in order to maintain business continuity and convenience. Alongside this, in recent years, various risks related to the integrity and reliability of information have become apparent, such as the spread of disinformation, deepfakes, and the tampering or leakage of information. The spread of disinformation and deepfakes and the tampering or leakage of in-

formation not only undermines societal trust and stability, and national security, but also has the potential to seriously impact political processes and decision-making, posing a significant threat to the health of democracy.

As highlighted in the National Security Strategy (December 2022), “cyberattacks across national borders on private critical infrastructure and the spread of disinformation are occurring constantly, blurring the line between peacetime and wartime.” The threats surrounding cyberspace are becoming increasingly serious, and it could be said that the situation has become one of “Constant Crisis.”

In light of this situation, efforts are being made to further ensure the safety and reliability of information and communication networks, enhance autonomous capabilities to address cyberattacks, respond to disinformation, promote international cooperation, and raise awareness and promote dissemination⁵.

⁵ National Security Strategy (December 2022), <<https://www.cas.go.jp/jp/siryou/221216anzenhoshou/nss-j.pdf>>

Penetration of Digital Technologies

Section 1 Status of use by the citizens and corporations

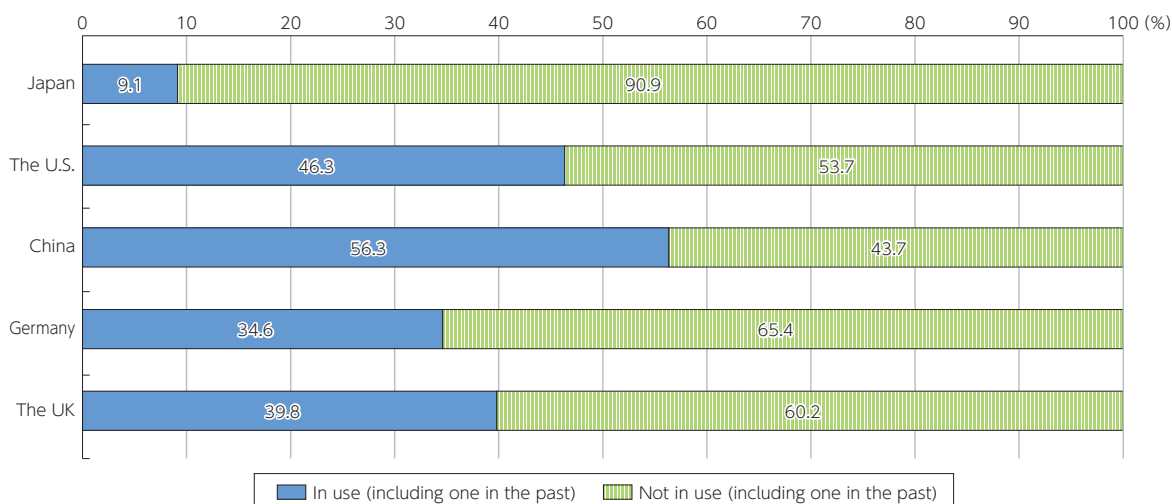
1. Generative AI

(1) Questionnaire to the general public

The penetration of generative AI services into the daily lives of citizens has been a topic of discussion both domestically and internationally. The MIC conducted a survey on the usage of “Digital Technology,” including generative AI, among citizens of Japan, the U.S., China, Germany, and the UK.

According to the survey, the percentage of respondents in Japan who reported “Using” generative AI (including those who have used it in the past) was 9.1%, which was lower compared to other countries (**Figure 1-5-1-1**).

Figure 1-5-1-1 Experiences to use generative AI

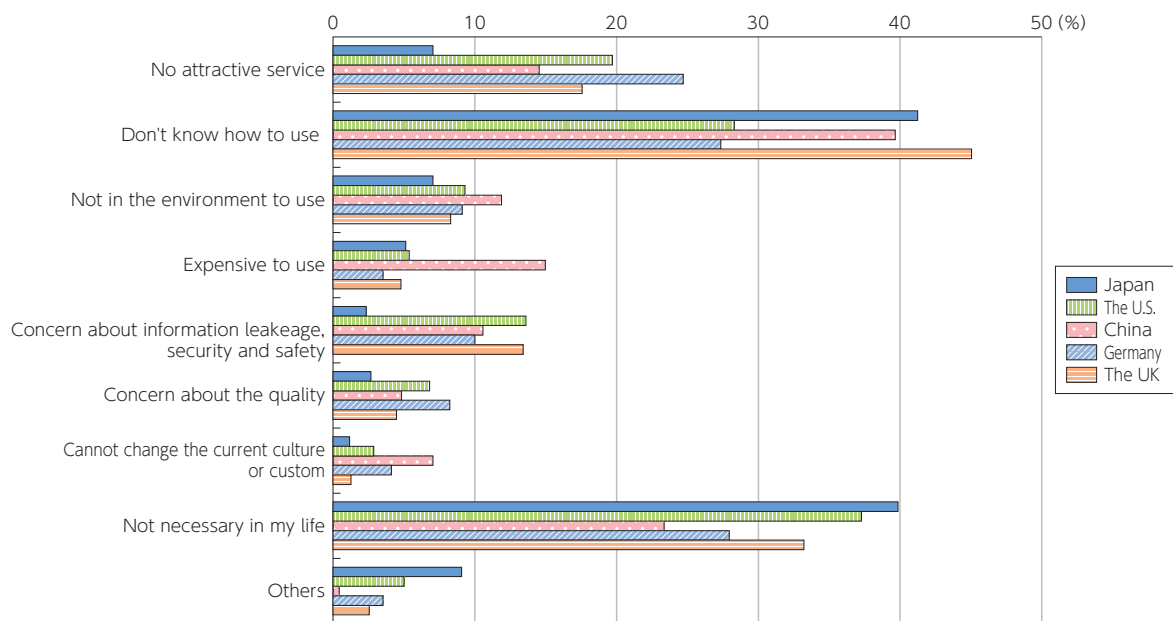


(Source) MIC(2024) “Research and study on the advancement of digital technologies and their utilization”

The reasons for not using generative AI were similar across the surveyed countries, with many citing “not knowing how to use it” and “not needing it in their daily

lives.” Concerns about “information leakage, safety, and security” were less frequently cited (**Figure 1-5-1-2**).

Figure 1-5-1-2 Reasons not to use generative AI

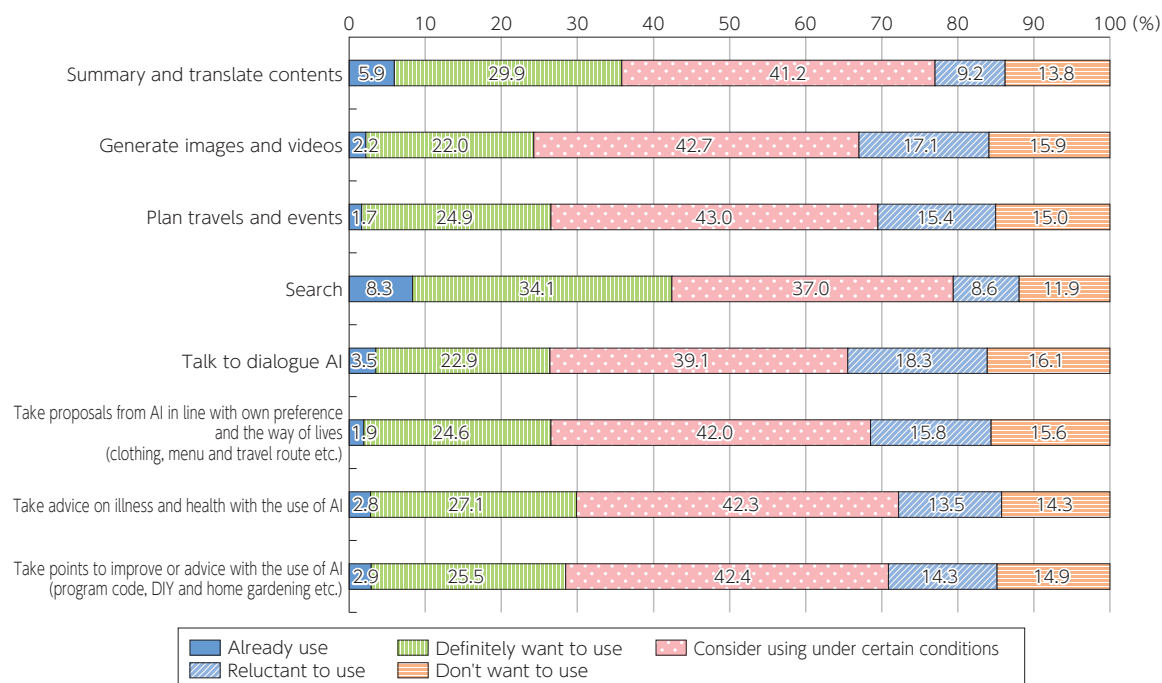


(Source) MIC(2024) "Research and study on the advancement of digital technologies and their utilization"

On the other hand, when asked about their willingness to utilize generative AI in their future lives and leisure activities, the percentage of respondents in Japan who indicated "already using it" was low. However, around 60-70% expressed an interest in using generative

AI in the future, with some stating that they would "definitely like to use it" or "consider using it depending on the conditions," indicating potential demand for such services (Figure 1-5-1-3).

Figure 1-5-1-3 Willingness to use generative AI



(Source) MIC(2024) "Research and study on the advancement of digital technologies and their utilization"



Figure (related data) Willingness to use generative AI (by topic)

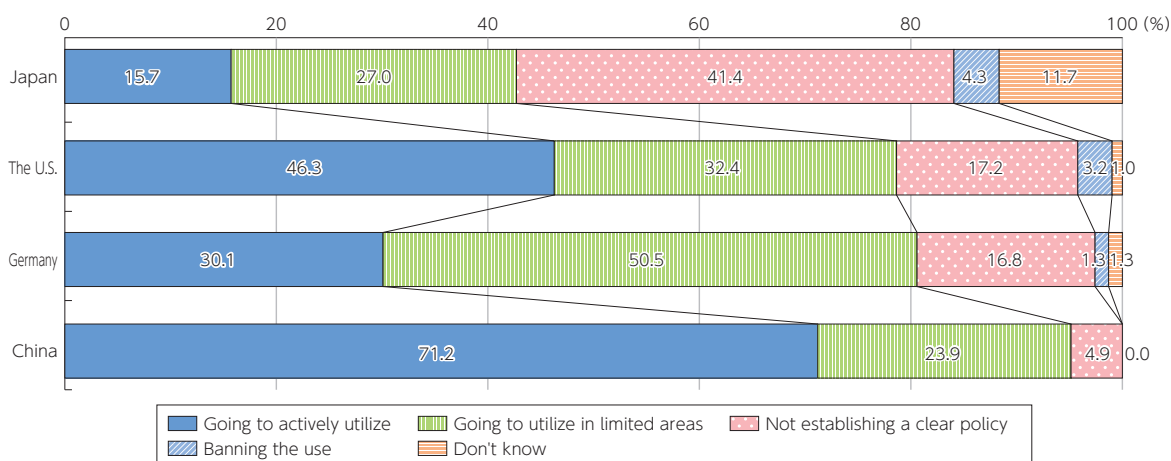
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00060>
(Data collection)

(2) Questionnaire to corporates

Subsequently, a survey was conducted targeting businesses in each country to inquire about the utilization of generative AI in their operations. When asked whether they had established a policy for utilizing generative AI, 42.7% of Japanese companies responded that they had

“established a policy for utilizing it” (combining those who actively utilize it and those who use it in limited areas), which was approximately half the percentage compared to the U.S., Germany, and China, where over 80% had established such a policy (**Figure 1-5-1-4**).

Figure 1-5-1-4 Status to establish a policy for utilizing generative AI

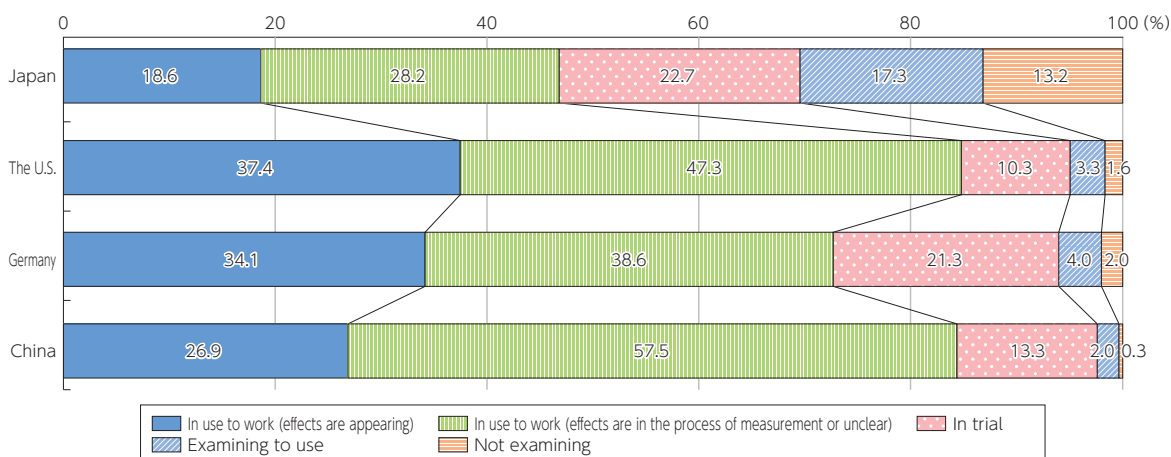


(Source) MIC(2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

When asked about the utilization of generative AI in specific business operations, such as “assistance in email, meeting minutes, and document creation,” 46.8% of Japanese companies reported using generative AI in their operations. However, when including those in the trial phase, around 90% of companies in the U.S., Ger-

many, and China were using it, indicating that overseas, active utilization has begun in various areas, including customer support, while Japanese companies are proceeding with cautious adoption, particularly for internal operations (**Figure 1-5-1-5**).

Figure 1-5-1-5 Status to utilize generative AI in business operations (support for creation of mail, minutes and material)



(Source) MIC(2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

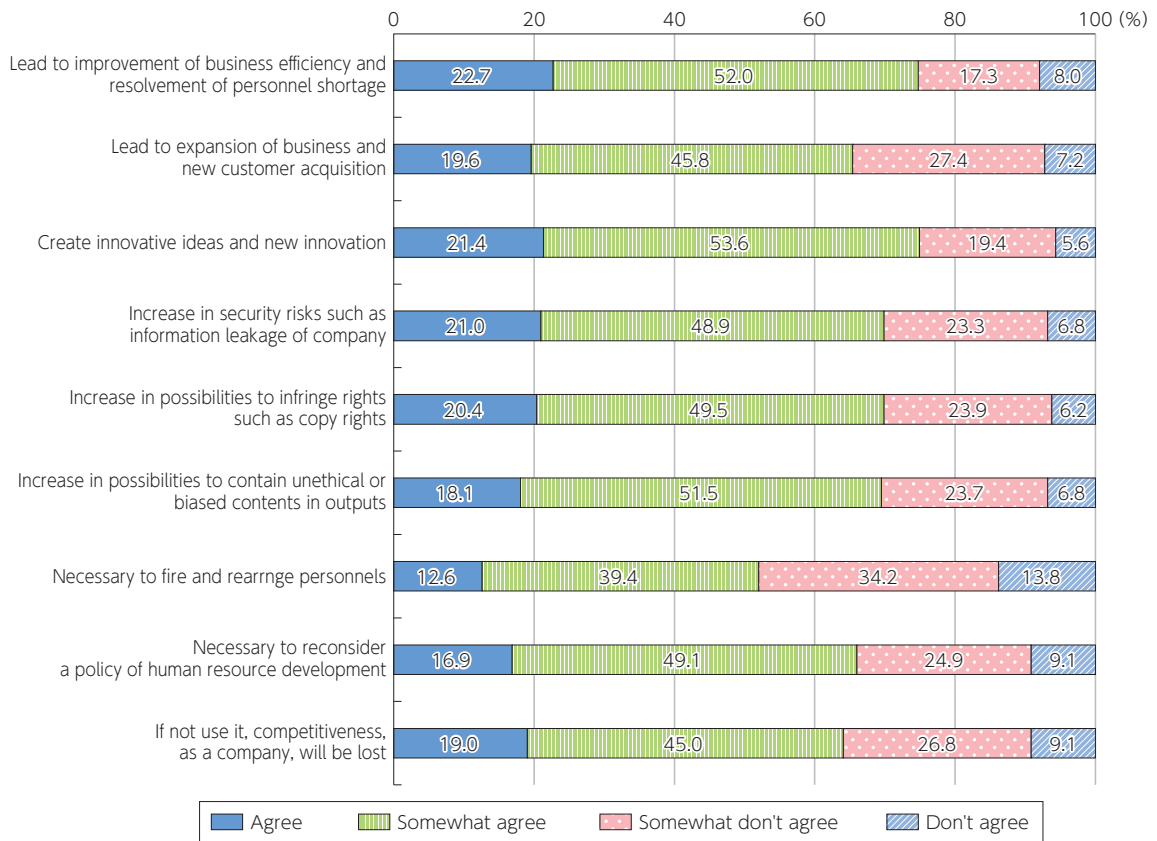


Figure (related data) Status to utilize generative AI in business operations (other business operation)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00063>
(Data collection)

Regarding the effects and impacts of utilizing generative AI, approximately 75% of companies believed that it would lead to “improving business efficiency and addressing labor shortages.” However, around 70% of companies also expressed concerns about the risks associ-

ated with generative AI, such as “an increase in security risks, such as internal information leakage” and “the potential for copyright and other rights infringement” (**Figure 1-5-1-6**).

Figure 1-5-1-6 Effects and influences by utilization of generative AI (Japan)

(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

**Figure (related data) Effects and influences by utilization of generative AI (by topic)**

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00065>
(Data collection)

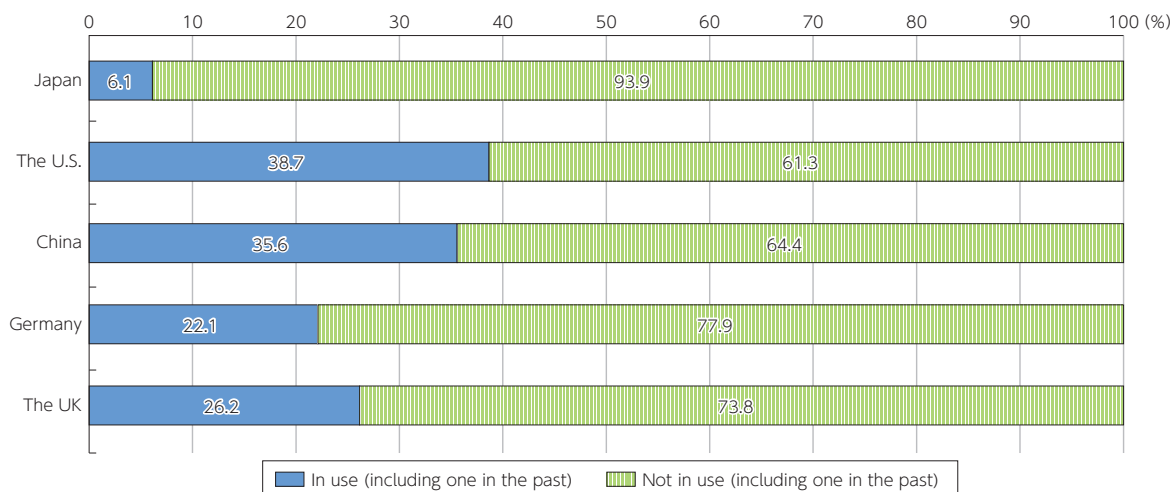
2. Metaverse

(1) Questionnaire to the general public

When asked about their experience with using the metaverse, the percentage of respondents who an-

swered “using it” (including those who have used it in the past) was low in Japan at 6.1% (**Figure 1-5-1-7**).

Figure 1-5-1-7 Experiences to use the metaverse

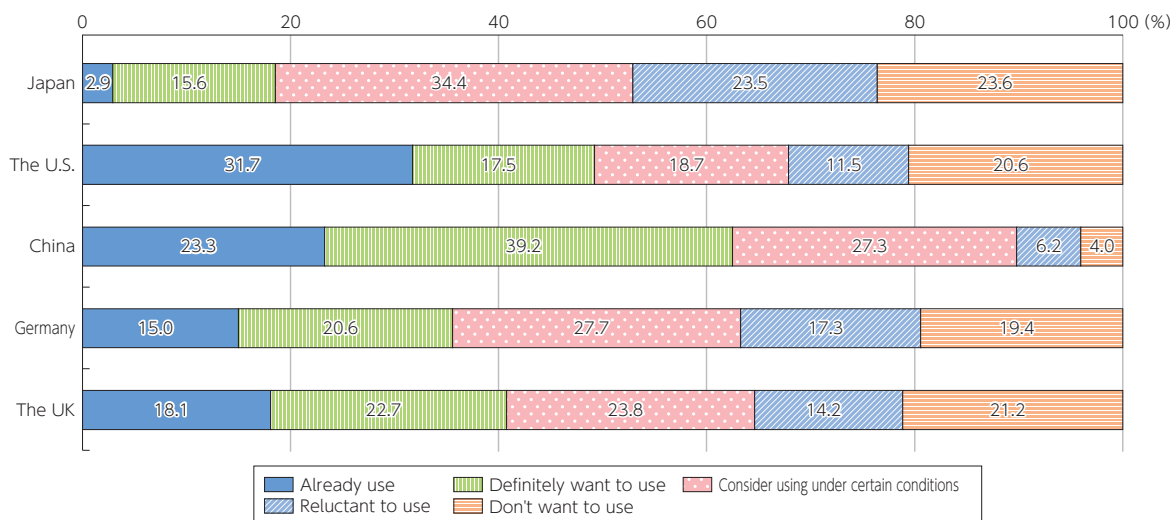


(Source) MIC(2024) “Research and study on the advancement of digital technologies and their utilization”

When asked about the usage status and intentions for specific scenarios, the percentage of respondents who answered “already using” for “communication between users in virtual space” was 2.9% in Japan, which was lower compared to other countries where the percent-

age was around 15-30%. However, when combined with positive responses for future use (“definitely want to use” and “consider using depending on the conditions”), the potential demand was 52.9%, indicating potential interest in usage (**Figure 1-5-1-8**).

Figure 1-5-1-8 Willingness to use the metaverse (communication among users)



(Source) MIC(2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”



Figure (related data) Willingness to use the metaverse (other scene to use)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00068>
(Data collection)

(2) Questionnaire to corporates

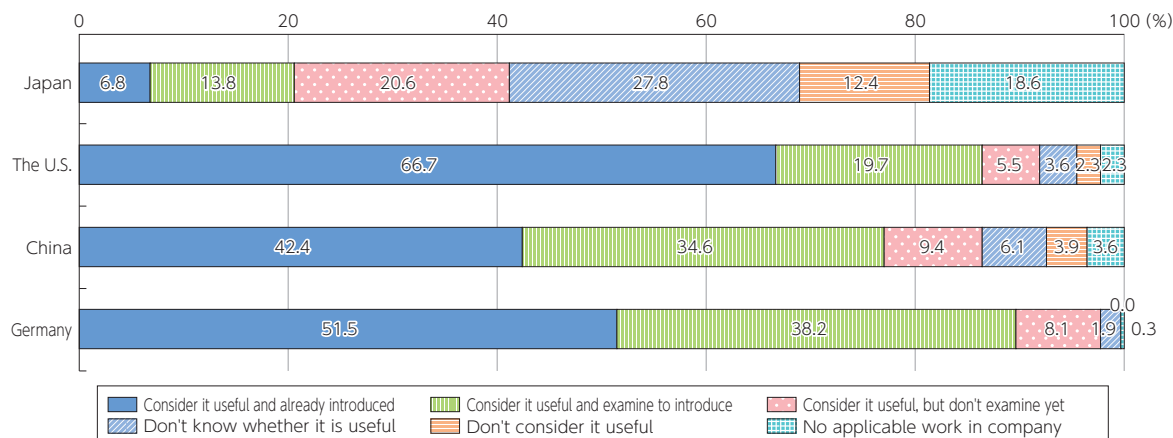
When asked about the consideration status of introducing the metaverse and digital twins in business operations such as “product development,” “manufactur-

ing,” and “logistics” among companies in various countries, the percentage of respondents in Japan who answered “consider it useful and already introduced”

was less than 10% for all operations. This is low compared to approximately 45-60% in the U.S. who answered

that they have already introduced it (Figure 1-5-1-9).

Figure 1-5-1-9 Consideration status of introducing the virtual space in business operation (merchandise development)



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Consideration status of introducing the virtual space in business operation (other business operation)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00070>
(Data collection)

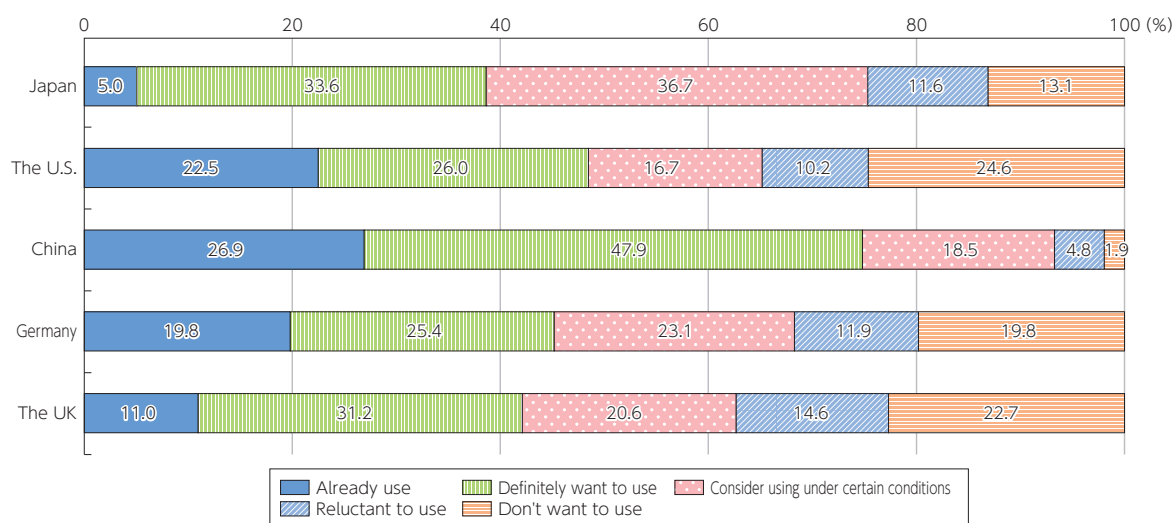
3. Robotics

To investigate the public perception of robot use in daily life and entertainment, respondents were asked about their willingness to use robots in six different scenarios. Regarding "robots performing household chores (cleaning, laundry, cooking, etc.)," 75.3% of Japanese respondents gave positive responses (already using,

definitely want to use, consider using under certain conditions). This percentage is similar to that in the U.S., Germany, and the UK (Figure 1-5-1-10).

Additionally, in the U.S., Germany, and the UK, about 30% of respondents indicated that they "do not want to use" robots in any of the six scenarios.

Figure 1-5-1-10 Willingness to use robots by scene in lives and entertainments (performing household chores (such as cleaning, laundry, cooking etc.))



(Source) MIC(2024) "Research and study on the advancement of digital technologies and their utilization"



Figure (related data) Willingness to use robots by scene in lives and entertainments (other scene to use)

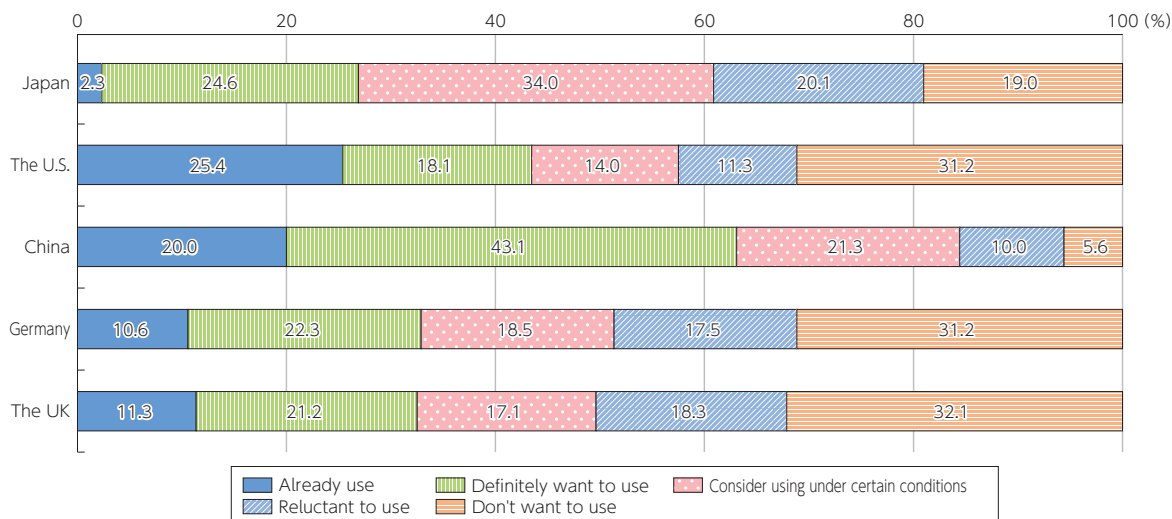
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00072>
(Data collection)

4. Automated driving

When asked about their willingness to use fully autonomous vehicles (driverless operation), about 60% of Japanese respondents indicated a willingness to use them (definitely want to use, consider using under certain conditions) in any of the five scenarios presented.

On the other hand, about 20% of Japanese respondents said they “do not want to use” them, compared to about 30% in the U.S., Germany, and the UK, indicating a more hesitant attitude towards use in these countries (**Figure 1-5-1-11**).

**Figure 1-5-1-11 Willingness to use fully autonomous vehicles
(commuting, daily shopping and transferring family members by fully autonomous home vehicles)**



(Source) MIC(2024) “Research and study on the advancement of digital technologies and their utilization”



Figure (related data) Willingness to use fully autonomous vehicles (other scene to use)
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00074>
 (Data collection)

Section 2 Current situation and new trends of utilization

As seen in the previous section, digital technologies, including generative AI, have not yet been widely adopted domestically. However, there is a latent intention to use them, and there is potential for their utilization to advance along with services and content in the future.

This section provides an overview of advanced cases that contribute to the promotion of generative AI utilization in companies and other organizations, as well as examples of digital technology applications expected to solve social issues in the future.

1. Generative AI driving business transformation

This section summarizes the actual state of introduction and utilization of generative AI in companies and

public organizations, considerations regarding risks, and efforts to promote healthy utilization.

(1) Trends in the introduction of generative AI in companies and public organizations

In companies and other organizations that actively promote the introduction of generative AI, efforts are being made to build systems and establish rules to pro-

mote utilization while evaluating and verifying AI risks and social impacts.

A NTT Data

NTT Data formulated the “NTT Data Group AI Guidelines” in May 2019 and established the “AI Advisory Board” consisting of external experts in April 2021 to consider the company’s AI governance. These activities have been conducted to create value through fair and healthy AI utilization and to contribute to the sustainable development of society. Furthermore, in April 2023,

NTT Data established the AI Governance Office as an organization to appropriately address business risks arising from the inappropriate use of AI that affects business and to provide safe AI systems to customers¹. From July of the same year, NTT Data began operating a risk management system using checklists for all projects involving AI and data utilization in its domestic business.

B Yokosuka City²

Yokosuka City began its internal efforts with the agency-wide demonstration of use of ChatGPT in April 2023. To promote the utilization of ChatGPT among staff and disseminate correct usage methods, the city launched the “ChatGPT Newsletter,” developed unique training programs for staff, held a ChatGPT utilization contest for staff, and established the “AI Strategy Advisor” to receive external advice³.

Yokosuka City also launched a chatbot for other municipalities to answer questions about their initiatives. In the same month, the city launched the “Municipal AI Utilization Magazine,” a portal site that disseminates the know-how and trial-and-error processes of municipalities that are early adopters of generative AI. The city also held a two-day training program called the “Yokosuka Generative AI Camp” for municipalities and companies nationwide.

Additionally, the city has been sharing the knowledge and know-how cultivated internally with other municipalities. In August 2023, the city started operating an in-

quiry bot for other municipalities to answer questions about their initiatives. In the same month, the city launched the “Municipal AI Utilization Magazine,” a portal site that disseminates the know-how and trial-and-error processes of municipalities that are early adopters of generative AI. The city also held a two-day training program called the “Yokosuka Generative AI Camp” for municipalities and companies nationwide.

(2) Trends in Utilization Across Various Fields and Industries

A Utilization in content creation (CyberAgent)

In the fields of media, gaming, and music content creation, generative AI is being used to assist in the creation of content itself or as a supplementary tool. This allows creators to produce content more efficiently despite labor shortages.

by considering the content of the ad images⁴. Additionally, in December 2023, they developed an automatic product image generation feature using AI, enabling the mass automatic generation of various combinations of scenarios and product images. They aim to provide more effective product images by utilizing the generated images and predictive AI⁵ (Figure 1-5-2-1).

At CyberAgent, in May 2023, they implemented an automatic catchphrase generation feature using ChatGPT in their proprietary “Kiwami Yosoku AI,” which is used for creating advertising creatives with AI. This allows for the creation of ad copy tailored to more specific targets

¹ NTT Data, “New establishment of “AI Governance Office” to strengthen AI risk management,” March 23, 2023, <<https://www.nttdata.com/global/ja/news/release/2023/032301/>>

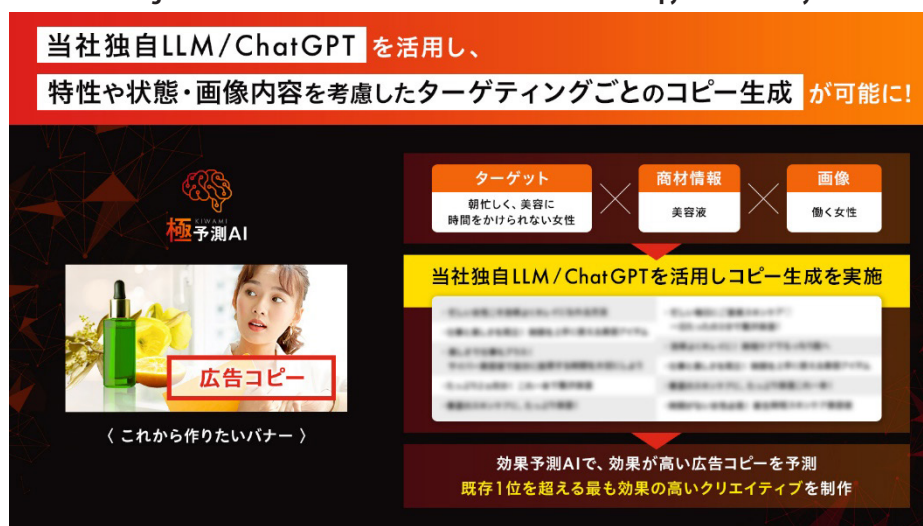
² Based on local government hearings (Yokosuka City).

³ Digital Cross “Yokosuka City Aims for Administrative Innovation Using Knowledge from Japan’s First ChatGPT Introduction,” December 12, 2023, <<https://dcross.impress.co.jp/docs/column/column20230929/003503.html>> (accessed on March 27, 2024)

⁴ CyberAgent “Kiwami Yosoku AI has a function of automatic ad copy generation with use of large-scale language models - Utilizing in-house LLMs technology and ChatGPT enables generation with more consideration to images and targets” May 18, 2023, <<https://www.cyberagent.co.jp/news/detail/id=28828>> (accessed on March 6, 2024)

⁵ Based on corporate interviews (CyberAgent).

Figure 1-5-2-1 Kiwami Yosoku AI function to create ad copy automatically



(Source) CyberAgent "Kiwami Yosoku AI has a function of automatic ad copy generation with use of large-scale language models"⁶

B Utilization in customer interaction (Aflac Life Insurance)

In the customer service sector, generative AI is being used to enhance user support, improve the efficiency and education of staff interacting with users, and detect fraud to ensure the healthy use of services. This is expected to improve customer satisfaction and maintain a consistent quality of service regardless of the individual knowledge or skills of the staff. This is particularly promising in fields like contact centers, which often face high turnover rates and labor shortages, by providing operators with appropriate knowledge and back-office

support.

For example, Aflac Life Insurance has developed a role-playing training program called "Recruitment Education AI" for insurance agents, using an AI avatar. This system analyzes and evaluates whether the sales representatives include the necessary keywords in their conversations using technologies like speech recognition. In the future, they plan to incorporate actual customer information to simulate sales activities⁷.

C Information services (NTT Data)

In the information services sector, which includes software development, generative AI is expected to be utilized in all stages of development, from requirements definition and specification generation to programming and testing. The productivity improvements brought by generative AI could help alleviate the shortage of engineers. Particularly for system integrators (SIs), there is also the potential to use AI for the modernization of COBOL assets.

NTT Data is promoting the application of generative AI across all phases of system development, from re-

quirements definition to testing. They have practical application results not only in PoC but also in commercial use, mainly overseas. Examples include reducing the manufacturing process by 70% and tripling productivity. In October 2023, they began PoC for migration in Japan. Currently, the main uses are in the manufacturing and testing phases, where AI is used to generate new source code and modernize old programming languages. In the testing phase, AI reads past design documents and test objectives to automatically extract test items⁸.

D Utilization in the construction sector (Obayashi Corporation)

In the construction sector, it is expected to be used in scenarios such as quickly creating design proposals and referencing past data like survey data, design documents, and specifications to handle specialized knowledge in construction. The industry is under pressure due to extensive overtime work, the aging workforce

leading to mass retirements, and rising material costs. AI is expected to improve efficiency in document creation, leverage the experience of veterans, and link published information with internal expertise⁹.

In March 2022, Obayashi Corporation announced that it had jointly developed an AI technology called "AiCorb"

⁶ CyberAgent, "Kiwami Yosoku AI toward development and start of operation of automatic product image generation function using polar prediction AI and generation AI," December 7, 2023, <<https://www.cyberagent.co.jp/news/detail/id=29572>> (accessed on March 6, 2024)

⁷ Nikkei Crosstech, "Insurance performance increased by more than 30%, Aflac achieved results with AI avatar sales role play" December 8, 2022, <<https://xtech.nikkei.com/atcl/nxt/column/18/01302/110800008/>> (accessed on March 6, 2024)

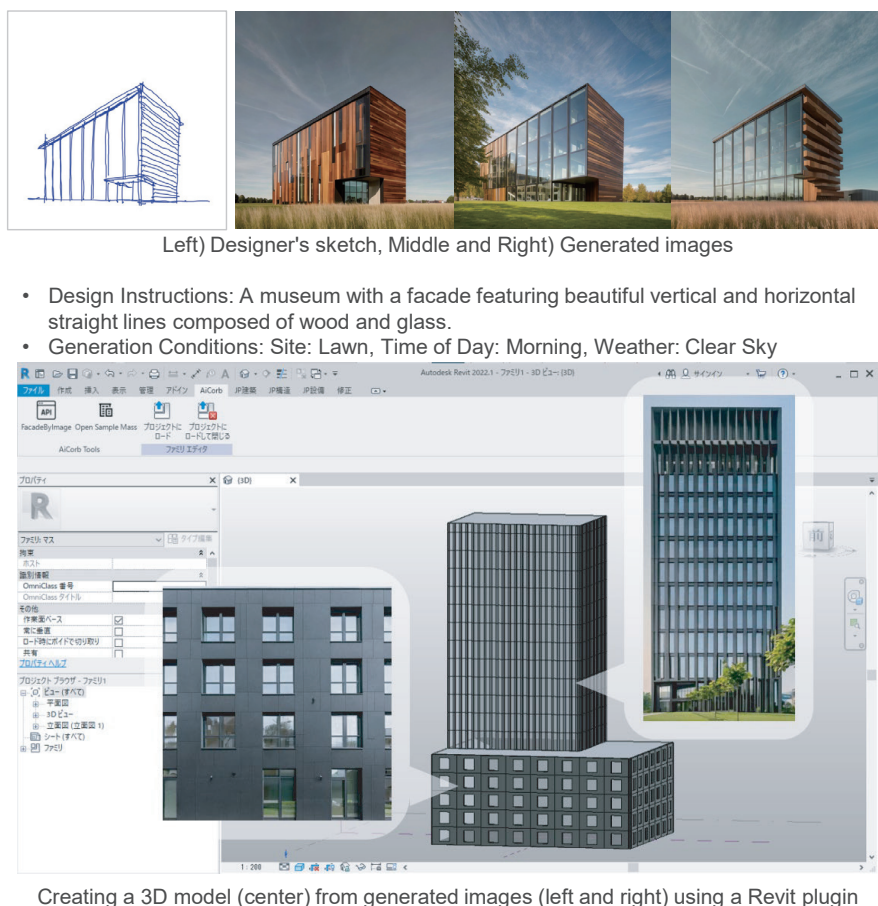
⁸ DATA INSIGHT "What is NTT Data's "new era system development" using generative AI? - Expanding track record of commercial applications globally! High-quality legacy assets modernized with quality and high productivity" November 16, 2023, <<https://www.nttdata.com/jp/ja/trends/data-insight/2023/1116/>> (accessed on March 26, 2024)

⁹ Akari, "Akari Co., Ltd. starts offering "AKARI Construction LLM" that specializes in large-scale language models such as ChatGPT for the construction industry" March 16th, <<https://prtimes.jp/main/html/rd/p/000000014.000083531.html>> (accessed on March 6, 2024)

with SRI International¹⁰, which can propose various building facade designs from sketches and 3D models in the early stages of architectural design. The company began internal operations of AiCorb in July 2023, and as of the end of May 2024, it has generated over 30,000 images. AiCorb consists of two AIs: the image generation AI, which can quickly output multiple facade design proposals based on hand-drawn sketches and design in-

structions, and the 3D transformation AI, which assists in converting the generated designs into 3D models¹¹ (currently, a plugin compatible with Revit models has been developed) (Figure 1-5-2-2). In the future, the aim is to use the 3D data for various performance evaluations, providing a tool to support decision-making and consensus-building for designers and clients.

Figure 1-5-2-2 Design proposal for facade generated by AiCorb from a sketch (top) and examples of using 3D model assistance function (bottom)



(Source) Obayashi Corporation

E Utilization in the field of materials (Preferred Networks, ENEOS)

In the field of materials development, a data-driven approach known as Materials Informatics has evolved, leveraging AI's machine learning and statistical methods to analyze large volumes of experimental and computational data, thereby constructing models that lead to the development of new materials. Generative AI, including models such as Generative Adversarial Networks (GAN) and Variational Autoencoders (VAE), can be utilized to learn from existing material datasets and design theoretically new materials by automatically generating new molecular and crystal structures. Additionally, generative AI can create virtual data based on real data, ex-

panding experimental datasets and improving model learning¹².

In July 2021, Preferred Networks and ENEOS jointly established Preferred Computational Chemistry (PFCC) and began offering a cloud service called Matlantis, a general-purpose atomic-level simulator utilizing deep learning. This generative AI-powered atomic simulation aids in understanding the properties of promising materials at the atomic level, as well as in the development and exploration of new materials. Compared to traditional simulations, it accelerates the process by 100,000 to several ten million times while maintaining

¹⁰ Obayashi Corporation, "Developing "AiCorb®" to streamline work in the early stages of architectural design," March 22, 2022, <https://www.obayashi.co.jp/news/detail/news20220301_3.html> (accessed on March 6, 2024)

¹¹ Nikkei Crosstech, "Obayashi's AI tool can generate building exteriors and create 3D images; internal operation will begin in July," July 4, 2023, <<https://tech.nikkei.com/atcl/nxt/column/18/02449/062900008/>> (accessed on March 6, 2024)

¹² JST Research and Development Strategy Center (CRDS) "Development and Future Prospects of Materials Informatics" April 5, 2022, <https://www.jst.go.jp/crds/sympo/20220325/pdf/20220405_01.pdf>

accuracy. Simulations that previously took hours to months on high-performance computers can now be performed in seconds. Matlantis supports 55 types of elements and can simulate unknown molecules and

crystals, providing versatility¹³¹⁴. As of January 2024, it is used by over 80 universities and companies both domestically and internationally.

(3) Utilization in public sector

A Utilization in education (Benesse, etc.)

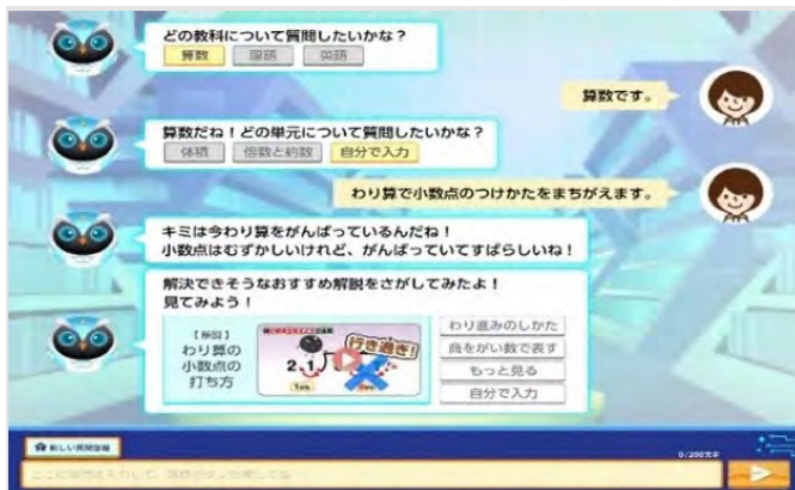
In the field of education, the use of generative AI is anticipated to support various applications such as personalized learning materials for autonomous learning through interactions between learners and AI, answering learners' questions, and assisting teachers in creating educational materials and tests. This is particularly significant in addressing the severe "Teacher Shortage"¹⁵ where the number of teachers actually deployed in schools does not meet the numbers designated by the boards of education in various prefectures and designated cities, resulting in vacancies. By leveraging generative AI, it is possible to create an environment where learners can ask questions without hesitation at any time, receive autonomous educational support, and reduce the workload of teachers in creating educational materials.

In July 2023, the Ministry of Education, Culture, Sports, Science and Technology (hereinafter referred as to MEXT) published "provisional guidelines on the use of generative AI in primary and secondary education". These guidelines provide a framework to help schools determine the appropriateness of using generative AI.

Additionally, based on these guidelines, the MEXT designated 52 schools in 37 municipalities as generative AI pilot schools to thoroughly address concerns related to AI and to evaluate the outcomes and challenges of using AI in educational settings.

Furthermore, Benesse Corporation has been integrating generative AI into its educational services, such as "Jiyu Kenkyu Otasuke AI," "AI Shimajiro," and "Challenge AI Learning Coach" (Figure 1-5-2-3). The "Challenge AI Learning Coach," launched in March 2024, is a service for elementary and junior high school students that utilizes generative AI to allow them to ask questions about their "Shinken Zemi" studies and school homework until they understand the material. To address the concern that students might directly ask for answers, which is one of the challenges of using generative AI in education, the "Challenge AI Learning Coach" is designed to support students by engaging with their questions, broadening their perspectives through dialogue with AI characters, and helping them arrive at answers on their own.

Figure 1-5-2-3 Challenge AI Learning Coach¹⁶



(Source) PR TIMES, "Shinken zemi" will start offering "Challenge AI Learning Coach," a new service that utilizes generative AI, from late March. You can ask questions about subjects at any time until you are satisfied"

¹³ KAWAGUCHI Masateru "Lecture report_The future of materials and material development brought about by the general-purpose atomic level simulator "Matlantis"TM ~ AI-driven ultra-high-speed calculation changes the world of material development ~" April 10, 2024, <<https://matlantis.com/ja/news/oilchemistrydx202404>>

¹⁴ Nikkei Crosstech "Matlantis, a general-purpose atomic-level simulator using AI," August 10, 2021, <<https://xtech.nikkei.com/atcl/nxt/mag/rob/18/00007/00041/>>

¹⁵ MEXT, "Survey on the actual situation regarding "Teacher Shortage"" January 2023, <https://www.mext.go.jp/content/20220128-mxt_kyoiku-jinzai01-000020293-1.pdf> (accessed on March 25, 2024)

¹⁶ Benesse Holdings, "Shinken zemi" will start offering "Challenge AI Learning Coach," a new service that utilizes generative AI, from late March. You can ask questions about subjects at any time until you are satisfied," PR Times, February 2, 2024, <<https://prtimes.jp/main/html/rd/p/000001239.000000120.html>> (accessed on May 26, 2024)

B Utilization in healthcare and nursing care (CDI)

In the healthcare and nursing care sectors, generative AI is expected to optimize care plans tailored to individual users, automate business reports, improve communication with users, and serve as training and educational tools¹⁷. This is anticipated to not only supplement the specialized knowledge required by staff but also improve operational efficiency. In this field, where the demand is increasing due to the aging population and labor shortages are becoming a challenge due to the rapid decline in the working-age population, generative AI holds the potential to become a natural language consultation partner for staff.

C Utilization in administrative services (minutes search)

In administrative services, generative AI is expected to be utilized for policy examination, information collection, policy proposal formulation, collection and drafting of past bills, drafting responses for bill deliberations, information dissemination, inquiry responses, form creation, checking and judgment, result issuance, and meeting implementation²⁰.

For example, Automation co.,ltd released the Chat

In June 2023, CDI began integrating its AI-powered care management support tool “SOIN” with ChatGPT. Based on user attribute information, diseases, and physical conditions already input by care managers, the SOIN server automatically creates command prompts for ChatGPT, which then provides personalized support content to care managers¹⁸. Additionally, in December 2023, CDI released “SOIN AI Chat,” adding a function that allows it to act as a consultation partner for care managers, considering the individual circumstances of each elderly person¹⁹.

GPT Plugin to search the national diet minutes in June 2023. This tool allows users to search for discussions in the National Diet minutes that are similar in meaning to texts such as news, trends, proposals, requests, and complaints, along with the source information. This enables anyone to easily investigate and compile the discussions held in the National Diet²¹ (Figure 1-5-2-4).

Figure 1-5-2-4 Searching the national diet minutes for GPTs

国会議事録検索 for GPTs

You
国民の給料向上について国会でどう議論されているか概要と出典を6件調べて、表形式で表示してください

国会議事録検索 for GPTs
Talked to the-diet-record.automation.jp

国民の給料向上に関する国会での議論の概要は以下の通りです：

議員名	議論の概要	出典
斎藤鉄夫	技能労働者の賃金水準の上昇につながる好循環を官民一体となって推進する決意を表明。	国会議事録
玉木雄一郎	選挙公約として給料が上がる経済を実現することを目指し、与野党共に賃金を上げることに重点を当てるべきだと提言。	国会議事録
大塚耕平	約30年間実質賃金が上がっていない現状を踏まえ、名目賃金上昇率が物価上昇率プラス2%に達するまでの積極財政での支援を提唱。	国会議事録
松本敬司	民間の賃金水準の引き上げについて、経済対策を通じて取り組むと述べ、国家公務員の給与水準も改善されることを期待している。	国会議事録
岡本三成	賃金の持続的な上昇を目指すべきであり、国民が前向きに取り組めるようなメッセージを政府に求める。	国会議事録

これらの議論は国会議事録から抽出されたもので、それぞれの議員が国民の給料向上に関してどのような立場や提案をしているかを示しています。

Message 国会議事録検索 for GPTs...

ChatGPT can make mistakes. Consider checking important information.

(Source) PR TIMES, “Automation co., ltd. developed and released the Diet Minutes Search for GPTs, using the function announced today by OpenAI to develop its own ChatGPT!”

¹⁷ pipon “Improving the efficiency of nursing care work using generative AI and ChatGPT: How to use it to transform the industry,” February 4, 2024, <<https://bigdata-tools.com/aisolutions-for-caregiving-challenges/>> (accessed on March 25, 2024)

¹⁸ CDI “Releasing new version of “AI Care Plan SOIN” to enhance “Compatible with generative AI” and “Compatible with appropriate care management methods”” June 29, 2023, <<https://www.cd-inc.co.jp/wp-content/uploads/2023/06/20230629.pdf>> (accessed on March 6, 2024)

¹⁹ CDI, “AI Care Plan SOIN releases new function “SOIN AI Chat.” Through the fusion of SOIN and ChatGPT, personalized care for each elderly person is provided.” December 20, 2023, <<https://www.cd-inc.co.jp/wp-content/uploads/2023/12/20231220.pdf>> (accessed on March 6, 2024)

²⁰ Boston Consulting Group, “How Generative AI Will Change Public Administration – Case Studies and Future Challenges,” July 13, 2023, <<https://www.bcg.com/ja-jp/publications/2023/how-generative-ai-can-be-used-in-public-sector>> (accessed on March 25, 2024)

²¹ Automation co.,ltd, “First in the nation! Automation co., ltd. released the Chat GPT Plugin to search the national diet minutes!” PR Times, June 16, 2023, <<https://prtimes.jp/main/html/rd/p/000000042.000067480.html>> (accessed on March 6, 2024)

D Utilization in back-office operations (ExaWizards)

In the field of back-office operations, it is expected that AI will be utilized for referencing past data for management and personnel purposes, as well as for coordinating with legal-related information for contract modifications.

In May 2023, ExaWizards announced the “exaBase IR Assistant powered by ChatGPT,” which supports the

creation of anticipated Q&A for shareholder meetings and financial results briefings²². In December 2023, they entered the field of recruitment business efficiency services using AI technology, and as their initial effort, they released the beta version of the “exaBase Recruitment Assistant,” a service that leverages AI technology for streamlining recruitment operations²³.

2. Expectations for solving social issues through advanced technology utilization

The evolving technologies such as the metaverse, robotics, and autonomous driving hold the potential to contribute to the realization of an inclusive society and

address labor shortages. In the medium to long term, the combination of these technologies with generative AI is expected to further solve social issues.

(1) Metaverse

Even for those who find it difficult to go outside, such as recluses and children who refuse to attend school, the metaverse allows everyone to communicate. Communication in the metaverse, transcending distance and location, can serve as a catalyst for social participation, potentially realizing an inclusive society.

Moreover, the advancement of generative AI has

made it easier to construct metaverse spaces and enabled natural conversations with characters. Generative AI is also being developed to automatically generate the necessary elements for creating non-player characters in the metaverse space, even without specialized knowledge, contributing to the vibrancy of the metaverse²⁴.

A Learning support (Katariba, NTT SmartConnect, and NTT Data NJK)

Since 2021, Katariba has been using the metaverse for an online support program for children who refuse to attend school. In collaboration with public and private sectors, they have introduced the program named “room-K” to municipalities. In FY2022, they conducted classes in the metaverse space in collaboration with eight municipalities, including Toda City in Saitama Prefecture, Bunkyo Ward in Tokyo, and Daito City in Osaka Prefecture^{25,26}.

NTT SmartConnect and NTT Data NJK have started providing a 3D metaverse service for educational institutions called “3D Education Metaverse.” (Figure 1-5-2-5) This service offers spaces similar to actual educational settings, such as classrooms and assembly halls, within the metaverse. It also provides diverse communication spaces for avatars, equipped with text chat functions with NG word filters to prevent trouble²⁷.

²² Nikkei Crosstech, “ExaWizards to support the creation of anticipated questions and answers for the general meeting of shareholders using ChatGPT and a scheme to increase accuracy,” May 24, 2023, <<https://xtech.nikkei.com/atcl/nxt/column/18/02423/052200024/>> (accessed on March 6, 2024)

²³ ExaWizards, “ExaWizards enters recruitment efficiency service using generative AI, accepting pre-orders for the beta version of “exaBase Recruitment Assistant” which will gradually provide an automatic recruitment form creation, scout email automatic generation, document selection support functions, etc.” December 18, 2023, <<https://exawizards.com/archives/26301/>> (accessed on March 6, 2024)

²⁴ NTT DOCOMO “World’s first! Developing a generation AI that automatically generates non-player characters in the metaverse” January 16, 2024, <https://www.docomo.ne.jp/binary/pdf/info/news_release/topics_240116_01.pdf> (accessed on March 6, 2024)

²⁵ KATARIBA Magazine Editorial Department ““What is truancy support using metaverse space through public-private collaboration?” Front-line seminar report inviting partner local governments” on January 27, 2023, certified NPO Katariba, <<https://www.katariba.or.jp/magazine/article/report230127/>> (accessed on March 6, 2024)

²⁶ Sankei Shimbun, “Online support spreading to local governments to locate children who are not attending school in the metaverse,” July 12, 2023, <<https://www.sankei.com/article/20230712-3ZOIWEEMAR5OYPEAHULO3WRA2BQ/>> (accessed on March 6, 2024)

²⁷ NTT SmartConnect “Starts offering “3D Educational Metaverse” that contributes to the diversity of children’s learning” August 28, 2023, <<https://www.nttsmc.com/news/2023/20230828.html>> (accessed on March 6, 2024)

Figure 1-5-2-5 3D Education Metaverse, lessons in classroom



(Source) NTT SmartConnect “Starts offering “3D Educational Metaverse” that contributes to the diversity of children’s learning”

B Employment support (Fukuoka Prefecture)

Fukuoka Prefecture has established the “Fukuoka Virtual Support ROOM,” where people who are shut-ins or have concerns about working can operate avatars in a virtual space on the Internet to interact and consult with third parties (Figure 1-5-2-6). It is available for residents of the prefecture aged 16 and over who are not

employed, providing a discussion space for people with concerns, skill improvement programs, and job training²⁸. As a demonstration project in FY2022, dedicated support spaces were constructed in the metaverse, and utilization was conducted at two locations within the prefecture. Full-scale operation began in FY2023²⁹.

Figure 1-5-2-6 Fukuoka Virtual Support ROOM. job training



(Source) Labor Policy Division, Labor Bureau, Welfare and Labor Department, Fukuoka Prefecture “Fukuoka Virtual Support ROOM”

C “Metaverse Ward Office” (Edogawa Ward, Tokyo)

Edogawa Ward, Tokyo, has been working towards the establishment of a “Metaverse Ward Office” where all procedures and consultations can be conducted in the metaverse, aiming to achieve a “ward office that does not require a visit” by advancing electronic applications and online services. As part of this effort, they have been conducting demonstration experiments with the cooperation of disability groups within the ward since

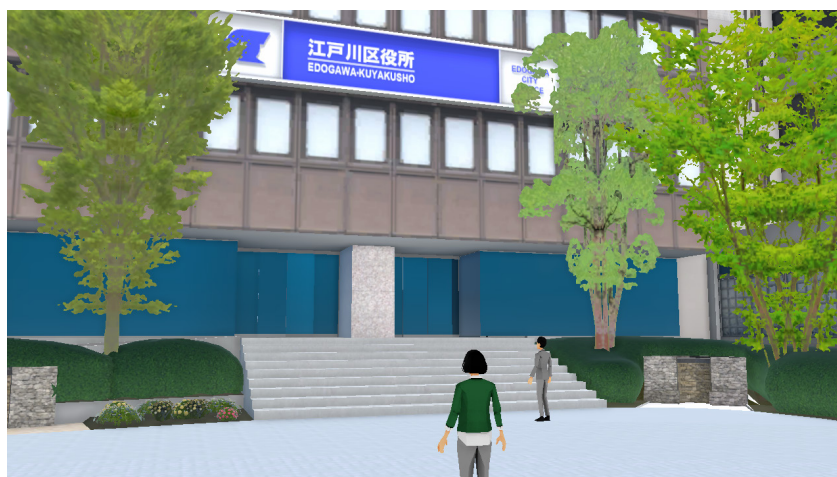
September 2023. In April 2024, they established a project team in collaboration with the Tokyo Information Design Professional University to accelerate efforts to solve technical challenges, and from June 2024, they plan to start providing consultation and procedural support services for general ward residents utilizing the metaverse³⁰ (Figure 1-5-2-7).

²⁸ Fukuoka Fukabori Media Sasatto - “A virtual space for employment support in Fukuoka Prefecture, a step towards the outside world” February 2, 2024, <<https://sasatto.jp/article/entry-5235.html>> (accessed on March 6, 2024)

²⁹ AIS Online “February 2024 Topics: Long-term unemployed employment support using the metaverse” February 1, 2024 <https://www.iais.or.jp/ais_online/20240201/202402_02/> (accessed on March 6, 2024)

³⁰ Edogawa Ward, Tokyo “Inauguration ceremony of metaverse ward office project on April 26, 2024” April 26, 2024, <<https://www.city.edogawa.tokyo.jp/e004/kuseijoho/kohokocho/press/2024/04/0426-2.html>>

Figure 1-5-2-7 Metaverse ward office



(Source) Edogawa Ward

(2) Robotics

The utilization of robotics is anticipated to address labor shortages across various sectors.

For instance, in critical fields such as healthcare and construction, remote-controlled robots can enable skilled professionals to deliver their expertise to distant locations without being physically present. In the future, a single expert might be able to commit to multiple sites

simultaneously. Additionally, robots performing household chores can reduce the burden of domestic tasks. In educational and caregiving settings, robots can play a role in enhancing communication, improving students' communication skills, and supporting interactions between residents and caregivers.

A Telemedicine (Kobe University, NTT DCOMO, NTT Communications, Mediaroid)

In February 2023, Kobe University, NTT DCOMO, NTT Communications, and Mediaroid successfully conducted a demonstration experiment using commercial standalone 5G to support robotic surgery performed by young doctors from a remote location, approximately 500 km apart, between Tokyo and Kobe. By securely and in real-time transmitting high-definition surgical im-

ages, audio, and large volumes of robot control data, experienced doctors in Kobe were able to monitor the surgery performed by young doctors in Tokyo, provide guidance, and even remotely control the robot, thus realizing remote surgical support and instruction³¹ (Figure 1-5-2-8).

Figure 1-5-2-8 Image of demonstration experiment

(Source) Kobe University³²

³¹ National University Corporation Kobe University, NTT DCOMO, NTT Communications, Mediaroid, Kobe City “Successful demonstration of supporting remote robotic surgery using commercial 5G SA over a distance of approximately 500km between Tokyo and Kobe” February 1, 2023, <https://www.docomo.ne.jp/binary/pdf/info/news_release/topics_230201_01.pdf> (accessed on March 6, 2024)

³² National University Corporation Kobe University, “Successful demonstration of supporting remote robotic surgery using commercial 5G SA over a distance of approximately 500km between Tokyo and Kobe” February 1, 2023 <https://www.kobe-u.ac.jp/ja/news/article/2023_02_01_01/index.html> (accessed on March 28, 2024)

B Household robots (Preferred Robotics)

In February 2023, Preferred Robotics announced “Kachaka,” a household robot that autonomously transports a dedicated caster-equipped shelf. The autonomous mobile robot “Kachaka” can dock under the caster-equipped shelf (wagon), move it to the desired location, and return it to its original position. It supports voice recognition, allowing users to give commands verbally³³ (Figure 1-5-2-9). Besides household use,

“Kachaka” is increasingly being utilized in businesses such as dental clinics, factories, and restaurants. For example, in dental clinics facing severe labor shortages, “Kachaka” can transport used equipment to the sterilization room, allowing dentists to focus more on high-value tasks and patient communication. In factories, the “Kachaka Pro,” which is tailored for industrial use with enhanced durability and sensors, is used for transporting parts.

Figure 1-5-2-9 Kachaka



(Source) Preferred Robotics, “Kachaka, a smart furniture platform that moves furniture according to human instructions, will be released on Wednesday, May 17, 2023”³⁴

C Communication enhancement (MIXI, etc.)

MIXI has introduced the autonomous conversational AI robot “Romi,” aiming to be a comforting and understanding presence, and conducted a test introduction in

classrooms of elementary and junior high schools at Shibuya Honmachi Gakuen in November 2021³⁵ (Figure 1-5-2-10).

Figure 1-5-2-10 Autonomous conversational AI robot “Romi,” a test introduction in classrooms of elementary and junior high schools



(Source) note “What happened after introducing Romi to elementary and junior high schools? What was the reaction of children and students?”³⁶

The test results revealed that 89% of children engaged in conversations with Romi, indicating its potential to

³³ Impress Watch “Carrying and cleaning shelves. Introducing the new household robot “Kachaka”” February 1, 2023, <<https://www.watch-impress.co.jp/docs/news/1475076.html>> (accessed on March 6, 2024)

³⁴ Preferred Robotics, “Kachaka, a smart furniture platform that moves furniture according to human instructions, will be released on Wednesday, May 17, 2023” May 12, 2023, <<https://www.pfrobotics.jp/news/fYD7X2FW>> (accessed on March 28, 2024)

³⁵ Nikkei Electronic Edition “MIXI test-introduces autonomous conversation robot “Romi” to elementary and junior high schools” November 8, 2021, <https://www.nikkei.com/article/DGXLRS621153_Y1A101C2000000/> (accessed on March 28, 2024)

³⁶ Conversation AI robot Romi, “What happened after introducing Romi to elementary and junior high schools? What was the reaction of children and students?” March 9, 2022, <https://note.com/romi_ai/n/n0bd54c3186f4> (accessed on March 28, 2024)

contribute to the development of children's conversational and communication skills. Feedback from students through surveys included statements such as "increased communication during break times."³⁷

Furthermore, the introduction of communication robots in caregiving settings is progressing. GROOVE X, which provides the home communication robot "LOVOT," conducted a demonstration experiment in a care facility, revealing that residents living with the communication robot could expect a suppression effect on the decline of their cognitive functions³⁸. Additionally, through generated AI, it is possible to issue natural language instruc-

tions to the robot, enabling flexible responses.

Pepper, a humanoid robot for caregiving known as "Pepper for Care," supports communication with residents and promotes communication among residents in caregiving settings³⁹ (Figure 1-5-2-11). SoftBank Robotics released a conversation app targeting the caregiving model of the humanoid robot "Pepper" in February 2024 which is equipped with ChatGPT to provide a natural conversation experience. "Pepper for Care" offers a wide range of recreational activities such as games, singing, and exercises, as well as language and upper limb training tailored to individuals through facial recognition.

Figure 1-5-2-11 Pepper for Care



(Source) Softbank Robotics⁴⁰

(3) Autonomous Driving

Autonomous driving is expected to provide transportation solutions for those with limited access to necessary mobility options, such as transportation-disadvantaged individuals and areas facing taxi and truck driver shortages. With autonomous driving, transportation can be ensured with fewer or no drivers, making access to various locations easier. Generative AI is utilized in the development, testing, and verification stages of autonomous vehicles, facilitating improvements in autonomous

driving technology towards achieving Level 5 autonomy⁴¹. In the U.S. and China, commercial use of autonomous taxis has already begun. While unmanned technology continues to advance, challenges such as safety concerns, including vehicles becoming immobile on the road, causing traffic congestion, and accidents, as well as concerns about job displacement, need to be addressed for widespread adoption.

A Ensuring mobility for transportation-disadvantaged individuals (Sakai Town in Ibaraki Prefecture, BOLDLY, Macnica, etc.)

In Sakai Town in Ibaraki Prefecture, three autonomous buses have been introduced to operate on fixed routes and schedules as a means of public transportation⁴². In Sakai Town, where cars are the primary mode of transportation for residents and the nearest train station is about 40 minutes away by car, the public transportation infrastructure is weak. This poses a challenge for

elderly residents who wish to surrender their driver's licenses but cannot due to their daily needs. To establish a transportation network not reliant on human drivers, autonomous buses were introduced. Currently, the buses operate at Level 2, with a driver on board for monitoring, aiming for Level 4 operation in the future⁴³ (Figure 1-5-2-12).

³⁷ Conversation AI robot Romi, "What happened after introducing Romi to elementary and junior high schools? An interview on teachers," March 9, 2022, <https://note.com/romi_ai/n/n28b1011eb1ad#eb1b4e24-43fd-473b-b716-1b03fba76eef> (accessed on March 28, 2024)

³⁸ GROOVE X, "LOVOT accelerates efforts in the nursing care field after receiving promising results in suppressing cognitive decline" April 27, 2022 <<https://prtimes.jp/main/html/rd/p/000000151.000055543.html>> (accessed on March 29, 2024)

³⁹ SoftBank Robotics, "pepper" <<https://www.softbankrobotics.com/jp/product/pepper/caregiver/>> (accessed on March 28, 2024)

⁴⁰ Nikkei Electronic Edition "SoftBank Robotics releases conversation app for nursing care model of humanoid robot "Pepper"" February 13, 2024, <https://www.nikkei.com/article/DGXZRS668323_T10C24A2000000/> (accessed on March 28, 2024)

⁴¹ NVIDIA "Generative AI opens a new era for the automotive industry, from design and engineering to production and sales," August 15, 2023, <<https://blogs.nvidia.co.jp/2023/08/15/generative-ai-auto-industry/>> (accessed on March 6, 2024)

⁴² Sakai Town "Self-driving buses are operating regularly in Sakai Town [first in local government!]", <<https://www.town.ibaraki-sakai.lg.jp/page/page002440.html>> (accessed on March 6, 2024)

⁴³ Softbank "Self-driving bus operations have begun [Sakai Town in Ibaraki Prefecture]" May 29, 2023, <<https://www.softbank.jp/biz/blog/business/articles/202305/self-driving-bus-BOLDLY/>> (accessed on March 6, 2024)

Figure 1-5-2-12 Autonomous driving bus introduced in Sakai Town in Ibaraki Prefecture



(Source) Softbank “First in Japan, Sakai Town in Ibaraki Prefecture introduces self-driving EV “MiCa”⁴⁴

Additionally, Eihei Town in Fukui Prefecture established a third-sector company and began Level 4 autonomous driving services under specific conditions in May 2023⁴⁵. The service operates on a limited 2-kilometer

section at a maximum speed of 12 km/h, with the operator monitoring the operation for emergencies. Acceleration, deceleration, and steering are entirely managed by a dedicated system installed in the vehicle⁴⁶.

B Addressing driver shortages (JR West Japan, Higashihiroshima City in Hiroshima Prefecture, Hiroshima University, etc.)

Starting in November 2023, JR West Japan began a demonstration experiment of a bus rapid transit (BRT) system with autonomous platooning on public roads. The experiment involves dedicated lanes for buses connecting JR Saijo Station and Hiroshima University's Higashihiroshima Campus. The system is expected to make buses more reliable and user-friendly while ad-

ressing driver shortages. During platooning, a driver will be on board the lead vehicle to handle tasks such as ensuring the safety of boarding and alighting, opening and closing doors, making announcements, and emergency stops in case of unforeseen circumstances. Under normal conditions, the driver will not operate the vehicle but will take manual control in case of abnormalities⁴⁷.

⁴⁴ Softbank, “First in Japan, Sakai Town in Ibaraki Prefecture introduces self-driving EV “MiCa”” December 6, 2023, <https://www.softbank.jp/drive/press/2023/20231206_02/> (accessed on March 28, 2024)

⁴⁵ Eihei Town “Autonomous Driving “ZEN drive””, <<https://www.town.eiheiji.lg.jp/200/206/208/p010484.html>> (accessed on March 6, 2024)

⁴⁶ NHK “Autonomous Driving “Level 4” begins operation in Fukui for the first time in the country. Savior of depopulation?” May 22, 2023, <<https://www3.nhk.or.jp/news/html/20230522/k10014074841000.html>> (accessed on March 6, 2024)

⁴⁷ Toyo Keizai Online, “Issues Observed in JR “Autonomous Driving/Platooning BRT” Running in Public Road Driving,” January 22, 2024, <<https://toyokeizai.net/articles/-/728920>> (accessed on March 6, 2024)

Toward Living Further in Harmony with Digital Technologies

Various digital services utilizing AI are increasingly permeating our lives, and technologies such as the metaverse, robotics, and autonomous driving are expected to contribute to solving various social and economic issues faced by our country, such as regional revitalization and disaster prevention. Effectively utilizing these technologies and promoting initiatives towards realizing a society where we coexist with them is crucial. Additionally, it is said that in the near future, AI will develop self-learning capabilities and be able to respond to various situations, leading to the emergence of Artificial General Intelligence (AGI). Furthermore, there are predictions that by 2045 (or even earlier), AI will reach a technological singularity, surpassing human capabilities. This chapter provides an overview of the challenges and necessary initiatives for further coexistence with digital technology in the future.

Section 1 Issues and necessary initiatives to live further in harmony with digital technologies

1. Promotion of use of digital technologies to strengthen industrial competitiveness and solve social issues

Digital technology is an indispensable element for strengthening industrial competitiveness and solving

social issues.

(1) Initiatives to strengthen AI development capabilities

The advancement of AI technology brings progress in other technologies such as robotics and autonomous driving, serving as a key to providing more advanced services. By utilizing AI, it is expected to improve productivity, strengthen industrial competitiveness, and create new markets, making AI a driving force for economic growth. In the field of research and development, there are emerging research areas that aim to innovate research processes through autonomous driving using AI, thereby transforming the foundation of research and development across various fields¹. Additionally, from a security perspective, AI is being utilized in the fields of cybersecurity and military applications. Given the broad and significant impact of AI on improving our lives and welfare, industrial competitiveness, technology (research and development), and national security, it is increasingly important to enhance and expand our own AI development capabilities.

Therefore, the government recognizes the importance of enhancing and expanding the computational resources and data, which are considered the infrastructure for AI development², and has begun supporting business initiatives and research and development. Regarding computational resources, support is being provided for the development of LLMs using the supercomputer “Fugaku”³ and the provision of GPU cloud services. Additionally, efforts are being made to collect, generate, and manage high-quality training data, which significantly affects the performance of AI models, and to share such high-quality data among research institutions and companies. The NICT is leveraging its knowledge accumulated through research and development in AI natural language processing, such as multilingual speech translation, to enhance and expand large volumes of high-quality and safe Japanese language data suitable for AI learning, and is providing access to this

¹ One of the six cross-disciplinary goals of the “Strategic Creative Research Promotion Project for FY2024,” announced by the MEXT on March 15, 2024, was “Research Innovation through Autonomous Driving.” The autonomous research approach aims not only to improve efficiency and speed up the most time-consuming experimental processes through the automation of physical experiments by robots, but also to achieve logical reasoning beyond human cognitive abilities by finding regularities in complex phenomena that cannot be fully described by equations during hypothesis formulation and prediction processes. This approach is expected to bring about a paradigm shift in research activities. The autonomous research approach has the potential to innovate scientific research methodologies by overcoming human cognitive limitations and biases, enabling the elucidation of complex phenomena and the exploration of new research areas. <https://www.mext.go.jp/b_menu/houdou/2023/mext_000010.html>

² “Tentative Summary of AI Issues” (2nd AI Strategic Council, May 26, 2023). Refer to 3-3 AI development capabilities in page15. <https://www8.cao.go.jp/cstp/ai/ai_senryaku/2kai/ronten.pdf>

³ Tokyo Institute of Technology, Tohoku University, Fujitsu, and RIKEN announced they develop a large-scale language module using the supercomputer “Fugaku” in the “Fugaku” policy framework. From August 2023, Nagoya University, CyberAgent, Kotoba Technologies Inc. have been added to the list of participating institutions.

“Regarding development of large-scale language model distributed parallel learning method for supercomputer “Fugaku” policy response framework” May 22, 2023, <<https://www.titech.ac.jp/news/2023/066788>>

data to private companies and academia⁴. Furthermore, support is being provided to strengthen research and development capabilities for efficient and accurate learning methods, and methods to ensure transparency and reliability through the elucidation of the principles of foundational models⁵.

Through such collaboration between industry, government, and academia, it is important to promote the development of domestic LLMs, create models tailored to domestic needs, and provide AI optimized for the Japanese language and culture (See Section 1 in Chapter 4.).

Moreover, the advancing development of domestic LLMs is expected to have significant potential for expanding the construction of unique language models in non-English-speaking countries such as Southeast Asian nations⁶. In Southeast Asian countries, it is predicted

(2) Initiatives for utilizing digital technologies to solve social issues

Japan faces various social challenges such as demographic changes, economic structural shifts, aging infrastructure, and increased natural disaster risks. In particular, local communities are grappling with issues such as labor shortages, declining regional industries, and the maintenance of public and quasi-public services. The use of digital technology is expected to play a crucial role in addressing these challenges.

The MIC has been working on promoting regional community digital transformation (DX) by establishing information and communication infrastructure to support the revitalization of regional economies, based on “The Vision for a Digital Garden City Nation” and “Digital Administrative and Financial Reform”. However, there is a recognition that not all previous efforts in regional community DX have directly contributed to solving regional issues. As a result, a “Discussion Panel on the Information and Communication Infrastructure and Utilization for Achieving Vibrant Regional Communities” has been convened since December 2023 to consider the policy direction necessary to achieve vibrant and diverse regional communities. As one of the discus-

sion items of this panel, there was a discussion on “the ideal way to establish an information and communication usage environment required for each use case” from the perspective of how to develop and popularize the optimal information and communication usage environment for use cases such as autonomous driving for maintaining local community transportation and smart agriculture for sustaining local industries. In the “Report (Draft)” of May 2024, it was indicated that “we should promote the verification and establishment of utilization models for advanced technologies, including AI and the metaverse, which are essential elements for advancing DX in areas such as automatic management of agricultural products, disaster countermeasures, and mobility for regional industrial promotion and solving social issues, and we should advance the verification and categorization of the optimal combination of communication technologies according to the usage purposes. The panel is scheduled to finalize its recommendations in July, and the MIC aims to promote policies necessary for realizing vibrant and diverse regional communities based on the panel’s findings.

(3) Efforts for improving market environment and user protection through enhanced transparency

Traditionally, the IT industry has been led by Big Tech companies represented by “GAFAM” (Google, Amazon, Facebook (now Meta Platforms), Apple, and Microsoft). However, with the advancement and proliferation of AI, there are growing concerns about the further concentration of data within these Big Tech companies. In the digital market platforms and cloud services, Big Tech companies already hold dominant positions. With the advent of AI, tech companies referred to as the

“Magnificent Seven” and the “Big Four” are expanding their dominance. The “Magnificent Seven” includes GAFAM, NVIDIA, which is said to hold nearly 90% of the market share for GPUs essential for generative AI⁷, and Tesla, one of the world’s largest electric vehicle manufacturers. The “Big Four,” also known as “GOMA” (Google, OpenAI, Microsoft, and Anthropic (a the U.S. startup)), have already accumulated technical and business advantages in the digital market⁸.

⁴ “Providing access to learning language data maintained by the MIC and the NICT” (September 8, 2023, 5th AI Strategic Council Materials 3-4) <https://www8.cao.go.jp/cstp/ai/ai_senryaku/5kai/datateikyoku.pdf>

⁵ “Major AI-related measures (draft)” (August 4, 2023, 4th AI Strategic Council Materials 2) <https://www8.cao.go.jp/cstp/ai/ai_senryaku/4kai/shisaku.pdf>

⁶ Based on an interview with Professor KAWAHARA Yoshihiro, Graduate School of Engineering at the University of Tokyo (conducted on March 19, 2024)

⁷ “Why did semiconductor giant NVIDIA become a “super profitable” company with a high profit? Approaching the secret behind the “3.7 times growth in sales” of a \$2 trillion company,” “Business Insider Japan PREMIUM” March 11, 2024 issue

⁸ The Atlantic, “The Future of AI Is GOMA Four companies are taking over everything.” <<https://www.theatlantic.com/technology/archive/2023/10/big-ai-silicon-valley-dominance/675752/>> (accessed on February 29, 2024)

The reasons for the increasing competitive advantage of these Big Tech companies include network effects⁹ and high switching costs¹⁰, as well as the enormous costs associated with AI development and operation. For example, it is said that the operation of OpenAI's generative AI "ChatGPT" costs 700,000 dollars (about 100 million yen) per day¹¹, and the execution of Google's generative AI "Bard" is estimated to cost about ten times that of Google Search¹².

Additionally, Microsoft, Google, and Amazon account for about two-thirds of the global cloud computing market share, and Meta Platforms owns a powerful proprietary data center network. Companies developing AI products need to rely on one or a combination of cloud services from Microsoft Azure, Google Cloud Platform, or Amazon Web Services (AWS). The more these major cloud platforms are used, the more profitable it becomes for Big Tech companies, thereby increasing their dominance.

Furthermore, creating AI programs requires not only computing power but also vast amounts of training data. These Big Tech companies have a competitive advantage in collecting massive amounts of data, putting them in a highly favorable position¹³.

In response to the increasing dominance of Big Tech

companies in the digital market, Japan has taken steps to enhance the transparency and fairness of transactions on digital platforms. In February 2021, the "Act on Improving Transparency and Fairness of Digital Platforms" (Act No. 38 of 2020) was enacted. This law designates certain digital platform providers, particularly those offering platforms where the need to enhance transaction transparency and fairness is high, as "specified digital platform providers."¹⁴ These providers are required to disclose transaction terms to users, provide advance notice of changes, ensure fairness in operations, handle complaints, and report on their operational status, including information disclosure.

Furthermore, in 2024, recognizing that providers of specific software essential for smartphone use, such as mobile OS, app stores, browsers, and searching services, are in an oligopolistic state by a few powerful companies, and that various competitive issues are arising, a bill titled "Act on Promoting Competition in Specific Software Used in Smartphones" was submitted to the Diet and passed in June. This law aims to ensure security and privacy while fostering innovation through competition, allowing consumers to choose from a diverse range of services and enjoy the benefits thereof.

2. Ensuring the healthiness of information circulation in digital space, improving the literacy and developing human resource

(1) Efforts to ensure the healthiness of information circulation in the digital space

The way citizens access information is undergoing significant changes, as exemplified by the evolving relationship between traditional media and their readers/viewers, and it is expected to continue evolving. Particularly among the younger generation, there is a noticeable trend of frequently using news curation services like Yahoo! News and SmartNews to obtain news, which

has led to concerns that the presence of individual news organizations providing content to these services is diminishing¹⁵. Additionally, search results from search engines and content on social media platforms are displayed based on algorithms that reflect users' browsing histories, raising issues such as "Filter Bubbles"¹⁶ and "Echo Chambers."¹⁷



Figure (related data) Behavior when to obtain latest news online in the 2023 White Paper on Information and Communications in Japan (Japan, the U.S., Germany, China)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00087>
(Data collection)

⁹ This concept means that the more participants there are in a network, the greater the value of that network and the more participants it attracts. As a result, services with a large number of users tend to be able to acquire more users and expand in scale. (Chapter 2, Section 2 in 2023 White Paper on Information and Communications)

¹⁰ This concept means that financial, procedural, and psychological burdens that occur when switching from the product or service currently being used to another alternative product or service. If a platform provider provides various services in conjunction with each other, the effect of reducing switching costs will be higher, and the co-creation effect between these services will be weakened. (Chapter 2, Section 2 in 2023 White Paper on Information and Communications)

¹¹ "The hegemony of the IT industry will change from "GAFAM" to "GOMA"...The impact of "generative AI" that will completely change the power relationship of Big Tech", "President Online" February 16, 2024 issue

¹² The same as above.

¹³ AI Now Institute, "2023 Landscape CONFRONTING TECH POWER" <<https://ainowinstitute.org/2023-landscape>> (accessed on February 28, 2024)

¹⁴ As of October 2022, there are three companies in the "Comprehensive online shopping mall": Amazon, Rakuten, and Yahoo, and two companies in the "App store": Apple, iTunes, and Google LLC, and there companies in the "online advertising": Google, Meta Platforms, and Yahoo. They are subject to regulation.

¹⁵ Based on an interview with Professor HEIWA Hiroshi, College of Liberal Arts, J.F. Oberlin University (conducted on March 8, 2024).

¹⁶ "Filter Bubble" is an algorithm that analyzes and learns from the search history and click history of individual internet users, so that information that each user wants to see is displayed on a priority basis, whether they want it or not. It refers to an information environment in which users are isolated from information that does not match their viewpoint, and are isolated in a "Bubble" of their own ideas and values.

¹⁷ An "Echo Chamber" is a group of people with the same opinion who come together and reinforce their opinions, making them believe that their own opinions are infallible. This is a phenomenon in which people become unable to experience diverse viewpoints.

As the tendency for citizens to obtain information from the internet increases, the problem of the circulation and spread of dis-/mis-information online is also expanding¹⁸. With the further advancement of AI, there is a possibility that AI will present more pinpointed information, potentially exacerbating the bias in the information users receive¹⁹. Moreover, the issue of fake advertisements (so-called “Fake Ads” with impersonation) misusing the photos and names of celebrities on social media has become a problem, making the healthiness of information circulation in the digital space an urgent issue.

The MIC has been addressing these issues by amending the Act on the Limitation of Liability for Damages of Specified Telecommunications Service Providers and the Right to Demand Disclosure of Identification Information of the Senders (Act No. 137 of 2001)²⁰ to establish new judicial procedures (non-contentious case procedures) for the disclosure of sender information. In 2024, further amendments were made to require platform operators to expedite deletion responses and increase transparency in their operations, with the amendments enacted in May 2024. The title of the law was also changed to the “Act on Measures for Addressing Rights Infringements, etc., Arising from Information Distribution via Specified Telecommunications” (abbreviated as the Information Distribution Platform Measures Act).

Additionally, to ensure the healthiness of information circulation in the digital space, a new “Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space²¹” was launched in November 2023, taking into account international trends and aiming to comprehensively address the circulation and spread of dis-/mis-information, including institutional measures.

(2) Efforts to improve literacy

As mentioned in the previous section, improving the literacy of citizens who receive information is a crucial element in combating dis-/mis-information. The advent of generative AI has highlighted the urgent need for further literacy updates and continuous reviews.

In Japan, efforts have primarily focused on creating a safe internet environment for young people, emphasizing the prevention of internet troubles and promoting the avoidance of risks associated with ICT use. As the use of ICT and digital services becomes commonplace, it is increasingly important for all generations to learn about the characteristics of digital services, the responsibilities associated with behavior on these services, and how to accept, utilize, and disseminate information in an active and interactive manner.

This study group is discussing the basic principles for ensuring the healthiness of information circulation in the digital space, the roles and responsibilities expected of various stakeholders, and specific measures. In May 2024, the group compiled and published a “Collection of Multi-Stakeholder Initiatives on Countermeasures Against Dis-/mis-information on the Internet” to facilitate easy reference among a wide range of stakeholders from the public, private, and academic sectors and to promote cooperation and collaboration both domestically and internationally. Moving forward, the MIC plans to conduct follow-up hearings with platform operators and advertising-related organizations, including responses to requests made to platform operators related to the Noto Peninsula Earthquake. Based on these hearings, the MIC aims to ensure the transparency and accountability of platform operators’ efforts, promote fact-checking, raise awareness, improve literacy, develop human resources, ensure the reliability of information providers, conduct research and development and verification of technologies, address issues related to digital advertising, and strengthen international cooperation. The MIC plans to publish a summary of these measures around the summer of the same year.

Furthermore, in FY2024, the MIC plans to promote the social implementation of countermeasure technologies by inviting applications for technology development entities through the “Development and Demonstration Project for Countermeasure Technologies Against Dis-/mis-information on the Internet,”²² which aims to address the risks of the circulation of dis-/mis-information on the Internet, including those caused by generative AI.

Since November 2022, the MIC has been holding the “Study Group on Improving Literacy for ICT Utilization” (Chair: YAMAMOTO Tatsuhiko, Professor at Keio University Law School). This group has been discussing and examining the literacy required in the upcoming digital society and the promotion measures for improving literacy. In June 2023, they created and published a roadmap outlining the items to be addressed in the future. The roadmap organizes the direction of short-term and medium- to long-term efforts. In FY2023, as a short-term initiative, they organized the necessary competencies for improving literacy for ICT utilization and developed learning content to address issues common to a wide range of generations.

¹⁸ According to a survey conducted by the MIC in FY2023, approximately half of the respondents (48.0%) said they saw dis-/mis-information on SNS “at least once a week.” (Awareness survey regarding dis-/mis-information in Japan and abroad in FY2023 <https://www.soumu.go.jp/main_content/000945550.pdf>)

¹⁹ Based on an interview with Professor HEIWA Hiroshi, College of Liberal Arts, J.F. Oberlin University (conducted on March 8, 2024).

²⁰ This is a law that clarifies the requirements for limiting the liability for damages of providers, etc., in cases where rights are infringed by the circulation of information on the Internet, and also establishes the right to request the disclosure of sender information from providers.

²¹ Holding of a “Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space” (press release) <https://www.soumu.go.jp/menu_news/s-news/01ryutsu02_02000374.html>

²² MIC “Development and demonstration project of technology to counter dis-/mis-information on the Internet” <https://www.soumu.go.jp/main_sosiki/joho_tsusin/d_syohi/taisakugijutsu.html>

(3) Human resource development in the era of generative AI

As discussed in Chapter 3, the advent of generative AI has had a significant impact on social and economic activities, causing transformations in various business domains. It has been pointed out that “not only in the field of research and development but also in business, basic knowledge is necessary for management to make appropriate investment decisions to promote transformation through the use of generative AI.” Knowledge about the amount of data and computational resources required to build foundational models, the differences between traditional information processing and those requiring foundational models or deep learning, and the appropriate use of technology is essential for management across all industries. Without this knowledge, there is a risk of making substantial investments in unnecessary areas due to misleading promotional claims. Therefore, it is suggested that educational materials to acquire basic knowledge are important for all business sectors, including management²³.

The “Study Group on Human Resource Development Policy in the Digital Age,” which has been held by the METI since February 2021, has been discussing the “Impact of Generative AI on Digital Human Resource

Development” as a major topic for FY2023. In August 2023, they compiled the “Concept of Human Resources and Skills Necessary for Promoting DX in the Era of Generative AI.” This report identifies the following skills as necessary literacy levels in the era of generative AI: (1) digital literacy, including a mindset and stance to continue learning proactively without fearing environmental changes, ethical considerations, and systematic understanding of knowledge; (2) proficiency in instructions (prompts), ability to articulate, and communication skills; and (3) the ability to formulate questions, hypothesize, and verify through experience. In response, the METI reviewed the “DX Literacy Standard (DSS-L)” (established in March 2022), which defines the knowledge and skills that all business persons involved in DX should acquire. They added descriptions related to the mindset and stance necessary for the appropriate use of generative AI, as well as understanding the basic mechanisms, technological trends, usage methods, and associated risks. The discussion will be continued on new issues brought about by the advancement of generative AI.

3. Realization of communication network which is a foundation of digital technologies

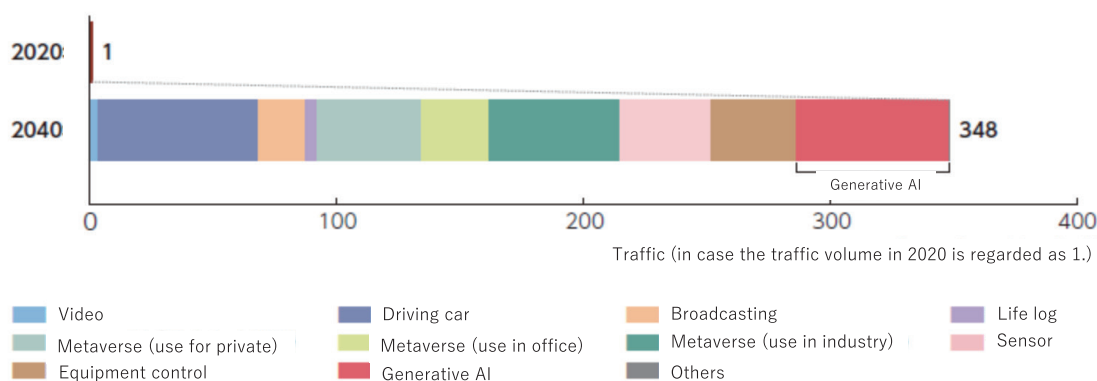
(1) Efforts toward the realization of Beyond 5G

With the explosive proliferation of AI and the expanded use of digital technologies such as robots, there is an increasing demand for instantaneous processing and decision-making. This, in turn, raises the requirements for low latency, reliability, and robustness in information and communication networks. Additionally, ideas such as “AI Constellations,” which function by distributing and interlinking small-scale AIs, have been proposed. To realize such functionalities, the sophistication of network capabilities may be necessary. Furthermore, the integration and unified operation of computational re-

sources like data centers and edge computing with networks are expected to advance further.

Moreover, as data necessary for AI learning and enhancement is generated and circulated in various societal settings, there is a potential for increased communication traffic and a corresponding rise in power consumption. According to Mitsubishi Research Institute, considering the widespread practical application of AI-driven avatars and robots by the 2030s, the volume of data circulation in 2040 is projected to increase 348 times compared to 2020 (Figure 1-6-1-1).

Figure 1-6-1-1 Increase in the data traffic in the age of Beyond 5G



(Source) Mitsubishi Research Institute “Avoiding the triple whammy of ICT infrastructure”²⁴

²³ Interview with Professor KAWAHARA Yoshihiro, Graduate School of Engineering at the University of Tokyo (conducted on March 19, 2024)

²⁴ <https://www.mri.co.jp/knowledge/mreview/202307.html>

To address the increase in data communication traffic and the associated rise in power consumption, and to further the use of digital technology, the realization of Beyond 5G, which enables real-time and large-capacity data transmission while minimizing power consumption, is essential. Beyond 5G aims to further enhance the features of 5G, such as high speed, large capacity, low latency, and massive simultaneous connections. Additionally, it is expected to address the increased power consumption of networks due to the rise in communication traffic driven by the recent trends of remote and online activities, and to realize new functionalities such as scalability, network safety, reliability, and autonomy. The all photonics network technology, which leverages Photonics-Electronics Convergence technology to achieve high-speed networks with significantly reduced power consumption, is also gaining attention.

In September 2021, the MIC consulted the Information and Communications Council on “The Strategy for Information and Communication Technology Toward Beyond 5G - Aiming for a Resilient and Vibrant Society in the 2030s.” In June 2022, an interim report was received. The interim report outlined the envisioned network for Japan, key technological areas such as all photonics network technology, non-terrestrial network

(NTN) technology, and secure virtualized and integrated network technology, and the strategic direction for promoting research and development, social implementation, intellectual property, standardization, and overseas expansion in an integrated manner. Following the interim report, the permanent research and development fund for the NICT has been fully operational, and discussions on the utilization of all photonics networks by public and private institutions have progressed. Internationally, various efforts in research and development and international standardization aimed at capturing the Beyond 5G market have expanded. In light of these developments, the Information and Communications Council resumed discussions in November 2023, with the final report scheduled for June 2024.

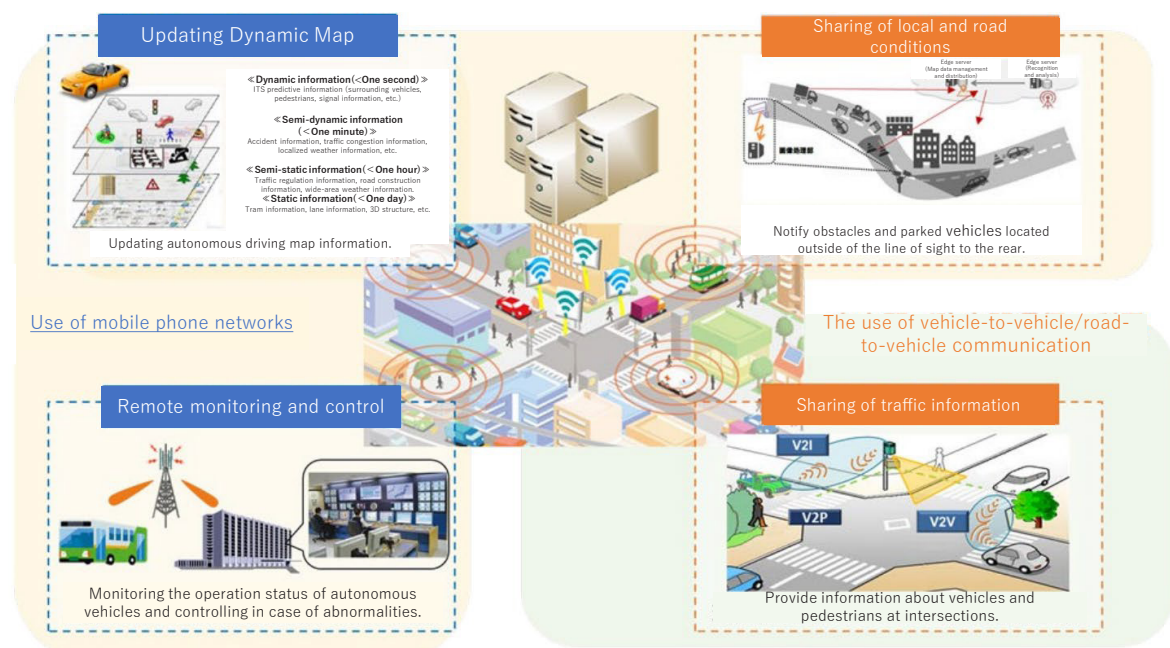
The final report is expected to state that AI will not only be used as a tool for efficiently analyzing vast amounts of data collected from the physical world in a tool optimizing the operation of information and communication networks (AI for Network) and CPS (Cyber Physical System) but also that information and communication networks will function as the foundation supporting a society where AI is utilized ubiquitously, essentially an “AI society” (Network for AIs).

(2) Realization of communication networks for autonomous driving

The realization of advanced autonomous driving is expected to contribute significantly to addressing various social issues such as population decline, aging demographics, and industrial hollowing, by ensuring local transportation and addressing the shortage of truck drivers for logistics. In advanced autonomous driving, communication tailored to specific use cases, such as

updating autonomous driving maps using mobile phone networks, remote monitoring and control, and vehicle-to-vehicle/road-to-vehicle communication for sharing local and road conditions and traffic information, is essential. Efforts are being made to build communication networks for the realization of autonomous driving (**Figure 1-6-1-2**).

Figure 1-6-1-2 Image of telecommunication needed for autonomous driving



(Source) MIC(2023) Interim report of the study group on “Next-generation ITS communication in the era of autonomous driving”

In Japan, the “Comprehensive Strategy for the Vision for a Digital Garden City Nation (Revised Edition 2023)” aims to promote regional transportation through autonomous driving and sets a goal to realize unmanned autonomous driving mobility services in approximately 50 locations by FY2025 and in over 100 locations by FY2027, with relevant government ministries and agencies collaborating. Additionally, the “Comprehensive Plan for National Development of Digital Lifelines” by the METI includes the establishment of support roads for autonomous driving services as one of the Early Harvest Projects. It aims to set up lanes prioritizing autonomous driving vehicles for over 100 kilometers on certain sections of the Shin-Tomei Expressway by FY2024, with the goal of realizing the operation of Level 4 autonomous driving trucks, and to enable the provision of autonomous driving vehicle mobility services in 50 locations nationwide by FY2025 and in 100 locations nationwide by FY2027.

Regarding the consideration and establishment of communication standards necessary for the realization of autonomous driving, collaborative efforts between industry, academia, and government have been ongoing since 2014 under the Strategic Innovation Promotion Program (SIP) for Autonomous Driving by the Cabinet Office. In 2022, the “Cooperative Autonomous Driving Communication Method Roadmap” was formulated. This roadmap outlines the use cases related to autonomous driving, indicating “the utilization of existing ITS radio (760MHz band) for early use cases” and “the need for new communication methods (5.9GHz band) around 2030 for mediation and negotiation by around 2040”. In response, the MIC held the “Study Group on Next-Generation ITS Communication for the Autonomous Driving Era” from February 2023. The group discussed the following topics: (1) use cases assuming the utilization of “next-generation ITS communication,” (2) strategies for integrating V2X communication with mobile networks (V2N communication), (3) allocation policies for the 5.9GHz band for V2X communication and the direction

of the implementation roadmap, and (4) challenges for implementation and other promotion strategies. In August of the same year, it published an interim summary stating “the consideration of allocating a maximum 30MHz bandwidth for V2X communication in the 5,895-5,925MHz band, taking into account international frequency harmonization and interference with existing radio stations”. In the future, the “short-term tasks” identified in the interim summary, such as “in-depth exploration of use cases for 5.9GHz band V2X communication, consideration of communication methods and expansion strategies,” “technical examination of 5.9GHz band V2X communication systems with adjacent systems (broadcasting, wireless LAN, ETC, etc.) (frequency sharing examination),” and “examination of measures to promote frequency migration for broadcasting wireless stations,” will be pursued. Furthermore, with the aim of early implementation of 5.9GHz band V2X communication, the MIC allocated 20.5 billion yen in the supplementary budget for FY2023 for the promotion of digital infrastructure development for the implementation of autonomous driving, and plans to work with relevant ministries and agencies to conduct verification of autonomous driving trucks on the Shin-Tomei Expressway and other activities.

Additionally, to ensure the reliability of communication systems necessary for safe and efficient autonomous driving, the MIC is conducting verifications under the “Regional Digital Infrastructure Utilization Promotion Project (Autonomous Driving Level 4 Verification Type)” and plans to develop a model collection that regions considering the introduction of autonomous driving can refer to by around FY2024, based on the results of these verifications. This model collection aims to support the development of regional information and communication environments necessary for ensuring the reliability of communication systems during the implementation of autonomous driving.

4. Creation and application of rules and international cooperation to ensure safe, secure and reliable use

With the advancement of AI, it is anticipated that the risks and challenges posed by digital technologies will become more severe. Therefore, the establishment and adherence to rules regarding AI governance and regulation, in coordination with international efforts, are indispensable. As mentioned in Chapter 4, Japan has already formulated AI Business Operator Guidelines and is conducting awareness activities to ensure that these guidelines are widely known and voluntarily adhered to by private businesses. Alongside the implementation of these AI Business Operator Guidelines, the government, centered around the AI Strategic Council, plans to continue examining the overall framework of regula-

tions²⁵.

Furthermore, it is essential to strengthen cooperation and collaboration in multilateral forums such as the G7, the OECD, the GPAI, and the United Nations. Regarding the Hiroshima AI Process, which was initiated at the G7 summit in May 2023, Japan, as the chair country, led intensive discussions among G7 countries. By December of the same year, an agreement was reached on the “Hiroshima AI Process Comprehensive Policy Framework,” the first international policy framework aimed at addressing advanced AI systems such as generative AI, and the “Work Plan to advance the Hiroshima AI Process,” which outlines future G7 initiatives. The impor-

²⁵ “AI Strategy Issues and Responses” (May 22, 2024, 9th AI Strategic Council Materials 1-1) https://www8.cao.go.jp/cstp/ai/ai_senryaku/9kai/shiryoy1-1.pdf

tance of interoperability between AI governance frameworks was emphasized within these agreements. Italy, the G7 chair country for 2024, has expressed its commitment to the continued promotion of the Hiroshima AI Process. The “G7 Industrial, Technology, and Digital Ministerial Declaration” adopted in March 2024 welcomed actions to promote the dissemination, adoption, and application of the Hiroshima AI Process outcomes among key partner countries and organizations, including developing and emerging economies.

Additionally, at the OECD Ministerial Council Meeting held in Paris in May 2024, where Japan served as the chair, Japan contributed to the revision of the “OECD AI Principles” adopted in 2019, based on the outcomes of the Hiroshima AI Process. Concurrently, at a side event

on generative AI, Prime Minister Kishida announced the establishment of the “Hiroshima AI Process Friends Group,” a voluntary framework of countries and regions that support the spirit of the Hiroshima AI Process, with participation from 49 countries and regions. Minister of Internal Affairs and Communications Matsumoto stated, “by leading the creation of international rules for AI, Japan will enhance the reliability of its business environment and promote investment in Japan. We aim to achieve Japan-centered standardization in the digital field.”^{26,27} He further plans that Japan will continue to work on implementing international guidelines and cooperate to ensure that people worldwide can use AI safely, securely, and reliably.

²⁶ Minutes of the 5th Economic and Fiscal Policy Council 2024 (May 10, 2024) <<https://www5.cao.go.jp/keizai-shimon/kaigi/minutes/2024/0510/gijiyoushi.pdf>>

²⁷ KASHIBA Sakura, “Microsoft invests 2.9 billion dollars to strengthen Japan’s AI and cloud infrastructure, advancing Japan-U.S. cooperation in the AI field”, “JETRO Business Brief” April 16, 2024, <<https://www.jetro.go.jp/biznews/2024/04/34ae6386dcb01c5b.htm>>

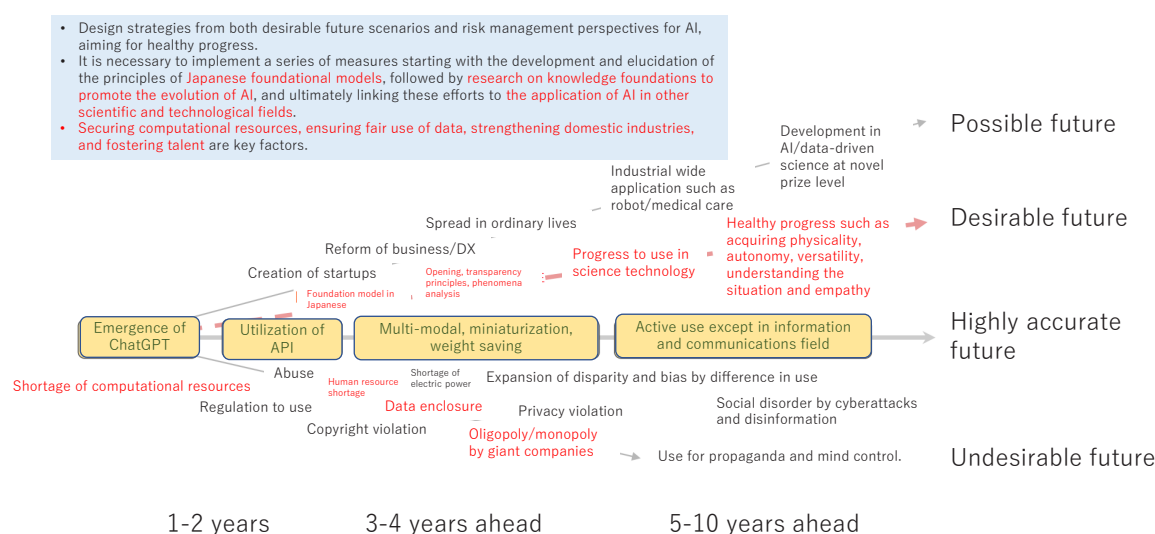
Column Towards a future of collaboration and coexistence with AI and robots (convivial relationships)

(1) Future scenarios of AI

At the second AI Strategic Meeting held in May 2023, Professor KAWAHARA Yoshihiro, Graduate School of Engineering at the University of Tokyo, presented future scenarios for AI (Figure 1). These scenarios predict that multimodal capabilities will be realized within 3-4 years, and that in 5-10 years, generative AI will be inte-

grated into robots, thereby acquiring physicality. Concurrently, the misuse of AI is rapidly advancing, necessitating measures against social disruption caused by cyberattacks and disinformation, as well as the adverse effects of monopolies by large corporations.

Figure 1 Desirable scenario of future of AI and its risks



(Source) 2nd AI Strategy Meeting, Material 2-3 by member KAWAHARA (May 26, 2023)

Considering these future scenarios and risks, it is essential to engage in comprehensive discussions that address not only technological aspects but also ethical and social issues. With the rapid development and proliferation of generative AI, efforts to analyze and seek solutions for the potential risks and challenges (Ethical, Legal, and Social Issues: ELSI) posed by AI technologies and systems to individuals and society have become more active.

The “Principles for a Human-Centric AI Society,” published in March 2019, established three fundamental principles:

1. A society that respects human dignity (Dignity)

(2) Convivial relationships with AI and robots

In building the future society, it is important not to overly depend on technologies like AI, but to balance the potential and risks brought by technological advancements while focusing on human-centered happiness. The concept of conviviality, proposed by Austrian philosopher Ivan Illich in his 1973 book “Tools for Conviviality,” is relevant here. Illich described two critical junctures: the “First Watershed,” where technology emerges and spreads, enhancing human freedom, and the “Second Watershed,” where people begin to be subjugated by technology, losing their freedom. He emphasized the

2. A society where people from diverse backgrounds can pursue diverse forms of happiness (Diversity and Inclusion)
3. A sustainable society (Sustainability)

Additionally, the “AI Guidelines for Business,” published in April 2024, emphasize “Human-centric” actions as the primary directive for all stakeholders, stating that “it is crucial for AI to enhance human capabilities and enable the pursuit of diverse forms of happiness (well-being) for various individuals”. The guidelines also highlight the need to address the risks of over-reliance on AI, such as automation bias, which refers to the excessive trust and dependence on automated systems and technologies in human judgment and decision-making.

importance of remaining between these two watersheds.

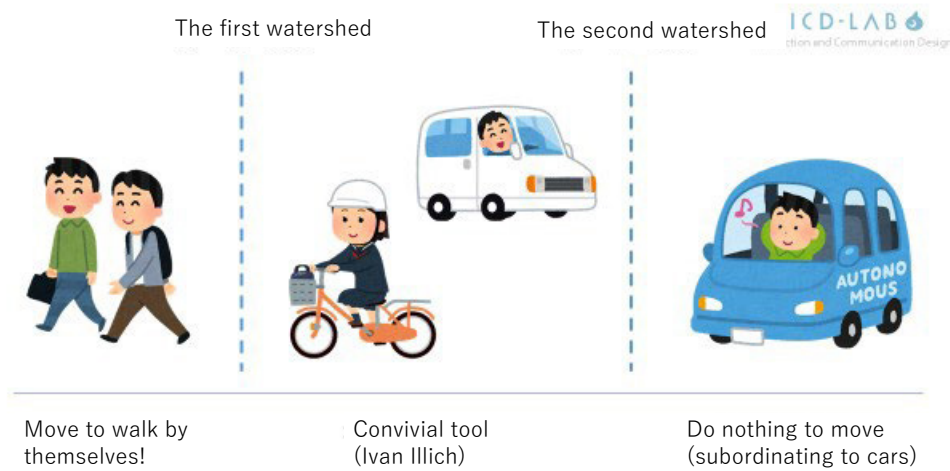
Professor OKADA Michio of Toyohashi University of Technology, who promotes research on “Weak Robots” that coexist with humans, advocates for a convivial relationship with AI and robots. This relationship should involve a gentle mutual dependence that does not undermine each other’s autonomy, allowing both human and robotic capabilities to be fully utilized and enhancing well-being. He proposes “Convivial Robotics,” where robots and humans enjoy a harmonious coexistence.

For example, in the context of mobility, the introduc-

tion of bicycles expanded human capabilities (the first watershed), but the advent of cars and fully autonomous vehicles may lead to a sense of passivity, where individu-

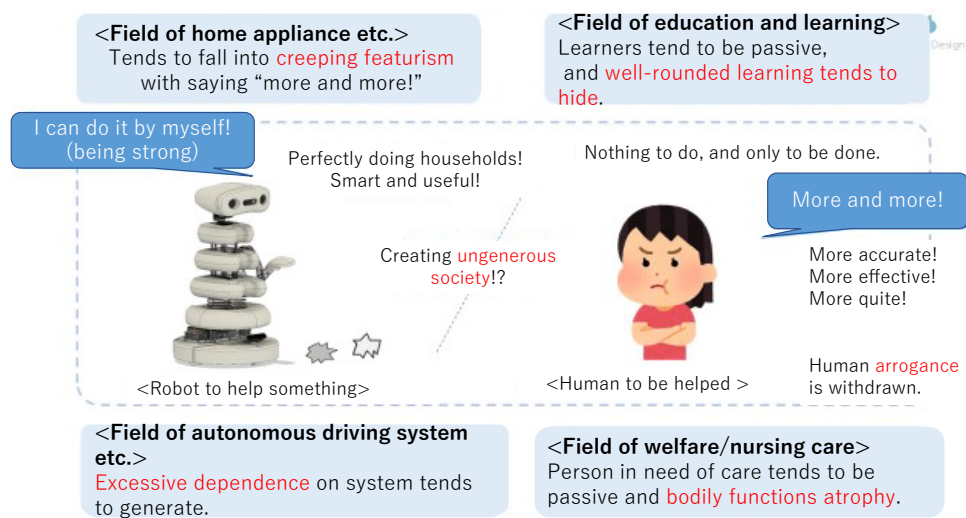
als feel like “Cargo” rather than active participants (the second watershed).

Figure 2 Conviviality in mobility (convivial relationship)



(Source) Provided material by professor OKADA Michio

Figure 3 Intolerance by “Creeping Featurism”



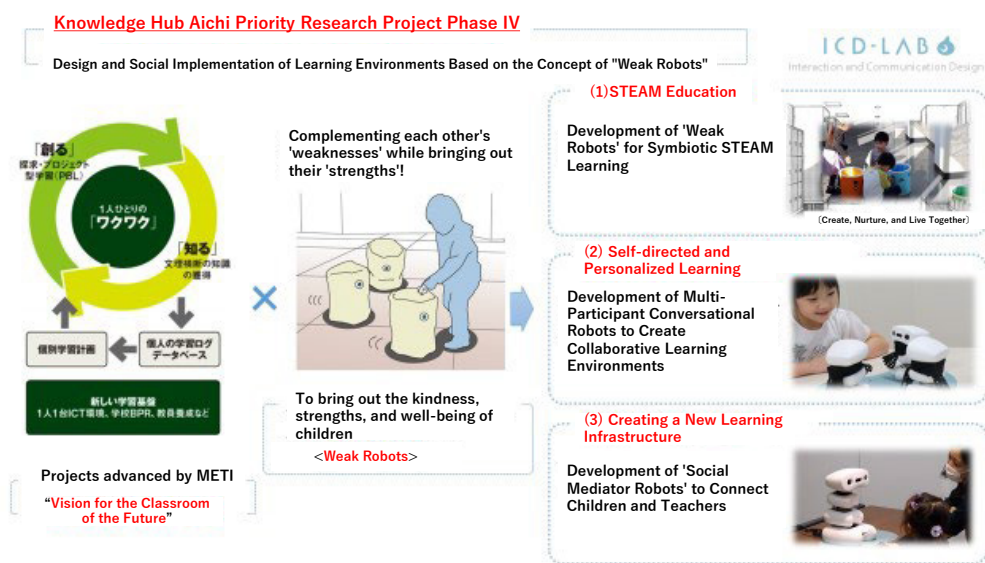
(Source) Professor OKADA Michio provided material

Traditional product and service development often follows an “Additive” approach, continuously adding functions, which cognitive scientist Donald Norman referred to as “Creeping Featurism.” However, excessive pursuit of functionality and convenience can undermine user autonomy, increase demands, and lead to a costly and exhausting arms race for providers. In education and learning, excessive passivity can hinder rich learning experiences, and in welfare and caregiving, it can lead to the deterioration of physical functions in care recipients.

Conversely, for example, in the case of widely accept-

ed cat-shaped serving robots in restaurants nationwide, customers accept the imperfection of having to serve the food brought to the table by themselves and are seen to cooperate lively, even yielding the way for the robot. In this example, without incurring significant costs to add a serving function to the table, the purpose is achieved within a symbiotic relationship between the service provider and the recipient, creating a natural state of happiness for the robot manufacturer, the restaurant, and the customers, transcending the boundaries between them.

Figure 4 Social implementation of “Weak Robot” in educational field



(Source) Professor OKADA Michio provided material

Part 2

Current Status and Challenges for Information and Communications



Chapter 1

Trends in the ICT Market

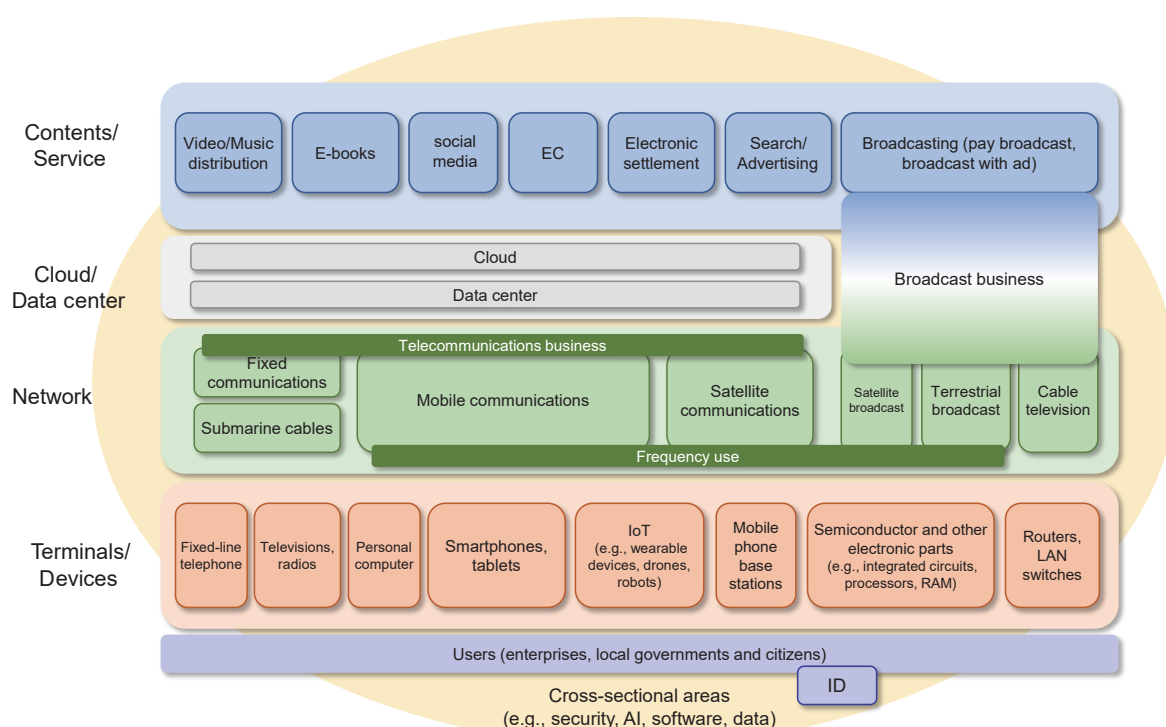
Section 1 Trends in the ICT industry

1. Size of the ICT market

ICT includes devices and terminals that serve as user interfaces, networks provided by telecommunications and broadcasting companies, cloud and data centers,

content services such as video and music streaming, and security and AI (**Figure 2-1-1-1**).

Figure 2-1-1-1 Structure of the ICT market by layer



The global ICT market (expenditure)¹ has been on an upward trend since 2016, driven by the proliferation of smartphones and cloud services. In 2023, it is expected

to reach 657.3 trillion yen² (a 10.3% increase from the previous year³), and it is forecasted to expand to 702.1 trillion yen in 2024⁴ (**Figure 2-1-1-2**).

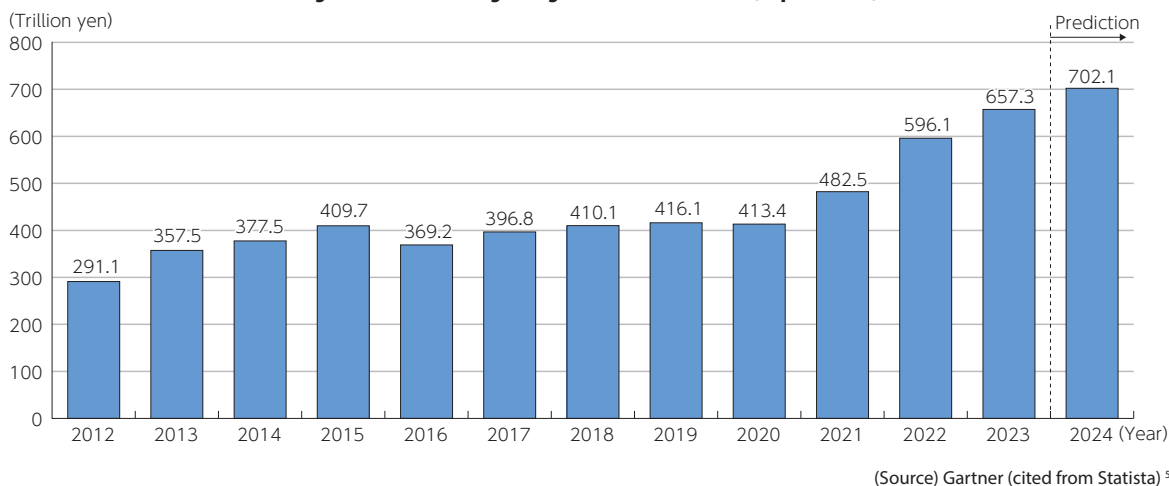
¹ The ICT market includes data center systems, enterprise software, devices, ICT services, and communication services.

² Converted to yen using the average exchange rate for each year, and for 2024, the average exchange rate for 2023 is used (the same applies hereafter).

³ It should be noted that 2023 was also affected by the weaker yen (the same applies hereafter).

⁴ MIC (2024) "Research on trends in domestic and international ICT markets" (the same applies hereafter).

Figure 2-1-1-2 Changes in global ICT market size (expenditure)

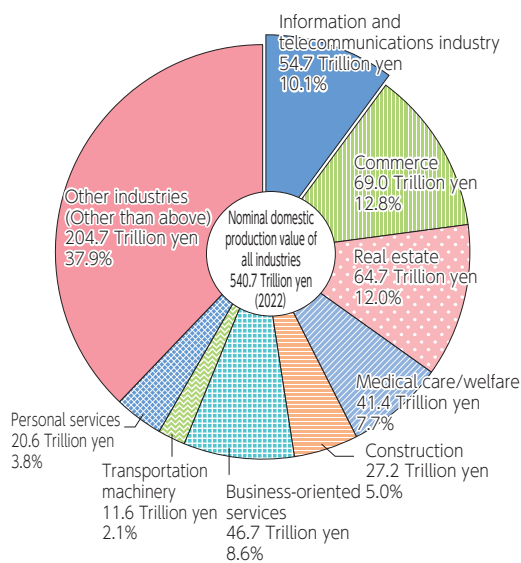


2. Gross Domestic Product (GDP) of the ICT industry⁶

The nominal GDP of the information and communication industry in 2022 was 54.7 trillion yen, a 1.5% increase compared to the previous year (53.9 trillion yen) (Figures 2-1-1-3, 2-1-1-4). When examining the nominal GDP trends by sector within the information and communica-

tion industry, most sectors have remained relatively stable, while the information services and internet-related services sectors have shown an increasing trend (Figure 2-1-1-5).

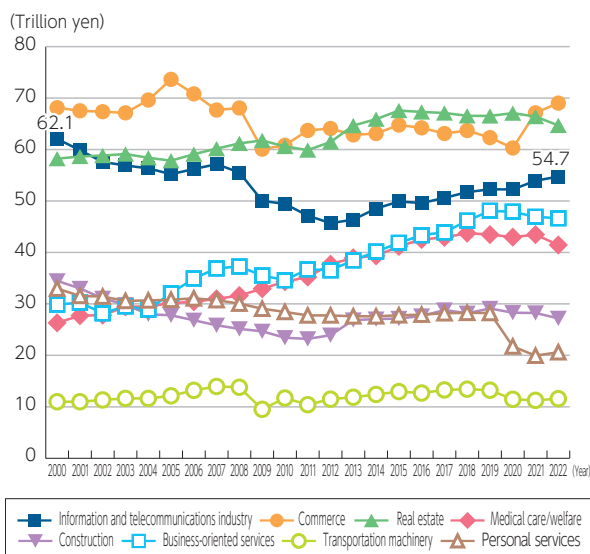
Figure 2-1-1-3 GDP of major industries (nominal)



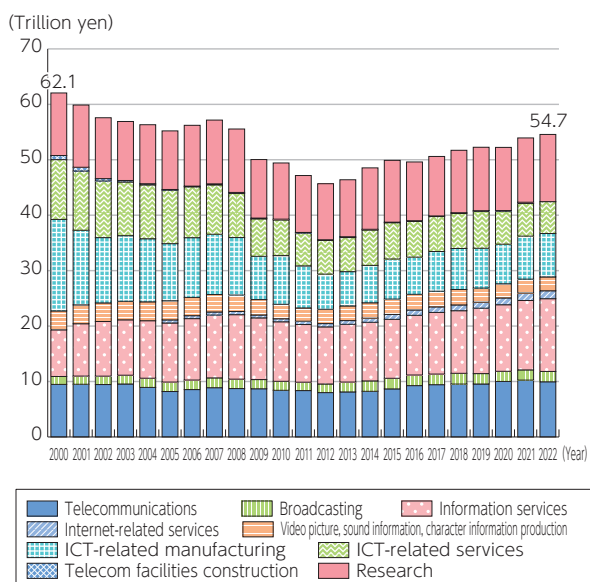
(Source) MIC(2024) "Survey on Economic Analysis of ICT in FY2023"

⁵ <https://www.statista.com/statistics/268938/global-it-spending-by-segment/>

⁶ The ICT industry has nine areas: telecommunications, broadcasting, information services, services incidental to the Internet, video/sound/text information production, manufacturing related to information and communications, services related to information and communications, construction related to information and communications, and research.

Figure 2-1-1-4 Changes in nominal GDP of major industries

(Source) MIC(2024) "Survey on Economic Analysis of ICT in FY2023"

Figure 2-1-1-5 Changes in nominal GDP of the ICT industry

(Source) MIC(2024) "Survey on Economic Analysis of ICT in FY2023"

3. IT investment⁷

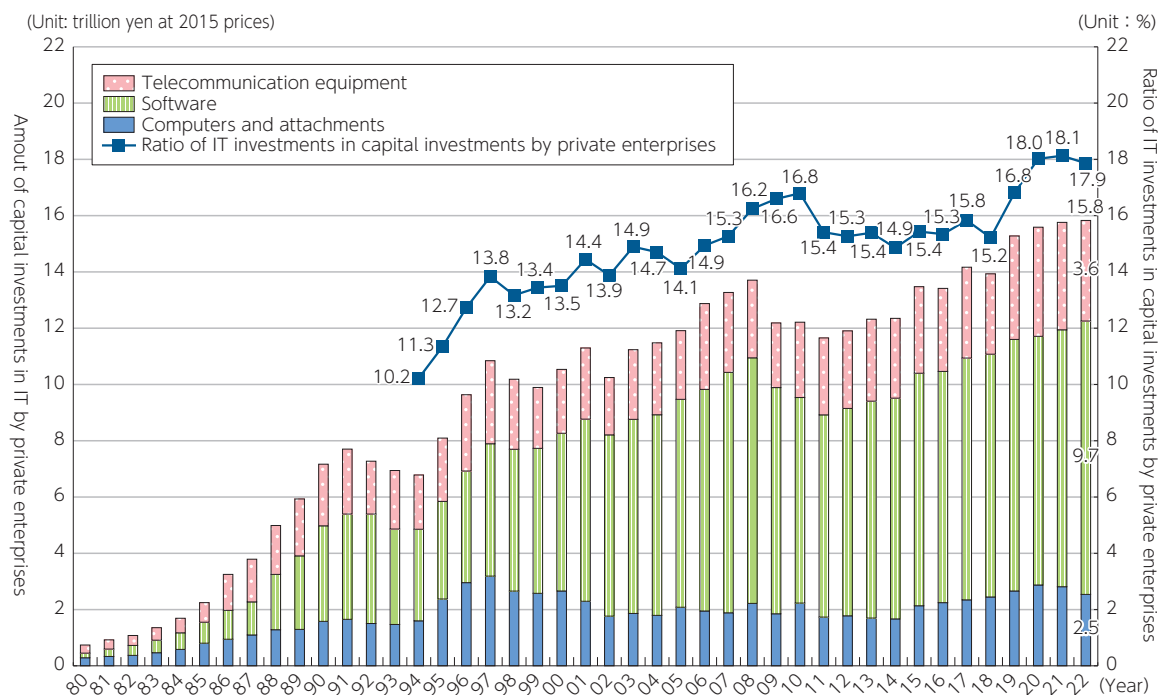
In 2022, private sector IT investment in Japan amounted to 15.8 trillion yen (2015 year prices), a 0.4% increase from the previous year. Software (custom development and packaged software) accounted for 9.7 trillion yen, nearly 60% of the total. The ratio of information investment to total private sector capital investment was 17.9% (a 0.2 percentage point decrease from the previous year), indicating that IT investment holds a significant

position within capital investment (**Figure 2-1-1-6**).

Comparing the trends in IT investment between Japan and the U.S. IT investment showed a rapid recovery after the 2008-2009 Lehman Shock, while Japan's IT investment, although less impacted immediately after the Lehman Shock, has shown a more gradual recovery compared to the U.S. (**Figure 2-1-1-7**).

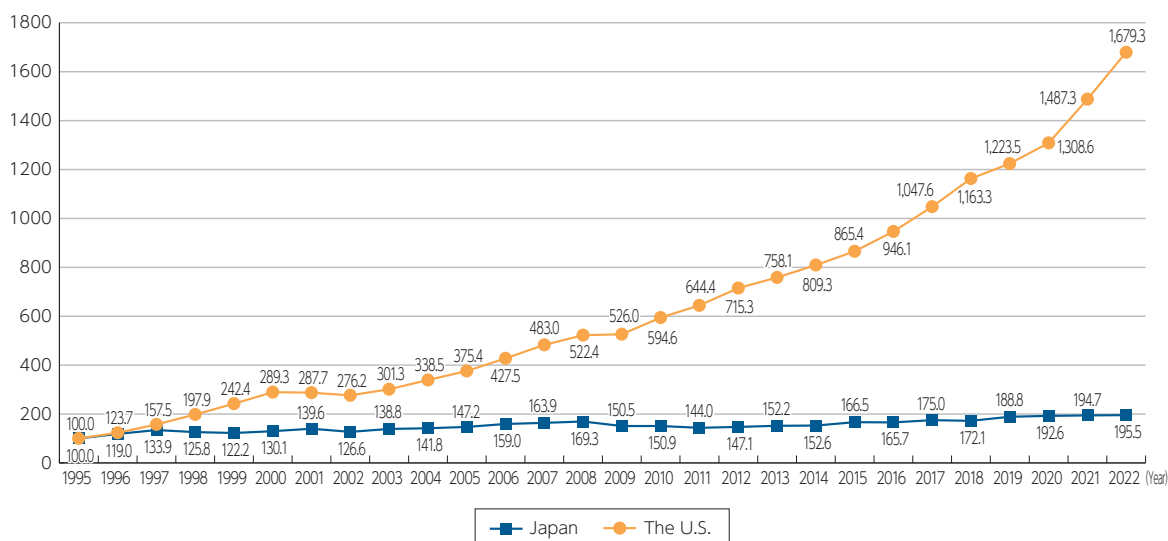
⁷ Here the term refers to investment in information and communications capital goods (computers and attachments, telecommunications equipment, software). The use of cloud services that have spread drastically in recent years is the purchasing of a service rather than the purchasing of capital goods and therefore is not included in IT investment here.

Figure 2-1-1-6 Changes in IT investment in Japan



(Source) MIC(2024) "Survey on Economic Analysis of ICT in FY2023"

Figure 2-1-1-7 Comparison of IT investment in the private sector in Japan and the U.S.



* Indexing year 1995=100 (Japan: price in 2015, the U.S.: price in 2012)

(Source) MIC(2024) "Survey on Economic Analysis of ICT in FY2023"

4. Exports and imports in the ICT field

In 2022, the nominal value of exports and imports of goods and services was 107.3 trillion yen for exports and 152.8 trillion yen for imports. Among these, ICT goods and services⁸ accounted for 13.9 trillion yen in exports (13.0% of total exports) and 23.1 trillion yen in imports (15.1% of total imports). The trade deficit for ICT goods

was 5.6 trillion yen (a 45.6% increase from the previous year), and the trade deficit for ICT services was 3.6 trillion yen (a 10.6% increase from the previous year) (**Figure 2-1-1-8**).

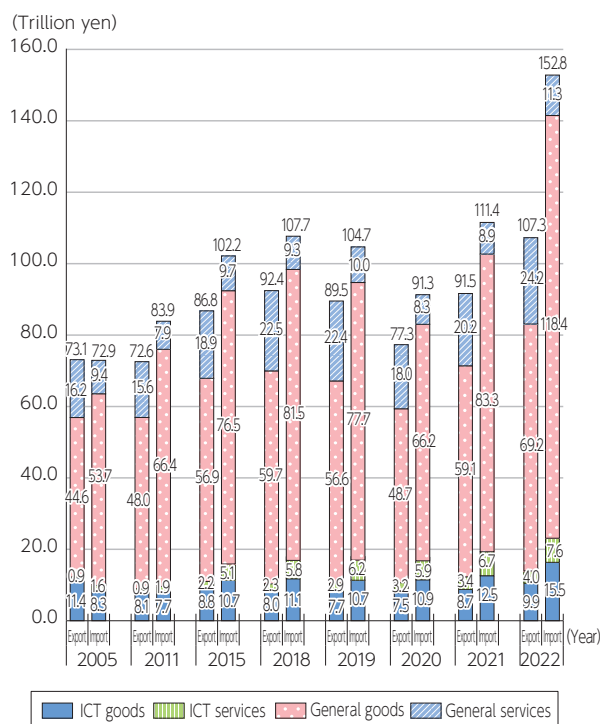
Examining the trends in ICT goods and services exports and imports, ICT services have consistently

⁸ In the table of 77 endogenous sectors, ICT goods and services refers to 1 to 43 and general goods and services refers to 44 to 77 (see in Annotation 4 of Appendix in the 2023 White Paper on Information and Communications in Japan). ICT goods includes communications devices such as personal computers and mobile phones, electronic components such as integrated circuits, televisions and radios, etc. and ICT services includes fixed and mobile telecommunications services, broadcasting services, software businesses, newspapers and publications, etc.

shown a trade deficit since 2005. On the other hand, ICT goods, which had a trade surplus in 2005, have shown a trend of increasing imports and decreasing exports, re-

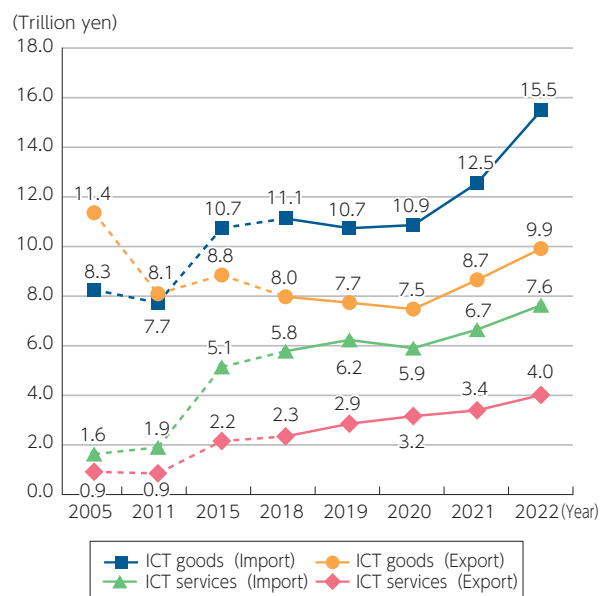
sulting in a trade deficit in recent years. ICT goods account for nearly 70% of both export and import values (Figure 2-1-1-9).

Figure 2-1-1-8 Changes in the value of import and exports of goods and services (nominal)



(Source) Prepared based on MIC "ICT Inter-Industry Table" (for each FY)

Figure 2-1-1-9 Changes in the value of import and exports of ICT goods and services (nominal)



* There are different blanks in the data from 2005 to 2018 so trends are shown sashed lines.

(Source) Prepared based on MIC "ICT Inter-Industry Table" (for each FY)

The balance of digital-related services has been in deficit in recent years, with a deficit of 5.3 trillion yen in 2023⁹. Among these, "Communication, Computer, and Information Services," which include fees for cloud ser-

vices and online meeting systems, have the largest deficit with Singapore (341.4 billion yen), followed by the Netherlands (307.0 billion yen) and the U.S. (230.4 billion yen).

⁹ Here, it refers to computer services, copyright fees, and management/consulting services. Calculated by the MIC from the Ministry of Finance's balance of payments statistics.



Figure (related data) Balance of digital-related services by country (top 3 countries)

Source: Prepared based on the Ministry of Finance's balance of payments statistics
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00110>
(Data collection)

5. Trend of R&D in the ICT field

(1) Situation of research and development expenditure

A Trends in research and development expenditure in major countries

In 2020, the U.S. maintained the top position in research and development expenditure at 76.9738 trillion yen. Following the U.S. are China, the EU, and Japan,

with Japan's research and development expenditure showing a flat trend and the gap with the top countries widening.



Figure (related data) Trend of total expenditure on research and development in major countries

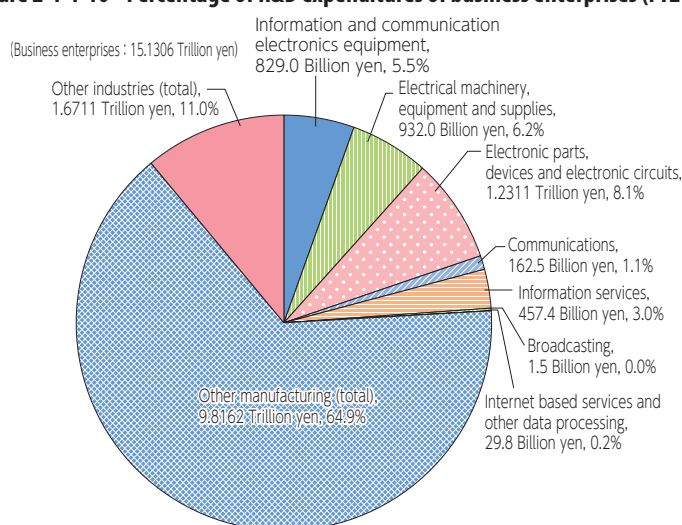
Source: Japan Science and Technology Agency, Research and Development Strategy Center "Overview of Research and Development Report (2023)"
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00114>
(Data collection)

B Situation of research and development expenditure in our country

In FY2022, the total amount of research and development expenditure in our country (the sum of research expenditure by business enterprises, non-profit institutions and public organizations, universities and colleges) was 20.704 trillion yen, with the R&D expenditures of business enterprises amounting to 15.1306 trillion

yen. Among the R&D expenditures of business enterprises, the R&D expenditures in the information and communications industry¹⁰ was 3.6433 trillion yen (24.1%) (**Figure 2-1-1-10**), and it has shown a trend of decrease or stagnation in recent years (**Figure 2-1-1-11**).

Figure 2-1-1-10 Percentage of R&D expenditures of business enterprises (FY2022)

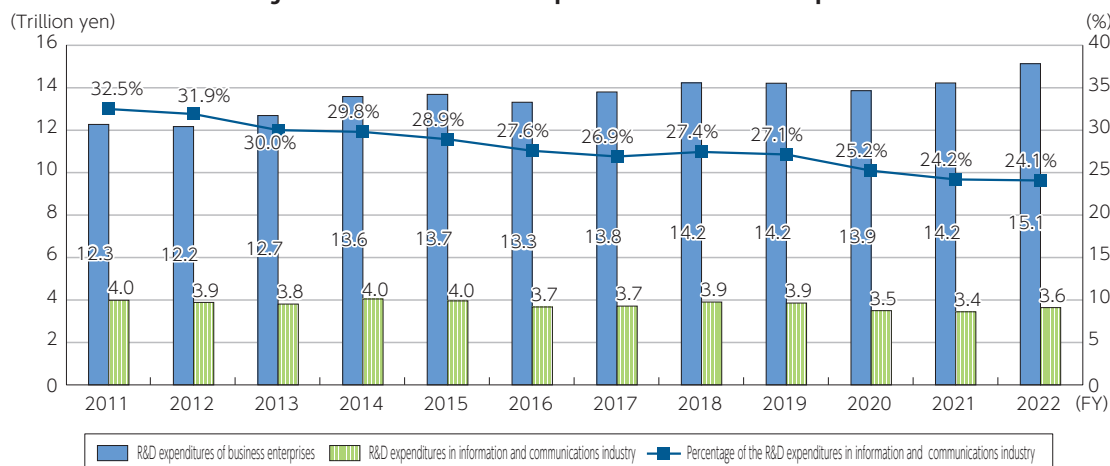


(Source) Prepared based on MIC "2023 Survey of Research and Development"¹¹

¹⁰ Here, the term refers to information and communication electronics equipment, electrical machinery, equipment and supplies, electronic parts, devices and electronic circuits, information and communications (information services, communications, broadcasting, and services incidental to the Internet and other ICT businesses).

¹¹ <https://www.stat.go.jp/data/kagaku/index.html>

Figure 2-1-1-11 Trend of R&D expenditures of business enterprises

(Source) Prepared based on MIC "Survey of Research and Development"¹² for each FY**(2) Situation of persons employed in research and development****A Trends in the number of researchers in major countries**

The number of researchers in major countries¹³ is increasing. In 2022, the number of researchers in Japan was 705,000, ranking third in size after China (1.866 million in 2018) and the U.S. (1.493 million in 2020). Look-

ing at the latest values for other countries in descending order, the Republic of Korea (471,000 in 2021), Germany (460,000 in 2021), France (340,000 in 2021), and the UK (296,000 in 2017).

**Figure (related data) Changes in the number of researches in major countries**

Source: National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2023"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00125>
 (Data collection)

B Number of researchers in our country

At the end of FY2022, the number of researchers in our country (the total number of researchers in business enterprises, non-profit institutions and public organizations, universities and colleges) was 910,393 with the number of researchers in companies being 530,587.

Among the researchers in business enterprises, the number of researchers in the information and communication industry was 153,854 (29.0%), showing a decreasing trend in recent years (**Figure 2-1-1-12**).

Figure 2-1-1-12 Trend in the number of researchers in business enterprises

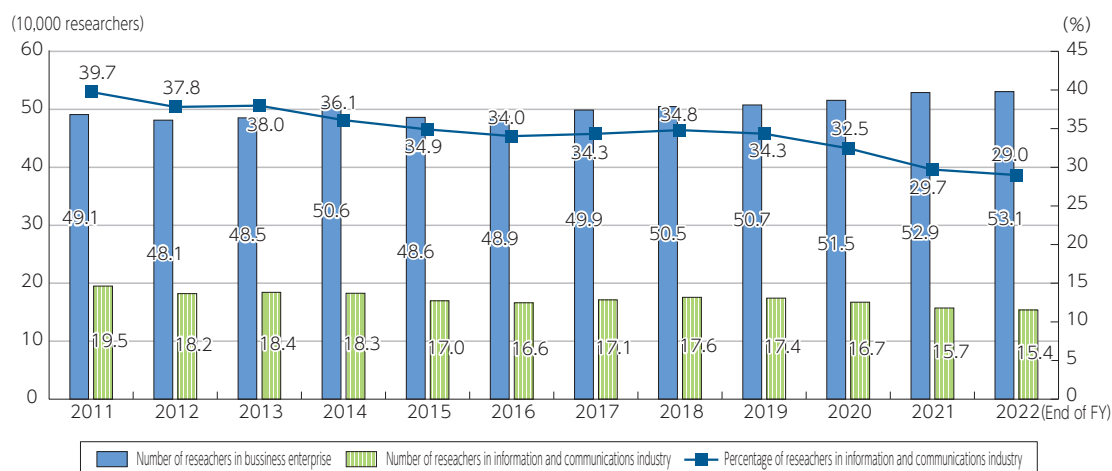
(Source) Prepared based on MIC "Survey of Research and Development"¹⁴ for each FY¹⁴¹² <https://www.stat.go.jp/data/kagaku/index.html>¹³ Measured by converting research work into fulltime employment.¹⁴ <https://www.stat.go.jp/data/kagaku/index.html>



Figure (related data) Percentage of the number of researchers at business enterprises by industry (as of March 31, 2023)

Source: Prepared based on MIC "2023 Survey of Research and Development"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00127>

(Data collection)

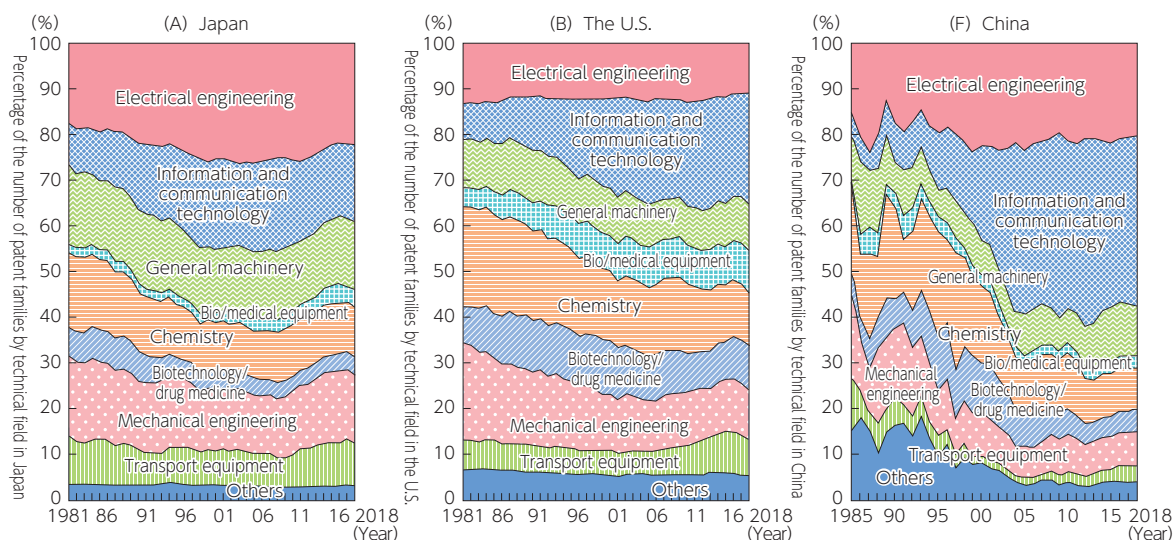
(3) Patent situation

The number of patent applications to the U.S. was 591,000 in 2021. The proportion of applications from non-residents has been increasing in recent years, suggesting that the U.S. market is attractive to overseas entities. The number of applications to Japan was 289,000 in 2021, ranking third in size after China and the U.S. However, the number of patent applications has been

decreasing since the mid-2000s, leading to a growing gap.

Looking at the proportion of patent families¹⁵ in the fields of technology in Japan, the U.S., and China, it is evident that the proportion of "Information and Communication Technology" is increasing in the U.S. and China, while it is stagnant in Japan (**Figure 2-1-1-13**).

Figure 2-1-1-13 Change in percentage of the number of patent families by technical field in Japan, China and the U.S.



(Source) National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2023"



Figure (related data) Changes in the patent application in major countries and from major countries

Source: National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2023"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00129>

(Data collection)

(4) Trends in research and development of major domestic and international companies in the ICT field

The ratio of research and development expenses to sales in 2022 for major domestic and international information and communication-related companies, excluding some such as IBM, remained below 10% (**Figure 2-1-1-14**).

For major Japanese telecommunications companies,

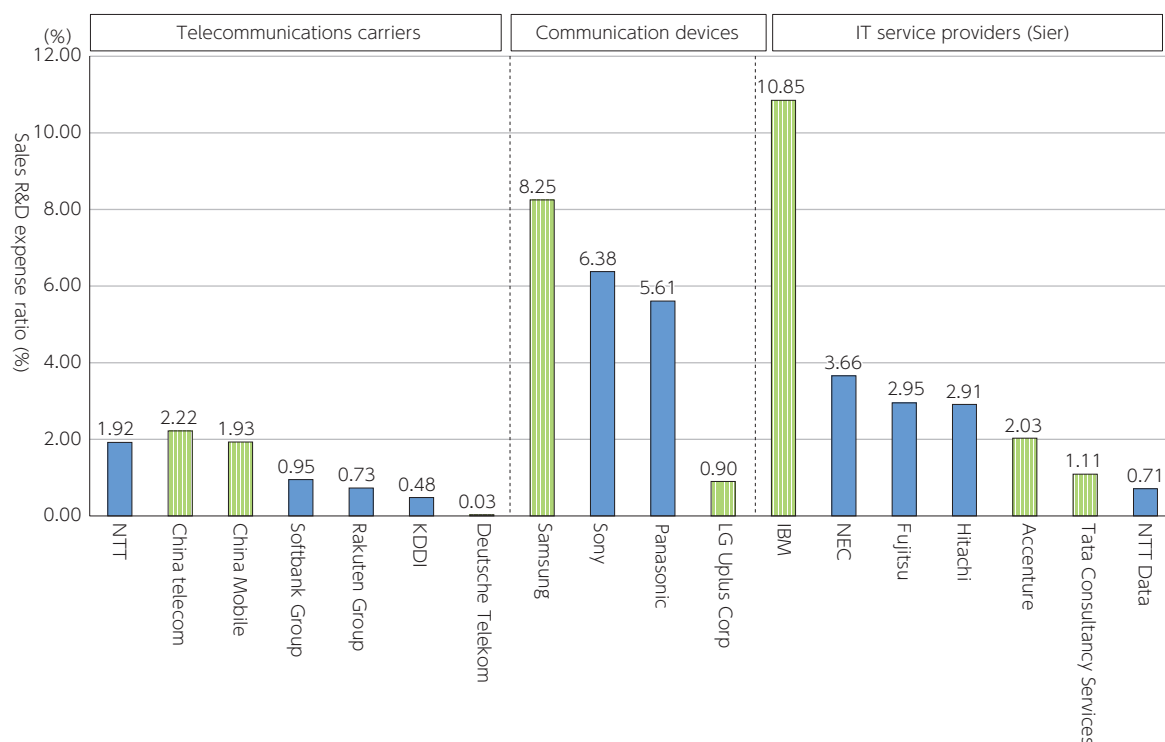
the ratio of research and development expenses to sales in 2022 was 2% for NTT, and less than 1% for KDDI and SoftBank, while GAFAM¹⁶, excluding Apple, had a ratio of approximately 10% to 35%, indicating an active commitment to research and development (**Figure 2-1-1-15**).

¹⁵ A patent family is a bundle of patent applications in two or more countries that are linked directly or indirectly by priority rights. Generally, patents with the same content that are filed in more than one country belong to the same patent family. Thus, counting patent families prevents the same application from being counted twice. In other words, the number of patent families is considered to be approximately the same as the number of inventions.

https://www.nistep.go.jp/sti_indicator/2021/RM311_45.html

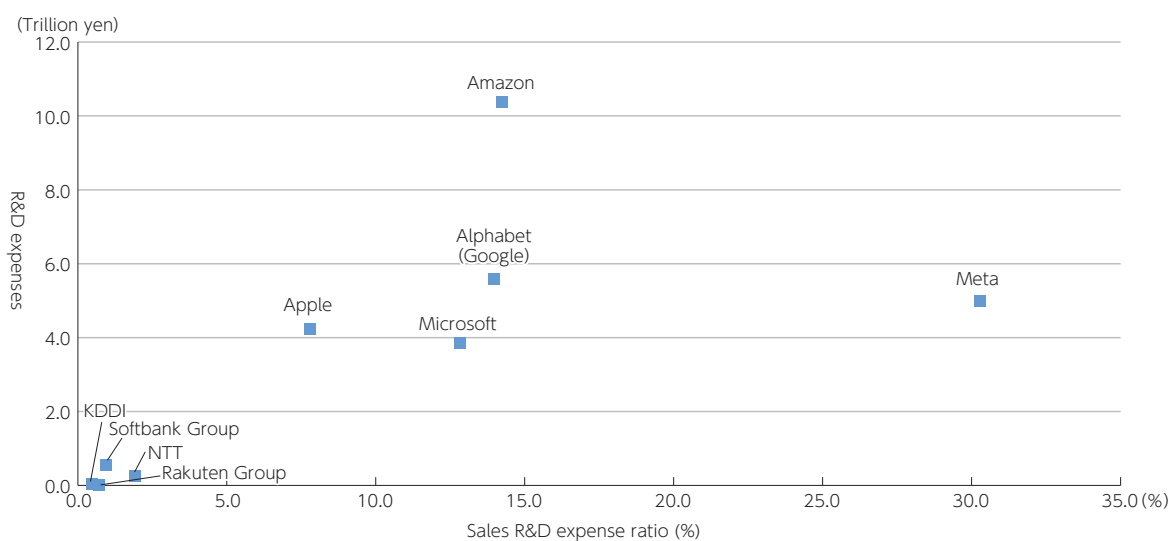
¹⁶ Alphabet (Google), Amazon, Meta (facebook), Apple, Microsoft

Figure 2-1-1-14 Comparison of research and development expenditure by telecommunications carriers, communications devices and IT service providers (2022)



(Source) Prepared based on the annual reports etc. by each company

Figure 2-1-1-15 Comparison of research and development expenditure between major Japanese companies and GAFAM (2022)



(Source) Prepared based on the annual reports etc. by each company

(5) Example of research and development of new technologies in the ICT field: IOWN Optical and Wireless Network fusion device

The “Innovative Optical and Wireless Network (IOWN)” concept, led by NTT, aims to create a rich society that optimizes individual and collective diversity based on all information, utilizing innovative technologies centered around light to provide high-speed, high-capacity communication and vast computing resources beyond the limitations of existing infrastructure, including network and information processing platforms, including terminals.

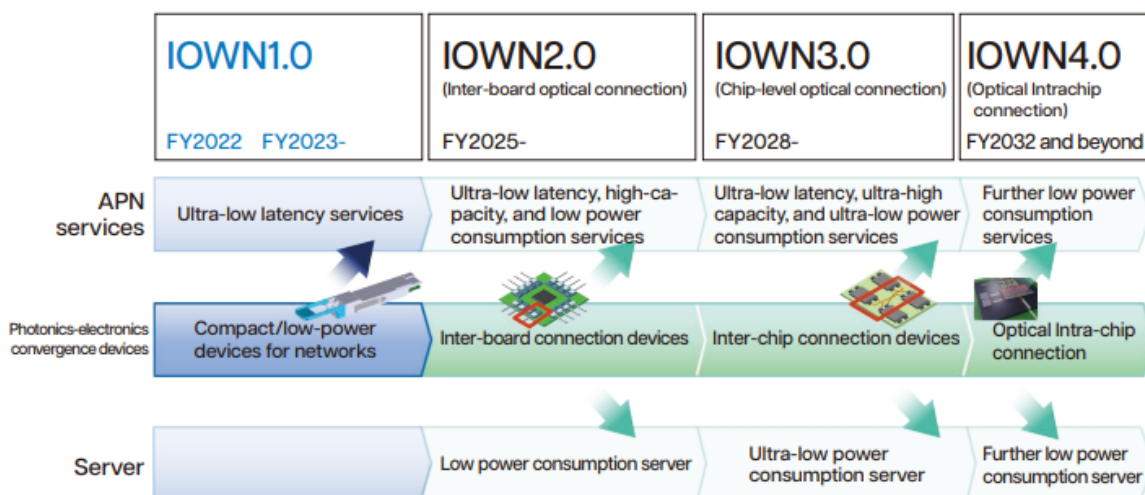
The optical-electronic fusion technology in the IOWN concept is a technology that integrates circuits handling electrical signals and circuits handling optical signals,

particularly important for high-speed transfer of large amounts of data in server-to-server communication and internal computer communication. By integrating electronic and optical devices into a single system, optical-electronic fusion devices can improve data transfer speeds and energy efficiency, making them essential in the IOWN concept. The optical-electronic fusion devices developed in IOWN 2.0 achieve optical connections between boards using tile-type optical engines, promoting low-latency and low-power consumption in All-Photonics Network (APN). Furthermore, the optical-electronic fusion devices developed in IOWN 3.0 enable optical con-

nections between packages by placing the optical-electronic fusion parts next to the silicon (die) inside the package, allowing further miniaturization and low-power consumption of boards. IOWN 2.0 realizes optical connections between boards, IOWN 3.0 realizes optical connections between chips, and IOWN 4.0 is expected to achieve optical connections within chips. By FY2025,

board connection devices for IOWN 2.0, by FY2028, chip-to-chip connection devices for IOWN 3.0, and from 2032 onwards, chip internal opticalization for IOWN 4.0 are expected to be achieved, aiming to realize new devices with 100 times the power efficiency (**Figure 2-1-16**)¹⁷.

Figure 2-1-1-16 Development of IOWN optical-electronic fusion technology devices



(Source) NTT (2023) "IOWN Technology Report 2023"

¹⁷ https://www.rd.ntt/download/NTT_IOWN_TR2023_J.pdf (accessed on December 22, 2023)

Section 2 Trends in the telecommunication field

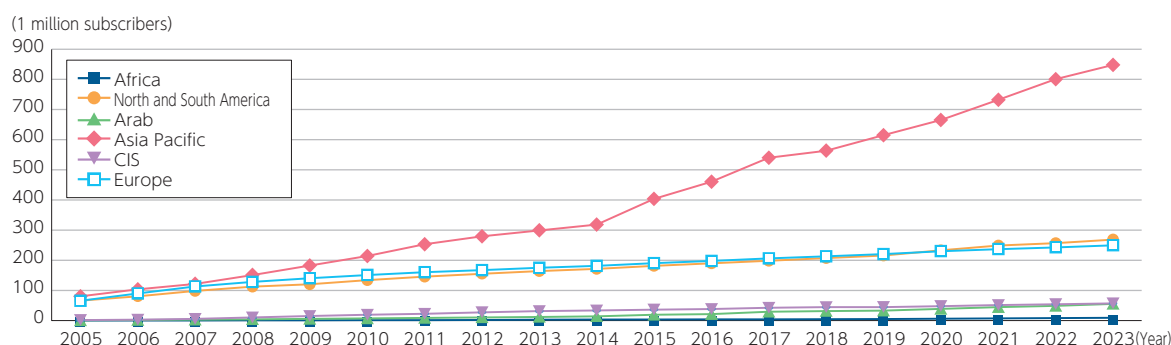
1. Trends in the domestic and overseas telecommunications market

The number of fixed broadband service subscriptions worldwide¹ has been on the rise since 2005 in all regions (**Figure 2-1-2-1**). Particularly, the Asia-Pacific region has seen a significant increase since 2015, surpassing 850 million in 2023, with an average annual growth rate of 14.0% from 2005 to 2023. The second-largest number of subscribers is in North and South America, with an average annual growth rate of 8.1%, followed by Europe with 7.7%.

The number of mobile phone subscriptions² has also

been increasing in all regions. The Asia-Pacific region has the highest number of subscriptions, reaching 4.93 billion in 2023, with an average annual growth rate of 10.4% from 2005 to 2023. Following this, the regions with the most subscribers in descending order are North and South America (5.2% annual growth rate), Africa (15.0%), Europe (2.1%), the Arab region (10.2%), and the CIS (5.7%), with Africa experiencing the most rapid expansion in mobile phone subscriptions (**Figure 2-1-2-2**).

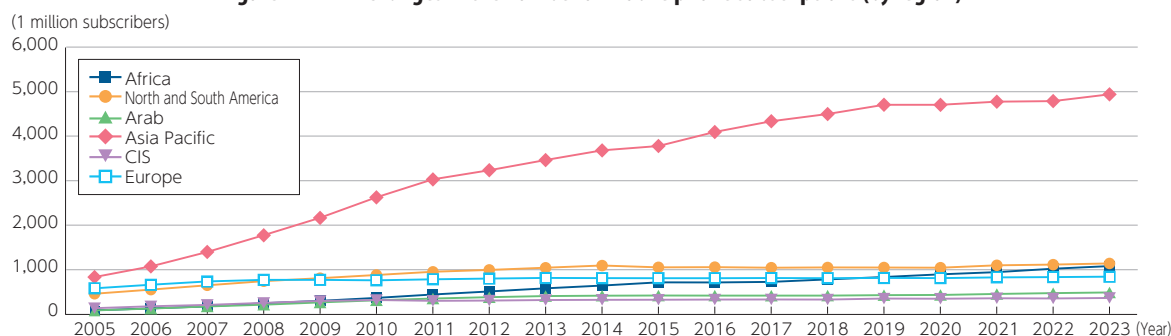
Figure 2-1-2-1 Changes in the number of fixed broadband service subscriptions (by region)



* ITU statistics. Fixed-broadband subscriptions are listed. Fixed broadband refers to high-speed connections that provide a transmission speed of 256kbps or higher in either the upstream or downstream direction, or both. High-speed connections include cable modems, DSL, fiber optics, satellite communications, fixed wireless access, and WiMAX, but do not include the number of data communication contracts using mobile networks (cellular systems).

(Source) ITU³

Figure 2-1-2-2 Changes in the number of mobile phone subscriptions (by region)



* ITU statistics. Mobile-cellular subscriptions are listed. The number of contracts includes postpaid and prepaid contracts. However, in the case of prepaid contracts, only those used for a certain period (e.g., 3 months) are included. Data cards and USB modems are not included.

(Source) ITU⁴

¹ Statistics from the ITU. Fixed-broadband subscriptions are shown. Fixed broadband refers to high-speed lines providing a communication speed of 256 kbps or faster for either or both uplink and downlink. High-speed lines include cable modems, DSL, optical fiber and satellite communications, fixed wireless access and WiMAX, etc., but do not include mobile network (cellular system) based data communications subscriptions.

² Statistics from the ITU. Mobile-cellular subscriptions are shown. The number includes deferred-payment subscriptions and prepaid subscriptions. Prepaid subscriptions are included only when the service was used for a fixed period of time (e.g., three months). Data card and USB modem subscriptions are not included.

³ <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

⁴ <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

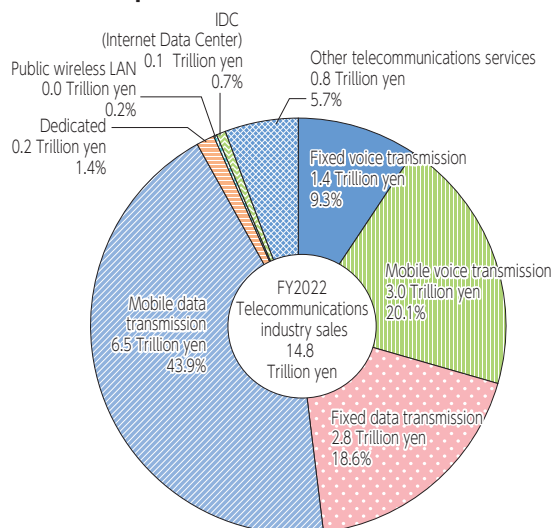
2. Current status of the telecommunications field in Japan

(1) Market size

The total revenue of the telecommunications industry for FY2022 is estimated to be approximately 15 trillion yen. Breaking it down, data transmission (both fixed and

mobile) accounts for about 9.3 trillion yen (62.4%), and voice transmission (both fixed and mobile) accounts for about 4.4 trillion yen (29.5%) (**Figure 2-1-2-3**).

Figure 2-1-2-3 Composition of sales in the telecommunications industry



*1 "Fixed voice transmission" is the sum of domestic and international services.

*2 "Fixed data transmission" includes sales through Internet access (ISP, FTTH etc.), IP-VPN and wide area Ethernet.

(Source) Prepared based on MIC "2023 Basic Survey on the Information and Communications Industry"⁵

(2) Number of carriers

As of the end of FY2023, the number of telecommunications carriers is 25,534 (338 registered carriers and

25,196 notified carriers), continuing the increasing trend from the previous year (**Figure 2-1-2-4**).

Figure 2-1-2-4 Changes in the number of telecommunications carriers

End of FY	2016	2017	2018	2019	2020	2021	2022	2023
Number of telecommunication carriers	18,177	19,079	19,818	20,947	21,913	23,111	24,272	25,534

(Source) Information and Communications Statistics Database⁶

(3) Infrastructure development status

As of the end of March 2023, the national coverage rate for fiber optic broadband services (household cov-

erage rate) is 99.84% (**Figure 2-1-2-5**).

⁵ <https://www.soumu.go.jp/johotsusintokei/statistics/statistics07.html>

⁶ <https://www.soumu.go.jp/johotsusintokei/field/tsuushin04.html>

Figure 2-1-2-5 Fiber optic broadband service coverage rate in Japan as of March 31, 2023 (estimated)

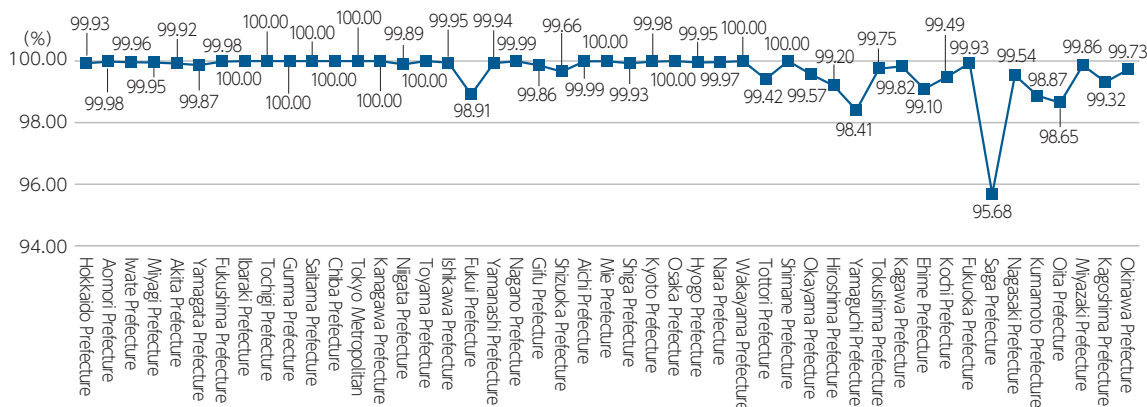
Nationwide fiber optic broadband service coverage rate

End of March 2023 **99.84%**

(Approximately 100,000 households are in undeveloped areas.)

*Based on the basic resident register, etc., the number of the households that can use optical fiber in the areas as estimated based on carrier information on a certain assumption was divided by the number of total households (rounded off to two decimal places).

Fiber optic broadband service coverage rate by prefecture

(Source) Survey on Broadband Infrastructure Coverage Rate at End of FY2022⁷

According to the OECD, as of June 2023, the proportion of fiber optics in Japan's fixed broadband is the second highest among member countries, indicating that

Japan's digital infrastructure is highly developed on an international scale.

**Figure (related data) Percentage of optical fiber in fixed broadband in the OECD member countries**

Source: OECD Broadband statistics, 1.10. Percentage of fibre connections in total fixed broadband, June 2023

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00141>

(Data collection)

Additionally, as of the end of March 2023, the nationwide 5G population coverage rate in Japan is 96.6%, and

all prefectures have exceeded 80% (Figure 2-1-2-6).

Figure 2-1-2-6 Japan's 5G coverage as percentage of population (as of end of March 2023)

Population coverage rate of 5G nationwide

(the end of March 2023)

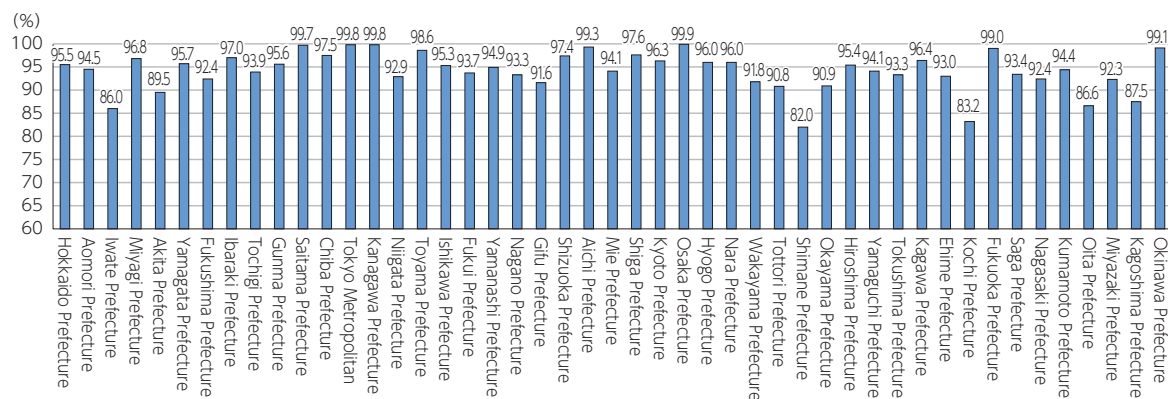
96.6%

(the end of March 2022 93.2%)

*Numbers that overlap the area coverage of four mobile carriers. Round off to the second decimal place.

Population coverage rate of 5G by prefecture

(the end of March 2023)

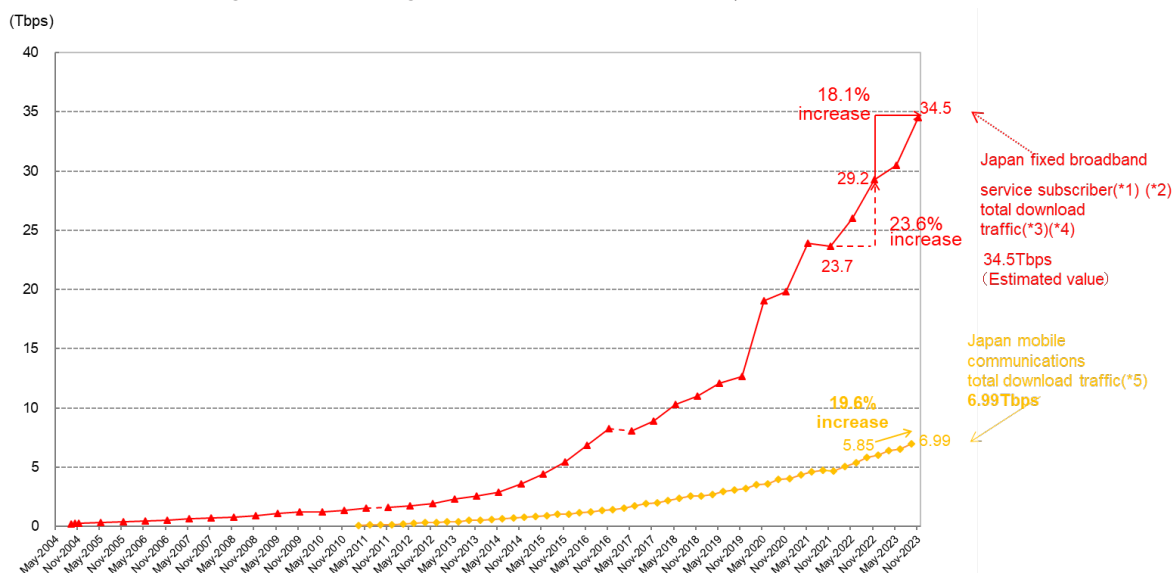
⁷ https://www.soumu.go.jp/menu_news/s-news/01kiban07_02000026.html

(4) The status of traffic

The total download traffic of fixed broadband service subscribers in our country experienced a sharp increase after the outbreak of the COVID-19 pandemic. Subsequently, despite fluctuations in growth rates, it has generally continued to increase, reaching an 18.1% increase

compared to the same month of the previous year as of November 2023. The total download traffic for mobile communication also continues to increase, with a 19.6% increase compared to the same month of the previous year as of November 2023 (**Figure 2-1-2-7**).

Figure 2-1-2-7 Change in Internet traffic (fixed/mobile systems, download traffic)



*1 Services for individuals (FTTH, DSL, CATV, FWA)

*2 Including some corporations

*3 Prior to May 2011, this also includes some mobile communications traffic to and from mobile phone networks

*4 Since May 2017, the number of cooperating ISPs increased from five to nine, resulting in discontinuities due to aggregated and estimated values based on information from the nine ISPs

*5 From "MIC Current State of Mobile Communications Traffic in Japan (Sept 2023)" (measured in March, June, Sept, and Dec)

(Source) MIC (2024) "Results of Aggregating Internet Traffic in Japan (for November 2023)"⁸

(5) The status of use of broadband

As of the end of December 2023, the number of fixed broadband subscriptions⁹ was 46.59 million (a 1.3% increase from the same period of the previous year). Among the subscriptions for mobile ultra-high-speed broadband¹⁰, the number of 3.9-4th generation mobile phones (LTE) was 120.88 million (a 7.1% decrease from

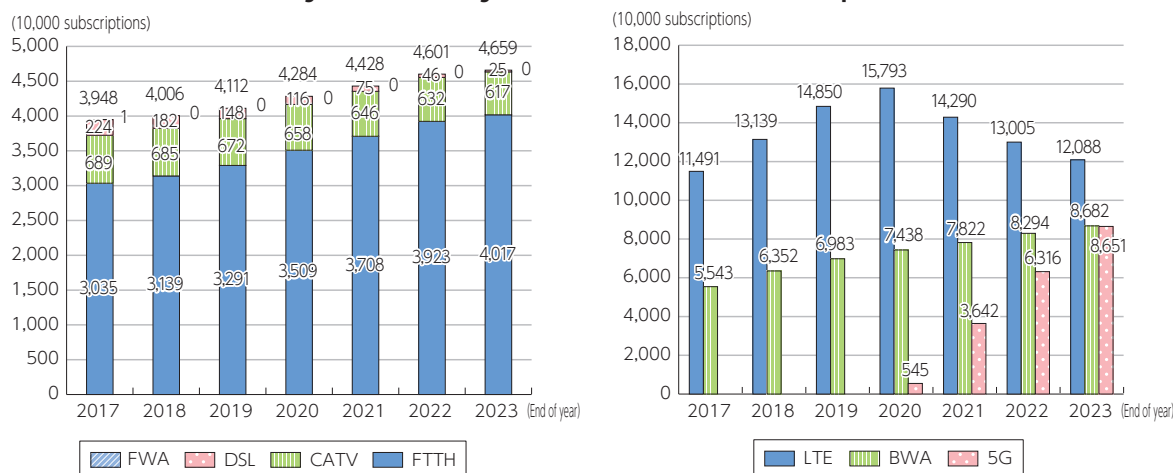
the same period of the previous year), 5th generation mobile phones was 86.51 million (an increase of 23.35 million from the same period of the previous year), and BWA was 86.82 million (a 4.7% increase from the same period of the previous year) (**Figure 2-1-2-8**).

⁸ https://www.soumu.go.jp/main_content/000929698.pdf

⁹ The number of fixed-line broadband subscription is the sum of the FTTH, CATV (limited to coaxial, HFC), DSL and FWA subscriptions.

¹⁰ This is the number of LTE, BWA and 5G subscriptions, and does not include 3G or PHS subscriptions.

Figure 2-1-2-8 Changes in the number of broadband subscriptions



* The figures of the past differ from those published last year due to revisions in business operator reports.

(Source) Prepared based on MIC "Publication of Quarterly Data on the Number of Subscriptions and Share of Telecommunications Services (Q3 of FY2023 (End of December))" ¹¹

(6) Satellite communications

Satellite communications utilize both geostationary satellites¹² and non-geostationary satellites¹³ to provide communication infrastructure in remote islands, mountainous areas, and for communication with ships and

aircraft, and during emergencies such as natural disasters, making use of advantages such as wide area coverage, simultaneous communications and disaster resistance.



Figure (related data) Major geostationary satellites used as communication services in Japan (as of end of FY2023)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00149>
(Data collection)



Figure (related data) Major non-geostationary satellites used as communication services in Japan (as of end of FY2023)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00150>
(Data collection)

(7) Status of voice communication service subscription contracts

As for the status of voice communication service subscription contracts, the number of fixed communication contracts (including NTT East/West subscribed telephone services (including ISDN), non-NTT telephone service¹⁴, and CATV telephone services, excluding OABJ type IP phone services) has been declining in recent years, while the number of mobile communications contracts (mobile phones, PHS, and BWA) and OABJ- IP phone services has been showing steady growth. As of the end of December 2023, the number of mobile communication contracts is approximately 15.8 times that of fixed communication contracts (Figure 2-1-2-9).

Furthermore, as of the end of December 2023, the market share of mobile communication contracts by operator is as follows: NTT DOCOMO at 34.9% (a decrease of 1.2 percentage points from the same period of the previous year, including those provided to MVNO, the share becomes 40.7%), KDDI Group at 26.8% (a decrease of 0.2 percentage points, 30.5%), SoftBank at 20.4% (a decrease of 0.5 percentage points, 25.9%), Rakuten Mobile at 2.6% (an increase of 0.4 percentage points), and MVNO at 15.2% (an increase of 1.4 percentage points) (Figure 2-1-2-10).

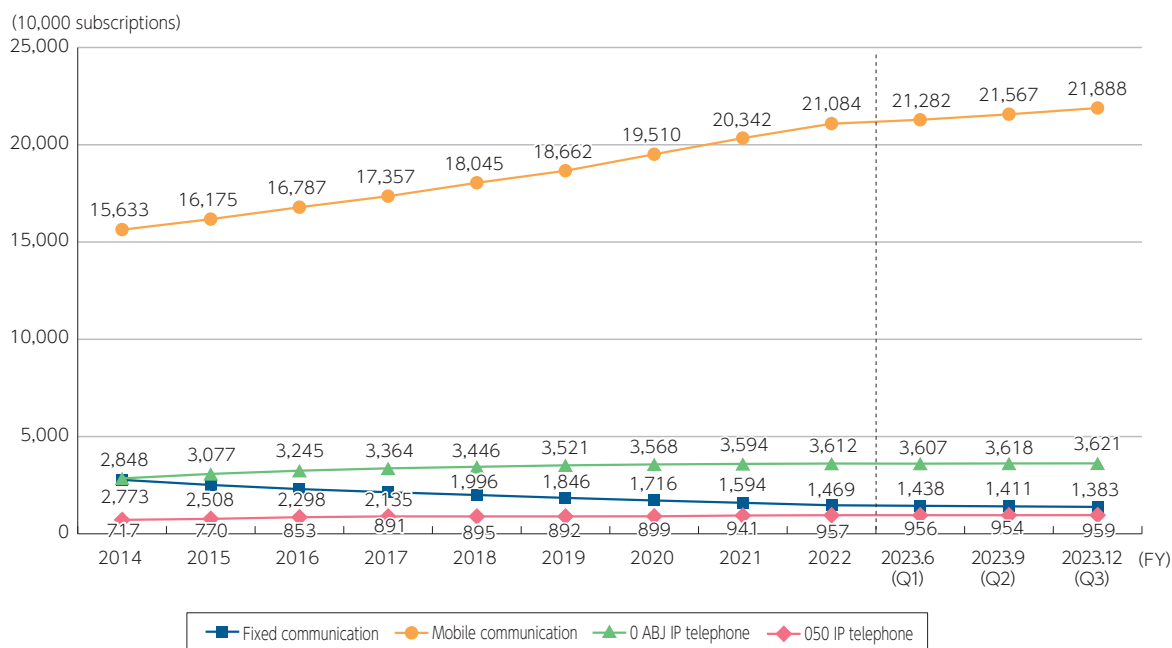
¹¹ https://www.soumu.go.jp/menu_news/s-news/01kiban04_02000238.html

¹² An artificial satellite that orbits the Earth at an altitude of approximately 36,000 kilometers above the equator, synchronized with the Earth's rotation. With three satellites, it is possible to cover the entire Earth except for the polar regions.

¹³ These satellites orbit at lower altitudes than geostationary satellites. Due to their lower orbit, they have lower transmission delays compared to geostationary satellites, enabling high-speed, high-capacity communication, and also allowing communication in polar regions. However, because the satellites move across the sky in a short period of time, simultaneous operation of a large number of satellites is required.

¹⁴ Non-NTT telephone services are subscribed telephone services by telecommunications carriers other than NTT East/West and includes direct subscriber telephone, ISDN services, new-type non-NTT telephone and ISDN services.

Figure 2-1-2-9 Changes in the number of subscriptions to voice communications services



*1 For FY2023, data up to the end of December was used, so care must be taken when comparing over time.

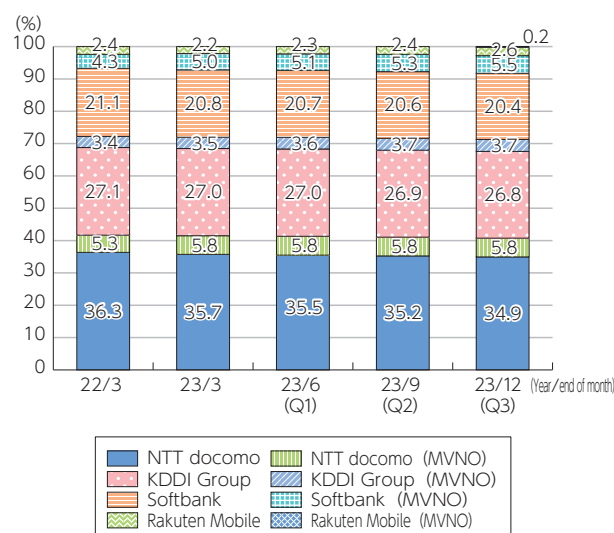
*2 Mobile communications is the sum of mobile phones, PHS and BWA.

*3 The number of mobile communication subscriptions, unless otherwise specified, refers to the figures "after intra-group transaction adjustments." "After intra-group transaction adjustments" means that when an MNO provides mobile phone or BWA services received from another MNO within the same group in the capacity of an MVNO, along with its own services, it is counted as one subscription instead of two.

*4 The reporting of MVNO service-specific subscription numbers was added from the fourth quarter of the FY2015, resulting in differences in the calculation method for the adjusted subscription numbers before the fourth quarter of the FY2014 and after the fourth quarter of the FY2015.

(Source) Prepared based on MIC "Publication of Quarterly Data on the Number of Subscriptions and Share of Telecommunications Services (Q3 of FY2023 (End of December))"

Figure 2-1-2-10 Changes in share of mobile communications subscriptions (adjusted for intra-group transactions) by operator



*1 "After intra-group transaction adjustments" means that when an MNO provides mobile phone or BWA services received from another MNO within the same group in the capacity of an MVNO, along with its own services, it is counted as one subscription instead of two.

*2 The share of the KDDI Group included KDDI Okinawa Cellular and UQ Communications.

*3 The share of MVNO is calculated by MNO group that provides services and is indicated by the supplementary note (MVNO) after the name of the MNO group.

*4 Rakuten Mobile's share as an MNO. MVNO services provided by Rakuten Mobile are included in NTT docomo (MVNO) and KDDI Group (MVNO).

(Source) Prepared based on MIC "Publication of Quarterly Data on the Number of Subscriptions and Share of Telecommunications Services (Q3 of FY2023 (End of December))"

(8) International comparison of communication charges

When comparing communication charges in Tokyo (Japan), New York (the U.S.), London (the UK), Paris (France), Dusseldorf (Germany), and Seoul (the Republic of Korea) as of March 2024, the smartphone (4G, for the leading MNO, for new contracts) fees in Tokyo are

at a median level.

The fees for fixed-line telephones, including basic fees and the cost of a 3-minute local call at 12:00 on weekdays, are also at a median level.



Figure (related data) International comparison of mobile phone charges by mode (FY2023)
Source: MIC "FY2023 Survey on Domestic-Overseas Price Difference of Telecommunication Service"
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/dashu.html#00161>
(Data collection)



Figure (related data) International comparison of fixed telephone charges based on individual charges (FY2023)
Source: MIC "FY2023 Survey on Domestic-Overseas Price Difference of Telecommunication Service"
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/dashu.html#00162>
(Data collection)

(9) Status of occurrence of telecommunications service accidents

In FY2022, there were 7,500 reported accidents requiring quarterly reports, of which 10 were classified as

serious accidents¹⁵. This represents an increasing trend since FY2019 (**Figure 2-1-2-11**).

Figure 2-1-2-11 Changes in the number of serious accidents



(Source) MIC "Accidents in Telecommunications Services (FY2022)"¹⁶

(10) Complaints and consultations regarding telecommunications services and consultations on illegal and harmful information

A Complaints and Consultations Regarding Telecommunications Services

In FY2023, the number of complaints and consultations regarding telecommunications services received by the MIC was 13,348, which represents a decrease from the previous fiscal year (**Figure 2-1-2-12**). Addi-

tionally, when looking at the content of complaints and consultations received by consumer centers nationwide and the MIC by service type, those related to "MNO services" were the highest (**Figure 2-1-2-13**).

¹⁵ Accidents falling under the Article 28 of the Telecommunications Business Act "When a serious accident specified by an Ordinance of the Ministry of Internal Affairs and Communications has occurred with respect to telecommunications activities, (the telecommunications carrier) shall report without delay to the Minister for Internal Affairs and Communications to that effect including its reason or cause."

¹⁶ https://www.soumu.go.jp/menu_news/s-news/01kiban05_02000302.html

* Number of reports from business operators. With regard to serious accidents, from FY2008, a decline in the quality of a telecommunications service is also classified as a serious accident, and from FY2015, reporting standards have been set for each category of telecommunications service, rather than uniformly for telecommunications services, so changes from year to year cannot be simply compared.

Figure 2-1-2-12 Changes in the number of complaints and inquiries received by the MIC

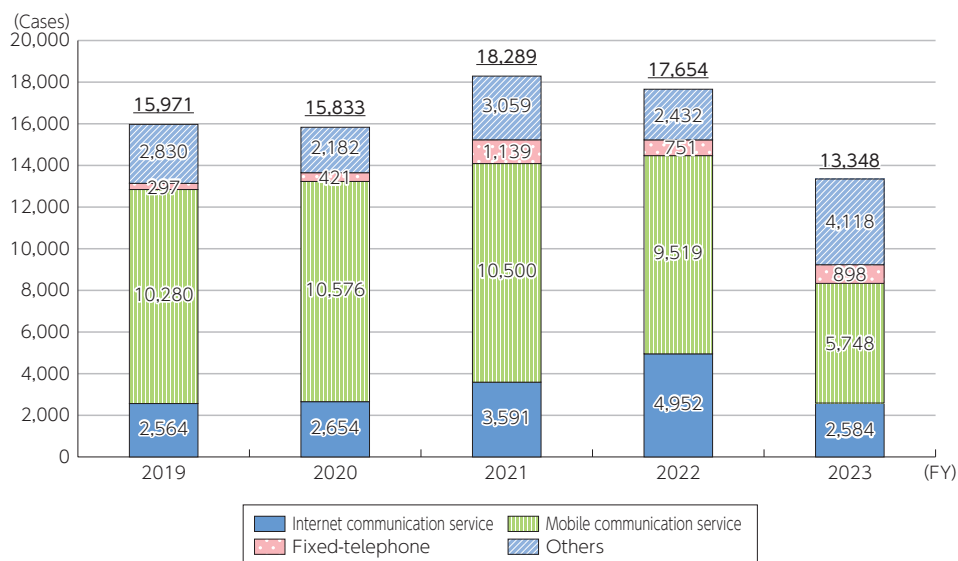
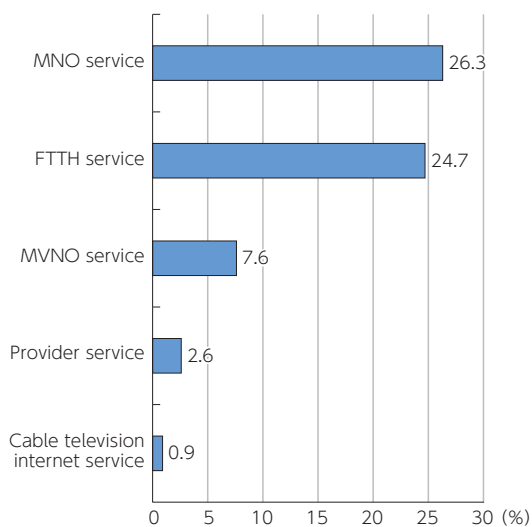


Figure 2-1-2-13 Breakdown of complaints and consultations received by consumer centers nationwide and the MIC (random sample of those received between April 2022 and March 2023)



* There is a possibility that ISP services provided together with FTTH lines are only included in provider services.

(Source) MIC "Regular Monitoring Meetings on the Implementation Status of Consumer Protection Rules (15th meeting)"

B Consultations on illegal and harmful information

The number of consultations received by the Illegal and Harmful Information Consultation Center, which is operated under the commission of the MIC, has remained high, with 6,463 consultations in FY2023 (Fig-

ure 2-1-2-14). The top five companies for the number of consultations in FY2023 were X (formerly Twitter), Google, Meta, LINE Yahoo, and 5ch (Figure 2-1-2-15).

Figure 2-1-2-14 Changes in the number of consultations regarding illegal and harmful information

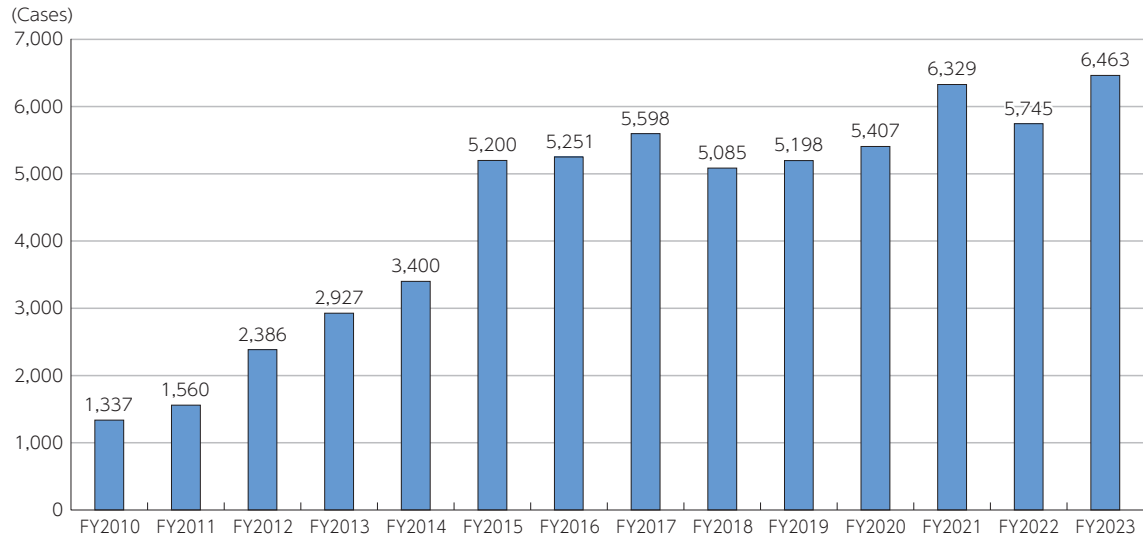
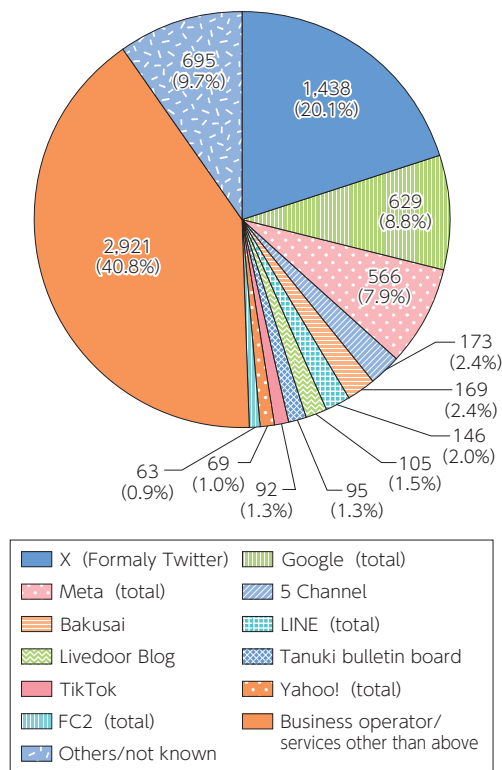


Figure 2-1-2-15 Breakdown of the number of consultations provided at the Illegal Harmful Hotline by business operator

* Breakdown of the number of consultations (work): By business operator/service (n=7,161) <FY2023> * Number of consultations (work): 6,463 cases



Business operator, service, etc.		Number of requests	Percentage
X (Formerly Twitter)		1,438	20.1%
Google (total)	Search	230	8.8%
	map	204	
	YouTube	164	
	Others	31	
Meta (total)	Instagram	422	7.9%
	Facebook	139	
	Whatsapp	5	
5 Channel		173	2.4%
Bakusai		169	2.4%
LINE Yahoo!*	LINE (total)	146	2.0%
	Yahoo! (total)	69	
	Yahoo! search	18	
	Yahoo! (Others)	51	
Livedoor Blog		105	1.5%
Tanuki bulletin board		95	1.3%
TikTok		92	1.3%
FC2 (total)		63	0.9%
Business operator/services other than above		2,921	40.8%
Others/not known		695	9.7%

*"LINE Yahoo! (total)" is the sum of the number of "LINE (total)" and "Yahoo! (total)" including the one before merger of LINE and Yahoo! on October 1, 2023.

*1 It is a total number of consultations (work), and counseling centers do not determine whether or not individual consultations constitute a violation of rights.

*2 The number of work (6,463 cases) and the total number of graph above (7,161 cases) are not coincident because there is a case in which multiple services are answered.

*3 It is not strictly compiled statistical information because there are cases where the same service is answered multiple times.

*4 Some use their own domains, so the actual domain may not be known.

3. New trends in the communications field

(1) Web3

Web3 refers to a decentralized network environment or the concept of the internet based on blockchain technology. It is also used as a general term for technologies such as blockchain and NFTs. According to A.T. Kearney, the global Web3 market is expected to grow from 5 trillion yen in 2021 to 67 trillion yen in 2027, approximately 13 times larger. The domestic market is expected to grow from about 0.1 trillion yen in 2021 to about 2.4 trillion yen in 2027, more than 20 times larger.

The market size here refers to revenue from Web3-

related businesses, including: (1) protocols (businesses utilizing blockchain infrastructure itself, transaction fees for cryptocurrencies, etc.); (2) applications (businesses utilizing blockchain, in-game purchases in blockchain games, etc.); and (3) content and IP (value of brands and animations attached to protocols and applications, blockchain games using NBA trading cards, etc.). Regarding the practical application of Web3, the number of large companies utilizing NFTs is increasing, with Asics selling NFT shoes, for example¹⁷.



Figure (related data) Size of market related to Web3

Source: Prepared based on the A.T. Kearney "Dramatically Changing Web3 Market"¹⁸

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00171>

(Data collection)

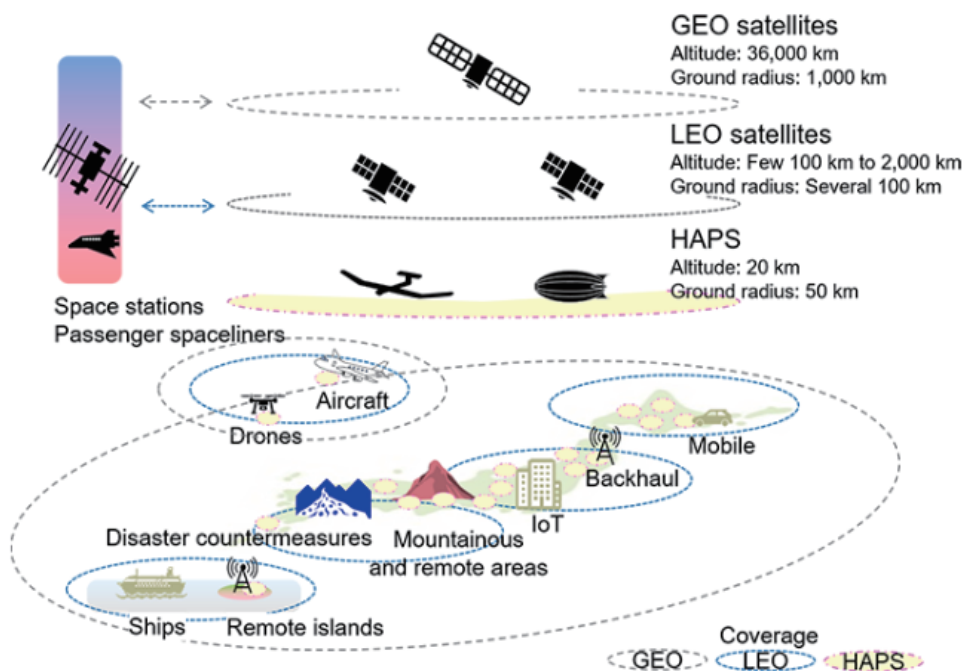
(2) NTN (Non-Terrestrial Network)

Non-Terrestrial Network (NTN) refers to a multi-layered network that connects not only the ground but also the sea, sky, and space, using HAPS (High Altitude Platform Station) and satellite communications. This allows for seamless communication services even in areas where communication infrastructure is not developed

(Figure 2-1-2-16).

NTN is also expected to be utilized for expanding 5G coverage, with the 5G NTN market size predicted to grow from 4.9 billion dollars in 2023 to 8.8 billion dollars in 2026 (Figure 2-1-2-17).

Figure 2-1-2-16 Image of provision of communication service by satellite and HAPS

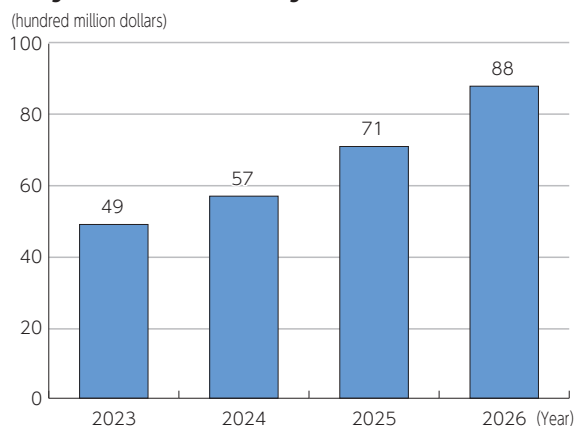


(Source) NTT docomo¹⁹

¹⁷ <https://corp.asics.com/jp/press/article/2021-07-13-1>

¹⁸ <https://www.jp.kearney.com/issue-papers-perspectives/web3-market-growth-scenario>

¹⁹ https://www.docomo.ne.jp/info/news_release/2022/01/17_01.html

Figure 2-1-2-17 Estimated global market size of 5G NTN(Source) TrendForce²⁰

Regarding HAPS, preparations such as the development of wireless equipment and aircraft are being made by mobile phone operators for its introduction as a mobile phone base station, with practical services expected to start in 2026.

In terms of satellite communications, the provision of communication services through “Satellite Constellations” that operate numerous non-geostationary satellites integrally is becoming active, especially among

Western companies. For example, SpaceX’s satellite communication service “Starlink” enables high-speed, large-capacity communication and has over 3 million users worldwide as of May 2024. Japanese companies are developing domestic services through investments and business partnerships with these companies. Additionally, with the increase in communication speed, satellite communications are being used for broadband services and as backhaul for mobile base stations.

**Figure (related data) Change in speed of “Starlink”**

Source: IJ Engineers Blog (IJ)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00174>

(Data collection)

²⁰ <https://www.trendforce.com/presscenter/news/20230413-11642.html>

Section 3 Trends in the broadcasting and content field

1. Broadcasting

(1) Size of the broadcasting market

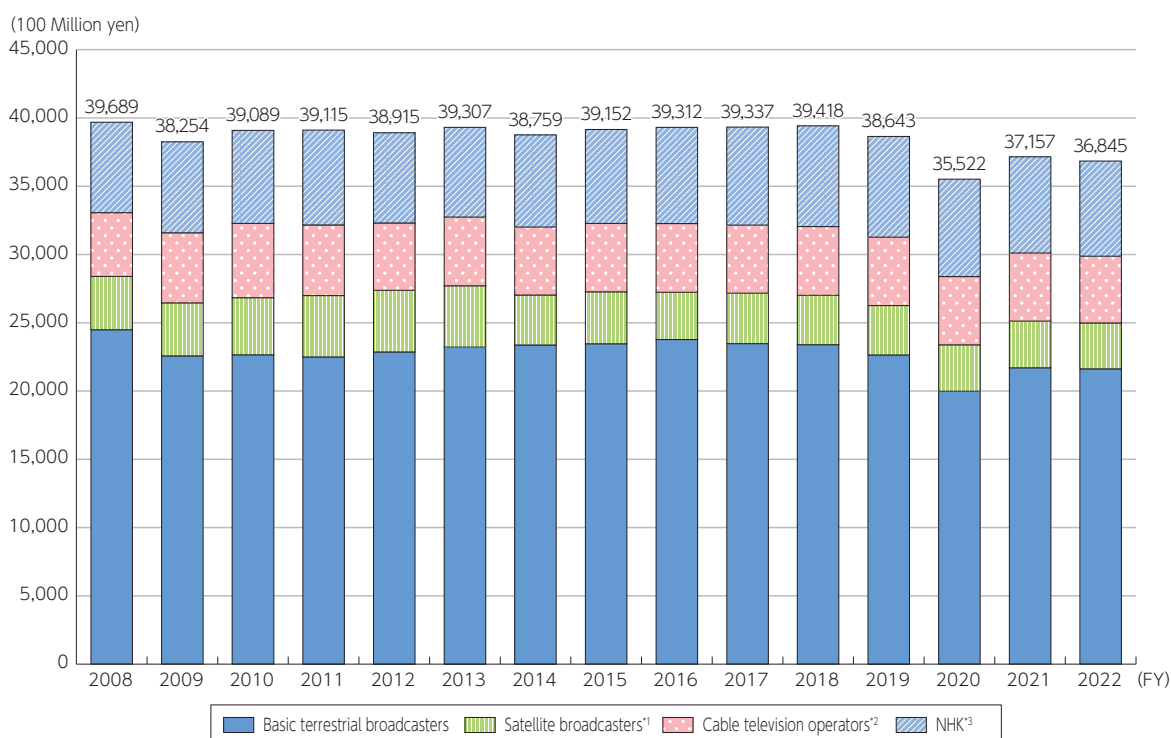
A Revenue of broadcasters

In Japan, broadcasting is conducted under a dual system consisting of NHK, which is funded by receiving fees, and private broadcasters, which are funded by advertising revenue or subscription fees for paid broadcasting. Additionally, the Open University of Japan Foundation broadcasts for educational purposes.

The total revenue of all broadcaster, including both broadcasting and non-broadcasting income, decreased from the FY2021, amounting to 3.6845 trillion yen in FY2022, a 0.8% decrease from the previous fiscal year.

Breaking it down, the total revenue of private basic terrestrial broadcasters was 2.1623 trillion yen (a 0.4% decrease from the previous fiscal year), the total revenue of private satellite broadcasters was 337 billion yen (a 1.4% decrease from the previous fiscal year), the total revenue of cable television operators was 488 billion yen (a 2.2% decrease from the previous fiscal year), and NHK's operating revenue was 697.2 billion yen (a 1.1% decrease from the previous fiscal year) (Figure 2-1-3-1).

Figure 2-1-3-1 Changes in the size of the broadcasting industry market (total sales) and market breakdown



*1 Calculated based on operating revenues related to the satellite broadcasting business.

*2 Up to FY2010, cable TV operators were commercial corporations that conducted independent broadcasting using facilities approved under the former Cable Television Broadcasting Act (including facilities registered under the former Broadcasting Act for Use of Telecommunications Services that uses a broadcasting system equivalent to the facilities), and from FY2011, cable television operators are registered general broadcasters (limited to commercial corporations) that conduct independent broadcasting using cable telecommunications equipment (with both excluding operators using the IP multicast method).

*3 NHK's value is ordinary business income.

*4 Community broadcasters who are also engaged in cable television are excluded.

(Source) Prepared based on MIC "Income and Expenditures of Private Broadcasters" and NHK "Financial Statements" for each FY

Additionally, the advertising expenses for private basic terrestrial broadcasters in 2023 amounted to 1.7234 trillion yen, with 1.6095 trillion yen related to television

broadcasting and 113.9 billion yen related to radio broadcasting¹.



Figure (related data) Changes in advertising expenditures of private basic terrestrial broadcasters

Source: Prepared based on Dentsu "Advertising Costs in Japan"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00178>

(Data collection)

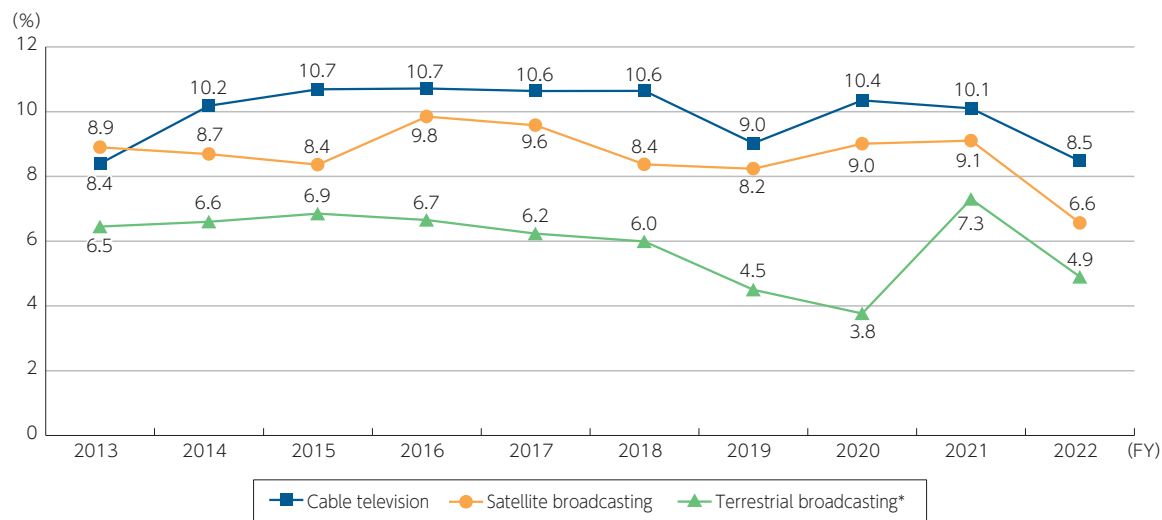
¹ Regarding the entire advertising market, refer to "2 Advertising" in this Section 2.

B Financial status of private broadcasters

Private basic terrestrial broadcasters (with an operating profit margin of 4.9% in FY2022), private satellite broadcasters (6.6% in the same period), and cable televi-

sion operators (8.5% in the same period) all continued to secure profits in FY2022, following FY2021 (**Figure 2-1-3-2**).

Figure 2-1-3-2 Changes in operating profit on sales of private broadcasters



* Basic terrestrial broadcasting excluding community broadcasting

(Source) Prepared based on MIC "Income and Expenditures of Private Broadcasters" for each FY etc.

(2) Number of operators

As of the end of FY2023, the breakdown of the number of private broadcasters is as follows: 537 companies for private basic terrestrial broadcasters (including 342

companies conducting community broadcasting) and 41 private satellite broadcasters (**Figure 2-1-3-3**).

Figure 2-1-3-3 Changes in the number of private broadcasters

End of FY			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Terrestrial	Television broadcasting (single operation)	VHF	16	93	93	94	94	98	94	94	95	95	95	96	96	96
		UHF	77													
	Radio broadcasting (single operation)	Medium-wave (AM) broadcasting	13	13	13	14	14	14	14	14	15	15	15	16	16	16
		Ultrashort wave (FM) broadcasting	298	307	319	332	338	350	356	369	377	384	384	388	390	393
		Community broadcasting of the above	246	255	268	281	287	299	304	317	325	332	334	338	339	342
		Short wave	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Television/radio broadcasting (combined operation)		34	34	34	33	33	33	33	33	32	32	32	31	31	31
	Text broadcasting (single operation)		1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Multimedia broadcasting				1	1	1	4	4	4	6	6	2	2	0	0
	Subtotal		440	449	461	475	481	500	502	515	526	533	529	534	534	537
Satellite	Basic satellite broadcasting	BS broadcasting	20	20	20	20	20	20	19	19	22	22	20	22	21	21
		110 degrees east longitude CS broadcasting	13	13	22	23	23	23	23	20	20	20	20	20	20	20
	General satellite broadcasting		91	82	65	45	7	5	4	4	4	4	4	4	4	3
	Subtotal		113	108	92	72	46	44	41	39	41	41	39	42	42	41
Cable television	General cable broadcasting pertaining to registration (limited to operators of independent broadcasting)	Broadcasting using former authorized facilities (limited to operators of independent broadcasting)	502	556	545	539	520	510	508	504	492	471	464	464	456	—
		Broadcasting using former cable services under the former Act Concerning Broadcast on Telecommunications Services	26													
		IP multicast broadcasting of the above	5													
	Subtotal		528	556	545	539	520	510	508	504	492	471	464	464	456	—

*1 The number of television broadcasters (single operation) at the end of FY2015 includes five operators conducting basic terrestrial broadcasting for mobile reception (one of them combined basic terrestrial broadcasting)

*2 Regarding satellite broadcasters, BS broadcasting and 110 degrees east longitude CS broadcasting are counted as basic satellite broadcasting, while other satellite broadcasting is counted as general satellite broadcasting based on the Broadcast Act amended and enforced in June 2011.

*3 Because some of the satellite broadcasters combine more than two of "BS broadcasting," "110 degrees east longitude CS broadcasters" and "general satellite broadcasting," sum of the values of the columns does not agree with the value of subtotal. Only operating broadcasters are included in FY2011 and after.

*4 Regarding cable television operators, up to FY2010, former approved facilities operators under the former Cable Television Broadcast Act and registered operators under the former Act Concerning Broadcast on Telecommunications Services were included, and from FY2011, registered general broadcasters conducting independent broadcasting using cable telecommunication facilities under the Broadcast Act are included (regarding IP multicast broadcasting, up to FY2010, it is included in former broadcasting using cable services, and from FY2011 it is included in registered general broadcasters conducting independent broadcasting using cable telecommunications facilities).

(Source) Prepared based on MIC "Current State of Cable Television"² (only the values for cable TV operators)

(3) Status of the provision of broadcasting service

A Terrestrial television broadcasting

As of the end of FY2023, there are 127 companies nationwide (including 31 companies with dual operations) conducting terrestrial private television broadcasting.



Figure (related data) Number of available private television broadcasting channels (as of end of FY2023)
URL: <https://www.soumu.go.jp/johotsusintokei/whitpaper/ja/r06/html/datashu.html#f00181>
(Data collection)

B Terrestrial radio broadcasting

For AM broadcasting, 47 private basic terrestrial broadcasters (as of the end of FY2023) are conducting broadcasts.

For FM broadcasting, 393 private basic terrestrial broadcasters (as of the end of FY2023) are conducting broadcasts. Among these, there are 342 community

broadcasters, which generally target specific areas within a single municipality.

For shortwave broadcasting, one private basic terrestrial broadcasting (as of the end of FY2023) is conducting broadcasts.

² https://www.soumu.go.jp/main_content/000504511.pdf

C Multimedia broadcasting

As of the end of FY2023, there are no operators conducting V-Low multimedia broadcasting, which utilizes

the frequency band of 99MHz-108MHz made available by the digitalization of terrestrial television broadcasting.

D Satellite broadcasting

(A) Basic satellite broadcasting

For BS broadcasting, NHK, the Open University of Japan, and private broadcasters (21 companies as of the end of FY2023) are conducting broadcasts using artificial satellites operated by Broadcasting Satellite System Corporation, with 9 of these companies conducting

4K/8K satellite broadcasting. Additionally, for CS broadcasting at 110 degrees east longitude, private broadcasters (20 companies as of the end of FY2023) are conducting broadcasts using satellites operated by SKY Perfect JSAT Corporation.

(B) General satellite broadcasting

For general satellite broadcasting, private broadcasters (3 companies as of the end of FY2023) are conduct-

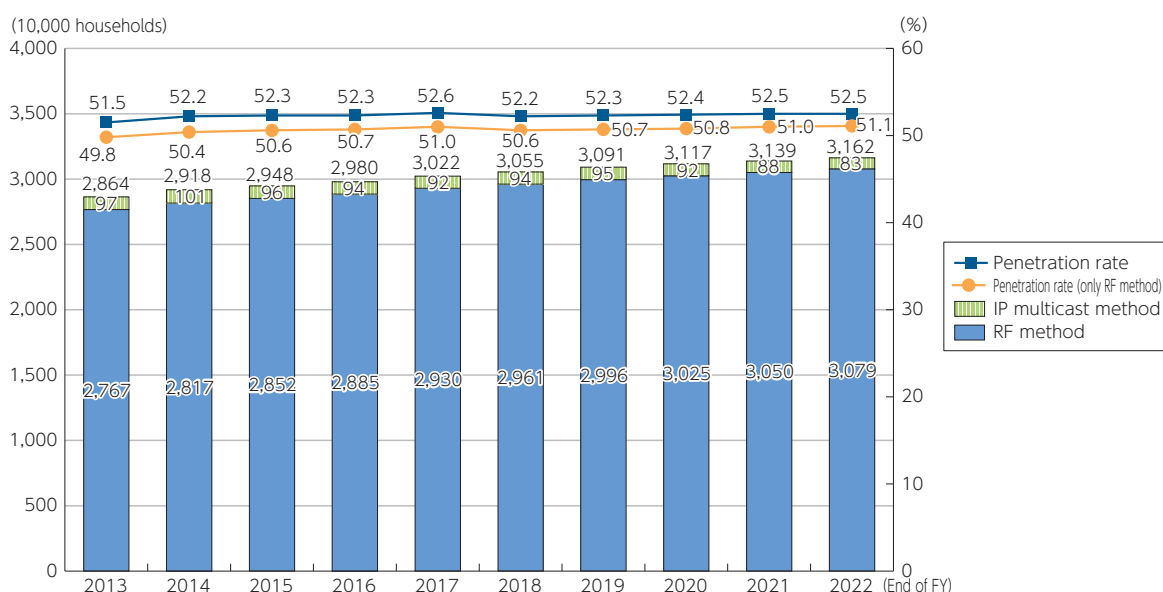
ing broadcasts using satellites operated by SKY Perfect JSAT Corporation.

E Cable television

As of the end of FY2022, there were 456 cable television operators. Cable television provides multi-channel broadcasting, including retransmission of terrestrial and satellite broadcasting as well as independent broadcasting channels. The number of households receiving services through wired telecommunications facilities

(with 501 or more terminals) for conducting independent broadcasting, the household penetration rate, is approximately 31.62 million households, with a household penetration rate of approximately 52.5% (**Figure 2-1-3-4**).

Figure 2-1-3-4 Changes in the number of subscribed households and penetration rate for receiving services from cable telecommunications equipment that provide independent broadcasting as per their registration



*1 The penetration rate is calculated from the number of households in the Basic Resident Register.

*2 "The number of subscribed households" means the total number households (including the number of households with radio interference) connected to the cable telecommunications equipment as per their registration.

(Source) Prepared based on MIC "Current State of Cable Television"³

(4) Status of NHK

A Domestic broadcasting by NHK

As of the end of FY2023, NHK's domestic broadcasting channels include 2 terrestrial television channels,

3 radio channels, and 4 satellite television channels.



Figure (related data) Domestic broadcasting of NHK (the end of FY2023)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00184>
(Data collection)

³ https://www.soumu.go.jp/main_content/000504511.pdf

B International television and radio broadcasting by NHK

NHK's international television and radio broadcasts are aimed at Japanese expatriates and foreigners, covering almost the entire world.



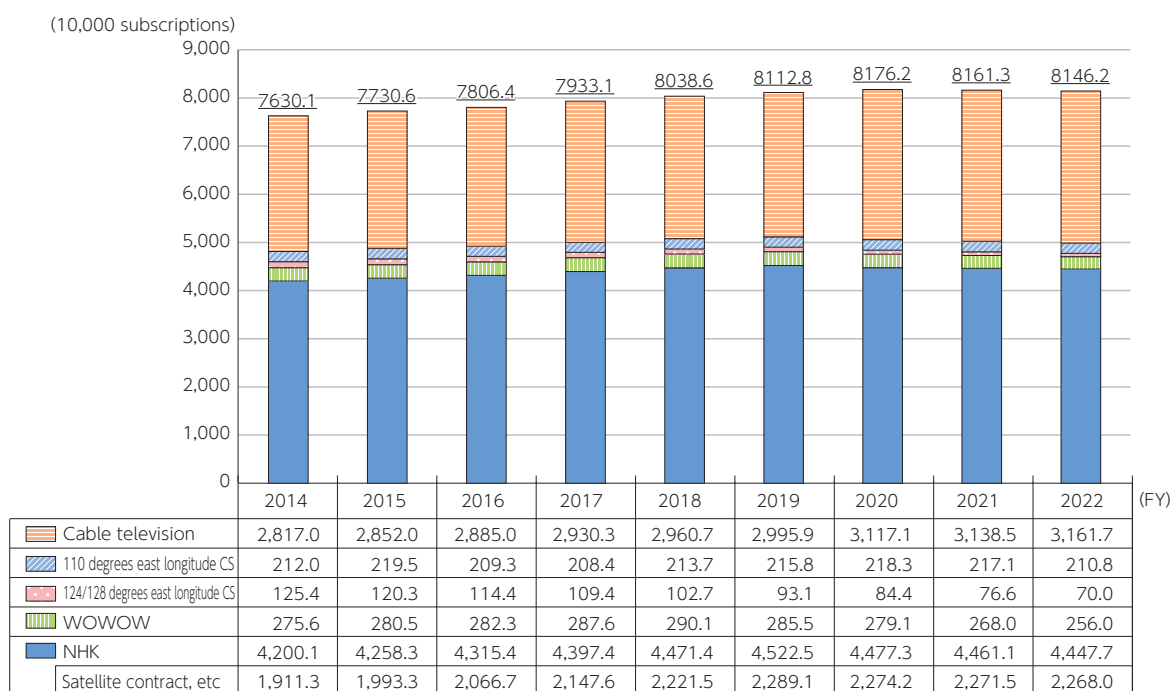
Figure (related data) Status of television and radio international broadcasting of NHK
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00185>
(Data collection)

(5) Utilization of broadcasting services

A Number of subscribers

In FY2022, the number of subscribers to broadcasting services increased for cable television, while it decreased for other broadcasting services (Figure 2-1-3-5).

Figure 2-1-3-5 The number of subscribers to broadcasting services



*1 The number of subscribers to terrestrial broadcasting (NHK) is the number of NHK subscriptions of all subscription types.

*2 The number of subscribers to satellite contracts, etc. is the number of NHK satellite contracts and special contracts.

*3 The number of WOWOW subscribers is the number of WOWOW subscriptions.

*4 The number of subscribers of 124/128 degrees east longitude CS is the number of Sky Perfect! premium service subscriptions.

*5 The number of subscribers of 110 degrees east longitude CS is the number of Sky Perfect! subscriptions.

*6 The number of households subscribed to cable television is the number of households subscribed to cable telecommunications equipment that carry out independent broadcasting as per their registration.

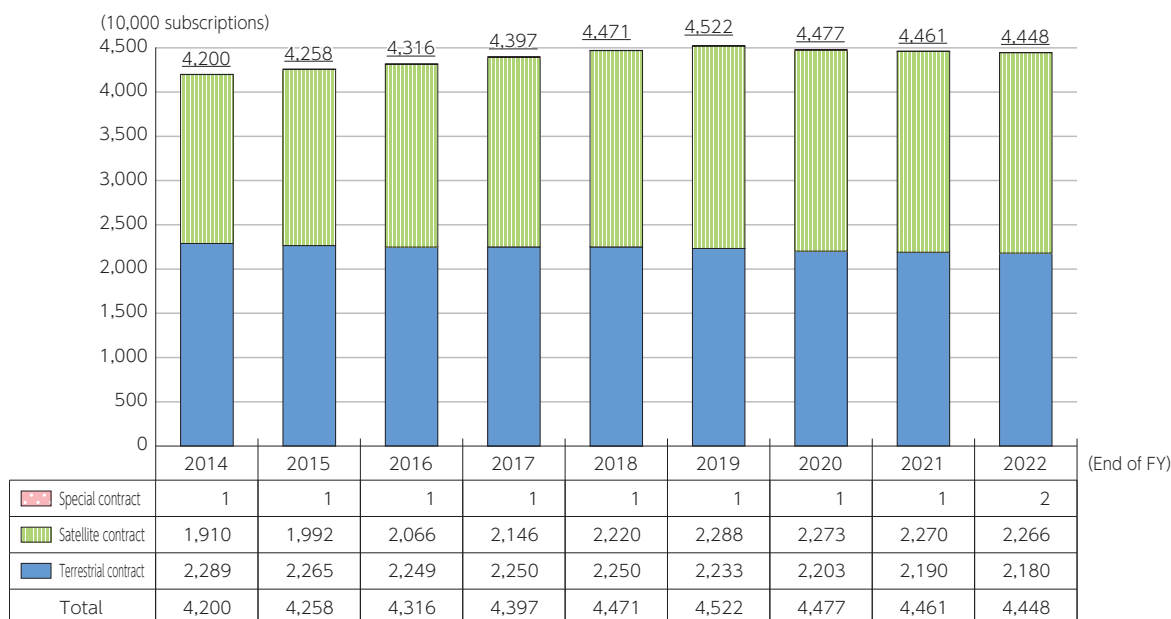
(Source) Prepared based on material from the Japan Electronics and Information Technology Industries Association, Japan Cable Laboratories, and NHK, and the MIC "Current State of Satellite Broadcasting" and "Current State of Cable Television"

B The number of NHK receiving contracts

As of FY2022, the number of NHK receiving contracts was approximately 44.48 million. Of these, terrestrial contracts (including standard and color contracts) ac-

counted for about 21.8 million, satellite contracts for about 22.66 million, and special contracts for about 20,000 (Figure 2-1-3-6).

Figure 2-1-3-6 Change in the number of subscribers of NHK



(Source) Prepared based on NHK's materials.

(6) Ensuring the safety and reliability of broadcasting equipment

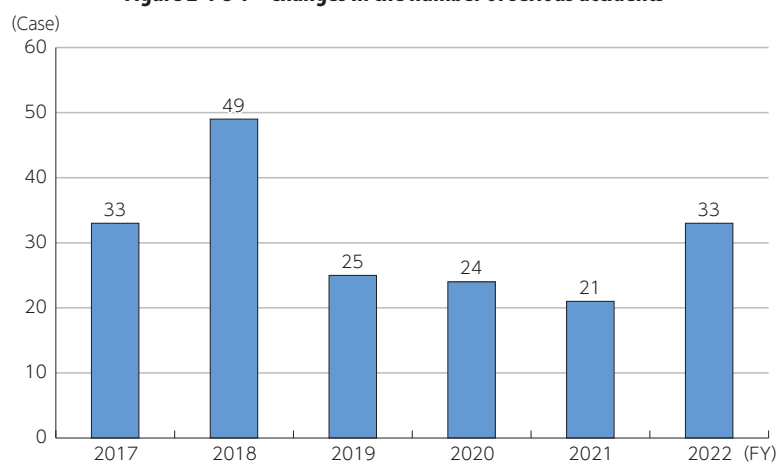
Broadcasting serves as an extremely important public utility, providing essential information for daily life and critical information such as disaster alerts instantaneously and widely. Therefore, the broadcasting equipment that supports this service must meet high standards of safety and reliability.

In FY2022, there were 356 incidents of broadcasting interruptions, of which 33 were classified as major incidents⁴, accounting for approximately 9% of the total (**Figure 2-1-3-7**). In response, measures to prevent recurrence of such incidents are being rigorously implemented by each broadcaster, and efforts to share

incident cases within the industry are being promoted to prevent similar incidents.

The number of broadcasting interruption incidents for terrestrial and satellite broadcasting was 258, the lowest since the start of data collection in FY2011. However, the number of incidents for general cable broadcasting increased compared to FY2021, with the number of major incidents being the third highest in the past five years. The most common cause of broadcasting interruptions was equipment failure, followed by natural disasters (**Figure 2-1-3-8**).

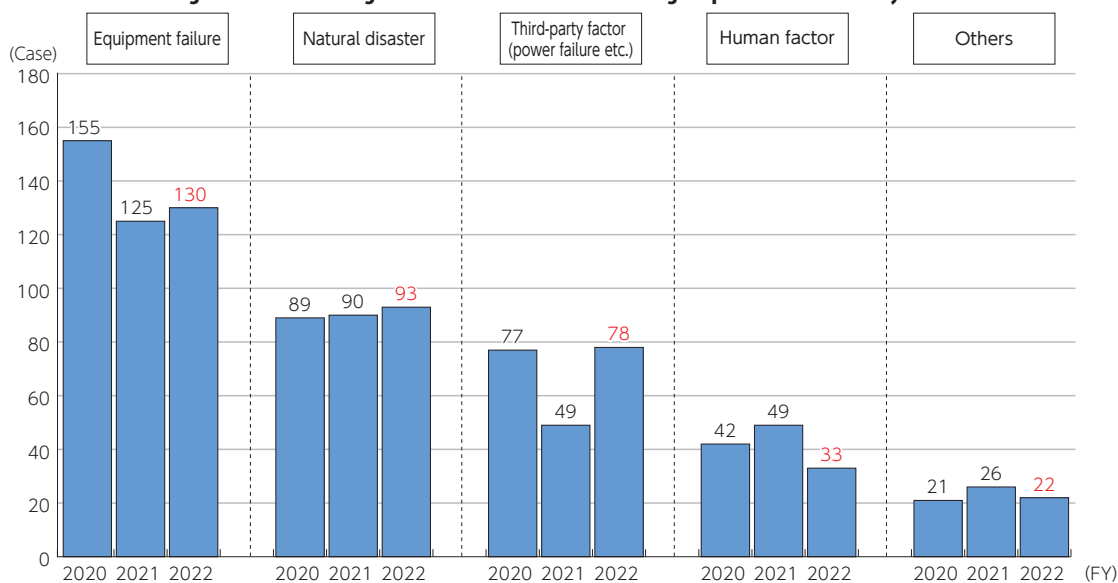
Figure 2-1-3-7 Changes in the number of serious accidents

(Source) Prepared based on MIC "State of the Occurrence of Broadcasting Suspension Accidents" (FY2022)⁵

⁴ Accidents falling under Articles 113, 122 or 137 of the Broadcast Act: "If the suspension of broadcasting caused by the equipment for basic broadcasting or other major accident stipulated in the Ministerial Ordinance of the Ministry of Internal Affairs and Communications occurs, the approved basic broadcaster must report such matter as well as the reason or cause without delay to the Minister for Internal Affairs and Communications."

⁵ https://www.soumu.go.jp/menu_seisaku/ictseisaku/housou_suishin/hoso_teishijiko.html

Figure 2-1-3-8 Changes in the number of broadcasting suspension accidents by cause



(Source) Prepared based on MIC "State of the Occurrence of Broadcasting Suspension Accidents" (FY2022)⁶

2. Content market

(1) Size of Japan's content market

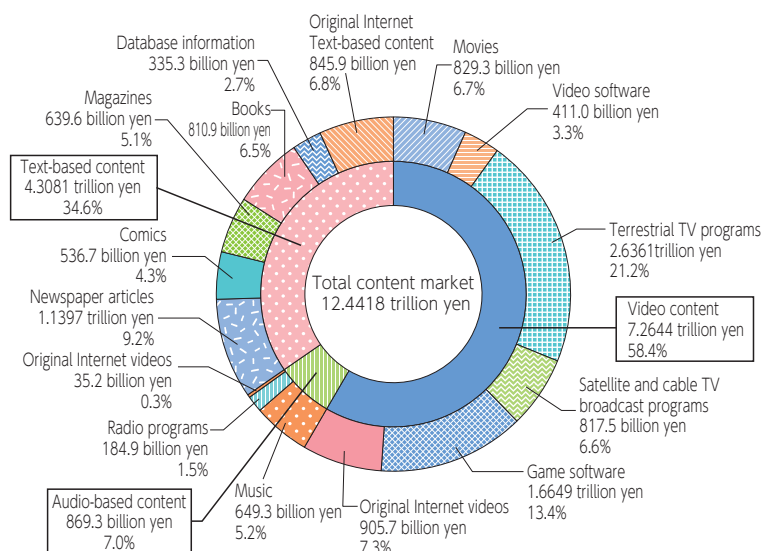
A Market overview

The size of Japan's content market in 2022 was 12.4418 trillion yen. In terms of market composition by type of content, video-based content accounted for nearly 60% of the total. Text-based content made up about 35%, and audio-based content accounted for approximately 7%⁷

(Figure 2-1-3-9).

The size of the content market saw a significant increase in 2021 but experienced a slight decrease in 2022. By type of content, text-based and audio-based content showed an increasing trend (Figure 2-1-3-10).

Figure 2-1-3-9 Breakdown of the Japanese content market (2022)

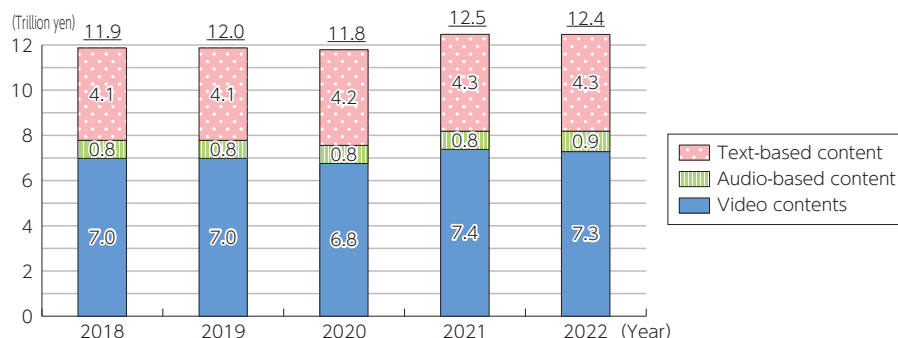


(Source) MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"

⁶ https://www.soumu.go.jp/menu_seisaku/ictseisaku/housou_suishin/hoso_teishijiko.html

⁷ Rather than aggregation by media, market size was calculated and analyzed after aggregation according to distribution stage such as primary distribution and multi-use with a focus on the original nature of the content.

Figure 2-1-3-10 Changes in size of the Japanese content market (by content type)



(Source) MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"

B Status of multi-use

The size of the primary distribution market in 2022 was 9.3887 trillion yen, accounting for about 75% of the total market. The breakdown of the primary distribution market is as follows: video-based content at 5.5033 trillion yen, text-based content at 3.1694 trillion yen, and audio-based content at 716 billion yen.

On the other hand, the size of the multi-use market was 3.0531 trillion yen, showing an increase from the previous year. The breakdown is as follows: video-based content at 1.7612 trillion yen, text-based content at 1.1387 trillion yen, and audio-based content at 153.3 billion yen.

**Figure (related data) Breakdown of primary distribution market (2022)**

Source: MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00192>
 (Data collection)

**Figure (related data) Breakdown of multi-use market (2022)**

Source: MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00193>
 (Data collection)

C Communication-based content market

Within the content market, the size of the communication-based content market, which includes content delivered via the internet to PCs and mobile phones, was 5.7199 trillion yen. In terms of market composition by type of content, video-based content accounted for 58%, text-based content for 33.1%, and audio-based content for 8.9%.

The size of the communication-based content market

has been on an increasing trend in recent years. By type of content, video-based content has been increasing due to the growth of movies and internet originals, while text-based content has also been increasing due to the growth of books, comics, and internet originals, contributing to the expansion of the communication-based content market.

**Figure (related data) Breakdown of the communication content market (2022)**

Source: MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00194>
 (Data collection)

**Figure (related data) Changes in the size of the telecommunications content market (by content type)**

Source: MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00195>
 (Data collection)

(2) Advertising

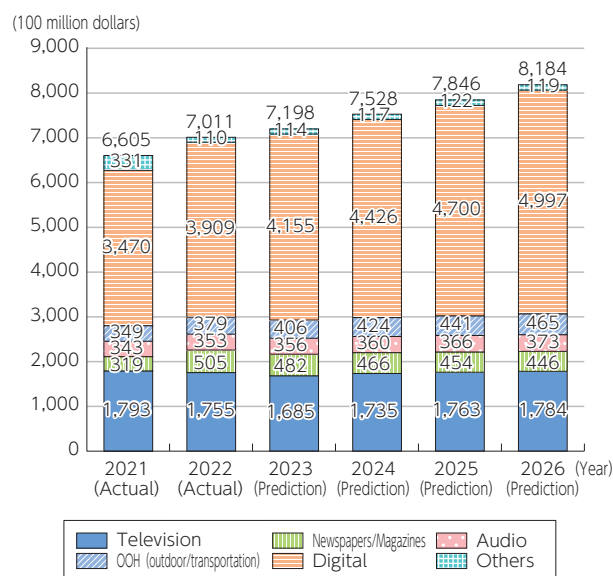
Looking at the global advertising market, digital advertising is expected to reach 415.5 billion dollars in 2023 (a 6.3% increase from the previous year), expand-

ing its share to 57.7% of total advertising expenditure (**Figure 2-1-3-11**). Japan's digital advertising market continues to grow. In 2023, internet advertising reached

3.333 trillion yen, while advertising in the four mass media⁸ continued to decline to 2.3161 trillion yen. Since 2021, when internet advertising expenditure first sur-

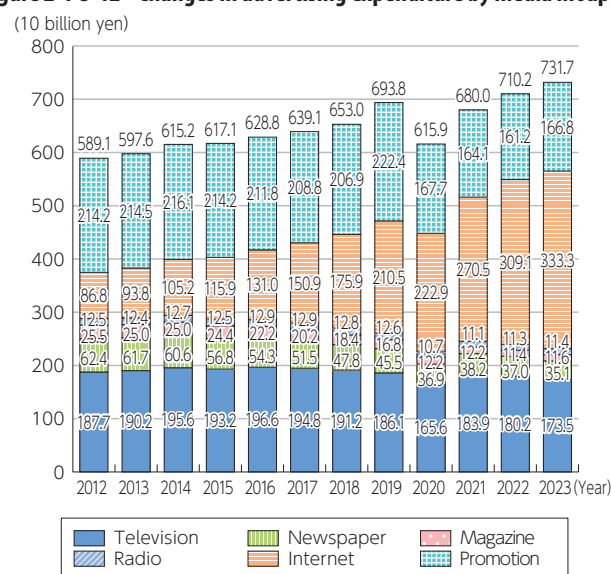
passed that of the four mass media, the gap has been widening (Figure 2-1-3-12).

Figure 2-1-3-11 Changes and forecast in global advertising expenditures by media type



(Source) Prepared based on Dentsu Group "Global Advertisement Spend Growth Rate Forecast (2023-2026)"⁹

Figure 2-1-3-12 Changes in advertising expenditure by media in Japan¹⁰



(Source) Prepared based on Dentsu "Advertising expenditure in Japan (each year)"¹¹



Figure (related data) Changes in global total advertising expenditure

Source: Dentsu Group "Global Advertisement Spend Growth Rate Forecast (2023-2026)"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00198>

(Data collection)

⁸ Television media, newspapers, magazines and radio.

⁹ <https://www.group.dentsu.com/jp/news/release/001091.html> * Figures for the Russian market are excluded.

¹⁰ Since 2019, advertisements on EC platforms for selling goods and the event field are included in the advertisement expenditure in Japan to estimate the advertisement market. Data for 2018 and before is not retroactively adjusted.

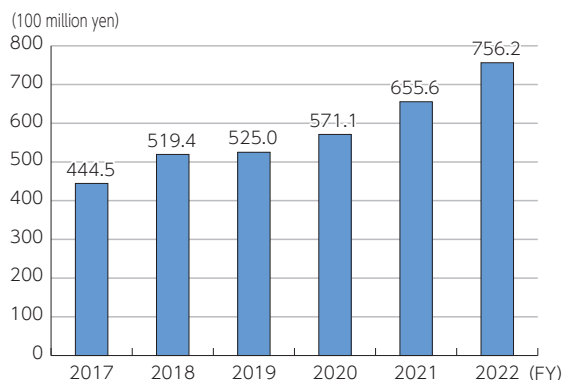
¹¹ https://www.dentsu.co.jp/knowledge/ad_cost/index.html

(3) Trends in overseas exports of Japan's broadcast content

The export value of broadcast content from Japan continued to increase in FY 2022, reaching 75.62 billion yen (Figure 2-1-3-13). Amid the growth of video distribu-

tion services, the proportion of internet distribution rights has increased, while the rights for program broadcasting and video production have decreased.

Figure 2-1-3-13 Changes in the value of broadcasting content exports from Japan



*1 Value of broadcasting content exports: Total sales to overseas of program broadcasting rights, Internet distribution rights, video/DVD rights, program format remake rights, and merchandising rights, etc.

*2 Calculated based on questionnaire responses submitted by NHK, key private broadcasting stations, semi-key private broadcasting stations, local stations, satellite broadcasters, CATV operators, and production companies, etc.

(Source) Prepared based on MIC "Analysis of the Current Status of Overseas Expansion of Broadcasting Content"



Figure (related data) Changes in the value of Japan's broadcasting content exports by rights

Source: Prepared based on the MIC "Analysis of the Current Status of Overseas Expansion of Broadcasting Content"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00200>
 (Data collection)



Figure (related data) Changes in the value of Japan's broadcasting content exports by entities

Source: Prepared based on the MIC "Analysis of the Current Status of Overseas Expansion of Broadcasting Content"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00201>
 (Data collection)

Section 4 Trends in radio wave usage in Japan

1. Major use by frequency band

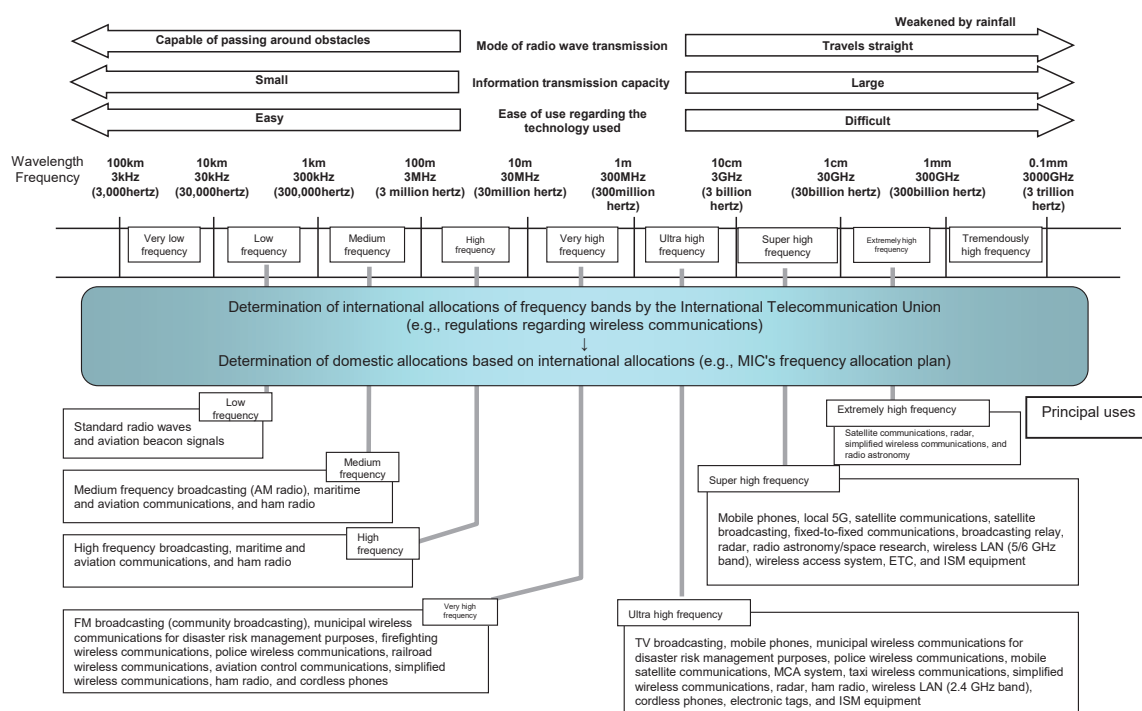
Regarding frequency, the International Telecommunication Union (ITU) divides the world into three regions and specifies international allocations for each frequency band and type of operation based on the Radio Regulations established in the ITU Constitution.

Based on these international allocations, the “Frequency Allocation Plan¹⁾” specifies the frequencies, types

of operations, purposes, and conditions that can be allocated to assist in the application for licenses for radio stations under the Radio Act. When establishing or amending this plan, the Radio Regulatory Council is consulted.

The main uses and characteristics of frequency bands in our country are as shown in (Figure 2-1-4-1).

Figure 2-1-4-1 Main uses and characteristics of each frequency band in Japan



Spectrum	Wave length	Characteristics
Very low frequency	10 to 100km	Propagating along ground surface, waves of this spectrum can go over low hills. Being capable of propagating in water, the spectrum can be used for seabed exploration
Low frequency	1 to 10km	Being capable of propagating to very distant places, the spectrum is used by standard frequency stations to inform radio clock, etc. of time and frequency standard.
Medium frequency	100 to 1000m	Capable of propagating through reflection off the E-layer of the ionosphere that is formed at the height of about 100km, the spectrum is used mainly for radio broadcasting.
High frequency	10 to 100m	Capable of reaching the other side of the globe by being reflected off the F-layer of the ionosphere that is formed at the height of about 200 to 400km and by repeating reflection between F-layer and the ground surface. Widely used for ocean ship and international flight plane communication, international broadcasting and amateur radio.
Very high frequency	1 to 10m	Waves of this spectrum propagate rather straight and are not easily reflected off the ionosphere, but are capable of reaching the other side of mountains and buildings to a certain extent. The spectrum is widely used for a variety of mobile communications including emergency and fire emergency radio.
Ultra high frequency	10cm to 1m	Waves of this spectrum have stronger tendency to propagate straight compared with very high frequency, but are capable of reaching the other side of mountains and buildings to a certain extent. The spectrum is widely used mostly for a variety of mobile communication systems including mobile phones, and digital television broadcasting and microwave ovens.
Super high frequency	1 to 10cm	Due to the strong tendency to propagate straight, this spectrum is suitable for emission to a specific direction. It is mainly used for fixed trunk circuits, satellite communication, satellite broadcasting and wireless LAN.
Extremely high frequency	1mm to 10mm	With strong tendency to propagate straight, waves of the spectrum can transmit very large information quantity, but not very far in bad weather due to rain or fog. For this reason, the spectrum is used for relatively short-distance radio access communication and image transmission systems, simplicity radio, car collision prevention radar and radio telescopes for astronomical observation.
Tremendously high frequency	0.1mm to 1mm	The spectrum has nature similar to light. It is rarely used for communication but used for radio telescopes for astronomical observation as is the case of Extremely high frequency.

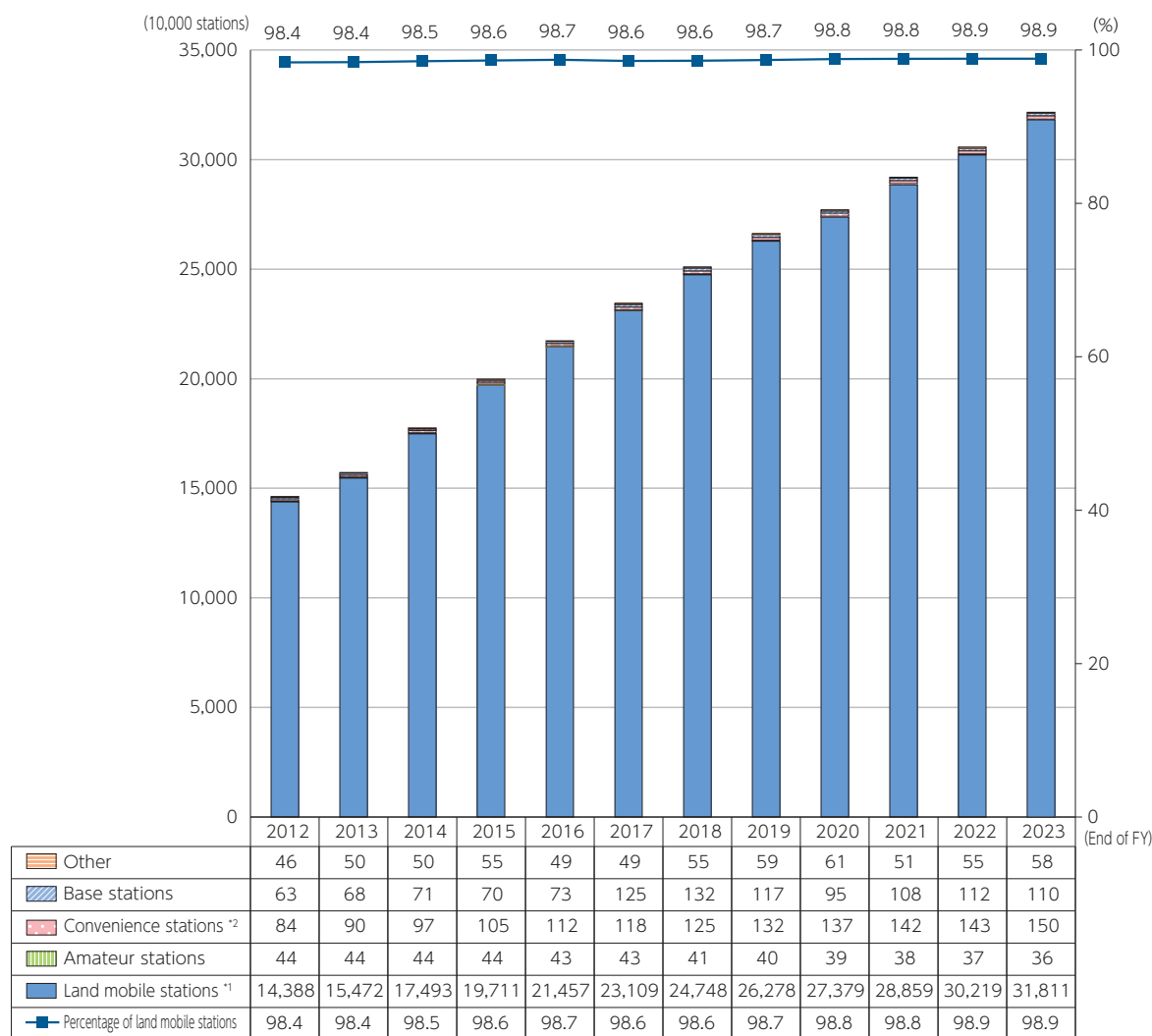
¹ <https://www.tele.soumu.go.jp/j/adm/freq/search/share/index.htm>

2. Trends in the number of radio stations

As of the end of the FY2023, the number of radio stations (excluding radio stations that do not require licenses, such as wireless LAN terminals) was 321.63 million (an increase of 5.2% from the previous fiscal year). Among these, the number of land mobile stations such as mobile phone terminals was 318.11 million (an in-

crease of 5.3% from the previous fiscal year), accounting for 98.9% of the total number of radio stations. Additionally, the number of simple radio stations also increased to 1.5 million (an increase of 4.9% from the previous fiscal year) (**Figure 2-1-4-2**).

Figure 2-1-4-2 Changes in the number of radio stations



*1 Land mobile station: A radio station (such as a mobile phone devices) operated while moving on land or stopped at an unspecified point.

*2 Convenience radio station: A radio station that performs simple radio communication.

3. Radio wave monitoring to eliminate obstruction of important radio communication etc.

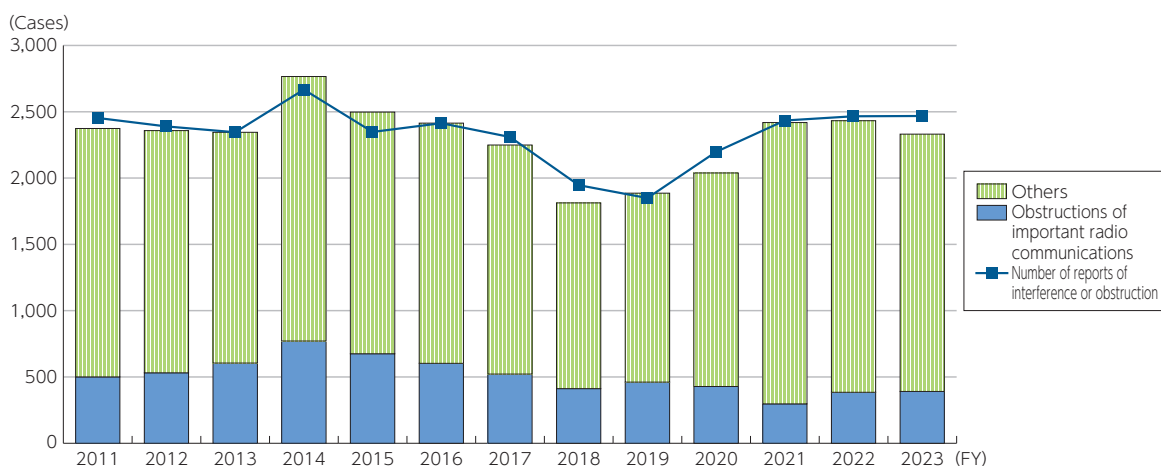
The MIC has established “DEURAS (DEtect Unlicensed RAdio Stations)” facilities to detect radio sources that interfere with important radio communications, such as fire and emergency radio, aviation and maritime radio, and mobile phones, and to crack down on unauthorized radio stations that disrupt the radio usage environment using sensor station facilities installed on the rooftops of major cities’ towers and buildings and unauthorized radio station search vehicles².

In FY2023, the number of interference and obstruction reports was 2,331, a decrease of 101 cases (4.2% decrease) from the previous fiscal year. Among these, the number of cases of interference with important radio communications increased by 6 cases (1.6% increase) to

391 cases compared to the previous fiscal year. The total number of measures for such interference and obstruction in FY2023, including previously unaddressed cases, was 2,468 (Figure 2-1-4-3).

Furthermore, the number of appearances of unauthorized radio stations in FY2023 decreased by 649 cases (14.5% decrease) to 3,832 cases compared to the previous year. The total number of measures in FY2023, including previously unaddressed cases, decreased by 216 cases (19.7% decrease) to 882 cases compared to the previous year. The breakdown of the total number of measures includes 63 prosecutions (7.1%) and 819 directives (92.9%) (Figure 2-1-4-4).

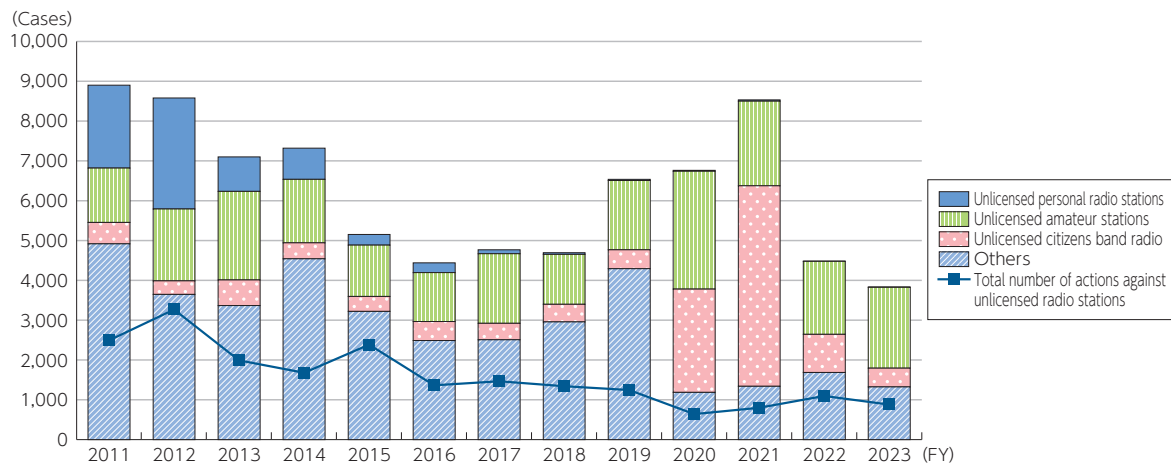
Figure 2-1-4-3 Changes in the number of reports of jamming and obstruction of radio stations and the number of actions taken



Number of reports of interference or obstruction	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	(FY)
Obstructions of important radio communications	501	532	605	771	676	603	522	412	461	429	298	385	391	
Others	1,873	1,826	1,740	1,995	1,821	1,811	1,727	1,401	1,425	1,610	2,121	2,047	1,940	
Total	2,374	2,358	2,345	2,766	2,497	2,414	2,249	1,813	1,886	2,039	2,419	2,432	2,331	
Number of actions in response to reports of interference or obstructions														
Number of actions in response to reports of interference	2,453	2,389	2,346	2,667	2,348	2,414	2,310	1,946	1,850	2,198	2,434	2,466	2,468	

² Regarding obstructions to important radio communications, in FY2010, DEURAS established a 24-hour system for receiving obstruction reports and have been working to promptly eliminate them. As an international radio wave monitoring facility registered with the International Telecommunication Union (ITU), DEURAS plays a role in HF and cosmic radio wave monitoring.

Figure 2-1-4-4 Changes in the number of reports of unlicensed radio stations and the number of actions taken



Number of unlicensed radio stations found		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	(FY)
Stations found	Unlicensed personal radio stations	2,081	2,788	865	784	265	245	99	40	28	25	32	3	7	
	Unlicensed amateur stations	1,367	1,803	2,225	1,592	1,291	1,229	1,749	1,253	1,739	2,959	2,126	1,831	2,028	
	Unlicensed citizens band radio	538	342	642	404	375	478	414	443	477	2,594	5,035	958	472	
	Others	4,917	3,648	3,369	4,541	3,221	2,489	2,508	2,958	4,293	1,187	1,341	1,689	1,325	
	Total	8,903	8,581	7,101	7,321	5,152	4,441	4,770	4,694	6,537	6,765	8,534	4,481	3,832	
Number of actions against unlicensed radio stations		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
Number of actions	Prosecution	249	231	228	215	230	168	168	208	189	62	49	94	63	
	Guidance	2,247	3,038	1,764	1,465	2,156	1,196	1,300	1,136	1,058	581	752	1,004	819	
	Total	2,496	3,269	1,992	1,680	2,386	1,364	1,468	1,344	1,247	643	801	1,098	882	

Section 5 Trends related to ICT equipment and devices in Japan and overseas

1. Trends in the ICT equipment market in Japan and overseas

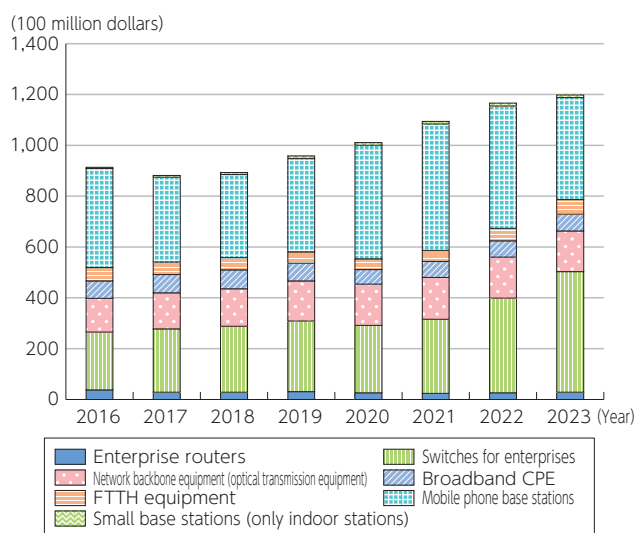
(1) Market size

The global shipment value of network equipment has been on an upward trend since 2017, reaching 16.8348 trillion yen in 2023 (a 9.8% increase from the previous year) (**Figure 2-1-5-1**). The breakdown shows that mobile base stations and enterprise switches are the main components.

In Japan, the production value of network equipment had been declining since the early 2000s but started to increase gradually from 2018. However, it turned downward again in 2021, reaching 626.1 billion yen in 2023 (a 6.0% decrease from the previous year)¹ (**Figure 2-1-5-2**). The breakdown indicates a decrease in telephone application devices² and switches due to the shift from

fixed-line phones to mobile and IP phones. Currently, wireless application devices³ and other wireless communication equipment⁴ constitute the largest segments. The production of base station communication equipment has shown significant fluctuations, experiencing a downturn after the completion of 4G investments in 2016 but increasing again from 2020, only to decrease in 2022. Network connection equipment⁵ used for IP communication started to increase in 2019, decreased from 2021 to 2022, and increased again in 2023. Carrier equipment⁶, mainly digital transmission devices, increased from 2019 but turned downward in 2021, only to increase again in 2023.

Figure 2-1-5-1 Changes in the value of global network equipment shipments



(Source) Omdia

¹ The production value of other terrestrial mobile communication equipment (part of the production value of other wireless communication equipment) has been undisclosed since 2023, which has had an impact.

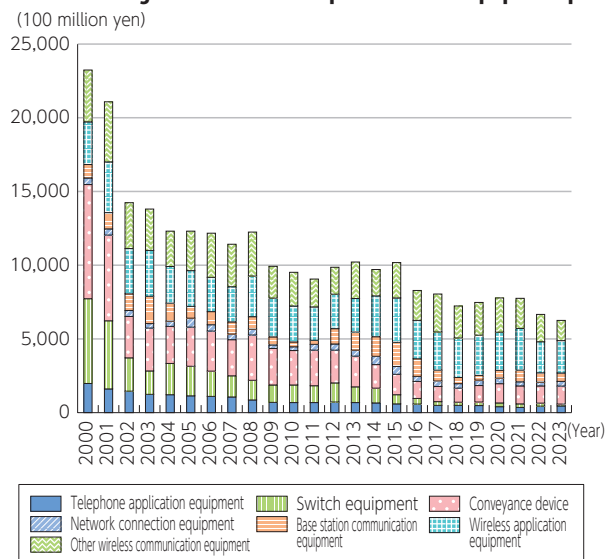
² Key telephone system and interphones

³ Maritime/aeronautical radars, wireless location measuring devices, telemeter/telecontrol apparatus, etc.

⁴ Satellite/terrestrial fixed communications equipment, maritime/aeronautical communications equipment, transceivers, etc.

⁵ Routers, hubs, gateways, etc.

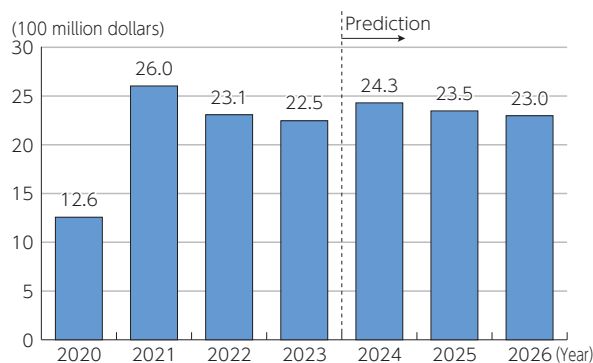
⁶ Digital transmission devices, power line carrier devices, CATV carrier devices, optical transmission devices, etc.

Figure 2-1-5-2 Changes in the value of Japan's network equipment production(Source) METI "Production Dynamics Statistical Survey, Machinery Statistics Edition"⁷**(2) Market trends by equipment type****A 5G base stations**

The global market size (shipment value) for 5G base stations (macro cells) in 2023 was 4.1184 trillion yen (a 3.3% increase from the previous year), while in Japan, it was 315.7 billion yen (a 4.0% increase from the previous year⁸) (**Figure 2-1-5-3**). Although both markets are expected to peak gradually, they are anticipated to maintain high levels. In 2023, the global market share (shipment value) for 5G base stations (macro cells) was led by Huawei (28.0%), followed by Ericsson (24.1%) and

Nokia (19.3%). This indicates that major overseas companies hold a high share in the 5G base station (macro cell) market, while Japanese companies have low international competitiveness.

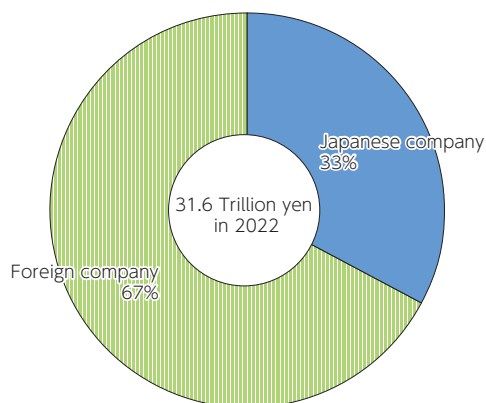
On the other hand, Japanese companies are expected to hold a 33% share of the global market for electronic components incorporated into mobile base stations and smartphones as of 2022, indicating potential competitiveness for Beyond 5G (**Figure 2-1-5-4**).

Figure 2-1-5-3 5G base stations (macro cells) market size in Japan (value of shipments)

(Source) Omdia

⁷ <https://www.meti.go.jp/statistics/tyo/seidou/index.html>⁸ In dollar terms, the market was down 2.7% from the previous year.

Figure 2-1-5-4 Share of global electronic components market (in terms of sales) (2022)



(Source) Omdia



Figure (related data) Global 5G base stations (macro cells) market size (value of shipments)

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00210>

(Data collection)



Figure (related data) Global 5G base stations (macro cells) market share (value of shipments)

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00211>

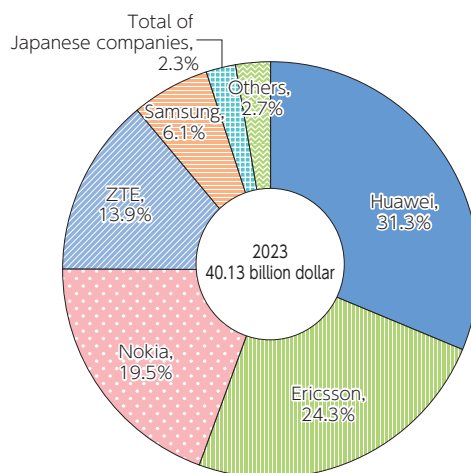
(Data collection)

B Macro cell base stations (including 5G)

In 2023, the global market share based on shipment value was led by Huawei (31.3%), followed by Ericsson

(24.3%) and Nokia (19.5%), with Japanese companies collectively holding a 2.3% share (**Figure 2-1-5-5**).

Figure 2-1-5-5 Share of the global macro cells base station market (value of shipment in 2023)



(Source) Omdia

C Enterprise routers

In 2023, the global market share based on shipment value was led by Cisco (70.4%), followed by H3C (10.7%) and Ekinops (2.7%).

In the Japanese market, the shipment value share in 2023 was led by Cisco (28.1%), followed by NEC (25.4%) and Yamaha (21.4%).



Figure (related data) Global enterprise router market share

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00213>
(Data collection)



Figure (related data) Japanese enterprise router market share

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00214>
(Data collection)

2. Trends in the ICT device market in Japan and overseas

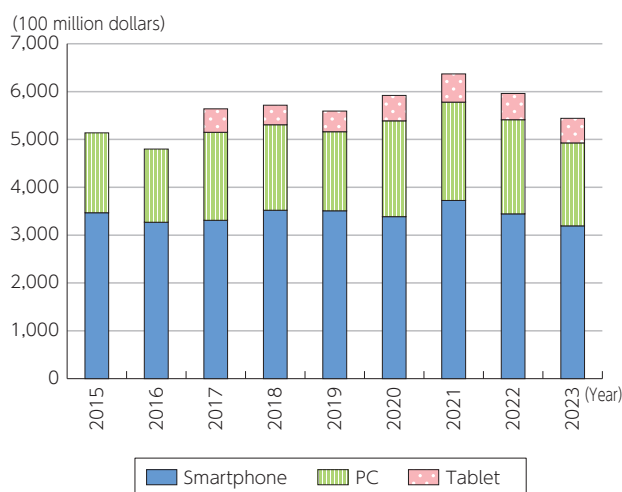
(1) Market size

The global shipment value of information terminals had been on an upward trend since 2016, but it decreased in 2023 to 76.4787 trillion yen (a 17.1% decrease from the previous year)⁹ (**Figure 2-1-5-6**). The breakdown shows that smartphones and PCs are the main contributors.

The production value of information terminals in Japan had been declining until 2017, but it started to in-

crease from 2018. However, it turned to a decline again from 2020, and in 2023, it increased to 1.0385 trillion yen (an 11% increase from the previous year) (**Figure 2-1-5-7**). The breakdown shows that mobile phones and PHS¹⁰ were significant until the mid-2010s, but they have since shrunk, and now desktop PCs, laptop PCs, and information terminals¹¹ are the main contributors.

Figure 2-1-5-6 Changes in the value of global information device shipments



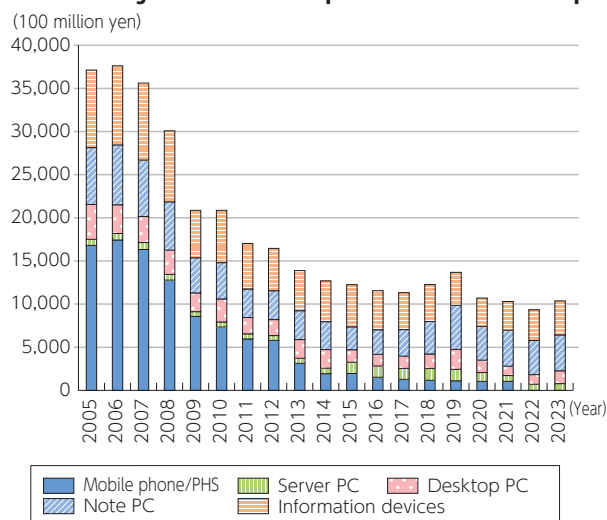
* Tablets have been counted since 2017.

(Source) Omdia

⁹ In dollar terms, the market was down 22.4% from the previous year.

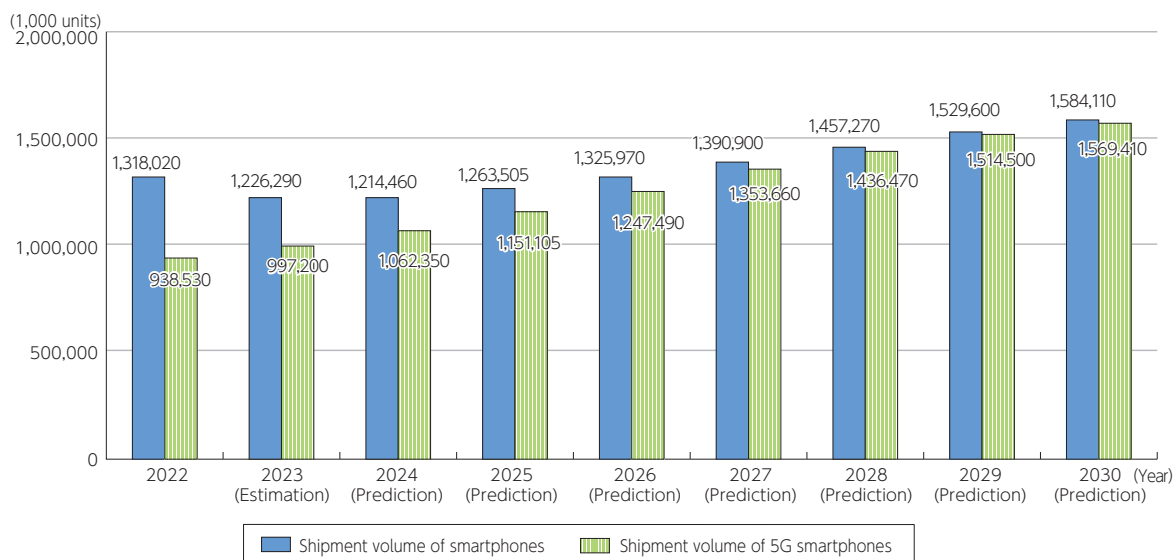
¹⁰ Since 2019, the value of mobile phone and PHS production is no longer disclosed, so the values for radio communications equipment (including satellite communications equipment) are used after deducting the values of broadcasting equipment, fixed communications equipment (satellite and terrestrial), other terrestrial mobile communications equipment, maritime/aeronautical mobile communications equipment, base station communications equipment, other radio communications equipment and associated radio equipment.

¹¹ External memories, printers, monitors, etc. Information kiosk terminal devices are excluded because their production was not disclosed in some years.

Figure 2-1-5-7 Changes in the value of Japanese information device production(Source) METI "Production Dynamics statistical Survey, Machinery Statistics Edition"¹²**(2) Market trends by device****A 5G-compatible smartphones**

The global shipment volume of 5G-compatible smartphones was 938.53 million units in 2022, accounting for 71% of the total smartphone shipments (1.31802 billion units). The shipment volume of 5G-compatible smartphones is expected to continue expanding, reaching 1.56941 billion units by 2030 (**Figure 2-1-5-8**).

In Japan, the shipment volume of 5G-compatible smartphones was 28.6 million units in 2022 (a 63.2% increase from the previous year). It is predicted that 5G-compatible smartphones will account for 100% of the market from 2024 onwards, expanding to 31.01 million units by FY2028 (**Figure 2-1-5-9**).

Figure 2-1-5-8 Changes and forecast of global shipment volume of smartphones and 5G smartphones

*1 It is based on makers' shipment volume

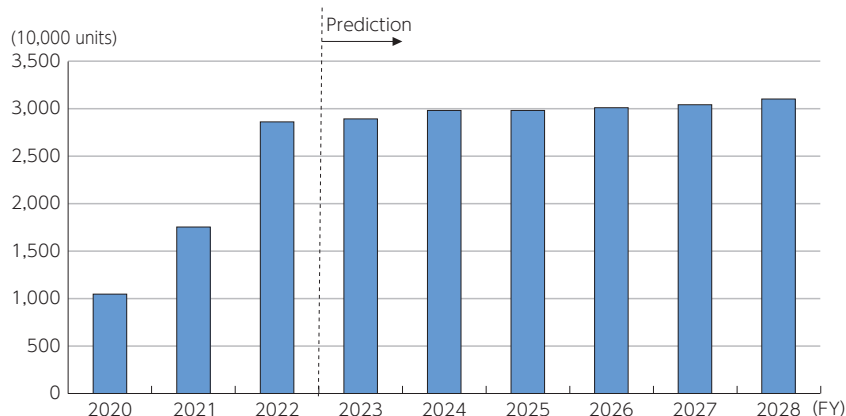
*2 Shipment volume of 5G smartphones is an inner number of the one of smartphone.

*3 The data in 2023 is estimated, and the one after 2024 is predicted.

(Source) Yano Research Institute Ltd. "Global Research on the Number of Mobile Phone Service Subscriptions and Shipment Volume of Smartphones" (2023) (published on March 27, 2024)

¹² <https://www.meti.go.jp/statistics/tyo/seidou/index.html>

Figure 2-1-5-9 Shipment of 5G smartphones in Japan



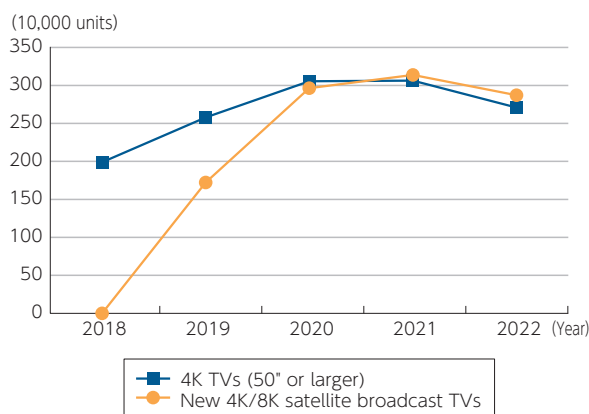
(Source) CIAJ "Medium-term Demand Forecast for Communications Devices [FY2023-DY2028]"

B 4K and 8K televisions

The domestic shipment volume of 4K-compatible televisions (50 inches and above) was 2.71 million units in 2022 (an 11.6% decrease from the previous year), and the shipment volume of new 4K8K satellite broadcast-

compatible televisions was 2.87 million units in 2022 (an 8.5% decrease from the previous year). Both categories turned to a decline in 2022 (**Figure 2-1-5-10**).

Figure 2-1-5-10 Number of 4K and 8K televisions shipped in Japan



(Source) JEITA "Domestic Shipments of Consumer Electronic Devices"

C VR and AR

The global shipment volume of VR headsets had been increasing since 2019, but it turned to a decline in 2023, reaching 7.65 million units (a 38.9% decrease from the previous year).

In Japan, the shipment volume of XR (which includes

"VR (Virtual Reality)", "AR (Augmented Reality)", and "MR (Mixed Reality)" compatible HMDs and smart glasses was 380,000 units in 2022, and it is predicted to increase to 1.02 million units by 2025.

**Figure (related data) Changes and forecast in global VR headset shipments**

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00220>
(Data collection)**Figure (related data) Forecast on domestic shipment volume of HMDs for XR (VR/AR/MR) and smart glasses**

Source: Yano Research Institute Ltd., "The Market of HMDs (Head Mounted Displays) for XR (VR/AR/MR) and Smart Glasses (2023)" (published in July 5, 2023)

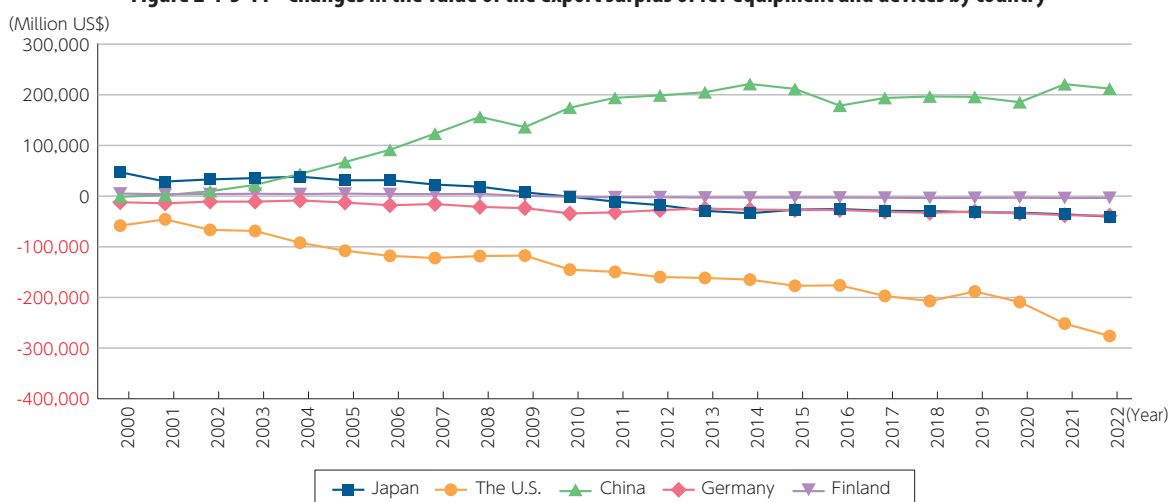
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00221>
(Data collection)

3. Trends in the import and export of ICT equipment and devices by country

In Japan, there has been a trade deficit since 2010, and in 2021, due to the spread of the novel coronavirus infection and the advancement of digitalization in various countries, the export value of ICT equipment and terminals¹³ in Japan increased to 8.131 trillion yen in 2022 (a 12.0% increase from the previous year). However, the import value increased to 13.3158 trillion yen (a 20.1%

increase from the previous year), resulting in a trade deficit of 5.3027 trillion yen (a 35.0% increase from the previous year). In 2022, the U.S. had a trade deficit of 36.3068 trillion yen (a 31.4% increase from the previous year), while China had a trade surplus of 27.9165 trillion yen (a 15.1% increase from the previous year) (**Figure 2-1-5-11**).

Figure 2-1-5-11 Changes in the value of the export surplus of ICT equipment and devices by country



(Source) UNCTAD "UNCTAD STAT"¹⁴



Figure (related data) Changes in the value of exports of ICT equipment and devices by country

Source: UNCTAD "UNCTAD STAT"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00223>

(Data collection)



Figure (related data) Changes in the value of imports of ICT equipment and devices by country

Source: UNCTAD "UNCTAD STAT"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00224>

(Data collection)

¹³ Computers, communications equipment, consumer electronics, electronic components, etc.

¹⁴ <https://unctadstat.unctad.org/EN/Index.html>

4. Trends in the semiconductor¹⁵ market

The global semiconductor market (shipment value) has been on the rise since 2015, reaching 13.3537 trillion yen in 2023 (a 6.4% increase from the previous year)¹⁶. Looking at the breakdown, discrete semiconductors are the most abundant. The sectors that have seen significant growth in recent years are image sensors and MCUs, with the former being dominated by Japanese companies (Sony Semiconductor Solutions) with a 52.0%

share.

Japan's semiconductor market (shipment value) had been declining since 2018, but it turned to an increase from 2021, only to decrease again in 2023 to 997.9 billion yen (a 1.6% decrease from the previous year). Similar to the global market, discrete semiconductors are the most abundant when looking at the breakdown.



Figure (related data) Changes in global semiconductor market (value of shipments)

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00225>
(Data collection)



Figure (related data) Changes in global imaging sensor market share (value of shipments in 2022)

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00226>
(Data collection)



Figure (related data) Changes in Japan's semiconductor market (value of shipments)

Source: Omdia

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00227>
(Data collection)

¹⁵ In this section, this means the discrete semiconductors used for the imaging sensors, MCUs, MEMS sensors and indispensable power sources that are positioned as key devices in the electronic equipment implementing IoT and AI, which are being introduced as part of the DX.

¹⁶ In dollar terms, the market was down 0.4% from the previous year.

Section 6 Trends in platforms

1. Market trends

In 2024, looking at the market capitalization of major players in the global ICT-related market, Microsoft, which was ranked second in 2023, surpassed Apple to take the top spot, as it accelerated its AI strategy through a partnership with the U.S.-based Open AI, fueling expectations for demand in generative AI. NVIDIA also made significant progress, rising to third place, buoyed

by strong performance and anticipated expansion in demand for semiconductor-related products in the generative AI space. Other companies, such as Taiwan Semiconductor Manufacturing, involved in the semiconductor sector, are being positively evaluated in the stock market (**Figure 2-1-6-1**).

Figure 2-1-6-1 Changes on the top 15 companies by market capitalization in the global ICT market

2023					2024			
Company name	Major business	Country or region	Market capitalization (100 million dollars)		Company name	Major business	Country or region	Market capitalization (100 million dollars)
Apple	Hardware, software, services	US	25,470	↑	Microsoft	Cloud service	US	31,420
Microsoft	Cloud service	US	20,890	↓	Apple	Hardware, software, services	US	26,380
Alphabet/Google	Search engine	US	13,030	↑	NVIDIA	Semiconductor	US	23,750
Amazon.com	Cloud service, e-commerce	US	10,270		Amazon.com	Cloud service, e-commerce	US	18,670
NVIDIA	Semiconductor	US	6,650	↓	Alphabet/Google	Search engine	US	18,660
Meta Platforms/ Facebook	SNS	US	5,370		Meta Platforms/ Facebook	SNS	US	12,820
Tencent	SNS	China	4,690	↑	Taiwan Semiconductor Manufacturing	Semiconductor	Taiwan	6,350
Visa	Payment	US	4,600	↑	Broadcom	Hardware, semiconductor	US	6,260
Taiwan Semiconductor Manufacturing	Semiconductor	Taiwan	4,530	↓	Visa	Payment	US	5,650
Mastercard	Payment	US	3,440		Mastercard	Payment	US	4,440
Samsung Electronics	Hardware	The Republic of Korea	3,280		Samsung Electronics	Hardware	The Republic of Korea	3,960
Broadcom	Hardware, semiconductor	US	2,610	↑	Oracle	Cloud service	US	3,470
Alibaba	e-commerce	China	2,570	↓	Tencent	SNS	China	3,440
Oracle	Cloud service	US	2,450	new	Salesforce	Cloud service	US	2,970
Cisco Systems	Hardware, security	US	2,100	new	Advanced Micro Devices (AMD)	Semiconductor	US	2,890

The figures for 2023 are as of March 31, 2023, and the ones for 2024 are as of March 27, 2024.

(Source) *Acquired from Wright Investors' Service, Inc¹

Comparing the 2022 revenues of major platforms in Japan, the U.S., and China², Amazon leads with 514 billion dollars, marking a 2.9-fold increase from 2017 (**Figure 2-1-6-2**). Alibaba from China has experienced a significant growth of 5.4 times compared to 2017, with

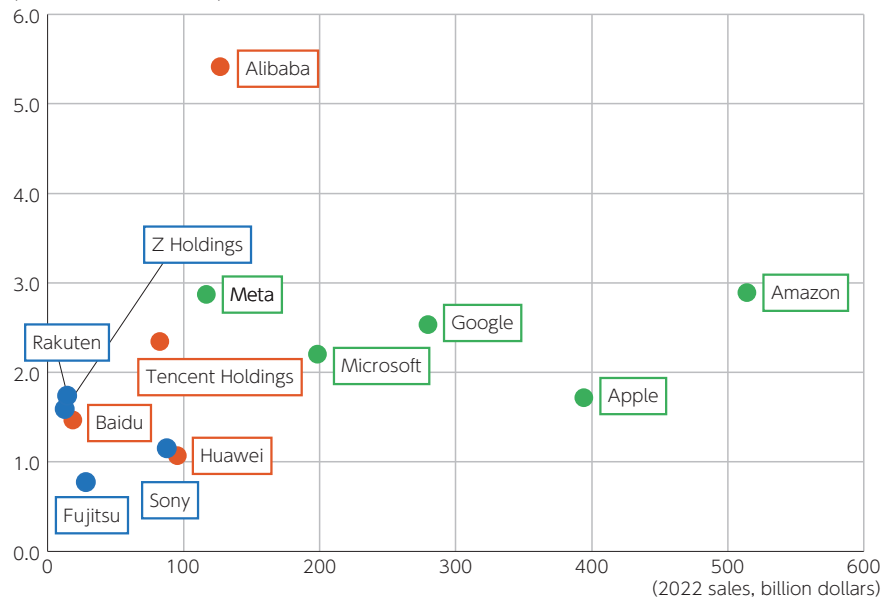
revenues of 126.9 billion dollars. On the other hand, Japanese companies, with smaller scales, show comparatively lower growth: Rakuten at 1.7 times, Z Holdings at 1.6 times, Sony at 1.2 times, and Fujitsu at 0.8 times.

¹ <https://www.corporateinformation.com/#/tophundred>

² Sales of Japanese and Chinese companies were converted to dollars by using the average rate of the respective year.

Figure 2-1-6-2 Sales of platform providers in Japan, the U.S. and China

(2022 sales / 2017 sales)



(Source) Prepared based on Statista data

2. Trends in major platform providers

The major platform companies in the U.S. and China are leveraging their respective strengths to focus on new areas and businesses, including generative AI and the metaverse. In particular, multiple platforms are in-

vesting in the development of generative AI, and it is anticipated that generative AI will be utilized in various scenarios in the future (Figure 2-1-6-3).

Figure 2-1-6-3 Trends with major platform providers in the U.S. and China

< The U.S. >

Key areas	Company	Business overview and areas	New areas and businesses
Advertising, search	Alphabet (Google)	It provides the largest search engine service in the world, and is developing a massive economic sphere including cloud and devices focused mainly in search advertising.	Google is enhancing its services by integrating conversational AI "Gemini" (formerly known as Bard) with Google Search, Gmail, YouTube, and other platforms.
E-commerce	Amazon	It is one of the largest e-commerce operator in the world, with a huge economic sphere centered on cloud services (AWS).	AWS is advancing the use of generative AI in its strong areas, such as generative AI-related services on AWS and shopping assistant AI.
SNS, apps	Meta (Facebook)	The company provides one of the world's largest social media services. In 2021 it changed its name to Meta Platforms to promote its metaverse business.	It is advancing the deployment of generative AI across our entire business, including AI chatbot "Meta AI" and various social networking services.
Communications devices, terminals	Apple	It is the world's largest manufacture and retailer of the internet and digital home appliances. The company has developed a massive economic sphere centered on iPhone and other devices.	It is expanding its business with the iPhone at its core, and the future developments of the XR market will be closely watched to see if the MR headset "Apple Vision Pro" can revitalize it.
Terminals, cloud	Microsoft	It is one of the largest software vendors in the world. The company has a massive economic sphere centered on software and cloud services such as Windows and Office.	It is focusing on leveraging generative AI, expanding partnerships with OpenAI, and aiming to introduce generative AI services in various scenarios.

< China >

Key areas	Company	Business overview and areas	New areas and businesses
Advertising, search	Baidu	It is the largest search engine operator in China. The company is focusing on collaboration with various business areas along with AI technology development by abundant data obtained by searching service.	In August 2023, the generative AI service "ERNIE Bot" was publicly released, aiming not only to enhance its own products but also to build an ecosystem by providing AI technology to various companies.
E-commerce	Alibaba	It is the world's largest e-commerce operator based on gross merchandise volume. The company is leveraging data technology to provide services ranging from marketing to logistics and payments.	In March 2023, the company announced its plan to split its business into six segments. Amidst the slowdown in domestic e-commerce growth, it is focusing on cross-border e-commerce, public cloud, and AI businesses.
SNS, apps	Tencent	It is the China's largest social media app platformer. The company has built a massive digital ecosystem to provide payment services, games and other services based on "WeChat" .	In September 2023, it released in-house developed large-scale language model "Kongen" and are focusing on implementing AI into own services, as well as dedicating efforts to the development of image and video generation AI.
Communications devices, terminals	Huawei	It is a leading global communications device vendor with operations in the following areas: ICT infrastructure, device, cloud service and digital energy.	The 5G smartphones released in August 2023 have been performing well, and the company is focusing on expanding its device business while also venturing into the EV sector, aiming for business diversification.

(Source) Prepared based on published materials by each company



Figure (related data) Sales of major platform providers in the U.S. and China by business

Source: Prepared based on financial results material released by each company

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00251>

(Data collection)

Section 7 Trends in the market of ICT services and contents and application services

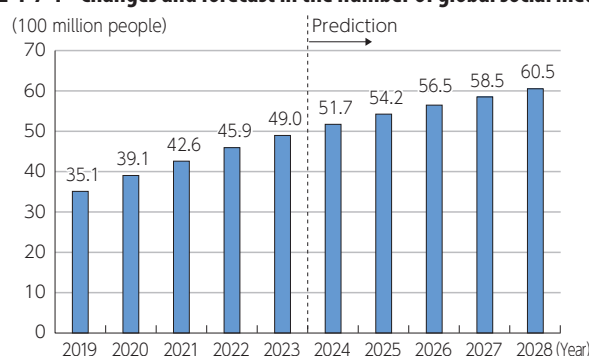
1. Social media service

The number of social media users worldwide¹ is expected to increase from 4.9 billion in 2023 to 6.05 billion by 2028 (**Figure 2-1-7-1**). Social media is being used not only for communication purposes but also for watching video content and live commerce. Additionally, metaverse social media, which allows communication within the metaverse space, is becoming popular, especially among young people. It is anticipated that there will be increased integration and convergence among various social media services in the future.

In Japan, the number of social media users is expected

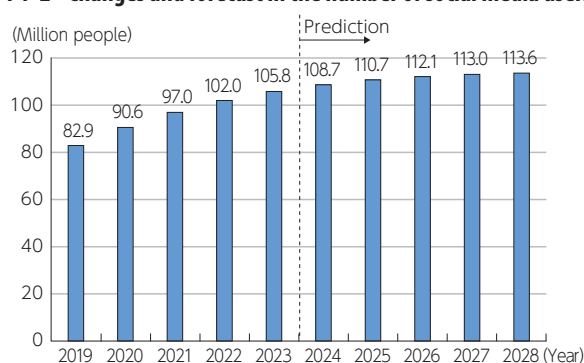
to increase from 105.8 million in 2023 to 113.6 million by 2028 (**Figure 2-1-7-2**). Social media is evolving from a communication tool primarily for young people to one used by all age groups, and it is expected to see a gradual increase in the future. While platforms like Facebook, Instagram, and X (formerly Twitter) remain mainstream, many new services are emerging that differentiate themselves from mainstream services through features such as posts that disappear after a certain time, time-restricted posting, and the inability to edit photos or add text.

Figure 2-1-7-1 Changes and forecast in the number of global social media users



(Source) Statista²

Figure 2-1-7-2 Changes and forecast in the number of social media users in Japan



* The Number of people who periodically use social media sites and applications at least once a month,

(Source) Statista³

2. E-commerce

The global EC market sales continue to show an increasing trend, with an estimated expansion to 812.6 trillion yen in 2023 (a 16.4% increase from the previous year). The average annual growth rates from 2024 to 2028 vary

by country, with the U.S. and India showing high rates, followed by Brazil, China, and Russia. Japan and various European countries (the UK, France, Germany) are predicted to have growth rates of around 6 to 8%.

¹ The people using social media sites and applications at least once a month.

² <https://www.statista.com/outlook/amo/advertising/social-media-advertising/worldwide>

³ <https://www.statista.com/statistics/278994/number-of-social-network-users-in-japan/>



Figure (related data) Changes and forecast in sales in the global EC market

Source: eMarketer(cited from Statista)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00254>
(Data collection)



Figure (related data) Growth rate of EC market by country (2024 to 2027)

Source: Statista "Statista Digital Market Insights"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00255>
(Data collection)

3. Searching services

In the world market for desktop search services, Google holds a high share, but its share has gradually decreased to 81.7% as of December 2023. On the other hand, Bing's share is expanding, reaching double digits at 10.5% as of December 2023. Microsoft's browser "Edge" sets Bing as the default search service, contributing to the expansion of Bing's share.

In Japan, as of January 2024, Google holds the highest share, accounting for over 70% in both personal computers and smartphones and tablets. Additionally, Bing's share exceeds 15% on personal computers, while Yahoo! holds a share of around 17% on smartphones and tablets, indicating differences in trends by device.



Figure (related data) Changes in global market share of search engines (desktop)

Source: StatCounter(cited from Statista)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00258>
(Data collection)



Figure (related data) Changes in global market share of search engines (mobile)

Source: StatCounter(cited from Statista)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00259>
(Data collection)



Figure (related data) Market share of searching engines in Japan

Source: StatCounter(cited from Statista)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00260>
(Data collection)

4. Video streaming, music streaming and e-book

The global market for video streaming, music streaming, and e-books has continued to grow, driven by the increasing popularity of subscription-based services and the rise in at-home time due to the spread of the novel

coronavirus. It is predicted that the total market size will reach 24.3752 trillion yen in 2023, marking a 27.7% increase from the previous year.



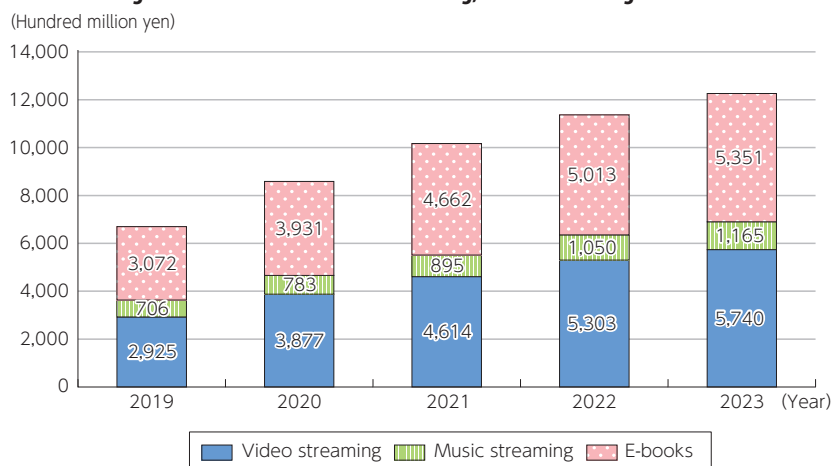
Figure (related data) Changes and forecast in size of global video streaming, music streaming and e-book market

Source: Omdia, Statista

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00261>
(Data collection)

In Japan, the video streaming market is expected to reach 574 billion yen (an 8.2% increase from the previous year), the music streaming market 116.5 billion yen (an 11.0% increase), and the e-book market 535.1 billion yen

(a 6.7% increase) in 2023 (**Figure 2-1-7-3**). These markets are all experiencing growth trends similar to those seen globally.

Figure 2-1-7-3 Changes in the size of the video streaming, music streaming and e-book markets in Japan

(Source) Prepared based on GEM Partners "Video Streaming (VOD) Market Forecast for Five Years (2024-2028) Report"⁴, the Recording Industry Association of Japan "Japan's Recording Industry 2024"⁵ and the Research Institute for Publications (2024) "Publishing Monthly Reports"⁶

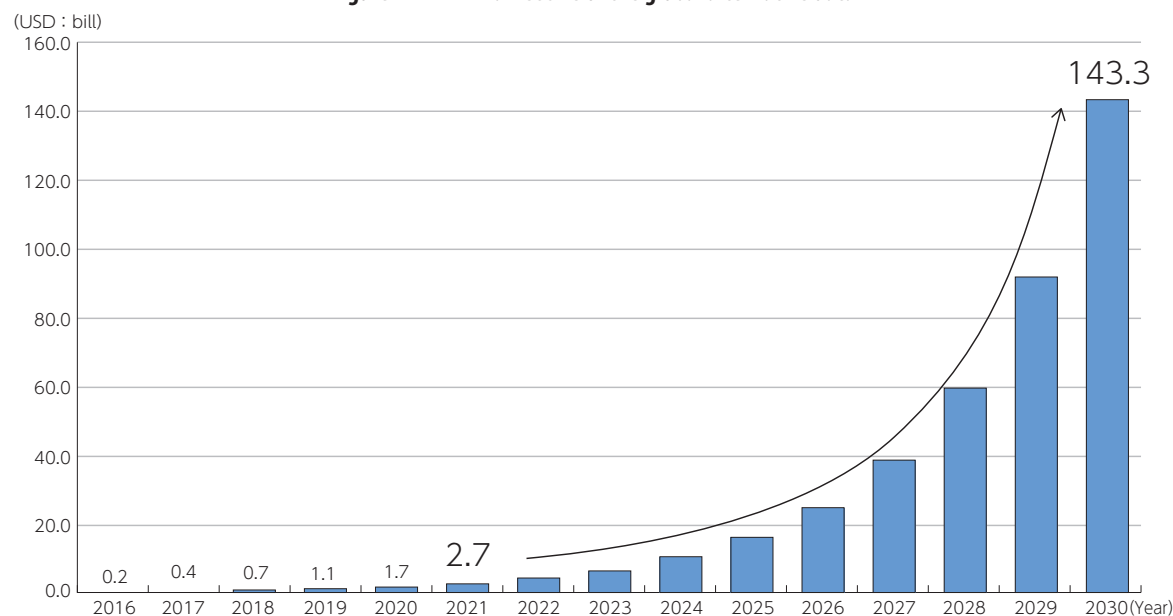
5. New trends in the market of ICT services and contents and application services

(1) Alternative data

With the advancement of digitalization, there has been an increase in data to support decision-making. This includes not only traditional data such as company financial information, press releases, IR information, and public statistics, but also non-traditional data like POS data, location information, satellite images, and social media data. The background factors include the

digitization of real-world data, the development of AI technology, and the growing need to quickly grasp the current situation.

The market size for alternative data is expected to expand from 2.7 billion dollars in 2021 to 143.3 billion dollars in 2030, a fifty-fold increase (**Figure 2-1-7-4**).

Figure 2-1-7-4 Market size of the global alternative data

(Source) Institute for International Monetary Affairs⁷

The advantages of using alternative data include "Differentiation from Existing Data", "Complementarity with Existing Data", and "Promptness". It is believed that companies are seeking to differentiate themselves from

others and enhance their decision-making by supplementing traditional data with information that can only be obtained through alternative data (**Figure 2-1-7-5**).

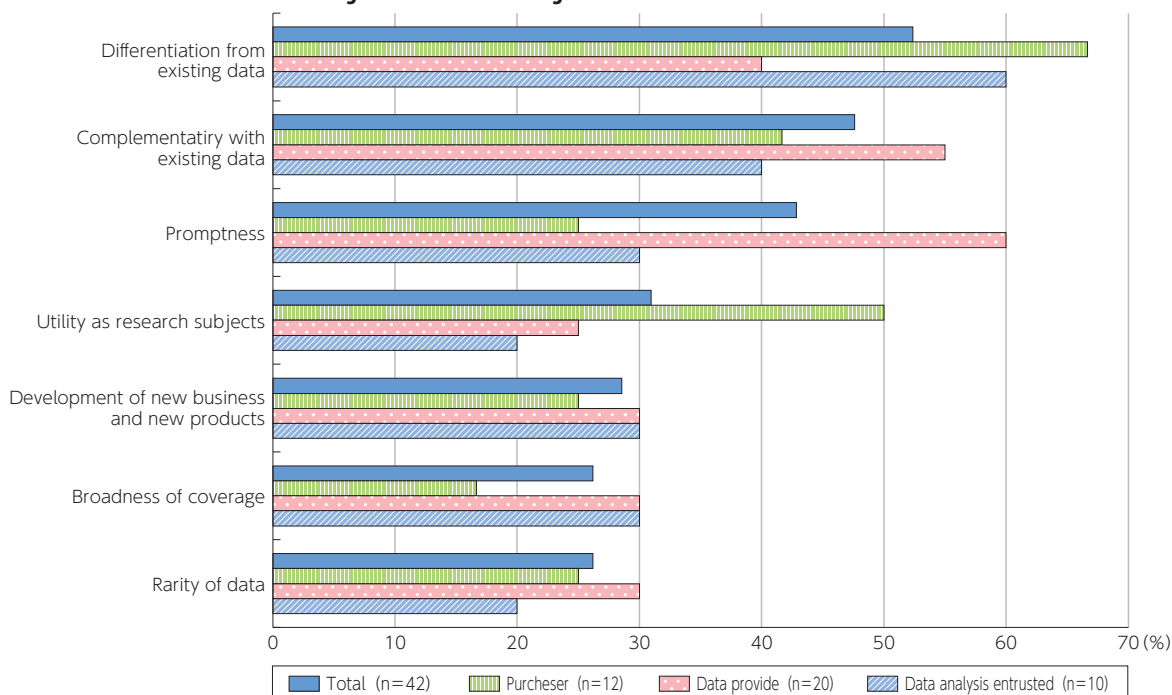
⁴ <https://gem-standard.com/columns/789>

⁵ <https://www.riaj.or.jp/t/pdf/issue/industry/RIAJ2024.pdf>

⁶ <https://shuppankagaku.com/wp/wp-content/uploads/2024/01/ニュースリリース2401.pdf>

⁷ https://www.iima.or.jp/files/items/3510/File/MIYAGAWA_1109.pdf

Figure 2-1-7-5 Advantages of the use of alternative data



(Source) Japan Alternative Data Accelerator Association "Alternative Data FACTBOOK"(Overview)⁸

(2) Metaverse

The global metaverse market is forecasted to expand from 46.1 billion dollars in 2022 to 507.8 billion dollars by 2030 (**Figure 2-1-7-6**). The largest segment within the metaverse is e-commerce, followed by games and health and fitness. The market is primarily driven by consumer-oriented metaverse services. The market, which is just beginning to take off, is expected to expand about tenfold in less than ten years, holding significant growth potential as one of the use cases for 5G and Beyond 5G.

The Japanese metaverse market (including metaverse platforms, non-platform content and infrastructure, and XR (VR, AR, MR) devices used in metaverse services) is

expected to reach 285.1 billion yen in FY2023, a 107% increase from the previous fiscal year, and expand to 2 trillion yen by FY2027 (**Figure 2-1-7-7**). The initial enthusiastic boom for the metaverse has settled, and business development is expected to proceed on a more grounded basis. From a market perspective, it is anticipated that the corporate market (exhibitions, training, retail, etc.) will first utilize the metaverse as a next-generation platform, forming markets for human resource development and related equipment and services, followed by the full-scale consumer market.

⁸ https://alternativedata.or.jp/wp-content/uploads/2023/11/JADAA_Factbook202311_outline.pdf

Figure 2-1-7-6 Transition and forecast in the size of the global metaverse market

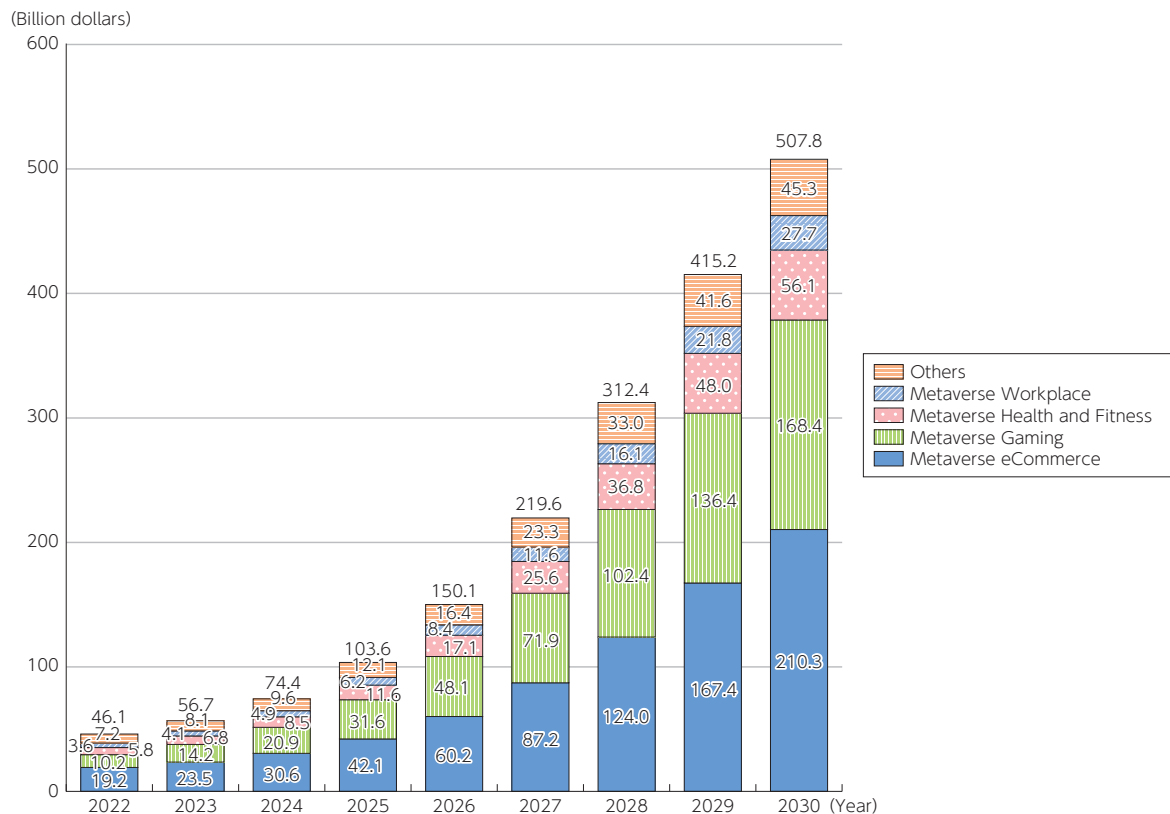
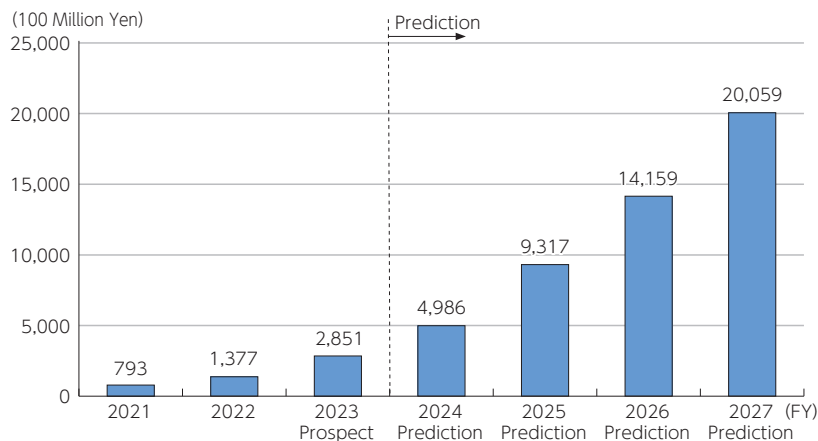
(Source) Statista⁹

Figure 2-1-7-7 Transition and forecast in the size of the Japan's metaverse market



*1 The total market size is the sum of metaverse platforms, non-platforms (contents, infrastructures etc.), and XR (VR,AR,MR) equipments. Platforms and non-platforms is calculated on a sales, and XR equipment is calculated on a sales price basis.

*2 It applies to the enterprise (corporate) metaverse and consumer metaverse, and excludes game-only metaverse services.

*3 FY2023 is prospect. After FY2024 is prediction.

(Source) Yano Research Institute Ltd., "Metaverse Market Survey in Japan (2023)" (published on August 30, 2023)

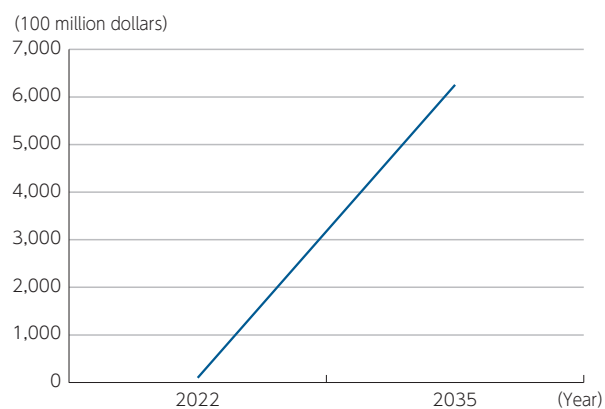
(3) Digital twin

A digital twin is a technology that constructs a twin in a digital virtual space based on data collected from the real world, allowing for various simulations. By recreating cities, cars, people, products, and equipment with digital twins, it becomes possible to repeatedly conduct tests that are difficult to perform in the real world, such

as traffic prediction, behavior simulation, manufacturing site monitoring, and durability testing.

According to SDKI, the global digital twin market is expected to grow from 9.9 billion dollars in 2022 to 625.5 billion dollars by 2035, which is a 63 times increase (**Figure 2-1-7-8**).

⁹ <https://www.statista.com/outlook/amo/metaverse/worldwide>

Figure 2-1-7-8 Size of the global digital twin market

(Source) Prepared based on SDKI "Market Survey on Digital Twin"¹⁰

¹⁰ <https://www.sdki.jp/reports/digital-twin-market/107636>

Section 8 Trends in the data center market and cloud services market

1. Data centers

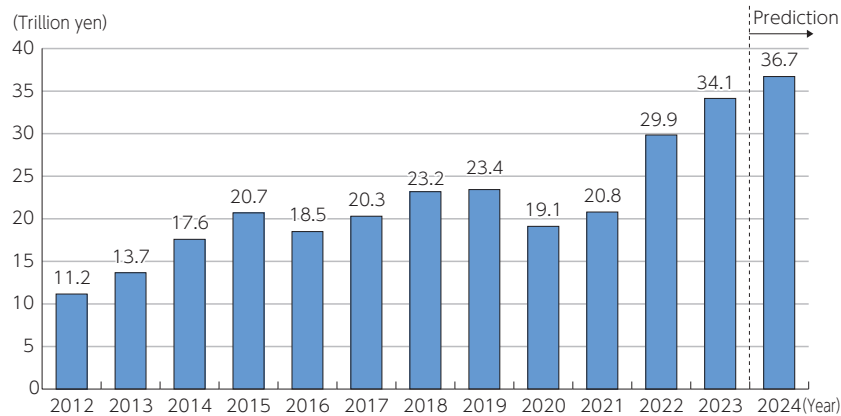
The number of data centers worldwide is overwhelmingly high in the U.S., with 5,381 as of March 2024. Even when combining the total number of data centers in European countries (Germany, the UK, France, the Netherlands, Italy, Poland, and Spain), it amounts to approximately 2,100, highlighting the concentration in the U.S. Japan has 219 data centers, which is less than 5% of the number in the U.S.

The global market size (expenditure) for data center

systems, which saw a decline in 2020 due to construction delays and supply chain disruptions caused by the COVID-19 pandemic, has been on an increasing trend since then. It is expected to reach 34.1 trillion yen in 2023 (a 14.4% increase from the previous year) and expand to 36.7 trillion yen in 2024 (**Figure 2-1-8-1**).

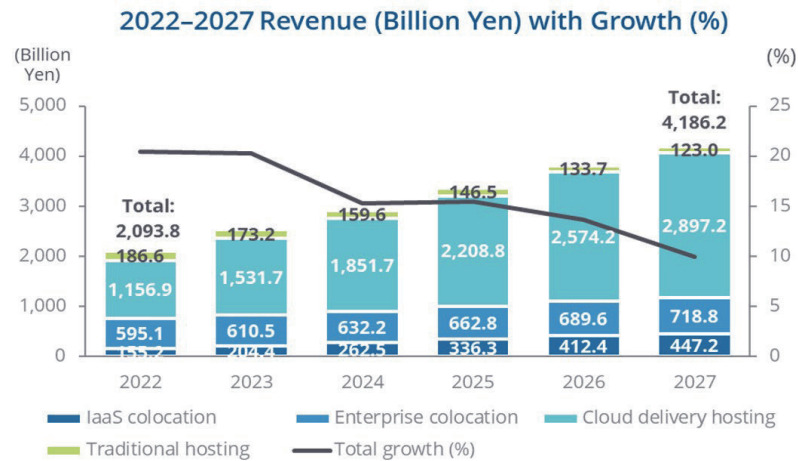
The market size (sales) for data center services in Japan was 2.0938 trillion yen in 2022 and is projected to reach 4.1862 trillion yen by 2027 (**Figure 2-1-8-2**).

Figure 2-1-8-1 Changes and forecast in the size of the global data center systems market (expenditure)



(Source) Gartner (cited from Statista)¹

Figure 2-1-8-2 Changes and forecast in the size of the Japan's data center services market (sales)



(Source) IDC Japan, July 2023 "Domestic Data Center Service Market Prediction 2023-2027" (JPJ49897923)



Figure (related data) Share of global large-scale data center market by region (data capacity)
 Source: Synergy "Virginia Still Has More Hyperscale Data Center Capacity Than Either Europe or China"
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00277>
 (Data collection)

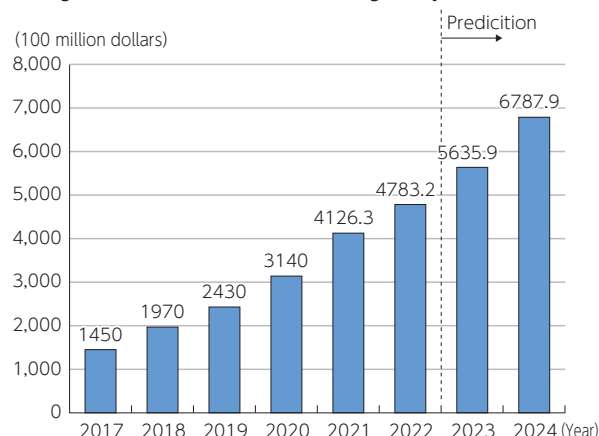
¹ <https://www.statista.com/statistics/268938/global-it-spending-by-segment/>

2. Cloud services

The global expenditure on public cloud services is expected to increase to 563.6 billion dollars in 2023 (**Figure 2-1-8-3**). This is attributed to the essential nature of cloud services in conducting business operations and the widespread adoption of new technologies, particularly AI. Regarding AI, its application across various industries is anticipated, but effective implementation will require customization (algorithms, costs, sovereignty, privacy, sustainability, etc.), making the use of cloud services crucial. The share of international expenditure on cloud infrastructure services² continues to be dominated

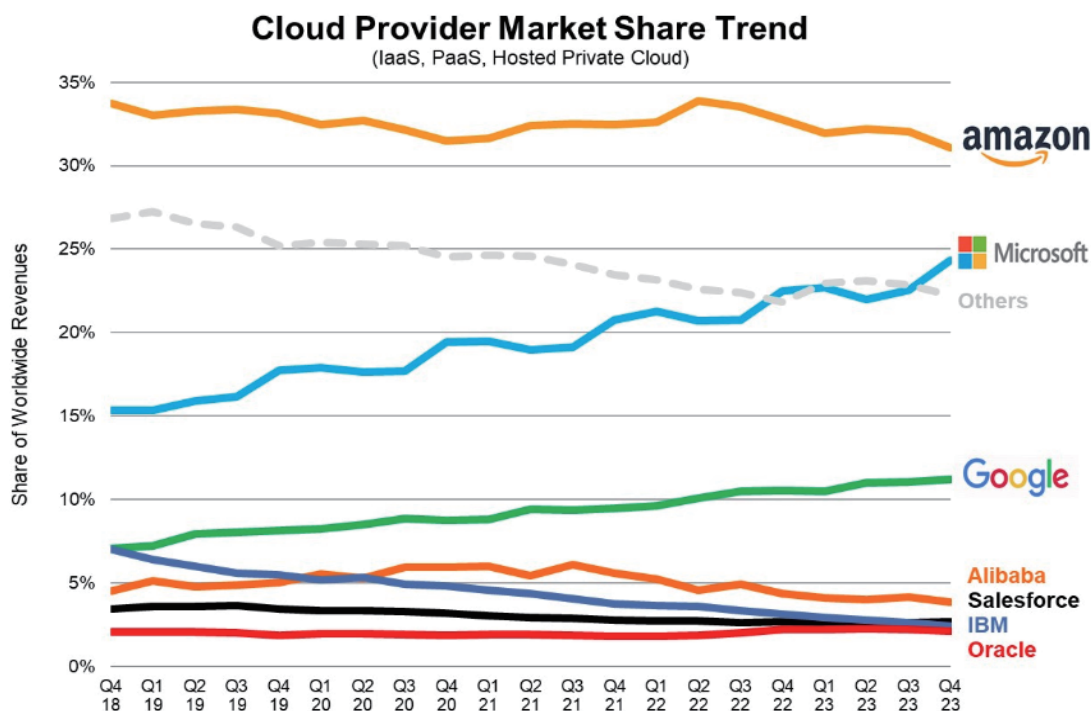
by Amazon, Microsoft, and Google, in that order, collectively accounting for nearly 70% of the market. As of the fourth quarter of 2023, Amazon held approximately 31%, Microsoft 24%, and Google 11%, with the expansion of Microsoft and Google's market share being particularly notable in recent years (**Figure 2-1-8-4**). The market continues to be toward oligopolization, and it is considered important for cloud providers outside the top three to focus on specific areas or seek collaboration with major players to gain market share.

Figure 2-1-8-3 Changes and forecast in the size of the global public cloud service market (sales)



(Source) Gartner (cited from Statista)³

Figure 2-1-8-4 Changes of global market share of cloud infra service



(Source) Synergy⁴ "Cloud Market Gets its Mojo Back; AI Helps Push Q4 Increase in Cloud Spending to New Highs"

² Total of IaaS, PaaS and hosted private cloud.

³ <https://www.statista.com/statistics/273818/global-revenue-generated-with-cloud-computing-since-2009/>

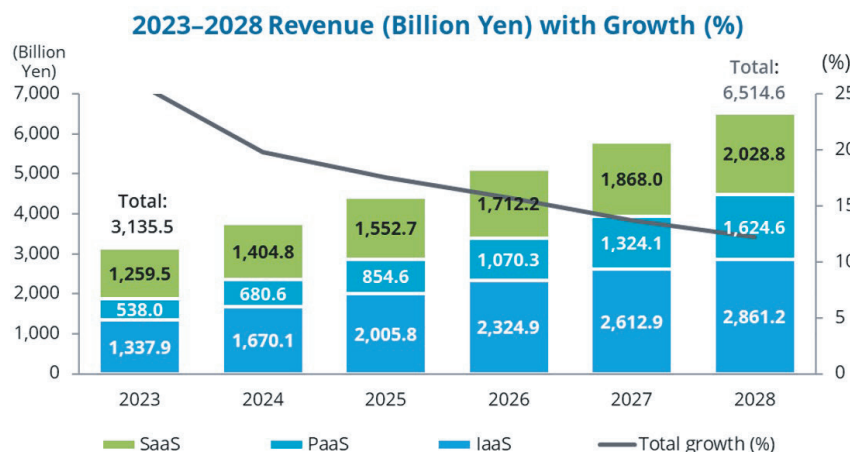
⁴ <https://www.srgresearch.com/articles/cloud-market-gets-its-mojo-back-q4-increase-in-cloud-spending-reaches-new-highs>

The Japanese public cloud services market⁵ is expected to achieve significant growth, reaching 3.1355 trillion yen in 2023, a 25.8% increase compared to the previous year (Figure 2-1-8-5).

Additionally, in Japan's PaaS and IaaS markets, the high utilization rates of major cloud services (AWS by

Amazon, Azure by Microsoft, and GCP by Google) are particularly notable. Specifically, AWS accounts for more than half of the companies using PaaS/IaaS, showing an increase of over 10 percentage points compared to the previous year.

Figure 2-1-8-5 Changes and forecast in the size of the public cloud service market in Japan (expenditure)



(Source) IDC Japan, February 2024 "Domestic Public Cloud Service Market Prediction 2024-2028" (JPJ50706624)⁶



Figure (related data) Use rate of AWS, Azure, GCP in PaaS/IaaS users

Source: MM Research Institute, Ltd. "Research Survey on Demand Trend of Domestic Cloud Services" (as of June 2022)
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00281>
 (Data collection)

3. Edge computing

The global edge computing market size (expenditure) is projected to expand to 232 billion dollars in 2024 and further to 350 billion dollars by 2027 (Figure 2-1-8-6).

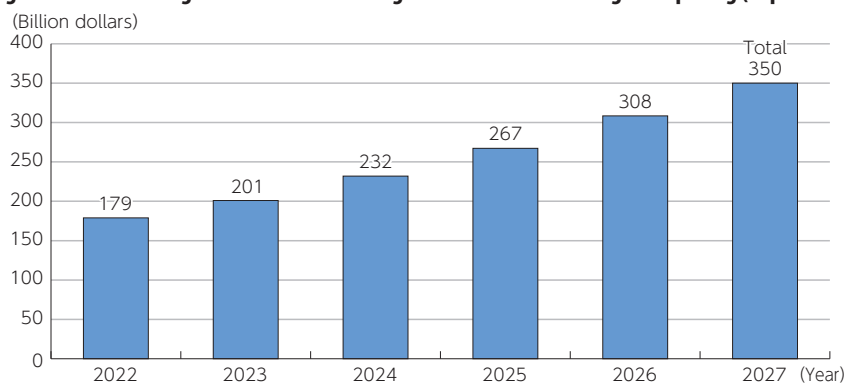
In Japan, the edge computing market size (expenditure) is estimated to reach 1.6 trillion yen in 2024 and is expected to grow to 2.3 trillion yen by 2027 (Figure 2-1-8-7).

Major use cases include smart factories, remote control of machinery and robots, high-definition video transmission, virtual space services via AR/VR, autonomous driving, gaming, and the metaverse. Given the low latency benefits of edge computing, it is anticipated to be widely used in remote operations within industries such as manufacturing and construction.

While edge computing offers advantages like reduced latency, it also has limitations in terms of scale and processing capacity, which can lead to increased costs. Therefore, it is common to use edge computing selectively rather than for all applications. This suggests that edge computing is not a replacement for the cloud but rather a new application of cloud utilization. Consequently, the spread of edge computing is expected to promote new uses of cloud services. The domestic edge AI product and service market (revenue) in Japan is projected to reach 15 billion yen in FY2023. It is expected to grow at an annual rate of 27.4%, reaching a scale of 37 billion yen by FY2027.

⁵ Cloud services that specialize in IT-related functions provided to a wide range of users without special regulations or restrictions.

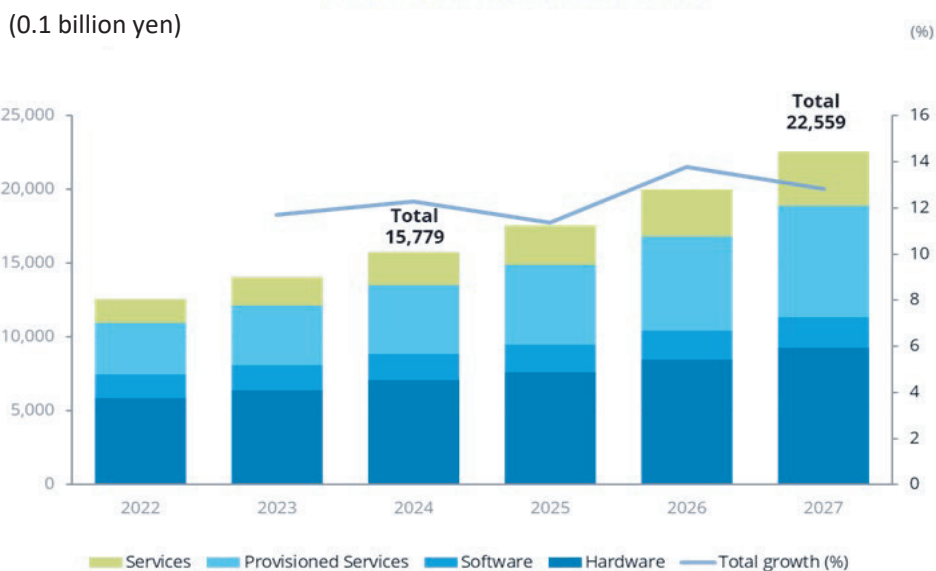
⁶ <https://www.idc.com/getdoc.jsp?containerId=prJPJ49684222>

Figure 2-1-8-6 Changes and forecast in the global market size of edge computing (expenditure)

(Source) IDC Worldwide Edge Spending Guide - Forecast 2024 | Feb (V1 2024)⁷

Figure 2-1-8-7 Changes and forecast in the market size of edge computing in Japan (expenditure)

2022~2027 Spending with Growth (%)



(Source) IDC "Investment in Edge Computing in the Domestic Market is Predicted to Reach 1.6 trillion yen in 2024 ~the Forecast for the Domestic Edge Infrastructure Market is Announced~" (March 22, 2024)⁸

**Figure (related data) Changes and forecast in the market size of the Japanese edge AI solutions**

Source: Deloitte Tohmatsu MIC Research Institute "Reality and Future Prospects of Edge AI Computing Market in FY2023 (ver.3)" (February 7, 2024)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00287>
(Data collection)

⁷ <https://www.idc.com/getdoc.jsp?containerId=prUS51960324>

⁸ <https://www.idc.com/getdoc.jsp?containerId=prJPJ51979224>

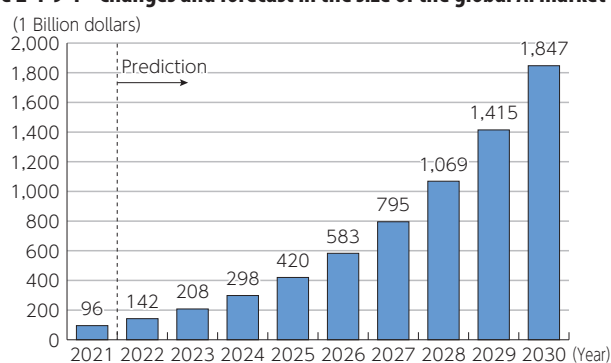
Section 9 Trends in AI

1. Market overview

The global AI market size (sales) is expected to grow to 18.7148 trillion yen in 2022, a 78.4% increase from the previous year, with accelerated growth projected to continue until 2030 (**Figure 2-1-9-1**).

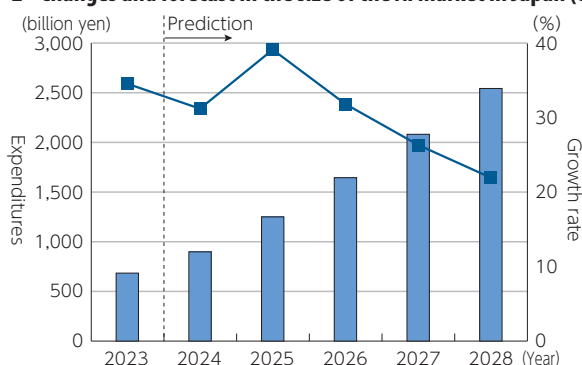
The market size for AI systems¹ in Japan (expenditure) is projected to reach 685.873 billion yen in 2023, a 34.5% increase from the previous year, and continue growing to 2.543362 trillion yen by 2028 (**Figure 2-1-9-2**).

Figure 2-1-9-1 Changes and forecast in the size of the global AI market (sales)



(Source) Next Move Strategy Consulting (cited from Statista)²

Figure 2-1-9-2 Changes and forecast in the size of the AI market in Japan (expenditure)



(Source) IDC "Announced Market Prediction of Domestic AI System in 2024" (April 25, 2024)³

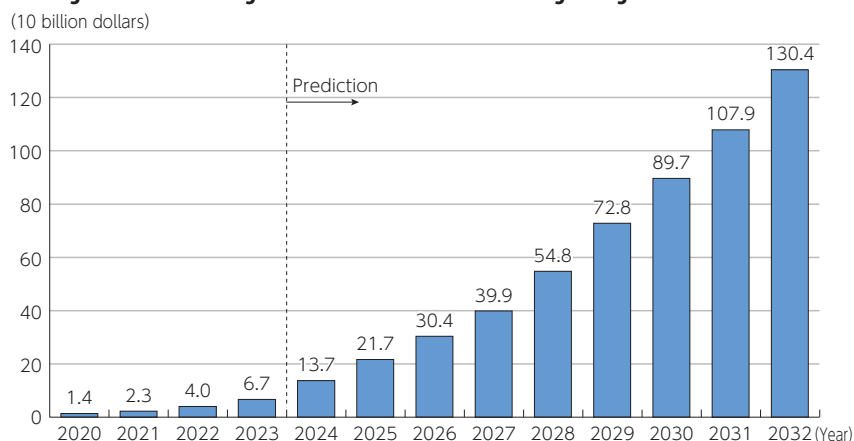
The societal implementation of AI is advancing, with generative AI, which creates text, images, audio, and video, gaining attention. The global generative AI market is expected to expand significantly from 67 billion dollars in 2023 to 1.304 trillion dollars by 2032. This growth is driven by the explosive adoption of generative AI tools such as Google's Bard, OpenAI's ChatGPT, and

Midjourney, Inc.'s Midjourney. Generative AI can create various types of content, including text, images, audio, and video, with applications in marketing, sales, customer support, data analysis, search, education, literature, law, and more. It can also generate computer programs and designs, addressing labor shortages and improving productivity (**Figure 2-1-9-3**).

¹ Hardware and software platforms for using AI functions and IT services related to the construction of AI systems

² <https://www.statista.com/statistics/1365145/artificial-intelligence-market-size/>

³ <https://www.idc.com/getdoc.jsp?containerId=prJPJ52070224>

Figure 2-1-9-3 Changes and forecast in the size of the global generative AI market(Source) Bloomberg (Statista)⁴

2. Trends in AI by country

AI is still in a developmental stage, with foundational research being conducted worldwide. According to AI Rankings, which publishes leading countries, companies, and universities based on the number of research

papers, the top countries are the U.S., China, the UK, Germany, and Canada, with Japan ranking 11th to 12th annually.

**Figure (related data) Changes of AI rankings by country (top 15)**

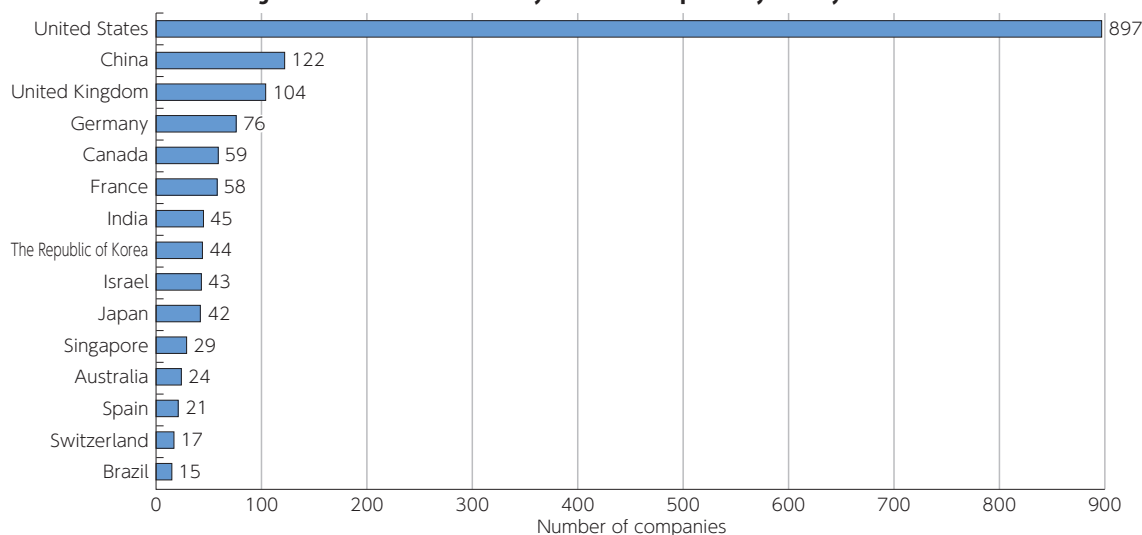
Source: Prepared based on AIRankings

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00291>

(Data collection)

Investment in AI-related companies is also increasing. According to Stanford University's "Artificial Intelligence Index Report 2024," the number of AI companies that received new funding in 2023 was highest in the

U.S. (897 companies), followed by China (122 companies), and Japan ranked 10th with 42 companies (**Figure 2-1-9-4**).

Figure 2-1-9-4 Number of newly funded AI companies by country in 2023(Source) Stanford University "Artificial Intelligence Index Report 2024"⁵⁵⁴ <https://www.statista.com/statistics/1417151/generative-ai-revenue-worldwide/>⁵ https://aiindex.stanford.edu/wp-content/uploads/2024/04/HAI_AI-Index-Report-2024_Master.pdf

Section 10 Trends of cybersecurity

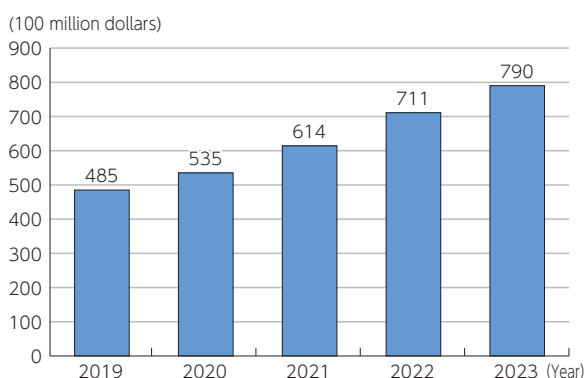
1. Market overview

The global market for cybersecurity is expected to remain robust, reaching 79 billion dollars in 2023, representing an 11.1% increase from the previous year (**Figure 2-1-10-1**).

As for the major players in the cybersecurity market, Cisco, Palo Alto Networks, Check Point, Symantec, and Fortinet held the top 5 market shares from 2018 to 2019.

However, starting in 2020, Trellix emerged as a replacement for Symantec, and by 2022, it had captured a 3.1% share. Nevertheless, as of 2023, Microsoft and Crowd Strike had replaced Check Point and Trellix in the top 5. Additionally, the market share of the leading player, Palo Alto Networks, has been expanding in recent years.

Figure 2-1-10-1 Changes in global cybersecurity market size



(Source) Prepared based on Canalis data



Figure (related data) Major global cybersecurity companies

Source: Prepared based on Canalis data

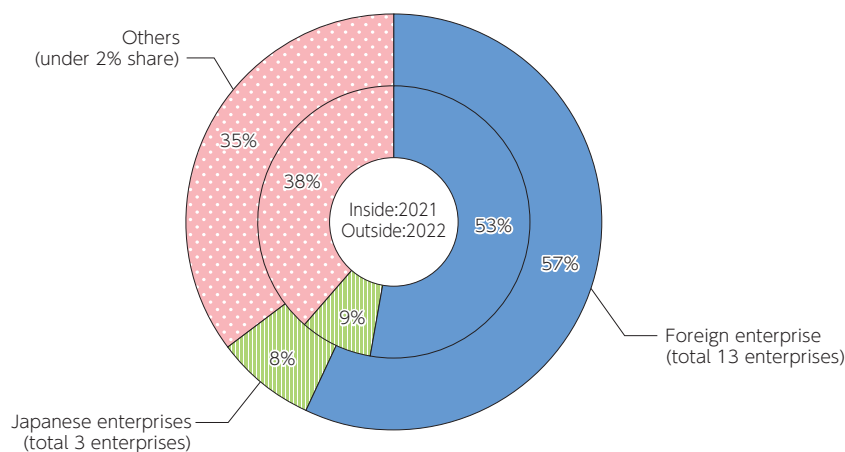
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00294>

(Data collection)

In 2022, the domestic market for information security products in Japan reached 525.454 billion yen, a 19.8% increase from the previous year. Within the security product functional market segments, the sales of security software, including endpoint security software and network security software, accounted for 81.3% of the total market at 427.42 billion yen, while security appliances, including content management, UTM, and VPN, accounted for 18.7% at 98.051 billion yen.

Furthermore, the market share of information security product vendors (sales) in 2021 and 2022 was categorized into “Foreign Companies” and “Domestic Companies” for those with a share of 2% or more in the overall market. The results showed that both foreign companies held a share of over 50%, indicating that a significant portion of Japan’s cybersecurity products rely on overseas sources (**Figure 2-1-10-2**).

Figure 2-1-10-2 Domestic information security products market share (sales)



(Source) IDC Japan, August 2023 “Japan IT Security Products Market Shares, 2022: Progress of Security Platform”(JPJ49213223)

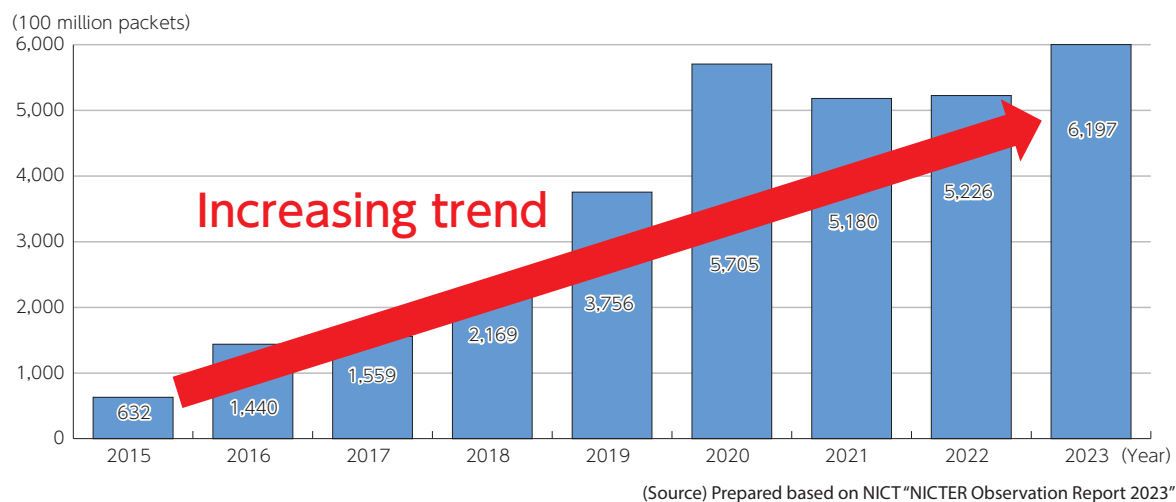
2. Current status of cybersecurity

(1) The increasing threat of cybersecurity

The NICT operates the large-scale cyberattack observation network (NICTER), which has observed a total of approximately 619.7 billion packets in 2023, a 9.8-fold increase compared to 2015 (approximately 63.2 billion packets) (Figure 2-1-10-3). This indicates that a significant number of observation packets are still being received. In addition, the total observed packet count in

2023 corresponds to an observation occurring approximately every 14 seconds for each IP address. It should be noted that 2023 has recorded the highest number of observations to date, and the observation packets flying around the internet are even more active compared to 2022.

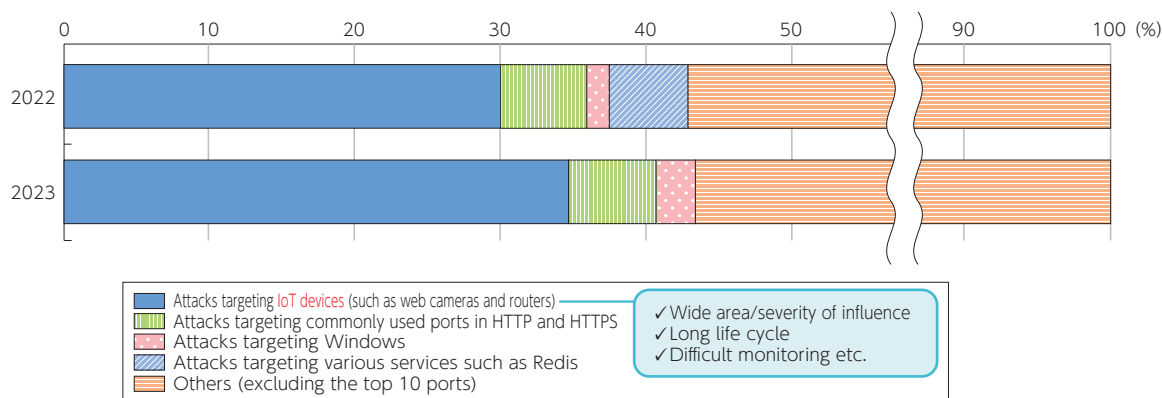
Figure 2-1-10-3 Changes in the number of cyberattack-related communications detected by NICTER



Furthermore, the observed communication related to cyberattacks in NICTER shows that, similar to 2022, a large number of communications targeting IoT devices were observed, accounting for about 30% of all cyberat-

tack-related communications. Attacks on ports used by HTTP and HTTPS were also observed at a similar rate (Figure 2-1-10-4).

Figure 2-1-10-4 Targets of cyberattack-related communications detected by NICTER



* This is an analysis of top 10 ports in what observed by NICTER in 2022 and 2023.

(Source) Prepared based on NICT "NICTER Observation Report 2023"

In 2023, there were 521 cases of violations of the Act on Prohibition of Unauthorized Computer Access (Act No. 128 of 1999, hereinafter referred to as the "Unau-

thorized Computer Access Prohibition Act"), which was one case fewer than the previous year.



Figure (related data) Changes in arrests for violation of the Unauthorized Computer Access Prohibition Act

Source: Prepared based on the National Police Agency, the MIC and the METI "Status of Unauthorized Access Activities and Research and Development of Access Control Technology",
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00300>
(Data collection)

In recent years, ransomware cyberattacks have continued to affect various companies and medical institutions both domestically and internationally, leading to impacts on people's lives and the socio-economic landscape. Additionally, the resumption of “Emotet” activity was confirmed in March 2023, prompting cautionary measures from the Independent Administrative Institution Information-technology Promotion Agency, Japan (IPA) and JPCERT/CC. There have also been cases of DDoS attacks targeting websites of Japanese govern-

ment agencies, local governments, and companies, affecting business continuity and raising concerns about cyberattacks for the general public.

Given this challenging situation, in April 2023, the METI, the MIC, the National Police Agency, and the National center of Incident readiness and Strategy for Cybersecurity (NISC) issued cautionary measures for the risks posed by the Golden Week holiday on cybersecurity.

(2) Economic losses caused by cybersecurity issues

Various organizations have conducted research and analysis on the economic losses caused by cybersecurity issues (Figure 2-1-10-5). The numerical values vary depending on the scope of the losses, but for example,

according to a survey conducted by Trend Micro in 2023, the average cumulative damage caused by cyberattacks experienced by corporate organizations over the past three years was approximately 125.28 million yen.

Figure 2-1-10-5 Economic losses caused by cybersecurity issues

Investigation/analysis entity	Target area	Period covered	Overview of economic loss	Amount of loss
Trend Micro	Japan	2023 [research period]	Average cumulative damage amount for corporate organizations that experienced damage from cyber attacks in the past three years	125.28 million yen
National Police Agency	Japan	First half of 2023	Total investigation and recovery costs associated with ransomware damage	26%: <1 million yen 19%: 1 million to <5 million yen 25%: 5 million to <10 million yen 23%: 10 million to <50 million yen 8%: ≥ 50 million yen or more
FBI	The U.S.	2022	Total amount of reported damage by cybercrime incidents	10.2 billion dollars
NFIB	The UK	2023	Total amount of reported damage by cybercrimes	5.6 million pounds
Sophos	14 countries	2023	Average annual cost per organization to recover from most recent ransomware attack	1.82 million dollars
IBM	16 countries	2023	Global average cost of single data breach for an organization	4.45 million dollars
Cybersecurity Ventures	World	2025 [Prediction]	Cost by cybercrimes	10.5 trillion dollars
Fastl	North America, Europe, Asia, Pacific area	2023	Loss of companies which had cyberattacks	9% of income in the past 12 months

(Source) Prepared based on published materials

(3) Trends in wireless LAN security

According to a survey conducted by the MIC in March 2024 to understand the security awareness of wireless LAN users, the awareness of public wireless LAN is high (approximately 94%), but only about half of the respondents actually use it. The most common rea-

son for not using public wireless LAN is “Security Concerns”, cited by about 70% of respondents. Among users of public wireless LAN, about 90% feel “Security Concerns”, with approximately 40% expressing a “Vague Sense of Unease”.

(4) Adoption status of sender domain authentication technologies

As of December 2023, the adoption status of sender domain authentication technologies for preventing spoofed emails in the JP domain is approximately 82.9%

for SPF and approximately 10.2% for DMARC, both showing a slight increase.



Figure (related data) Status of introduction of sender domain authentication technologies for JP domains
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00307>
 (Data collection)

Section 11 Trends in digital usage

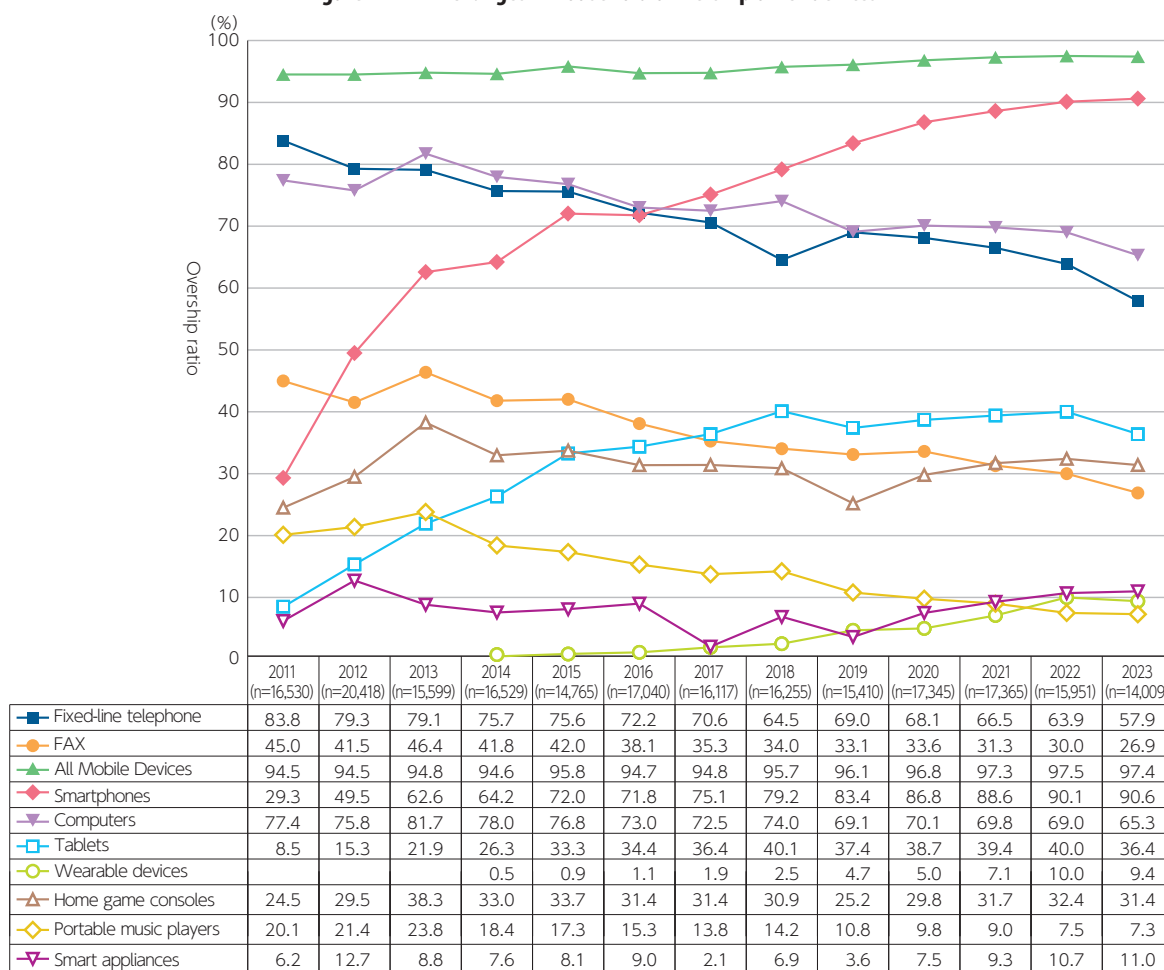
1. Trends in digital usage in the daily life of the citizens

(1) Information and communication devices and terminals

Regarding the terminals necessary for connecting to the internet and utilizing digital services, the household ownership rate of information and communication devices in 2023 is 97.4% for “All Mobile Devices,” with

“Smartphones” accounting for 90.6% of that figure. Additionally, the ownership rate for personal computers is 65.3% (Figure 2-1-11-1).

Figure 2-1-11-1 Changes in household ownership of ICT devices



(Source) MIC “Communications Usage Trend Survey”¹

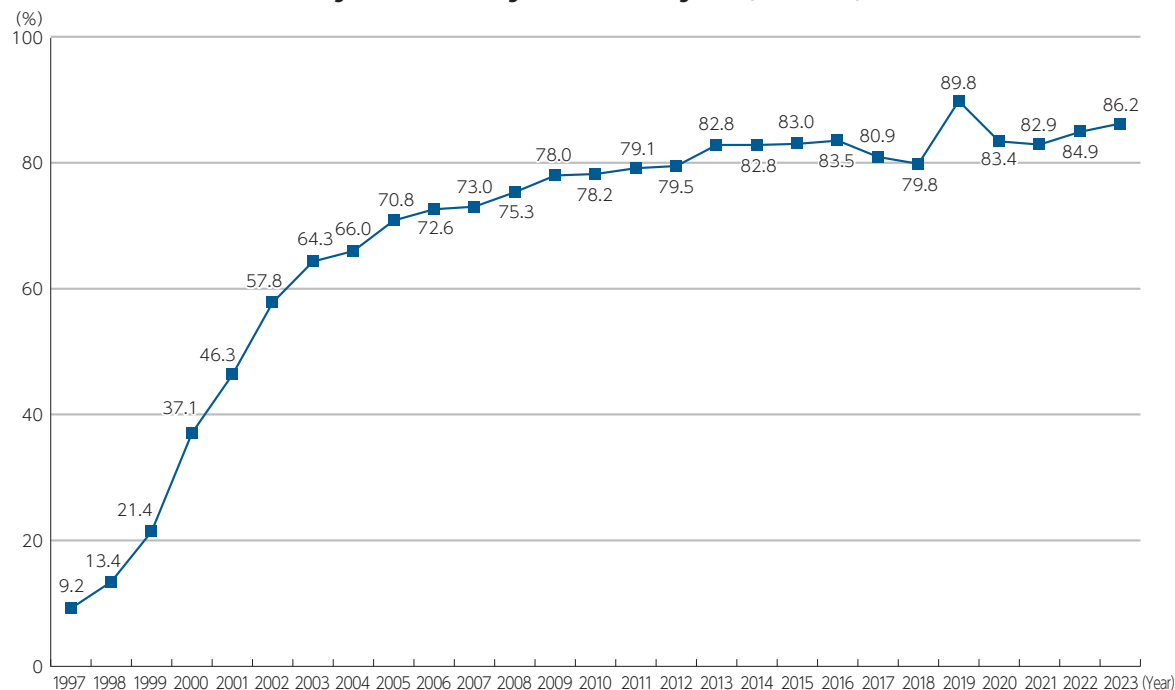
¹ <https://www.soumu.go.jp/johotsusintokei/statistics/statistics05.html>

(2) Internet**A Usage status**

The internet usage rate (individual) in 2023 is 86.2% (**Figure 2-1-11-2**). When broken down by device, the internet usage rate (individual) for “Smartphones”

(72.9%) surpasses that for “Personal Computers” (47.4%) by 25.5 percentage points.

Figure 2-1-11-2 Changes in Internet usage rate (individuals)²



(Source) MIC “Communications Usage Trend Survey”



Figure (related data) Devices types of Internet use (individuals)

Source: MIC “Communications Usage Trend Survey”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00311>

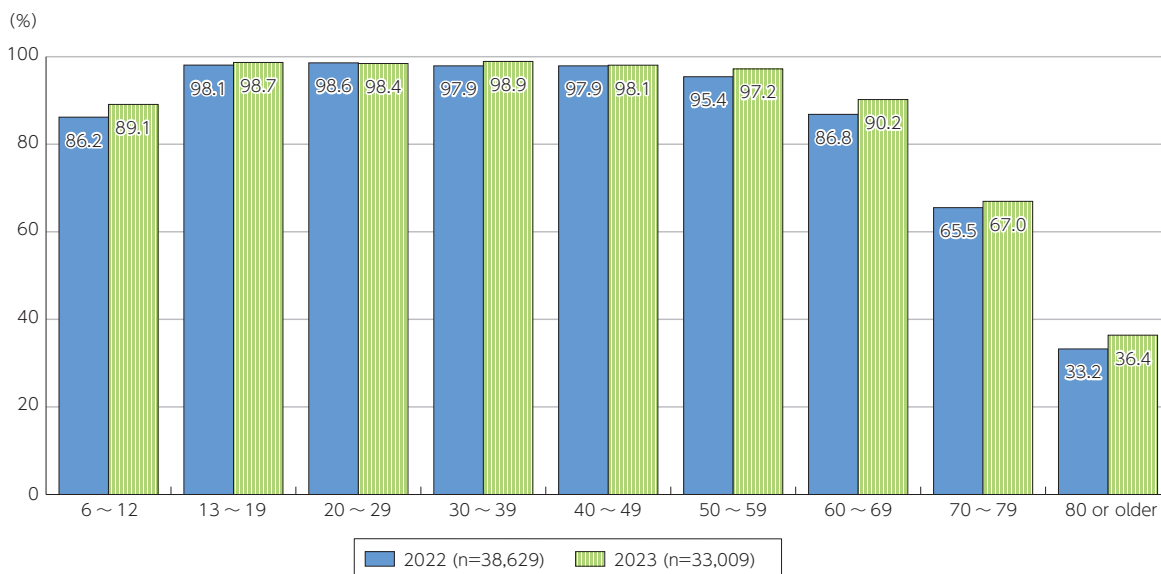
(Data collection)

Examining the internet usage rate by age group, it exceeds 90% for each group from ages 13 to 69, while it tends to decrease as the age group rises beyond 70 years old (**Figure 2-1-11-3**). Additionally, the internet usage rate by household income shows that it exceeds

80% for all income brackets above 4 million yen (**Figure 2-1-11-4**). Furthermore, by prefecture, 38 prefectures have an internet usage rate exceeding 80%, and in all prefectures, the usage rate for smartphones exceeds 50%.

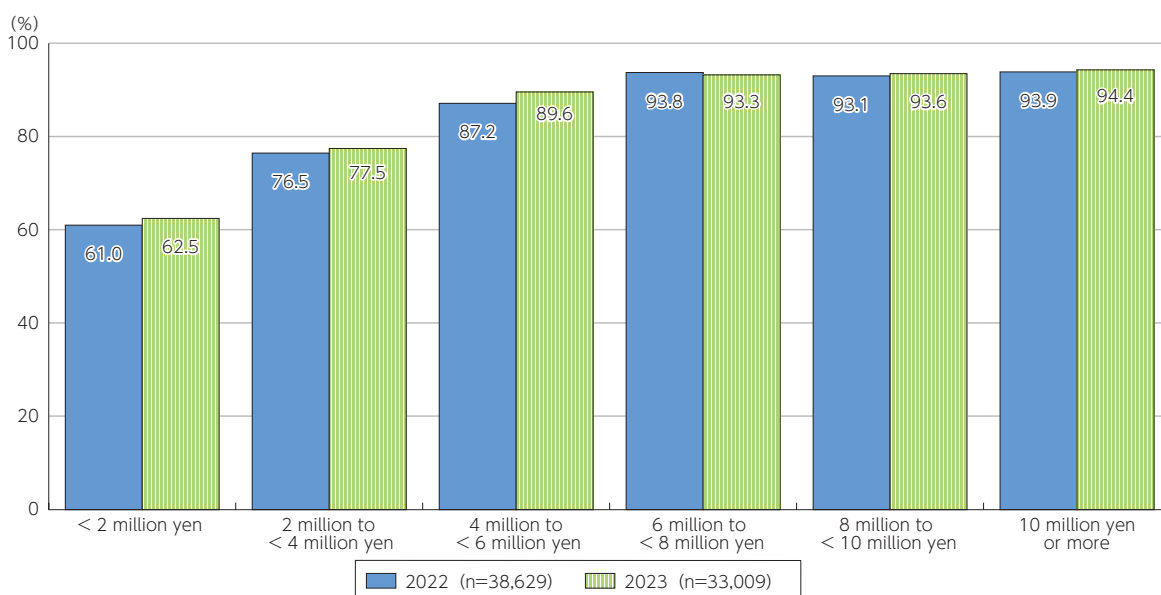
² The design of the questionnaire in the 2019 survey was partially different from that in previous years, so care should be taken when comparing over the years.

Figure 2-1-11-3 Internet usage by age group



(Source) MIC "Communications Usage Trend Survey"

Figure 2-1-11-4 Internet usage by annual household income



(Source) MIC "Communications Usage Trend Survey"



Figure (related data) Rate of Internet usage by prefecture and the status of usage by device (individuals) (2023)

Source: MIC "Communications Usage Trend Survey"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00314>

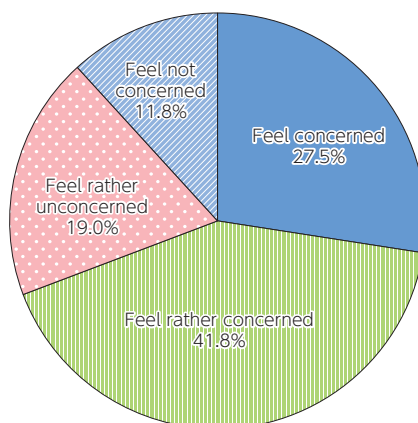
(Data collection)

B Concerns about internet usage

Approximately 70% of internet users feel some form of anxiety when using the internet (**Figure 2-1-11-5**). The specific concerns include "Leakage of Personal Information and Internet Usage History" at 89.4%, fol-

lowed by "Infection by Computer Viruses" at 61.1%, and "Fraudulent Billing or Internet Scams" at 53.9% (**Figure 2-1-11-6**).

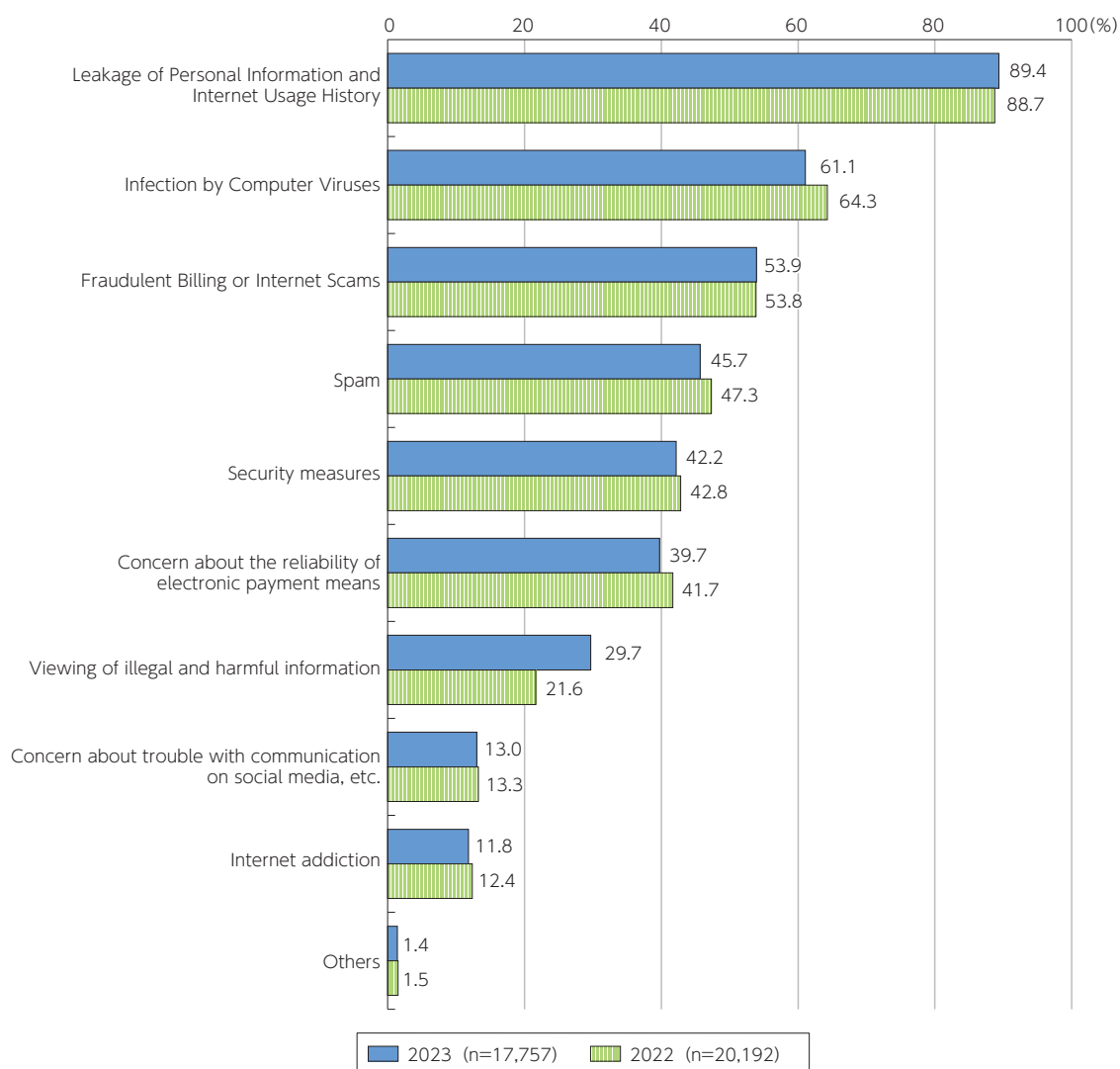
Figure 2-1-11-5 Percentage of individuals who feel anxiety when using the Internet



2023 (n=25,375)

(Source) MIC "Communications Usage Trend Survey"

Figure 2-1-11-6 Anxiety felt when using the Internet (multiple answers allowed)



(Source) MIC "Communications Usage Trend Survey"

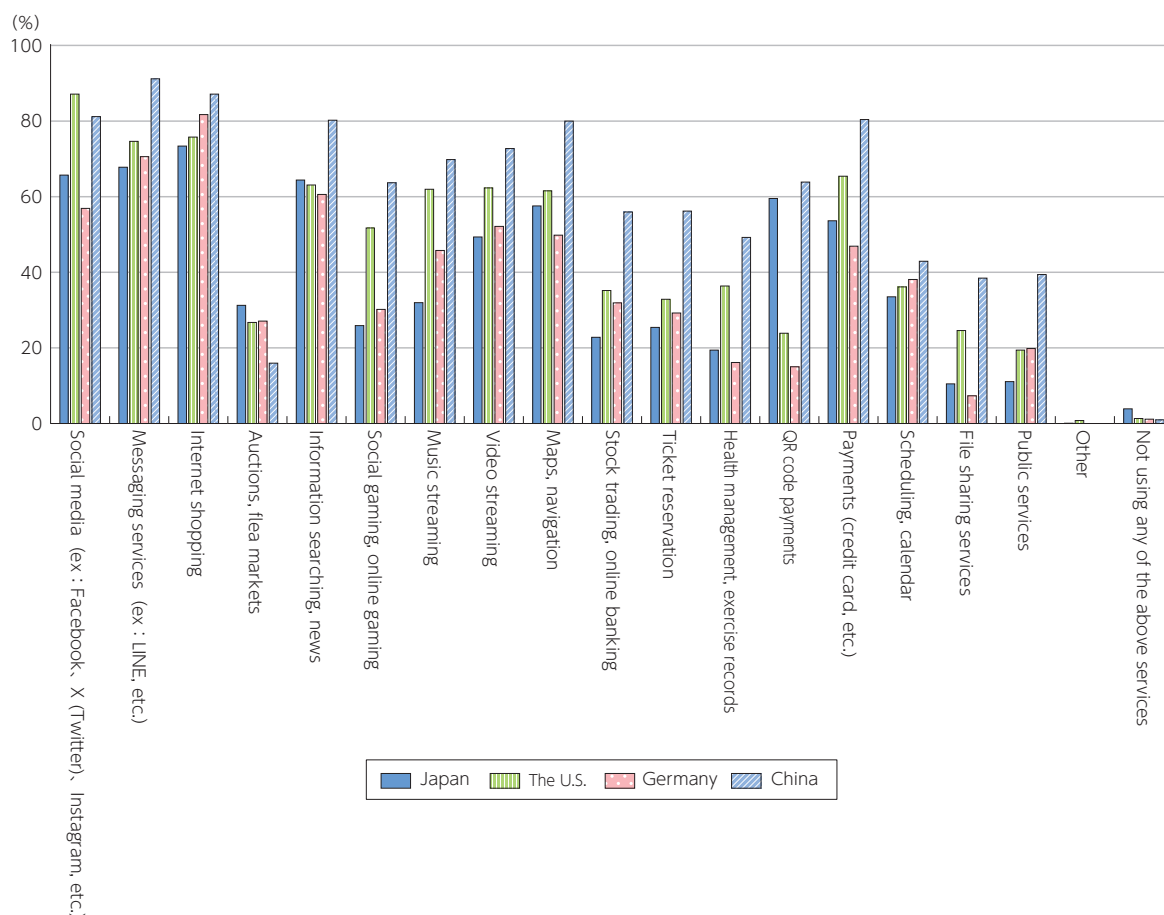
(3) Utilization of digital services

A General utilization of digital services

A survey was conducted in Japan, the U.S., Germany, and China regarding the digital services people commonly use. In Japan, the services with over 60% usage included “Internet Shopping,” “Messaging Services,” “social media,” “Information Search and News,” and “QR Code Payments,” which were higher compared to

other services. The relatively high usage of “QR Code Payments” in Japan can be attributed to the widespread use of smartphones, promotional campaigns by QR code payment providers, government initiatives to promote cashless transactions, and support for small and medium-sized enterprises (**Figure 2-1-11-7**).

Figure 2-1-11-7 Status of overall usage of digital services



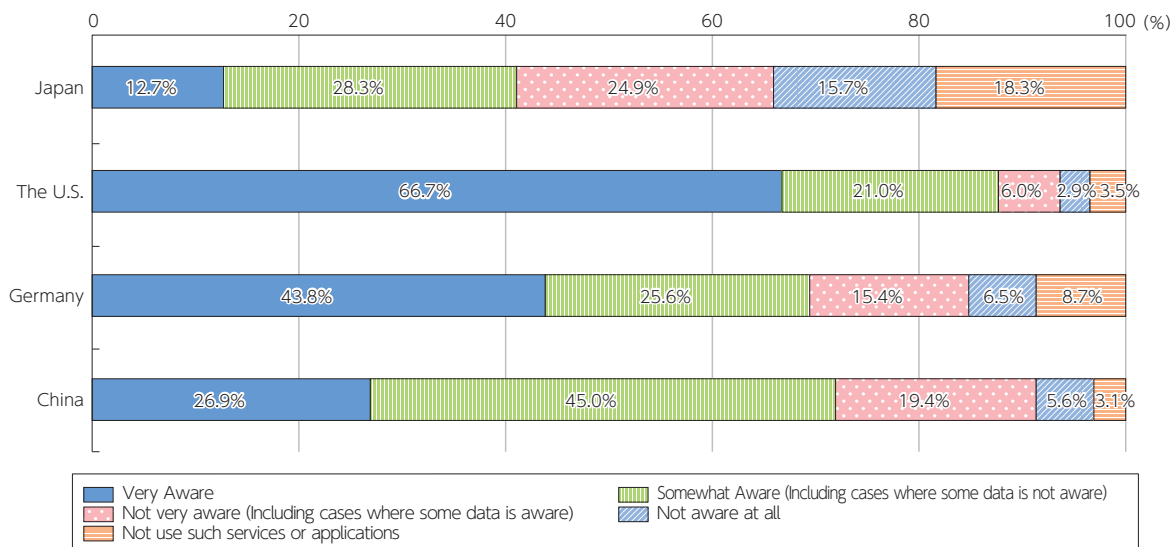
(Source) MIC (2024) “Survey Research on R&D on the Latest Information and Communications Technologies and Trends of Use of Digital Technologies in Japan and Abroad”

Additionally, when asked whether they are aware of providing personal data when using services or applications offered by platform companies, the percentage of respondents who answered “Aware” (sum of “Very Aware” and “Somewhat Aware”) was highest in the U.S. (87.7%), while in Japan it was about 40% (41.0%) (**Figure 2-1-11-8**).

When asked about their concerns, the most common

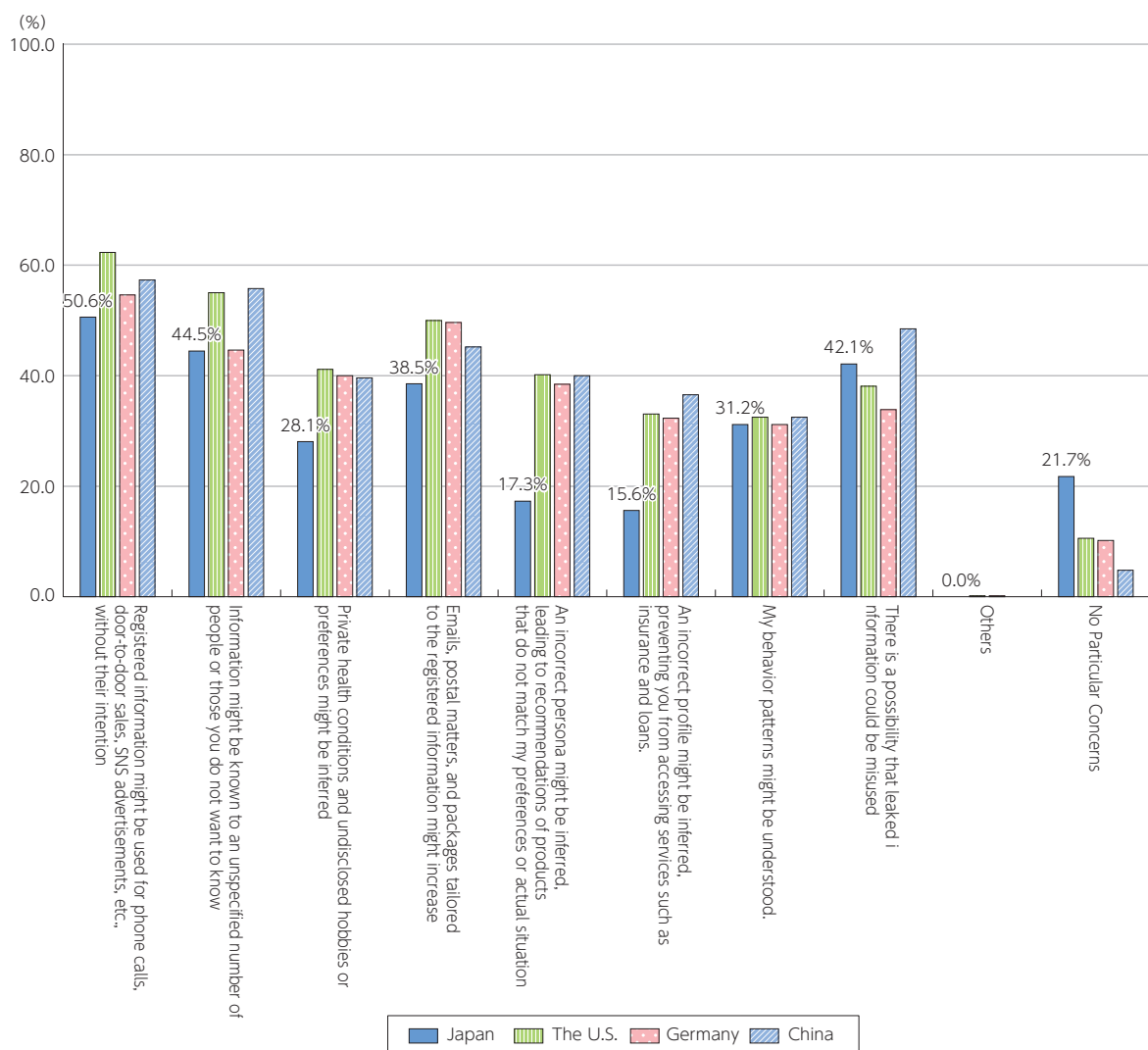
concern across all countries, including Japan, was that “registered information might be used for phone calls, door-to-door sales, social media advertisements, etc., without their intention.” On the other hand, the percentage of respondents in Japan who answered “No Particular Concerns” was 21.7%, higher compared to around 10% in the U.S. and Germany (**Figure 2-1-11-9**).

Figure 2-1-11-8 Whether or not to be aware of the provision of personal data



(Source) MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Figure 2-1-11-9 Concerns to services which require the provision of personal data



(Source) MIC (2024) "Survey Research on R&D on the Latest Information and Communications Technologies and Trends of Use of Digital Technologies in Japan and Abroad"

When asked about the conditions under which they would be willing to provide personal data to platform companies, respondents in Japan, compared to other countries, particularly chose “no concern about data

leakage,” “no concern about misuse of data by companies,” and “protection of privacy.” The increase in opportunities to provide personal data and set conditions for its use may have raised awareness among users.



Figure (related data) Conditions under which they would be willing to provide personal data

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00320>

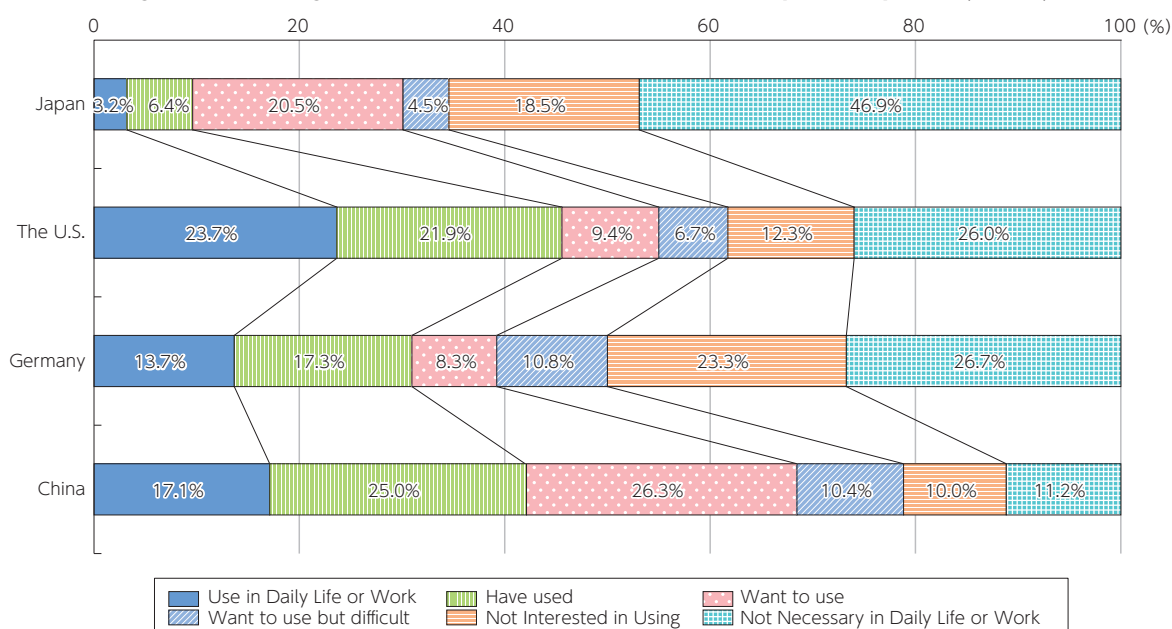
(Data collection)

B Utilization of digital services in virtual spaces (XR content)

The percentage of respondents who have used experiential entertainment services in virtual spaces³ (sum of “Use in Daily Life or Work” and “Have Used”) was about 30-45% in the U.S., Germany, and China, while in Japan it was significantly lower at 9.6%. The percentage of respondents who indicated low intention to use such services (sum of “Not Necessary in Daily Life or Work” and

“Not Interested in Using”) was 65.4% in Japan, compared to 50.0% in Germany, which had the highest percentage (**Figure 2-1-11-10**). Looking at the usage in Japan by age group, the usage rate was highest among those in their 20s (13.6%), and the percentage of those who “Want to Try Using It in the Future” was also highest in their 20s (27.2%).

Figure 2-1-11-10 Usage of interactive entertainment services in virtual spaces (comparison by country)



(Source) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”



Figure (related data) Usage of interactive entertainment services in virtual spaces (by age)

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00322>

(Data collection)



Figure (related data) Reasons why people don't use entertainment services in virtual spaces

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00323>

(Data collection)

³ XR content (interactive entertainment services in virtual space) is a type of services in which users have interactive relationships with others in real-time, such as online games and virtual events.

C Media usage time

Since 2012, the MIC's Institute for Information and Communications Policy has been conducting joint research with Professor Emeritus HASHIMOTO Yoshiaki of the University of Tokyo, Professor KITAMURA Satoshi of Tokyo Keizai University, and others⁴ on the us-

age time, time slots, purposes, and reliability of information and communication media⁵. Below is an overview of the usage time of information and communication media based on the FY2023 survey results⁶.

(A) Average usage time⁷ and user rate⁸ of major media

The average usage time and user rate of “Real-time TV Viewing,”⁹ “Recorded TV Viewing,” “Internet Usage,”¹⁰ “Newspaper Reading,” and “Radio Listening” are shown in (Figure 2-1-11-11).

Across all age groups, the average usage time for “Internet Usage” was the longest on both weekdays and holidays, followed by “Real-time TV Viewing.” The average usage time for “Internet Usage” on holidays exceeded 200 minutes for the first time. The user rate for “Internet Usage” also exceeded that of “Real-time TV Viewing” on both weekdays and holidays.

By age group, the average usage time for “Internet Usage” on weekdays exceeded that of “Real-time TV Viewing” for the first time among those in their 50s. The user rate for “Internet Usage” exceeded that of “Real-time TV Viewing” on both weekdays and holidays for those in their teens to 50s. Additionally, the user rate for “Newspaper Reading” increased with age, but compared to the previous FY2022 survey results, the user rate for those in their 40s to 60s either decreased or remained almost flat.

⁴ Assistant Professor KAWAI Daisuke in School of Cultural and Creative Studies in Aoyama Gakuin University

⁵ “Survey on Usage Time of Information and Communications Media and Information Behavior”: 1,500 men and women aged 13 to 69 (selected by sex and age group (in 10 years increments) in proportion to the actual situation in the Basic Resident Register; the register of January 2023 was used for the FY2023 survey) were visited and received questionnaires based on random location quota sampling.

⁶ The FY2023 survey was conducted from December 2 to December 8, 2023

⁷ The total number of hours of all people surveyed for a particular information behavior per survey day, divided by the number of people surveyed. The average time is calculated by including the respondents who did not do the activities throughout the day.

⁸ For weekdays, the ratio of people who performed a particular information behavior for each day of the two survey days was calculated and averaged over the two days. For holidays, this is the ratio of survey days.

⁹ Television viewing (real-time): Real-time television viewing with any device not limited to TV receiver

¹⁰ Internet use: The use of services over an Internet connection, including email, website, social media, video sites, and online games, regardless of device.

Figure 2-1-11-11 Average usage time for major media and user ratio

<Weekday (one day)>

		Average usage time (minute)					Doers' ratio				
		Television viewing (real-time)	Television viewing (recorded program)	Internet use	Newspaper reading	Radio listening	Television viewing (real-time)	Television viewing (recorded program)	Internet use	Newspaper reading	Radio listening
All age groups	2019	161.2	20.3	126.2	8.4	12.4	81.6	19.9	85.5	26.1	7.2
	2020	163.2	20.2	168.4	8.5	13.4	81.8	19.7	87.8	25.5	7.7
	2021	146.0	17.8	176.8	7.2	12.2	74.4	18.6	89.6	22.1	6.2
	2022	135.5	18.2	175.2	6.0	8.1	73.7	17.5	90.4	19.2	6.0
	2023	135.0	16.4	194.2	5.2	7.3	71.1	15.3	91.2	16.1	5.4
10s	2019	69.0	14.7	167.9	0.3	4.1	61.6	19.4	92.6	2.1	1.8
	2020	73.1	12.2	224.2	1.4	2.3	59.9	14.8	90.1	2.5	1.8
	2021	57.3	12.1	191.5	0.4	3.3	56.7	16.3	91.5	1.1	0.7
	2022	46.0	6.9	195.0	0.9	0.8	50.7	10.0	94.3	2.1	1.8
	2023	39.2	3.6	257.8	0.0	0.8	47.1	5.7	96.4	0.0	2.1
20s	2019	101.8	15.6	177.7	1.8	3.4	65.9	14.7	93.4	5.7	3.3
	2020	88.0	14.6	255.4	1.7	4.0	65.7	13.6	96.0	6.3	3.1
	2021	71.2	15.1	225.0	0.9	7.0	51.9	13.7	96.5	2.6	3.0
	2022	72.9	14.8	264.8	0.4	2.1	54.4	11.8	97.7	2.8	2.3
	2023	53.9	6.2	275.8	0.5	4.8	43.3	7.4	98.4	1.8	2.8
30s	2019	124.2	24.5	154.1	2.2	5.0	76.7	21.9	91.9	10.5	2.2
	2020	135.4	19.3	188.6	1.9	8.4	78.2	19.4	95.0	8.8	6.0
	2021	107.4	18.9	188.2	1.5	4.8	65.8	20.9	94.9	5.9	3.2
	2022	104.4	14.6	202.9	1.2	4.1	67.1	14.9	95.7	4.1	3.9
	2023	89.9	13.7	201.9	0.5	2.5	64.5	13.3	94.0	3.9	4.1
40s	2019	145.9	17.8	114.1	5.3	9.5	84.0	18.9	91.3	23.6	6.0
	2020	151.0	20.3	160.2	5.5	11.7	86.2	23.0	92.6	24.1	6.0
	2021	132.8	13.6	176.8	4.3	12.9	77.8	15.3	94.6	17.9	5.4
	2022	124.1	17.2	176.1	4.1	5.5	75.7	18.0	91.5	16.5	6.3
	2023	134.6	13.7	176.2	2.7	7.2	78.3	15.7	93.0	11.2	5.4
50s	2019	201.4	22.5	114.0	12.0	18.3	92.8	21.9	84.2	38.5	12.2
	2020	195.6	23.4	130.0	11.9	26.9	91.8	20.7	85.0	39.4	13.4
	2021	187.7	18.7	153.6	9.1	23.6	86.4	20.9	89.4	33.8	11.1
	2022	160.7	18.6	143.5	7.8	14.0	84.0	19.5	88.8	29.6	8.6
	2023	163.2	21.2	173.8	7.6	8.6	81.2	19.4	90.0	27.3	7.5
60s	2019	260.3	23.2	69.4	22.5	27.2	93.6	21.2	65.7	57.2	13.4
	2020	271.4	25.7	105.5	23.2	18.5	92.9	22.3	71.3	53.7	12.1
	2021	254.6	25.8	107.4	22.0	14.4	92.0	23.0	72.8	55.1	10.0
	2022	244.2	30.5	103.2	17.7	16.7	92.8	25.2	78.5	46.1	9.9
	2023	257.0	31.3	133.7	15.9	15.2	91.5	23.1	79.8	39.4	7.6

<Holiday (one day)>

		Average usage time (minute)					Doers' ratio				
		Television viewing (real-time)	Television viewing (recorded program)	Internet use	Newspaper reading	Radio listening	Television viewing (real-time)	Television viewing (recorded program)	Internet use	Newspaper reading	Radio listening
All age groups	2019	215.9	33.0	131.5	8.5	6.4	81.2	23.3	81.0	23.5	4.6
	2020	223.3	39.6	174.9	8.3	7.6	80.5	27.6	84.6	22.8	4.7
	2021	193.6	26.3	176.5	7.3	7.0	75.0	21.3	86.7	19.3	4.2
	2022	182.9	30.2	187.3	5.6	5.5	72.2	22.7	88.5	17.7	4.1
	2023	176.8	23.6	202.5	5.0	4.1	69.3	18.0	88.2	14.7	3.0
10s	2019	87.4	21.3	238.5	0.1	0.0	52.8	17.6	90.1	0.7	0.0
	2020	93.9	29.8	290.8	0.9	0.0	54.9	25.4	91.5	1.4	0.0
	2021	73.9	12.3	253.8	0.0	0.0	57.4	14.9	90.8	0.0	0.0
	2022	69.3	17.4	285.0	1.0	2.8	46.4	19.3	92.9	2.1	2.1
	2023	56.8	4.8	342.2	0.0	0.0	42.9	6.4	95.0	0.0	0.0
20s	2019	138.5	23.0	223.2	0.9	1.2	69.7	19.9	91.0	3.3	1.9
	2020	132.3	26.5	293.8	2.0	1.9	64.3	20.2	97.7	6.6	2.3
	2021	90.8	17.2	303.1	0.7	1.8	49.3	14.0	97.2	2.3	1.4
	2022	89.6	25.1	330.3	0.5	1.0	48.4	16.1	96.8	2.3	1.4
	2023	66.0	15.0	309.4	0.2	1.0	41.0	11.1	97.2	0.9	1.4
30s	2019	168.2	31.0	149.5	2.5	2.0	78.3	23.3	90.1	9.9	2.0
	2020	198.1	45.0	191.3	1.6	7.4	77.2	31.6	91.2	5.6	3.2
	2021	147.6	30.3	212.3	1.5	3.2	69.6	22.7	92.3	4.0	1.2
	2022	152.5	25.9	199.9	0.8	6.9	63.3	19.6	92.7	3.3	4.1
	2023	121.2	17.8	218.3	1.6	2.3	57.3	14.5	92.1	4.6	2.5
40s	2019	216.2	37.5	98.8	6.0	5.0	83.7	25.5	84.7	20.2	3.7
	2020	232.7	41.5	154.5	5.2	4.2	85.3	28.5	89.3	19.9	3.1
	2021	191.1	28.5	155.7	4.9	6.3	79.0	21.0	91.0	14.8	3.4
	2022	191.0	29.7	157.5	4.6	4.8	76.5	22.9	89.0	16.3	2.8
	2023	188.2	23.1	176.2	2.8	3.1	78.6	21.4	90.7	10.2	2.6
50s	2019	272.5	48.0	107.9	12.9	6.6	90.3	30.6	77.3	37.4	6.5
	2020	256.5	49.8	127.8	12.5	16.3	91.6	31.4	81.5	36.6	7.7
	2021	242.6	28.9	119.0	9.2	14.2	84.8	24.9	82.2	29.6	8.1
	2022	220.5	33.0	134.9	7.6	5.6	85.7	24.8	85.3	24.4	4.6
	2023	225.3	29.0	152.7	7.3	6.3	81.2	21.9	86.5	23.5	3.8
60s	2019	317.6	28.1	56.1	21.8	18.5	94.5	19.0	60.7	51.7	10.3
	2020	334.7	37.2	83.7	22.0	10.9	91.8	25.9	63.1	50.4	9.2
	2021	326.1	31.4	92.7	22.3	11.2	93.5	25.4	71.0	50.4	8.0
	2022	291.4	42.2	105.4	15.0	10.1	92.3	29.8	78.7	45.2	8.5
	2023	307.6	39.8	119.3	14.4	8.6	91.9	24.1	73.0	37.0	5.9

(Source) MIC Institute for Information and Communications Policy "FY2023 Survey on Usage Time of Information and Communications Media and Information Behavior"

(B) Position of the internet as a medium

The comparison of the Internet with other media for different usage purposes is shown in (Figure 2-1-11-12).

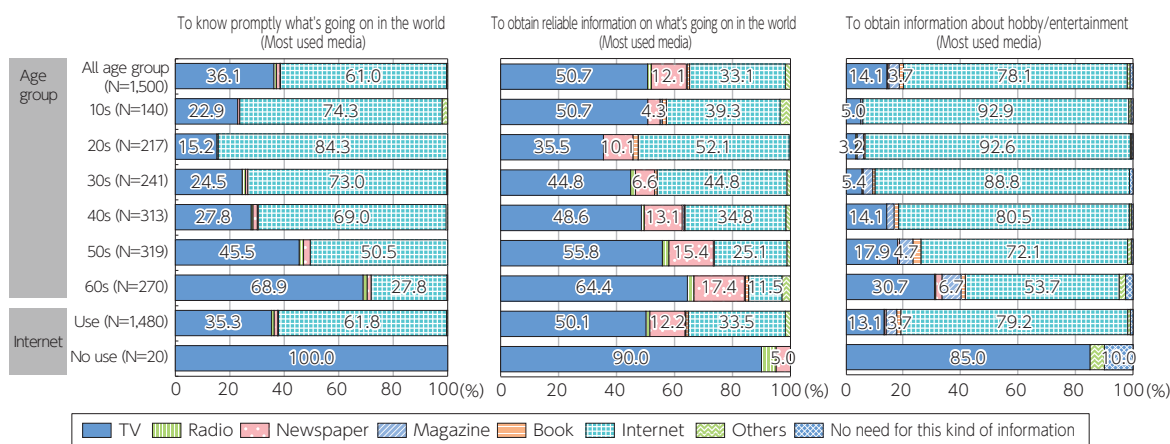
The Internet was the most used medium for “quickly knowing about events and trends in the world” across all age groups. By age group, the “Internet” was most used by those in their teens to 50s, while “TV” was most used by those in their 60s.

For “obtaining reliable information about events and trends in the world,” “TV” was the most used medium

across all age groups. By age group, the “Internet” was most used by those in their 20s, “TV” and the “Internet” were equally used by those in their 30s, and “TV” was most used by other age groups. “Newspapers” were used more than the “Internet” by those in their 60s.

For “obtaining information about hobbies and entertainment,” the “Internet” was the most used medium across all age groups and within each age group, with the percentage of “Internet” usage being around 90% for those in their teens to 30s.

Figure 2-1-11-12 Media used by purpose
(most used media by all groups, by age group and by using or not using the Internet)



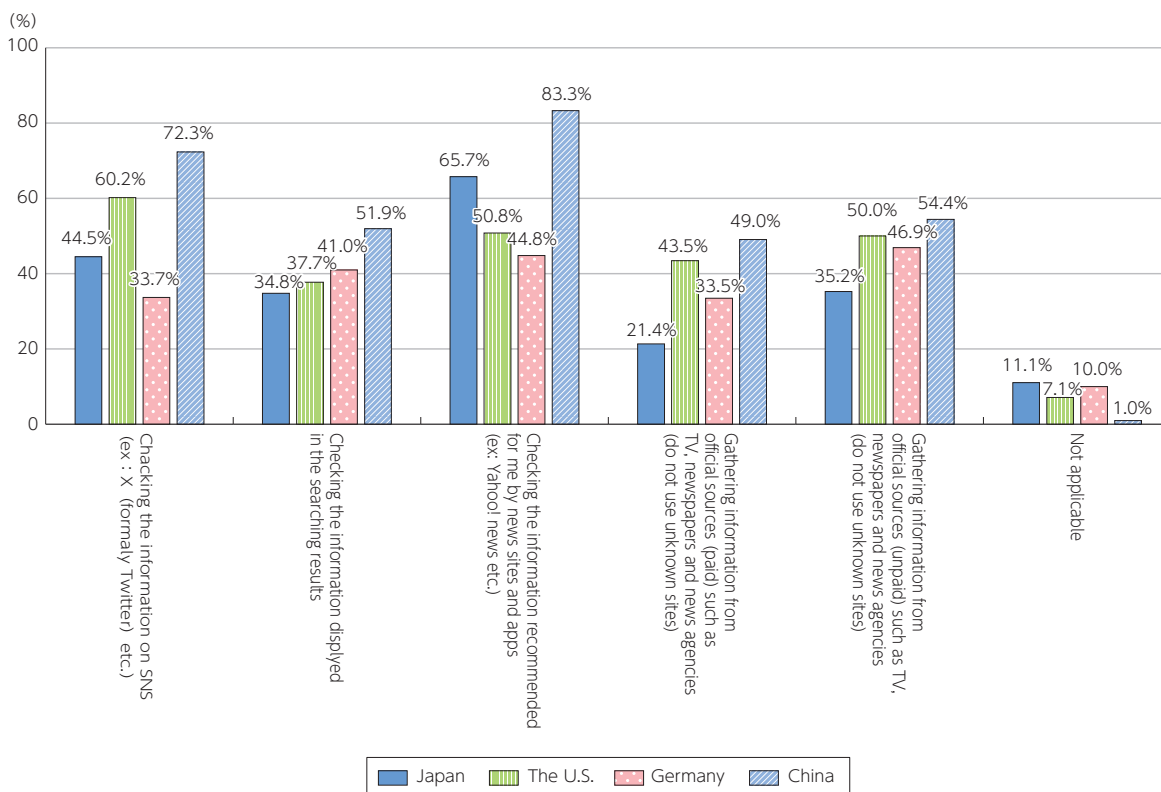
(Source) MIC Institute for Information and Communications Policy “Survey on Usage Time of Information and Communications Media and Information Behavior”

D Utilization of internet media, etc.

When asked about their actions when they want to know the latest news online, the percentage of respondents in Japan who “look at recommended information from news sites/apps” (65.7%) and “look at information

on social media” (44.5%) was high, while relatively fewer people relied on traditional mass media such as TV, newspapers, and news agencies (Figure 2-1-11-13).

Figure 2-1-11-13 Way to obtain the latest news online (by country)

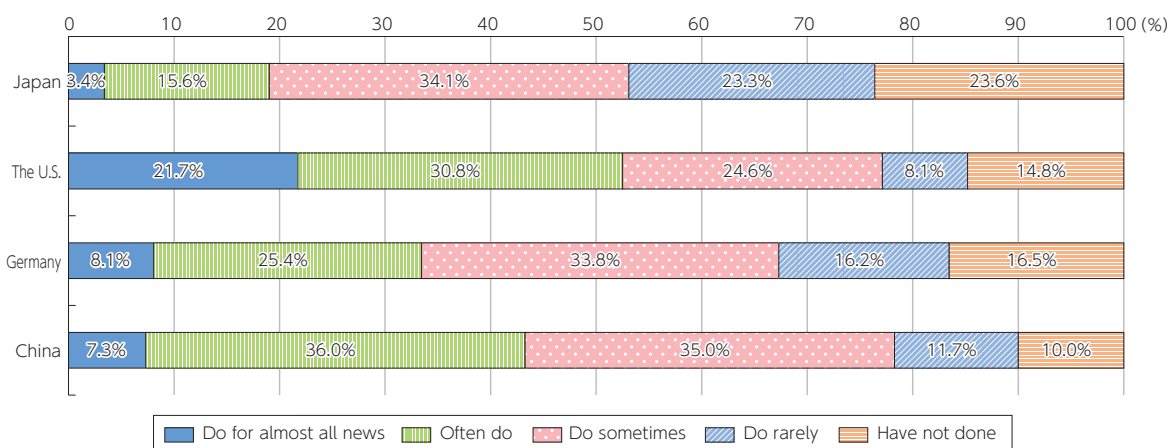


(Source) MIC (2024) Research and study on the latest trends in information and communication technology research and development as well as digital utilization, both domestically and internationally

When asked whether they check the source (organization or person) of the information flowing online, the percentage of respondents in Japan who answered

check (sum of “Do for Almost All News” and “Often Do”) was 19.0%, lower compared to other countries (Figure 2-1-11-14).

Figure 2-1-11-14 Frequency to check the source of information (organizations and persons) (by country)



(Source) MIC (2024) Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally



Figure (related data) When to compare the news reports by multiple media (broadcasters, news media and news agency)

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00337>

(Data collection)



Figure (related data) When to check the official information announced by the government etc.

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00338>
(Data collection)



Figure (related data) When to check the results of verification by experts and fact-checking organizations

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00339>
(Data collection)

Additionally, when asked about their awareness of the characteristics of online services and apps (such as searching services and social media), including the “Information Displayed is Optimized (Personalized) for You,” “Recommended Accounts or Content on social media may be Those that the social media Provider

Wants You to See,” and “Information Close to Your Opinions and Thoughts is Displayed on social media,” the percentage of respondents in Japan who answered aware (sum of “Very Aware” and “Somewhat Aware”) was below 50% for all items.



Figure (related data) Whether or not to recognize the personalization of information displayed in searching results and social media

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00340>
(Data collection)



Figure (related data) Whether or not to recognize the cases that accounts and contents are displayed which service providers want to show

Source: Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00341>
(Data collection)



Figure (related data) Whether or not to recognize the cases that opinions and information are tend to be displayed which are close to themselves

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00342>
(Data collection)

2. Trends in utilization in corporate activities

(1) The Status of digitalization in each country's companies

A Efforts in digitalization

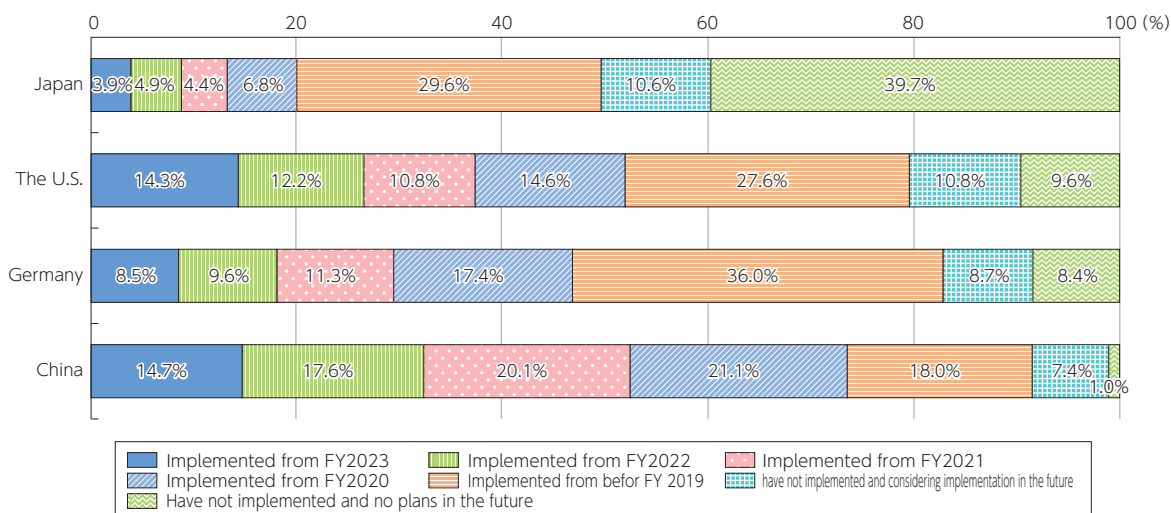
A survey was conducted on the efforts in digitalization among companies in Japan, the U.S., Germany, and China. After excluding those who responded with “Don’t Know,”¹¹ it was found that in Japan, the proportion of companies that have not implemented digitalization efforts (combining “have not implemented and considering implementation in the future” at 10.6% and “have not implemented and no plans in the future” at 39.7%) was approximately 50%, indicating a delay in promoting digitalization compared to overseas. When looking at the efforts by company size in Japan, it was observed that about 25% of large companies and about 70% of small and medium-sized enterprises responded with “not implemented,” showing differences in the status of digitaliza-

tion efforts based on company size (**Figure 2-1-11-15**).

In Japanese companies, while there are many comprehensive efforts in digitalizing new ways of working (such as telework) and improving/reforming business processes (such as optimizing business flows with ERP), there are fewer comprehensive efforts in digitalizing new business creation and improving customer experiences. In Japanese companies, there is a tendency to focus more on defensive digitalization rather than proactive digitalization. In contrast, in the U.S. companies, there is a trend of comprehensive efforts in new business creation, but partial departmental efforts in improving customer experiences (**Figure 2-1-11-16**).

¹¹ The data were compiled based on the screening data collected until the number of samples for this study was secured.

Figure 2-1-11-15 Status of initiatives to promote digitalization (comparison by country)



* Based on screening research results to extract companies which is taking on digitalization.

(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Status of digitalization (Japan: comparison by company size)

Source: MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00344>

(Data collection)

Figure 2-1-11-16 Detailed initiatives to promote digitalization (comparison by country)



(Source) MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

B Effects of digitalization

Regarding the effects of digitalization in terms of “Creating New Business,” “Improving/enhancing Customer Experiences,” “Adding High Value to Existing Products/services,” “Improving/reforming Business Processes,” “Streamlining Operations,” and “Realizing

New Ways of Working,” it was found that in Japan, the proportion of responses indicating “Exceeding Expectations” was the lowest across all aspects, and the proportion of responses indicating “Not Achieving the Expected Effects” was the highest among the four countries.



Figure (related data) Effects of digitalization

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

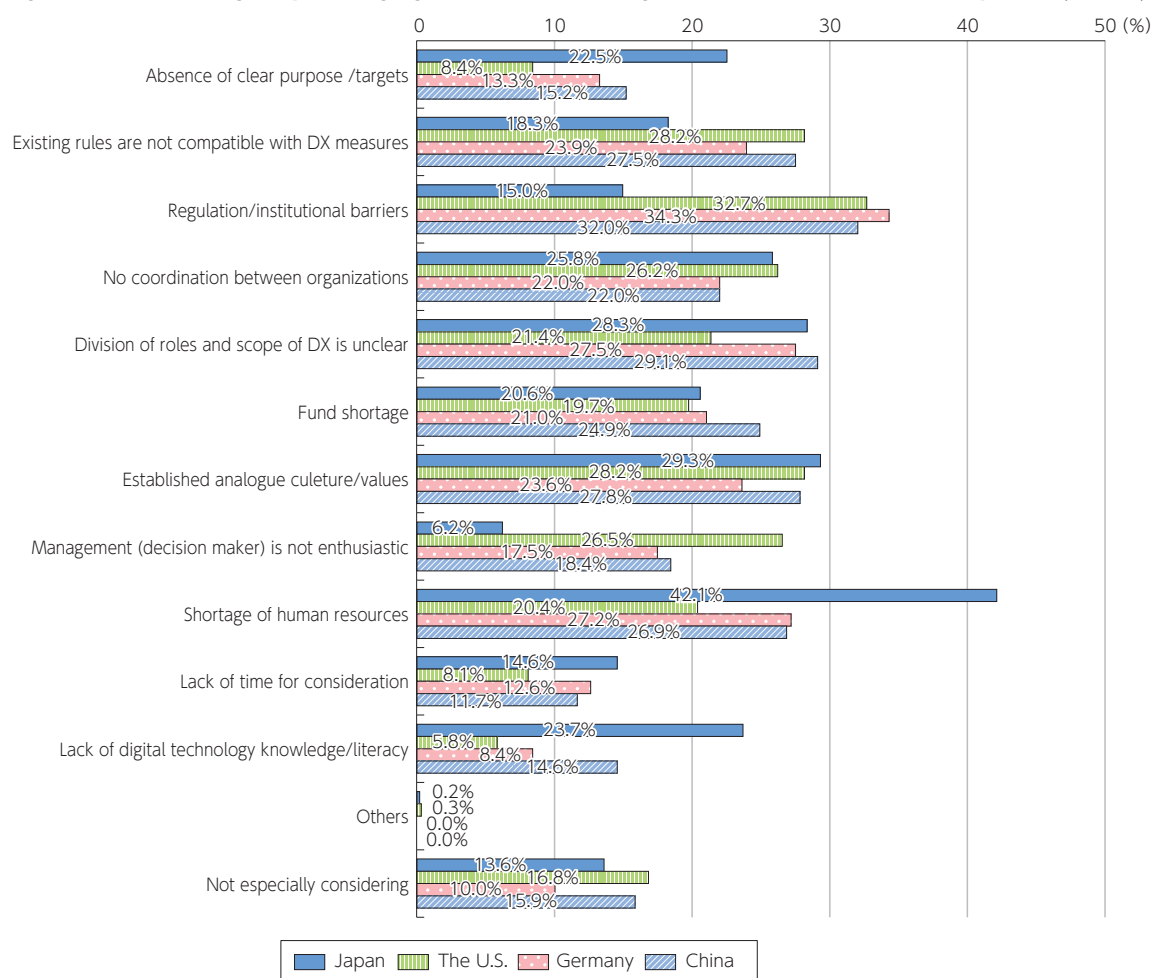
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00346>
(Data collection)

C Challenges in digitalization

In terms of challenges and barriers currently recognized or anticipated in digitalization, Japanese companies had the highest response rate for “Insufficient human resources(42.1%),” which was overwhelmingly

higher compared to companies in other countries. This was followed by the “Prevalence of Analog Culture/values (29.3%)” and “Unclear Role Allocation and Scope of DX (28.3%)” (Figure 2-1-11-17).

Figure 2-1-11-17 Challenges in promoting digitalization which is recognized or foreseen in the future (comparison by country)

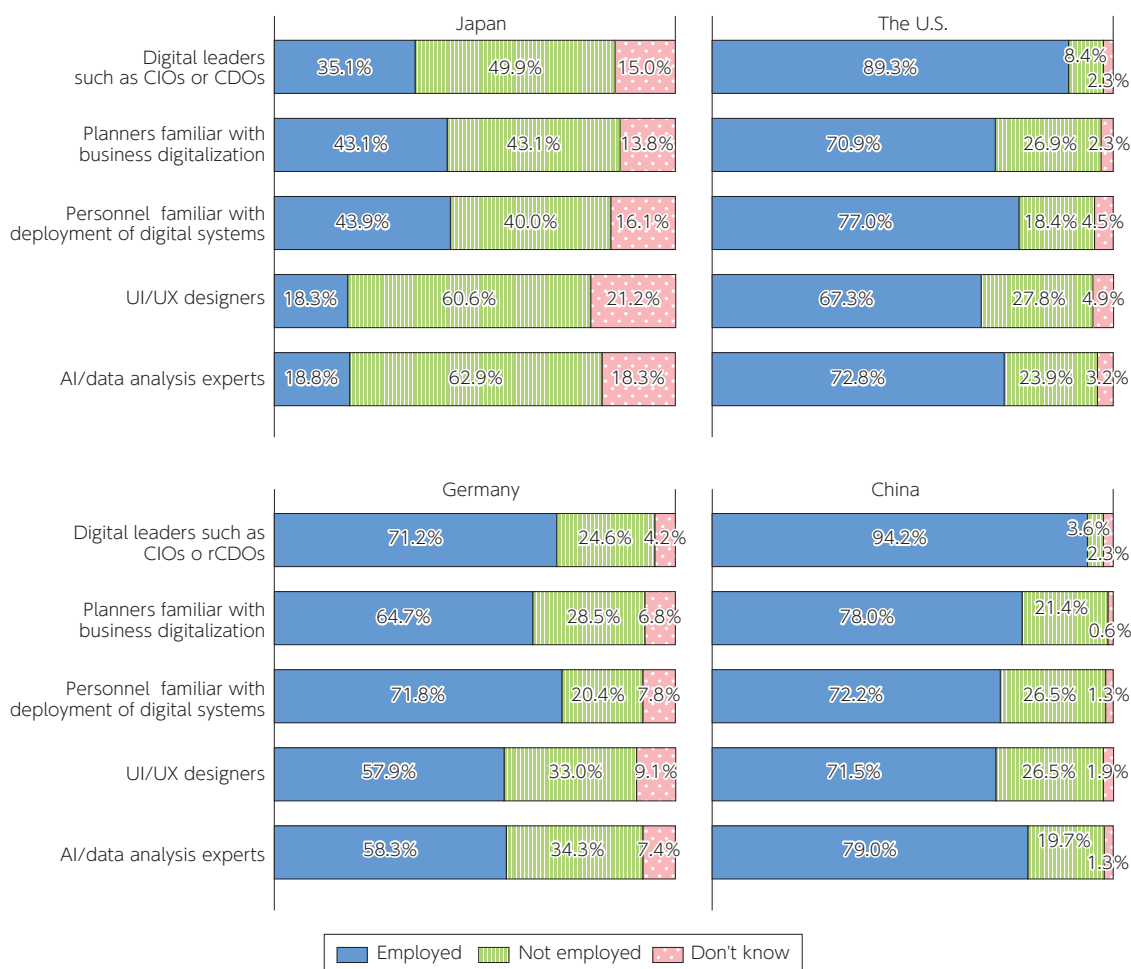


(Source) MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

Particularly notable in Japanese companies is the scarcity of UI/UX designers and specialists in AI/digital analytics compared to other countries. The proportion of companies indicating the “Presence of UI/UX designers” was 18.3% in Japan, while it was approximately 60-

70% in other countries. Similarly, the proportion of companies indicating the “Presence of AI/digital analytics specialists” was 18.8% in Japan, while it was approximately 60-80% in other countries (Figure 2-1-11-18).

Figure 2-1-11-18 Status of the specialized digital human resources



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Initiatives to secure digital human resources (comparison by country)

Source: MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00349>

(Data collection)

Furthermore, when asked about the internalization status of system development, it was found that in Japan, 41.3% of companies responded that they conduct system development under their own leadership ("almost all development is carried out by in-house engineers" and

"mainly developed by in-house engineers, with some development outsourced to external vendors"). In contrast, overseas, approximately 85-95% of companies reported conducting development under their own leadership, showing a significant difference from Japan.



Figure (related data) In-house development of systems (comparison by country)

Source: MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00350>

(Data collection)

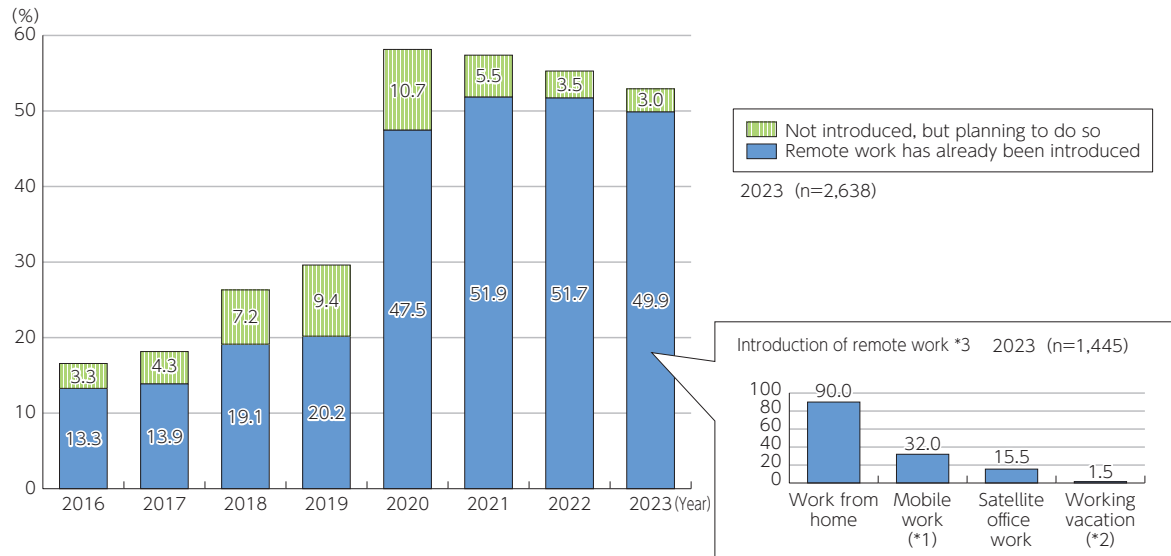
(2) Telework and online meetings

A Adoption of telework in Japanese companies

The adoption of telework in private companies rapidly progressed after the spread of COVID-19 in 2020. According to the 2023 Communication Usage Trend Sur-

vey conducted by the MIC, about 50% of companies have introduced telework (Figure 2-1-11-19).

Figure 2-1-11-19 Changes in introducing remote work



*1 Working outside of the office for sales activities and other similar work, including work such as checking email and writing daily reports during commutes or at locations such as cafes.

*2 Remote work performed in a location other than that the usual work place or the home, combined with personal time.

*3 Total includes entities that provided no response to introduction type.

(Source) MIC "Communications Usage Trend Survey"



Figure (related data) Purpose of introduction of teleworking

Source: MIC "Communication Usage Trend Survey"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00355>

(Data collection)



Figure (related data) Issues when to introduce teleworking (multiple answers allowed)

Source: Prepared based on MIC "Survey Result of Teleworking Security in FY2023"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00356>

(Data collection)

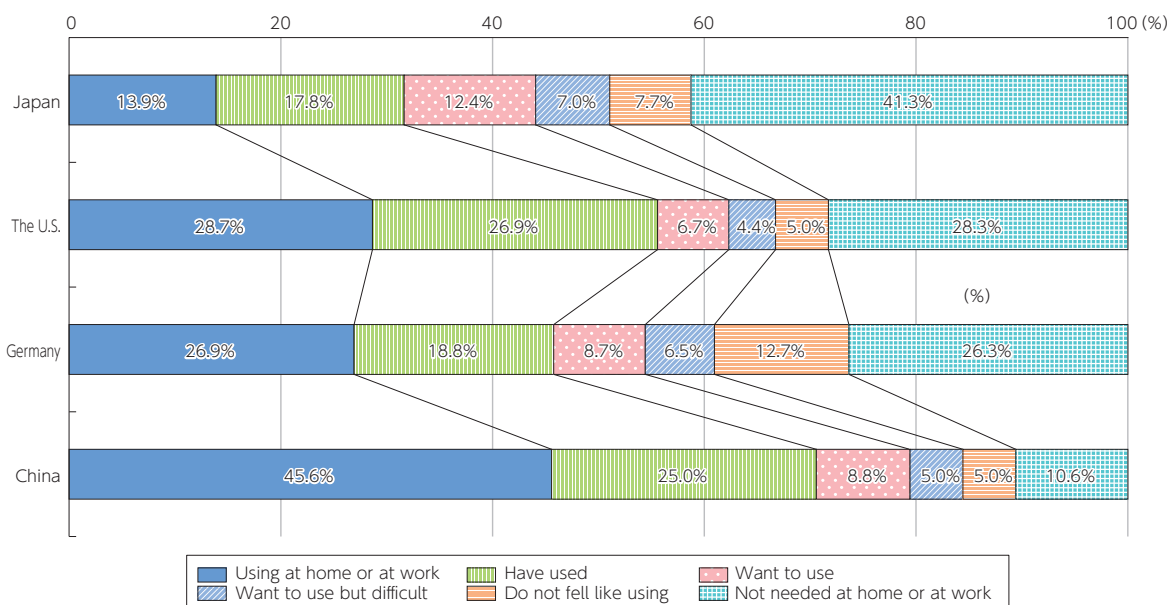
B Utilization of telework and online meetings (individual and international comparison)

A survey was conducted among citizens of Japan, the U.S., China, and Germany regarding the utilization of telework and online meetings (hereinafter referred to as "Telework, etc.>").

The percentage of respondents who answered that they "Use Telework, etc. in Their Daily Life and Work" slightly increased in the U.S., while it slightly decreased in Japan and Germany (Figure 2-1-11-20). In Japan, the most common reason cited for the difficulty in implementing telework, etc. was the lack of "Desired Services within the Company" at 30.5%.

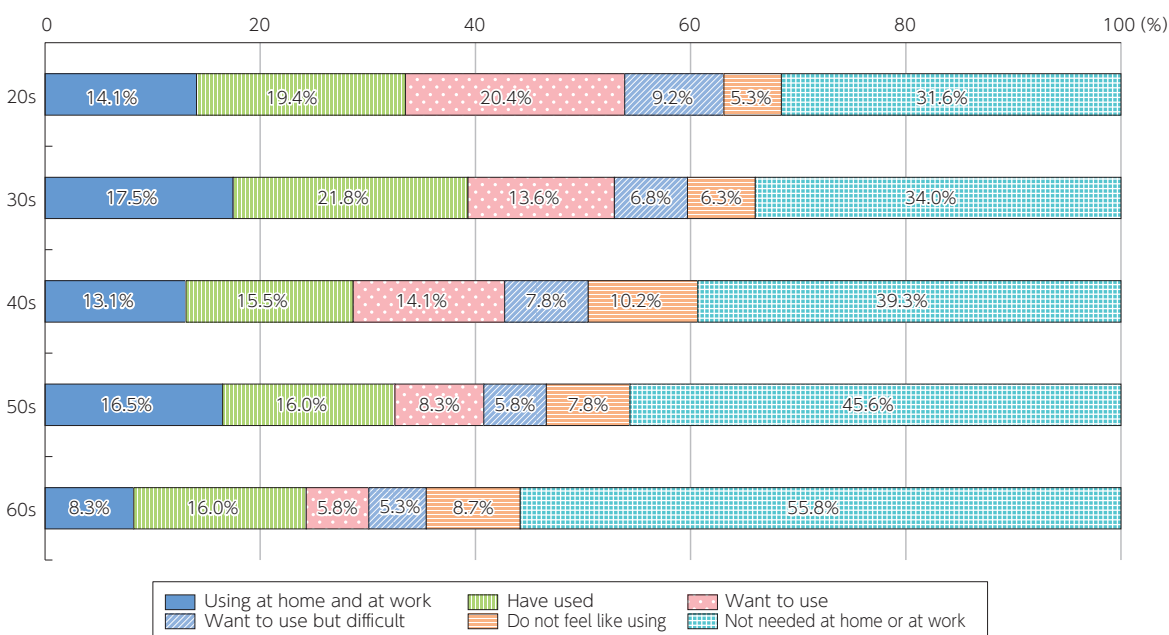
When examining the utilization of telework, etc. in Japan by age group, the highest utilization was among those in their 30s, followed by those in their 20s and 50s, with 39.3% in their 30s. Additionally, a high percentage of respondents in their 20s expressed a "Desire to Use Telework, etc. in the Future". On the other hand, the percentage of respondents who answered that telework, etc. is "Not Necessary in Their Daily Life and Work" increased with age, with 31.6% in their 20s and 55.8% in their 60s (Figure 2-1-11-21).

Figure 2-1-11-20 Usage of remote work and online meetings (international comparison)



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Figure 2-1-11-21 Usage of remote work and online meetings (Japan, by age)



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"



Figure (related data) Reasons why people don't use remote work or online meetings

Source: MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00359>

(Data collection)

3. Trends in digital usage in administration

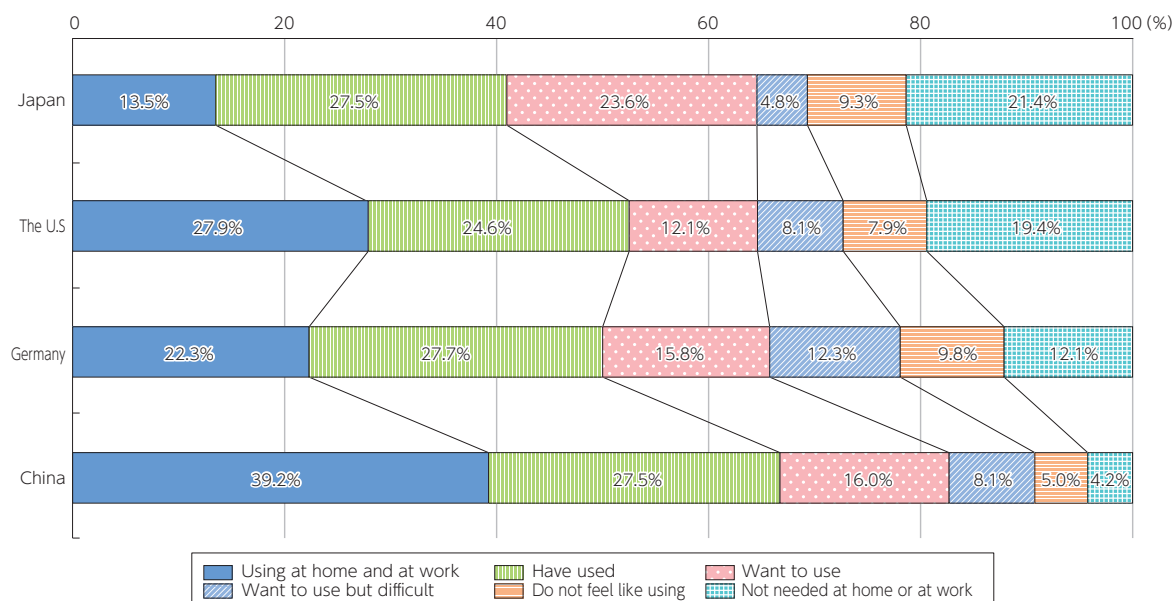
(1) Usage of electronic administrative services (electronic applications, electronic tax filing, electronic notifications)

Regarding the usage of electronic administrative services (electronic applications, electronic tax filing, electronic notifications), only about 41% of people in Japan have experience using these services. Although this is an increase from the previous survey (about 35%)¹², it remains lower compared to the other three countries (Figure 2-1-11-22). The main reasons for not using these services include “Security Concerns,” “Not Know-

ing How to Use the Services or the Devices and Applications Required,” and “Lack of Desired Services.”

When examining the usage of electronic administrative services in Japan by age group, the percentage of people with experience using these services ranged from 34% to 44% across all age groups, showing little difference.

Figure 2-1-11-22 Usage of digital administrative services (by country)



(Source) MIC(2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”



Figure (related data) Usage of digital administrative services (Japan, by age)

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00362>
 (Data collection)



Figure (related data) Reasons why people don't use public digital services (by country)

Source: MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”
 URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00363>
 (Data collection)

(2) Promotion of digital government in Japan

A International indicators

An overview of Japan's position in the world regarding digitalization in the public sector based on international

indicators.

(A) United Nations Department of Economic and Social Affairs (UNDESA) “World E-Government Ranking”

The UNDESA e-government survey aims to improve transparency and accountability in public policy through ICT and promote citizen participation in public policy. It has been conducted since 2003 and biennially since

2008. The survey ranks countries based on the average of three indicators: Online Service Index, Human Capital Index, and Telecommunications Infrastructure Index, resulting in the E-Government Development Index

¹² The 2023 White Paper on Information and Communications in Japan. MIC, 2023 “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

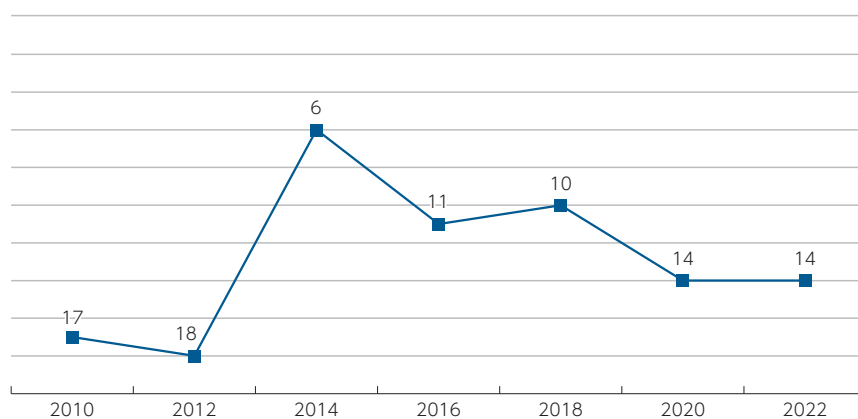
(EGDI).

In the 2022 World E-Government Ranking, Denmark ranked first, followed by Finland, the Republic of Korea, New Zealand, and Sweden. Japan ranked 14th, the same as in the previous survey, but its score improved. Historically, Japan has ranked between 10th and 18th (**Figure 2-1-11-23**).

In individual indicators, Japan ranked first in the “e-

Participation Index,” up from fourth in the previous survey. The e-Participation Index scores countries based on three areas: “e-information (information provision)”, “e-consultation (dialogue and opinion collection)”, and “e-decision-making (decision-making)”. Japan received high scores in all areas: Information 0.9818, Consultation 1.0000, and Decision-making 1.0000.

Figure 2-1-11-23 Changes in Japan's ranking in the UN (UNDESA) “World E-Government Ranking”



(Source) UN e-Government Surveys

(B) Waseda University “World Digital Government Ranking”

The Waseda University Institute of e-Government has been publishing the “World Digital Government Ranking” annually since 2005, evaluating the progress of digital government promotion in 66 ICT-advanced countries using 10 main indicators (35 sub-indicators). The top five countries were Denmark, Canada, the UK, New Zealand, and Singapore, with Denmark ranking first for three consecutive years. Japan fell out of the top 10 for the first time since the survey began, due to insufficient progress in digitalization from a citizen's perspective

and administrative and financial reforms. Challenges and structural weaknesses in Japan include the negative effects of siloed administration, lack of speed, and issues with the effectiveness of the Digital Agency as a control tower. Additionally, the complexity of decision-making due to the legal separation of government and local authorities, and the widening digital and administrative disparities among prefectures and municipalities were pointed out.



Figure (related data) Changes of the rank of Japan in Waseda University “World Digital Government Ranking”

Source: Institute of Digital Government in Waseda University

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00365>

(Data collection)

B Development of data linkage and authentication infrastructure

(A) My Number Card

As of March 17, 2024, the issuance rate of My Number Cards relative to the population reached 78.5% (excluding cards invalidated due to death or expiration, the possession rate is 73.3%). As of January 21, 2024, approximately 72.07 million cards were registered as health insurance cards, with a registration rate of 73.8% relative

to the total number of issued My Number Cards. Regarding the registration of public money receiving accounts, as of January 21, 2024, the cumulative number of registrations was approximately 62.65 million, with a registration rate of 64.2% relative to the total number of issued My Number Cards.



Figure (related data) Status of issuance of My Number Card

Source: Prepared based on MIC “The Status of Issuance of My Number Card”

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00366>

(Data collection)



Figure (related data) Changes in registration of My Number Card as health insurance cards

Source: Prepared based on Digital Agency “Dashboard on the proliferation of My Number Card” (data obtained on March 25, 2024)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00367>
(Data collection)



Figure (related data) Changes in public fund receipt account registrations

Source: Prepared based on Digital Agency “Dashboard on the proliferation of My Number Card” (data obtained on March 25, 2024)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00368>
(Data collection)

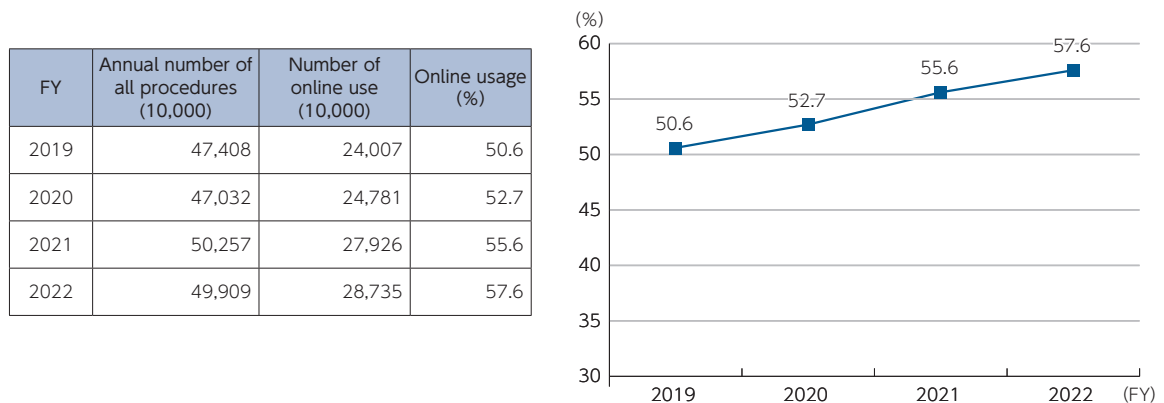
C Digitalization efforts in local governments

(A) Current status of online procedures

According to the “Priority Plan for Realizing a Digital Society” (Cabinet decision on June 7, 2022), the online usage rate for 59 procedures that local governments

should prioritize to digitalize promotion is as follows (**Figure 2-1-11-24**).

Figure 2-1-11-24 Changes in online usage 59 procedures which local governments must prioritize to digitalize



*1 Online usage for FY2020 and FY2019 was calculated based on a resurvey of the 59 procedures that local governments should prioritize in taking procedures online as listed in the “Priority Policy Program for Realizing Digital Society” (approved by the Cabinet on June 7, 2022).

*2 Online usage rate (%) = Number of procedures used online / total number of procedures per year × 100

The total number of procedures per year is a national estimate based on the total number of procedures and the population of organizations that have already gone online for these procedures.

The number of procedures used online is estimated in the same way as the total number of procedures per year, in order to more precisely calculate online usage.

(Source) Prepared based on MIC “Overview of Promotion of DX and Use of Information by Local Governments: Summary of FY2023 Survey on Promotion of Use of Administrative Information by Local Governments”¹³

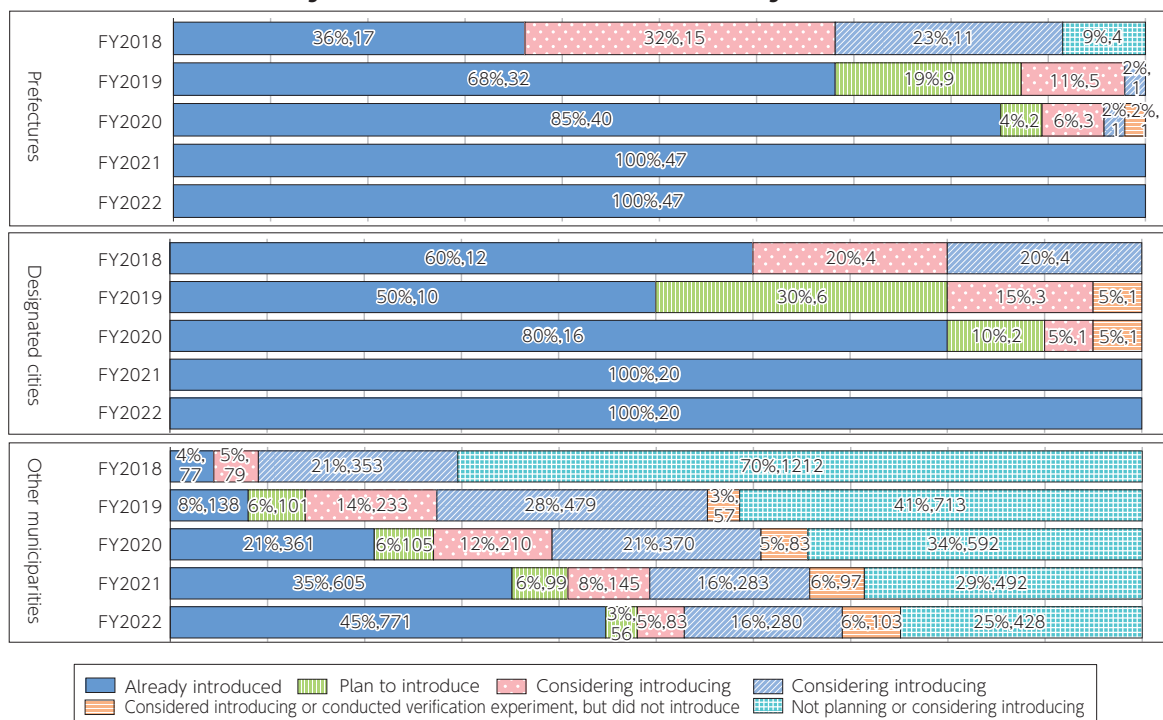
(B) Promotion of AI and RPA utilization

As of FY2021, 100% of prefectures and designated cities have introduced AI. Among other municipalities, 45% have introduced AI, and including those in the process of verification, planning to introduce, or considering introduction, about 69% of local governments are working towards AI introduction (**Figure 2-1-11-25**). By function, the top three areas (voice recognition, character

recognition, chatbot responses) are being introduced across all sizes of local governments. The bottom four areas (matching, optimal solution display, image/video recognition, numerical prediction) have fewer examples of introduction even at the prefecture level, but have been consistently increasing since the survey began, except for numerical prediction.

¹³ https://www.soumu.go.jp/denshijiti/060213_02.html

Figure 2-1-11-25 Status of introduction of AI in local governments

(Source) MIC "Promotion of Utilization of AI and RPA in Local Governments"¹⁴**Figure (related data) Status of introduction of AI in local governments (by AI function)**

Source: MIC "Promotion of Utilization of AI and RPA in Local Governments"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00371>

(Data collection)

Additionally, the number of organizations that have implemented RPA has increased to 94% for prefectures and 100% for designated cities. For other municipalities, the implementation rate stands at 36%, but when including those in the trial phase, planning to implement, or considering implementation, approximately 67% of local

governments are working towards RPA adoption (**Figure 2-1-11-26**). By sector, RPA is most commonly implemented in "Finance, Accounting, and Treasury," "Child Welfare and Childcare," "Health and Medical Care," and "Organization and Personnel (including administrative reforms)."

¹⁴ https://www.soumu.go.jp/main_content/000934146.pdf

Figure 2-1-11-26 Status of introduction of RPA in local government

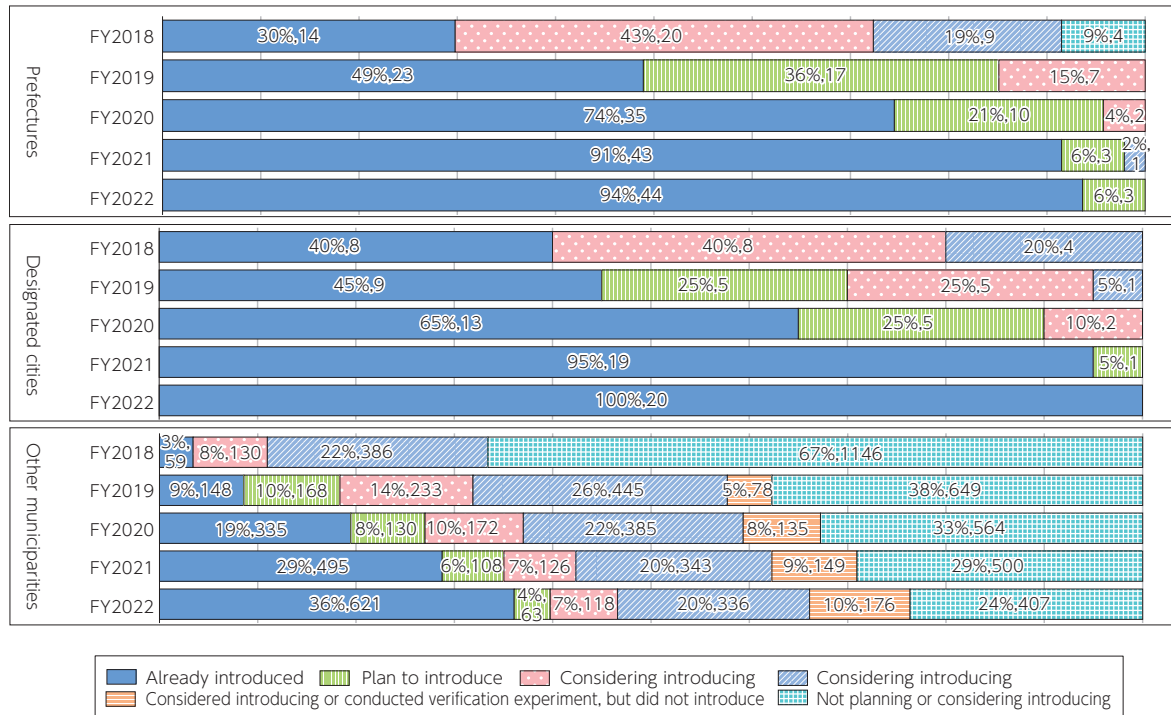
(Source) MIC "Promotion of Utilization of AI and RPA in Local Governments"¹⁵

Figure (related data) Status of introduction of RPA in local governments (by RPA field)

Source: MIC "Promotion of Utilization of AI and RPA in Local Governments"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00373>

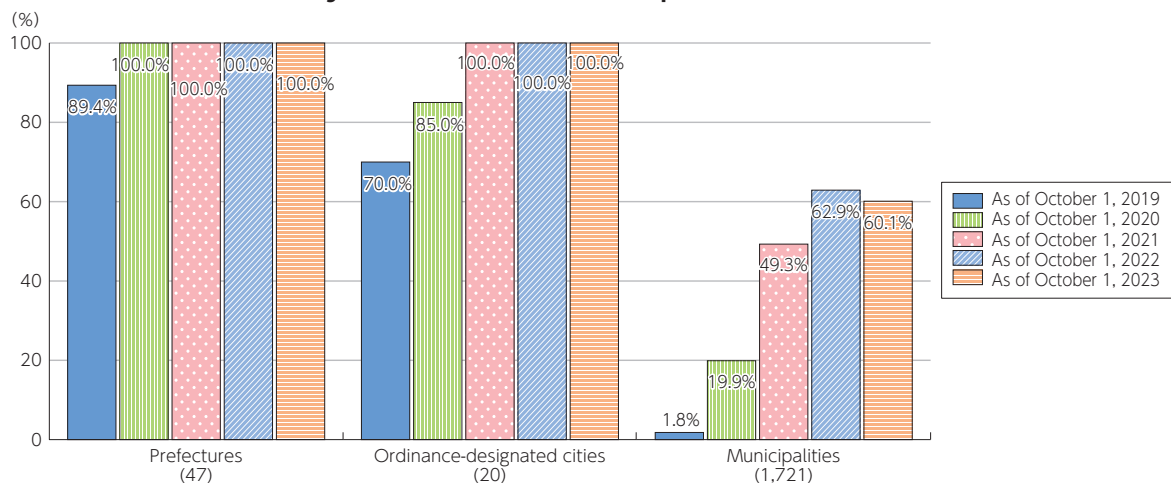
(Data collection)

(C) Status of telework implementation for staffs

As of October 2023, all prefectures and designated cities have implemented telework. Among municipalities, the implementation rate was 62.9% as of October 2022, but slightly decreased to 60.1% as of October 2023, part-

ly due to the reclassification of COVID-19 as a Category 5 infectious disease under the Infectious Diseases Control Law (Figure 2-1-11-27).

Figure 2-1-11-27 Status of telework implementation for staffs

(Source) Prepared based on MIC "Survey on Remote Work Initiatives by Local Government"¹⁶¹⁵ https://www.soumu.go.jp/main_content/000934146.pdf¹⁶ MIC "Survey on Remote Work Initiatives by Local Governments" (October 1, 2019, October 1, 2020, October 1, 2021, October 1, 2022, October 1, 2023) (https://www.soumu.go.jp/main_content/000920596.pdf)

Section 12 Trends in postal service and correspondence delivery business

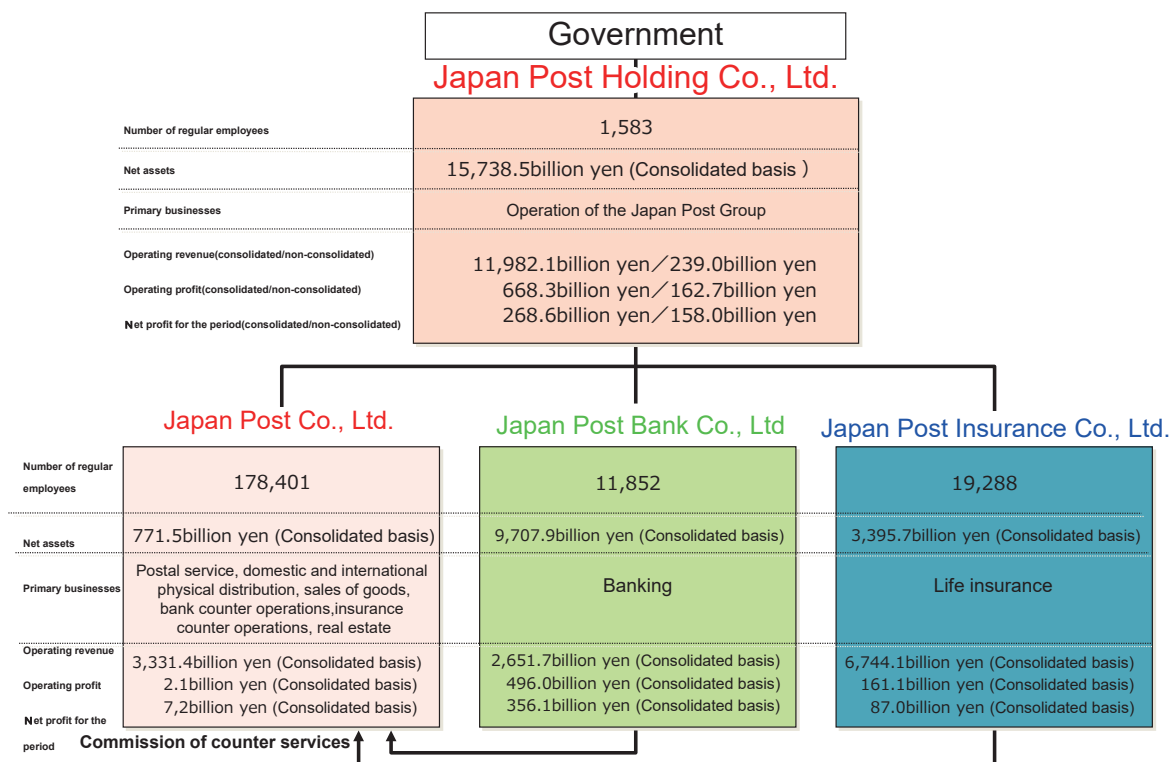
1. Postal service

(1) Japan Post Group

Japan Post Group has operated as a holding company structure since October 1, 2012, consisting of four companies (Figure 2-1-12-1). Japan Post Holdings holds 100% of the issued shares of Japan Post, as well as 61.5%

of the voting rights of Japan Post Bank shares and 49.8% of the voting rights of Japan Post Insurance shares (as of the end of March 2024).

Figure 2-1-12-1 Japan Post Group organization chart



*1 Number of employees (regular employees) as of September 30, 2023.

*2 The "current net profit" of each company is the current net profit attributable to parent company shareholders.

(Source) Based on financial results for the period ending March 2024 and disclosure reports (2023)

The consolidated financial results for Japan Post Group in FY2023 show an operating revenue of approxi-

mately 12 trillion yen and a net profit for the period of 26.86 billion yen (Figure 2-1-12-2).

Figure 2-1-12-2 Japan Post Group management status

Fiscal year	2018	2019	2020	2021	2022	2023
Operating revenue	127,749	119,501	117,204	112,647	111,385	119,821
Operating profit	8,306	8,644	9,141	9,914	6,576	6,683
Net profit for the period	4,794	4,837	4,182	5,016	4,310	2,686

(100 million yen)

(Source) Based on Japan Post Holdings Co., Ltd. "Overview of Financial Results"

(2) Japan Post Co., Ltd.

A Financial status

For FY2023, Japan Post (consolidated) reported operating revenues of 3.3237 trillion yen, operating income of 6.3 billion yen, ordinary income of 2.1 billion yen, and net income of 7.2 billion yen, indicating a decrease in both revenue and profit.

By business segment, the postal and logistics busi-

ness recorded operating revenues of 1.9755 trillion yen, operating expenses of 2.0441 trillion yen, and an operating loss of 68.6 billion yen, a decrease of 101.6 billion yen compared to the previous fiscal year. The post office business recorded operating revenues of 1.1129 trillion yen, operating expenses of 1.0399 trillion yen, and an op-

erating profit of 72.9 billion yen, an increase of 23.6 billion yen compared to the previous fiscal year (Figure

2-1-12-3).

Figure 2-1-12-3 Changes in Japan Post's (consolidated) operating profit and loss

(100 million yen)

Fiscal year	2018	2019	2020	2021	2022	2023
Postal/logistics business	1,213	1,475	1,237	1,022	328	△ 686
Post office business	596	445	377	245	493	729
International logistics business	103	△ 86	35	287	107	95
Japan Post (consolidated)	1,820	1,790	1,550	1,482	837	63

* The segment name was changed from "financial counter service" to "post office business" during the March 2022 term.

(Source) Based on Japan Post Holdings Co., Ltd. "Overview of Financial Results"

Additionally, the postal business of Japan Post recorded an operating loss of 21.1 billion yen for FY2022.



Figure (related data) Postal service income and expenditure

Source: Prepared based on Japan Post Co., Ltd. "Postal Service Income and Expenditure"

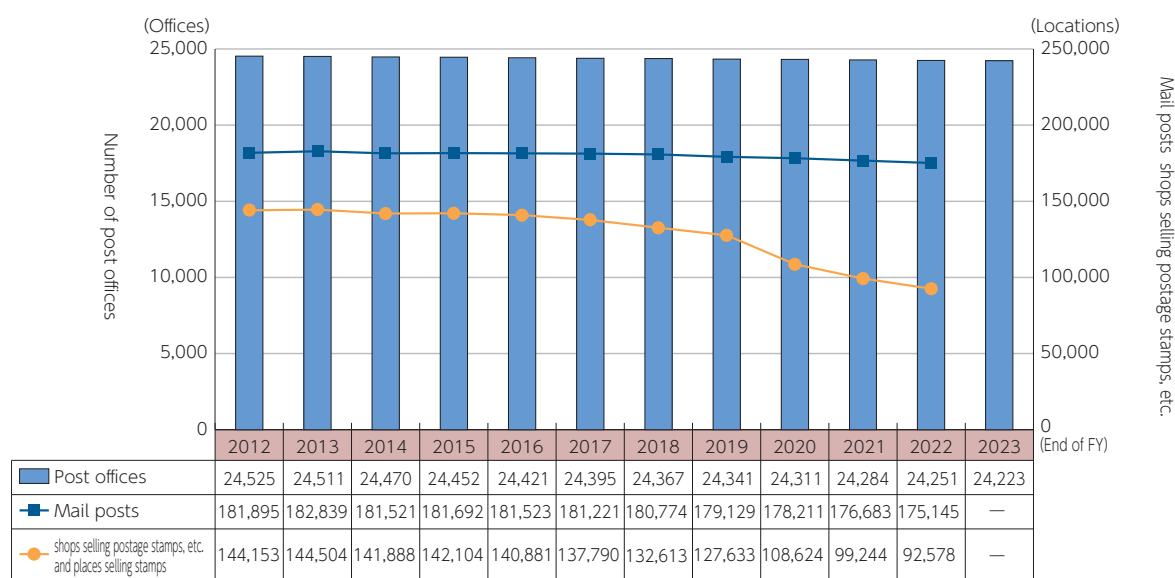
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00378>

(Data collection)

B Number of postal facilities

As of the end of FY2023, the number of postal offices stood at 24,223, remaining stable (Figure 2-1-12-4).

Figure 2-1-12-4 Changes in the number of facilities related to postal services



(Source) "Japan Post Group Disclosure Report" Based on Japan Post "Information on the number of postal offices (open data)" website

This includes 20,143 directly managed post offices (including branch offices and temporarily closed post

offices) and 4,080 simplified post offices (including temporarily closed simplified post offices).



Figure (related data) Breakdown of the number of post offices (as of the end of FY2023)

Source: Prepared based on Japan Post Co., Ltd. "Information on the number of postal offices (open data)"

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00380>

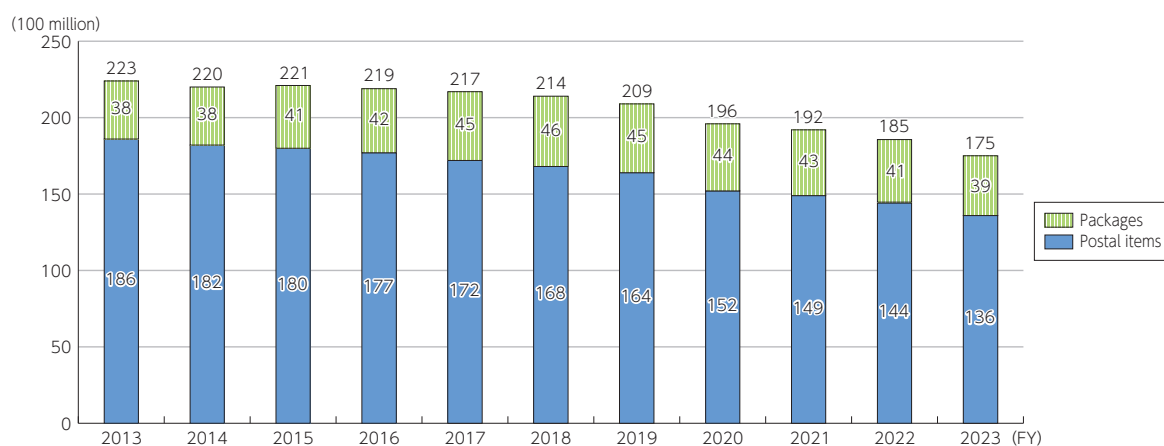
(Data collection)

C Volume of accepted postal items

The total volume of accepted postal items for FY2023

was 17.46084 billion pieces (**Figure 2-1-12-5**).

Figure 2-1-12-5 Changes in the total number of postal items accepted



* Following the privatization of postal services, Yu-Pack and Yu-Mail are now provided as packages as defined by the Motor Truck Transportation Business Act, and not as parcels as defined by the Postal Act.

(Source) Prepared based on Japan Post "Number of Accepted Postal Items" for each FY

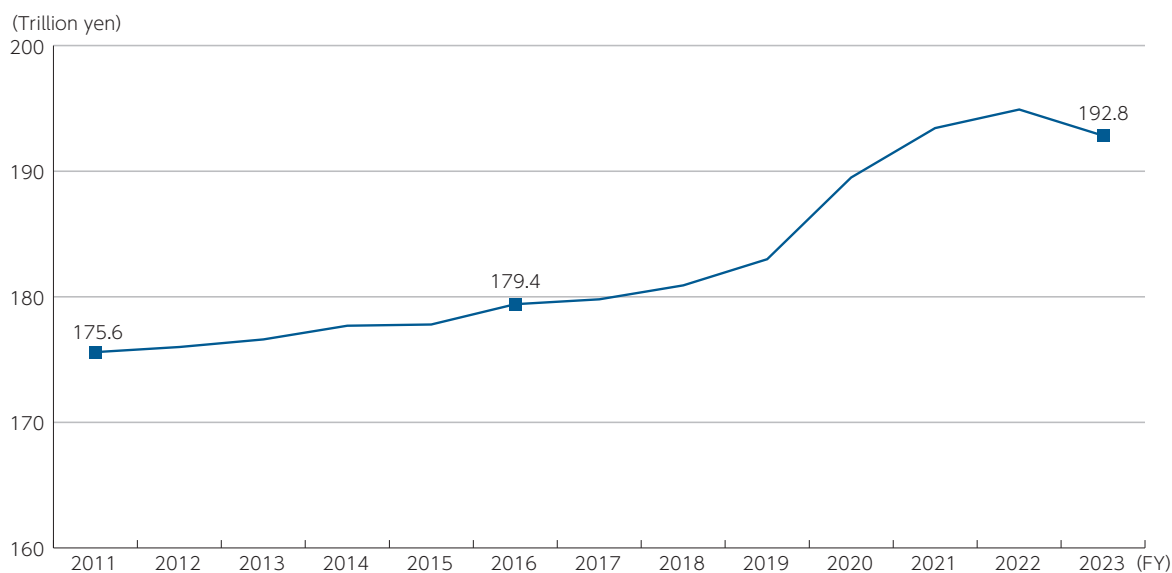
(3) Japan Post Bank Co., Ltd.

Japan Post Bank operates through its directly managed branches (233 branches) and delegates banking agency operations to post offices (approximately 20,000 offices).

The balance of deposits at Japan Post Bank, including

postal savings from the national era, was 192.8 trillion yen at the end of FY2023, a decrease of 67.2 trillion yen (25.8%) from the peak of 260.0 trillion yen at the end of FY1999 (**Figure 2-1-12-6**).

Figure 2-1-12-6 Changes in the balance of deposits of Japan Post Bank Co., Ltd.



* The figure is the sum of savings before and after postal service privatization..

(Source) Prepared based on Japan Post Bank Securities Report

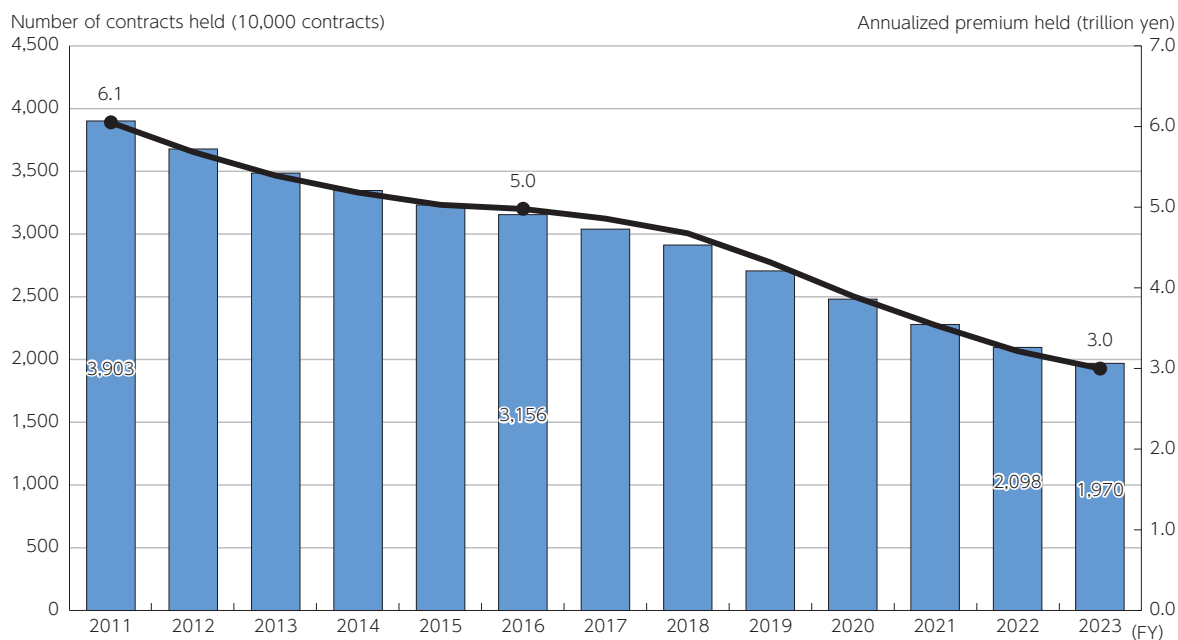
(4) Japan Post Insurance Co., Ltd.

Japan Post Insurance operates through its branches (82 branches) and delegates insurance solicitation operations to post offices (approximately 20,000 offices).

The number of policies in force, including simple life insurance from the national era, was 19.7 million at the end of FY2023, a decrease of 64.62 million (76.6%) from

the peak of 84.32 million at the end of FY1996. The annualized premium income was 3.0 trillion yen at the end of FY2023, a decrease of 4.7 trillion yen (61.0%) compared to the end of FY2008 (7.7 trillion yen) (**Figure 2-1-12-7**).

Figure 2-1-12-7 Changes in the number of insurance contracts and annualized premiums for Japan Post Insurance



(Source) Prepared based on Japan Post Insurance Securities Report

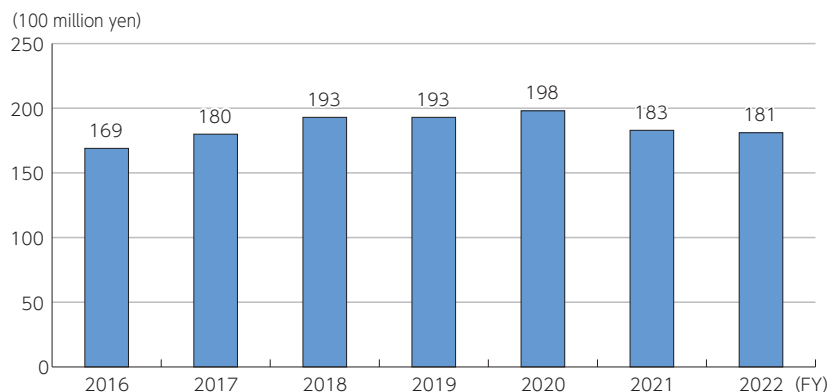
2. Correspondence delivery service

(1) Sales of correspondence delivery business

The sales of the specified correspondence delivery business for FY2022 were 18.1 billion yen, a decrease of

1.1% from the previous fiscal year (**Figure 2-1-12-8**).

Figure 2-1-12-8 Changes in correspondence delivery service operator sales



(2) Number of correspondence delivery service providers

Since the enforcement of the Act on Correspondence Delivery by Private Business Operators (Act No. 99 of 2002) in April 2003, there have been no new entrants into the general correspondence delivery business¹, but

as of the end of FY2023, 596 providers have entered the specified correspondence delivery business². The number of entrants into the first-class service has been increasing.



Figure (related data) Changes in the number of specified correspondence delivery service operators
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00385>
(Data collection)



Figure (related data) Changes in the number of business operators by type of service provided
Source: MIC "Promotion of Utilization of AI and RPA in Local Governments"
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00386>
(Data collection)

(3) Correspondence delivery handling performance

The number of accepted correspondence delivery items for FY2022 was 20 million pieces, a decrease of

0.3% from the previous fiscal year.



Figure (related data) Changes in the number of correspondences accepted
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00387>
(Data collection)

¹ "Nationwide full-scale entry" business that can deliver all types of correspondences on condition of providing general correspondence delivery service across the country.

² "Specific service type" business with ingenuity. The organization must perform one of three types of specified correspondence delivery service (Class 1 to 3).

Chapter 2

ICT policy initiatives in the MIC

Section 1 Promotion of comprehensive ICT policies

1. Current status and issues

(1) Progress of declining birthrate, aging population, and population decrease

In Japan, the declining birthrate and aging population are progressing, and it is expected that the population will continue to decrease in the future. Particularly, the decrease in the working-age population (ages 15-64) is a concern as it may lead to a reduction in labor supply, a decrease in future economic and market size, and a decline in economic growth rate. Therefore, improving la-

bor productivity and expanding labor participation are urgent tasks. ICT plays a significant role in addressing these issues. For example, by utilizing AI and robots to improve work efficiency and allocate labor resources effectively, and by expanding employment options through telework and satellite offices, which are not constrained by location.

(2) Frequent and severe disasters, aging social infrastructure

In recent years, Japan has experienced frequent and severe weather disasters due to climate change, and the occurrence of large-scale earthquakes such as the Nankai Trough Earthquake, the Japan Trench and Kuril Trench Earthquakes, and the Tokyo Metropolitan Earthquake is also considered imminent. During such disasters, it is essential to utilize ICT to accurately collect disaster-related information and provide evacuation information, as well as to ensure the rapid restoration of communication and the continuous provision of commu-

nication services.

Moreover, the infrastructure that was intensively developed during the period of rapid economic growth is expected to age rapidly in the future, necessitating strategic maintenance and renewal. Given the decreasing labor supply due to the declining birthrate and aging population, it is also challenging to allocate manpower for infrastructure maintenance. Therefore, it is necessary to use ICT to manage and update infrastructure more efficiently.

(3) Increasing complexity of international situations

The international situation surrounding Japan is becoming increasingly complex, with events such as Russia's invasion of Ukraine, cross-border cyberattacks on critical infrastructure, and the spread of disinformation. In this context, the "Act on Promotion of Ensuring Security by Taking Integrated Economic Measures" (Act No. 43 of 2022), enacted in May 2022, lists "Telecommunications Business," "Broadcasting Business," and "Postal Business" as business fields that may be subject to the system for ensuring the stable provision of specific social infrastructure services. Efforts are being made to ensure the effective implementation of this system. Moving forward, it is necessary to build resilient ICT infrastructure, strengthen cybersecurity and supply chains, and collaborate with the international community.

Additionally, as climate change issues become more

severe, Japan declared in October 2020 its goal to achieve carbon neutrality by 2050, aiming to reduce greenhouse gas emissions to net zero. The "Growth Strategy Execution Plan," formulated in June 2021, promotes the greening of the information and communication industry through two approaches: (1) promoting energy efficiency and CO2 reduction through digitalization (Green by ICT) and (2) improving energy efficiency and greening of digital devices and the information and communication industry itself (Green of ICT).

Japan's internet traffic¹ has surged approximately 2.7 times as of November 2023 compared to pre-COVID-19 levels in November 2019. With the expected continued increase in traffic, the power consumption of ICT-related equipment is also on the rise, necessitating the greening of ICT itself.

¹ Total download traffic for fixed broadband subscribers

2. Initiatives to promote comprehensive ICT policies

(1) Promoting efforts to realize the Vision of Digital Garden City Nation

To advance the implementation of digital technologies from rural areas, create a new wave of transformation, and narrow the gap between rural and urban areas, the “Vision of Digital Garden City Nation Realization Conference,” chaired by the Prime Minister, was established in November 2021. This initiative aims to realize the “Vision for a Digital Garden City Nation,” which connects Japan to the world, by concretizing the concept and promoting regional revitalization through digital implementation. Based on the discussions of this conference, the “Basic Policy for the Vision for a Digital Garden City Nation” was formulated in June 2022, and the “Comprehensive Strategy for the Vision for a Digital Garden City Na-

tion,” a five-year plan from FY2023 to FY2027, outlining the medium- to long-term basic direction of the concept, was approved by the Cabinet in December of the same year. Furthermore, in December 2023, the “Comprehensive Strategy for the Vision for a Digital Garden City Nation (Revised Edition in 2023)” was approved by the Cabinet, taking into account the trends in digital administrative and fiscal reforms.

Particularly regarding the development of digital infrastructure such as optical fiber and 5G, the “Infrastructure Development Plan for a Digital Garden City Nation” was formulated by the MIC in March 2022², and efforts are being vigorously promoted in line with this plan.



Figure (related data) Vision of Digital Garden City Nation Realization Conference
URL: https://www.cas.go.jp/jp/seisaku/digital_denen/index.html

² Revised on April 2023

Section 2 Trends in telecommunications business policies

1. Summary

(1) Initiatives so far

Since the liberalization of telecommunications in 1985 and the enactment of the Telecommunications Business Act (Act No. 86 of 1984), numerous new entrants have joined the market over the past 35 years. Under the principles of competition, various telecommunications technologies such as IP and digitalization, mobile, and broadband have advanced and been introduced, leading to significant progress in reducing costs, diversifying services, and enhancing their sophistication. The MIC has continuously reviewed various policies and systems to maintain the innovation and dynamism of these telecommunications services while ensuring the provision of reliable telecommunications services.

For example, in recent years, Japan's telecommunications market has seen significant environmental changes, such as the widespread adoption of mobile phones

and broadband and the advancement of competition primarily among groups of mobile communication operators. In response to these changes, efforts have been made to establish systems that ensure a fair competitive environment. Additionally, given that mobile phones have become essential in daily life, issues such as high fees compared to other countries and the complexity of pricing plans have been addressed to enable citizens to access affordable and diverse mobile phone services.

Furthermore, systems have been established to address various issues related to the use of telecommunications services, such as the information gap between users and operators, inappropriate solicitations by operators, the increase in various troubles, and the growing complexity and sophistication of cyberattacks and global risks.

(2) Future challenges and directions

The telecommunications business provides essential telecommunications services necessary for the daily lives of citizens and socio-economic activities. As Japan's social structure moves towards "Rapid Population Decline and Super-aging," the role of ICT in regional revitalization, such as strengthening local industrial bases and promoting regional migration, is expected to increase. Additionally, ICT is anticipated to play a growing role in revitalizing economic activities, creating new businesses, improving productivity, ensuring a safe and secure society, and solving social issues in fields such as healthcare, education, and administration. Consequently, the importance of telecommunications services is increasing.

In this context, ensuring the benefits of telecommunications service users and developing digital infrastructure as a foundation to support the promotion of innova-

tion, digitalization, and DX (Digital Transformation) in Japan's society and economy is extremely important.

Looking ahead, it is anticipated that not only the telecommunications market but also Japan's social structure will undergo further drastic changes, leading to an era where the social and economic models we have taken for granted may no longer apply. There is a growing need to use advanced information and communication technologies to solve social issues and create value.

Moreover, as telecommunications services have become indispensable for daily life and socio-economic activities, it is essential to provide continuous services even during emergencies such as natural disasters and communication disruptions.

Therefore, it is necessary to develop an environment where all entities in Japan can utilize reliable and secure information and communication.

2. Examination of telecommunications policy in response to changes in the market environment

To respond swiftly and flexibly to changes in the market environment and improve the quality of life for citizens and economic revitalization, the MIC consulted the Information and Communications Council in August 2023 on the "Telecommunications Policy in Response to Changes in the Market Environment Changes." Following discussions in the Special Subcommittee on Telecommunications Policy established under the council, the first report, compiled in February 2024, organized the discussions into two categories. Urgent issues necessary to strengthen international competitiveness, such as reviewing research responsibilities, were proposed as "Matters to be Implemented Promptly." Matters that could significantly impact citizens, users, and telecommunications operators, such as universal ser-

vice, fair competition, and economic security, were organized as "Matters Requiring Further Consideration." The MIC submitted a bill to partially amend the "Act on Nippon Telegraph and Telephone Corporation, etc." to the Diet in March of the same year, incorporating the contents proposed as "Matters to be Implemented Promptly." The bill was enacted and came into effect in April of the same year. The Information and Communications Council continues to discuss the "Matters Requiring Further Consideration" proposed in the first report. In particular, specialized discussions are being held in a working group to compile recommendations on ensuring universal service, fair competition, and economic security in the telecommunications sector by around this summer.

3. Creation of a fair competitive environment

(1) Analysis and verification of the telecommunications market

A Verification of the telecommunications market

Since FY2016, the MIC has been implementing market verification initiatives that integrate the analysis and verification of market trends and the confirmation of the appropriateness of telecommunications operators' operations. To obtain advice from an objective and specialized perspective, the "Telecommunications Market Verification Conference," composed of academic experts and other professionals, has been convened. Additionally, starting from FY2023, in light of the rapid changes in the market environment and the diversification of services due to the advancement of digitalization, and considering

the increasing dependence of national life and socio-economic activities on telecommunications, the MIC has decided to conduct monitoring of major telecommunications operators through hearings and other means. This monitoring will take into account the risks associated with providing telecommunications services, not only in emergencies but also during normal times. In August 2023, the MIC formulated the "Basic Policy on Market Verification in the Telecommunications Business Field," which includes this monitoring. Market verification is being conducted based on this basic policy.

B Ensuring a fair competitive environment in the mobile market

The MIC is working to establish a fair competitive environment in the mobile market to achieve affordable and diverse services through active competition among operators. In 2019, the MIC amended the Telecommunications Business Act to separate communication charges from device charges and to prohibit excessive customer retention practices. The effects of these measures and their impact on the mobile market have been continuously verified since 2020 by the "Working Group on the Verification of Competition Rules," established under the "Telecommunications Market Verification Conference." In September 2023, the working group compiled the results of the review based on Article 6 of the Supplementary Provisions of the 2019 Amendment to the Telecommunications Business Act into the "Report on the Verification of Competition Rules in 2023." Based on this report, the MIC revised the system in December 2023.

As part of its efforts, the MIC published the "Action Plan for Ensuring a Fair Competitive Environment in the Mobile Market" in October 2020, which outlines specific measures to establish a fair competitive environment in the mobile market. Based on the discussions in the

"Working Group on the Verification of Competition Rules" and the action plan, the MIC implemented measures such as the principle prohibition of SIM locks (August 2021) and the establishment of systems to facilitate the early termination of existing contracts (January 2022). Additionally, mobile phone operators have made progress in eliminating cancellation fees, launching carrier email portability services, and introducing eSIMs, thereby advancing the establishment of a fair competitive environment in the mobile market. In November 2023, the MIC published the "Mobile Market Competition Promotion Plan to Enrich Daily Life," which outlines measures that the MIC will promptly implement to further promote a competitive environment focused on pricing and services.

Furthermore, the MIC is working to promote user understanding through public awareness activities via consumer organizations. Since December 2020, the MIC has also launched a "Mobile Phone Portal Site" on its website, which provides neutral information to help users choose plans that suit their needs, thereby enhancing consumer understanding.



Figure (related data) Mobile phone portal site

URL: https://www.soumu.go.jp/menu_seisaku/ictseisaku/keitai_portal/

(2) Establishment of interconnection rules and other regulations

A Review based on changes in the situation of voice communications

In voice services such as telephone calls, the typical form of connection (voice connection) involved mutual payment of interconnection charges between connecting operators, corresponding to the bidirectionality of voice calls. However, considering environmental changes such as the transition of fixed telephone networks to IP networks (scheduled for completion in January 2025), various discussions have been held regarding the system and rules.

In this context, the MIC has been discussing the re-

view of voice connections, including the "Bill & Keep Method," where operators do not mutually pay interconnection charges, in the "Study Group on Calculation of Interconnection Charges etc." since 2023. Based on the results of these discussions, in March 2024, the MIC established a system allowing the selection of the "Bill & Keep Method" based on mutual agreement between connecting parties, including operators installing Designated telecommunications facilities such as MNOs (Amendment to the Ordinance for Enforcement of the

Telecommunications Business Act etc., Ministry of Internal Affairs and Communications Ordinance No. 14 of 2024).

Additionally, regarding the specific calculation method of interconnection charges applicable to “Metal IP Phones” and other services provided by NTT East and

B Review of the calculation method for mobile interconnection charges

The Telecommunications Business Act imposes regulations (designated telecommunications facilities system) on specific operators that establish major networks to ensure the fairness and transparency of interconnection charges and conditions, and the promptness of interconnections. The MIC ensures the appropriateness of interconnection charges through administrative procedures such as approval and notification, and improves the appropriateness of calculation methods through discussions in the “Study Group on Calculation of Interconnection Charges etc.”

Regarding the interconnection charges for MNO networks in mobile communications (mobile interconnection charges), the “Seventh Report of the Study Group on Calculation of Interconnection Charges etc.” in September 2023 pointed out differences in the allocation standards for costs and assets among MNOs when cal-

C Review of the system for wholesale telecommunications services

For wholesale telecommunications services provided using Category I designated telecommunications facilities, the Act for Partial Amendment of the Telecommunications Business Act (Act No. 70 of 2022) imposes obligations to provide services and disclose information during negotiations to correct the negotiating superiority of wholesale providers and ensure the appropriateness of negotiations between wholesale providers and wholesale recipients.

The MIC confirms the status of negotiations and the

West after the transition of fixed telephone networks to IP networks, the MIC consulted the Information and Communications Council in October 2023 and received a report in June 2024. Based on this, the MIC plans to stipulate the specific calculation methods in ministerial ordinances.

culating both voice and data communication interconnection charges. Based on this report, MIC amended the “Rules for Category II Designated Telecommunications Facilities Interconnection Accounting” (Amendment to the Ordinance for Enforcement of the Telecommunications Business Act etc., Ministry of Internal Affairs and Communications Ordinance No. 99 of 2023) and organized unified allocation standards in the “Working Group on Cost Allocation for Mobile Interconnection Charges” under the same study group.

Regarding the interconnection charges for NTT East and West networks in fixed communications, the study group also organized necessary reviews, including the calculation method for remuneration (appropriate profit) and the handling of “Remaining Lines” of subscriber optical fibers.

operation of the system after the enforcement of the amended law through the “Study Group on Calculation of Interconnection Charges etc.” and other forums. The MIC also discusses the verification of wholesale charges, focusing on the substitutability of wholesale telecommunications services and interconnection functions, and continues efforts to appropriately parallel the use of “Interconnections” and “Wholesale Telecommunications Services” in the use of Category I and II designated telecommunications facilities.

4. Development and maintenance of digital infrastructure

(1) Promotion of optical fiber development

Regarding digital infrastructure using optical fiber, there is a strong expectation for the utilization of digital technologies, including telework, remote education, and telemedicine, to solve regional issues. However, in geographically disadvantaged areas such as depopulated regions and remote islands, the financial burden is significant relative to the population, leading to delays in development¹.

In light of this background, the MIC has implemented the “Project to Promote Advanced Wireless Environment,” which subsidizes part of the project costs when local governments and telecom service operators develop optical fiber, which is a prerequisite for high-speed, large-capacity wireless communication such as 5G, in disadvantaged areas. This project also includes subsidies for expenses required for the maintenance and management of optical fiber in remote island areas con-

ducted by local governments. Additionally, based on the “Infrastructure Development Plan for a Digital Garden City Nation,” (formulated in March 2022, revised in April 2023), efforts are being made to increase the national coverage rate for fiber optic broadband services (household coverage rate), which was 99.8% as of the end of March 2023, to 99.9% by the end of March 2028.

To accelerate development in remote islands, where the cost of laying submarine cables is often high, the support content has been significantly expanded in the supplementary budget for FY2023 and the budget for FY2024, including increased subsidy rates for remote island areas. The promotion of optical fiber development in disadvantaged areas, including remote islands, will continue. Furthermore, based on the requests of local governments, efforts will be made to promptly and smoothly transition public facilities to private facilities.

¹ Refer to Section 2 “Trends in telecommunications field” in Chapter 1, Part 2.

(2) Decentralization of data centers and submarine cables

Against the backdrop of increasing internet traffic and the growing use of cloud and AI with the advancement of DX, the demand for data centers and submarine cables is increasing globally. These digital infrastructures have become indispensable for supporting social life and economic activities. In Japan, while investment in the Osaka area has increased in recent years, about 60% of data centers are concentrated in the Tokyo area, and this trend is expected to continue. Regarding submarine cables, the landing stations for international submarine cables are concentrated on the Boso Peninsula and its surroundings, and the Sea of Japan side is a missing link for domestic submarine cables. In such a situation, if the Tokyo or Osaka areas are affected by a major disaster, there could be nationwide impacts on communication services. From the perspective of strengthening Japan's digital infrastructure, it is necessary to promote the decentralized location of data centers and the development of submarine cables on the Sea of Japan side. Additionally, given Japan's position as a relay point between North America/Europe and the Asia-Pacific region, it is essential to further promote the laying of international submarine cables to establish Japan as a hub for international data distribution and build autonomous digital infrastructure. Furthermore, considering the recent changes in the international situation, such as the increasing complexity of the national security environment surrounding Japan, it is also necessary to strengthen the security measures for international submarine cables and landing stations.

The MIC, as part of the supplementary budget project for FY2021, has created a fund to support private businesses in developing data centers and submarine cables,

(3) Ensuring the provision of broadband services

The MIC has positioned broadband services, which are essential for utilizing services such as telework, remote education, and telemedicine, as the newly designated Type II Basic Telecommunications Services (Universal Services) under the Telecommunications Business Act. To ensure their appropriate, fair, and stable provision, the MIC has imposed business regulations, such as the requirement to submit contract terms, on telecommunications carriers providing these services. Additionally, the MIC has established a new grant system (Universal Service System for Broadband Services) funded by contributions from telecommunications carriers providing broadband services nationwide. This system reform was enacted through the partial amendment of the Telecommunications Business Act (Act No. 70 of 2022, hereinafter referred to as the "2022 Amended Telecommunications Business Act"). The 2022 Amended Telecommunications Business Act and the related cabinet orders and ministerial ordinances defining the scope of Type II Basic Telecommunications

providing support for data center development projects located outside the Tokyo area. Additionally, as part of the supplementary budget project for FY2023, the fund has been increased, and new support targets, such as branch lines and branching devices for international submarine cables, have been added to promote the diversification of routes for international submarine cables.

Furthermore, in the "Infrastructure Development Plan for a Digital Garden City Nation" (formulated in March 2022, revised in April 2023), it is stated that (1) for data centers, the development of the third and fourth core bases to complement and substitute Tokyo and Osaka will be promoted, and in collaboration with relevant ministries such as the METI, further decentralization of data centers and necessary support for base development will be considered; and (2) for submarine cables, efforts will be made to develop domestic submarine cables on the Sea of Japan side, which is currently a missing link, to complete the submarine cable encircling Japan (Digital Rural City Super Highway). In conjunction with efforts to decentralize data centers, the development of submarine cables and other infrastructure will be promoted to strengthen Japan's function as an international data distribution hub. Additionally, to strengthen the security measures for international submarine cables and landing stations, efforts will be made to promote the diversification of routes in preparation for disconnections of international submarine cables, protect international submarine cables and landing stations, and strengthen the installation and maintenance systems for international submarine cables.

Services² came into effect in June 2023.

Regarding the specific calculation methods for grants under this system, in July 2023, the MIC consulted the Information and Communications Council on the "Framework for Basic Telecommunications Services Related to Broadband Services." From September of the same year, the Universal Service Policy Committee under the Telecommunications Business Policy Subcommittee of the Information and Communications Council convened the "Working Group on the Calculation of Grants and Contributions in the Universal Service System for Broadband Services" to conduct detailed examinations on the calculation of grants and contributions. Concurrently, to build and verify the standard determination formula used for designating support areas and calculating grants, the "Study Group on Cost Calculation in the Universal Service System for Broadband Services" was held from September 2023, deepening the discussions. In March 2024, the discussions from these councils and committees were compiled.

² FTTH access service, CATV access service (HFC method) and wireless fixed broadband access service (dedicated type)

5. Ensuring the safety and reliability of telecommunications infrastructure

(1) Establishment of technical standards for telecommunications infrastructure development

In light of the advancement of virtualization technology in communication networks and the utilization of cloud services, leading to the diversification and complexity of service provision structures, the Information and Communications Technology Subcommittee on IP Network Equipment of the Information and Communications Council deliberated on the “technical requirements for telecommunications equipment to address the diversification and complexity of networks due to the advancement of technology” from April 2022 to February 2023.

Based on the first interim report compiled in September 2022, the Information and Communications Council’s partial recommendation³ indicated the appropriateness of imposing standards equivalent to those currently applied to MNOs on MVNOs that receive the designation of voice transmission mobile phone numbers. Subsequently, following the recommendation of the Information and Communications Administration and Postal

Administration Council⁴, in February 2023, ministerial orders amending certain provisions of the Ordinance for Enforcement of the Telecommunications Business Act were implemented to relax the designation conditions for voice transmission mobile phone numbers.

Furthermore, the same committee conducted deliberations on “technical requirements for telecommunications equipment based on the advancement of virtualization technology” and “technical requirements for situations where there is a recognized risk of a significant accident,” and compiled a second interim report in February 2023. Based on the partial recommendation⁵ of the Information and Communications Council derived from this report, amendments were made to the Ordinance for Enforcement of the Telecommunications Business Act in June 2023 for “technical requirements for telecommunications equipment based on the advancement of virtualization technology,” and the amended regulations were enforced in January 2024.

(2) Ensuring communication services during emergencies

A Efforts to establish standards for measures to be implemented by telecommunications operators

In recent years, Japan has experienced frequent natural disasters such as earthquakes, typhoons, heavy rains, heavy snowfalls, floods, landslides, and volcanic eruptions. These events have caused disruptions in communication services due to power outages, equipment failures, and cable cuts. The MIC has revised the “Information and Communication Network Safety and Reliability Standards” (Ministry of Posts and Telecommunications Notification No. 73 of 1987) to include measures such as earthquake resistance, power outage countermeasures, and fire prevention measures that telecommunications operators should implement, aiming

to ensure communication services during disasters.

Additionally, since October 2018, the “Liaison Meeting on Ensuring Communication Services During Disasters” has been held to review responses to successive disasters, share information, and exchange opinions on issues such as rapid damage assessment and restoration efforts. Based on the information obtained from these meetings, efforts are being made to establish communication systems and initial response training between telecommunications operators and related organizations involved in power, fuel, and fallen trees removal.

B Efforts of the “MIC-TEAM” (MIC Disaster Telecom Support Team)

In June 2020, the MIC established the “MIC-TEAM” to support disaster response efforts aimed at ensuring communication means. The MIC-TEAM is dispatched to local governments in disaster-affected areas when a large-scale disaster occurs or is likely to occur. The team assesses the damage to communication services, coordinates with relevant administrative agencies and operators, and provides technical advice and support such as

lending mobile power supply vehicles. For instance, during the heavy rains in the summer of 2023, the team was dispatched to the Fukuoka and Akita prefectural offices. Additionally, approximately 133 staff members were dispatched to the Ishikawa prefectural office following the Noto Peninsula Earthquake in January 2024 (as of the end of May 2024).

C Considerations on intercarrier network utilization during emergencies

Mobile phone services are essential lifelines for daily life and economic activities. Ensuring that users can continue to use communication services during emergencies, such as natural disasters or communication fail-

ures, by temporarily utilizing other operators’ networks through “intercarrier roaming” is a critical issue. In response, the MIC has been holding the “Study Group on Intercarrier Roaming in Emergency Situations” since

³ The partial recommendation of Information and Communications Council regarding “Technical conditions for telecommunications equipment that respond to the diversification and complexity of networks due to advances in virtualization technology, etc.” (September 16, 2022), https://www.soumu.go.jp/menu_news/s-news/01kiban05_02000253.html

⁴ Results of soliciting opinions regarding partial revisions to the Ordinance for Enforcement of the Telecommunications Business Act etc. and the recommendation of the Information and Communications Administration and Postal Administration Council (January 20, 2023) https://www.soumu.go.jp/menu_news/s-news/01kiban06_02000100.html

⁵ The partial recommendation of Information and Communications Council regarding “Technical conditions for telecommunications equipment that respond to the diversification and complexity of networks due to advances in virtualization technology, etc.” (February 24, 2023) https://www.soumu.go.jp/menu_news/s-news/01kiban05_02000283.html

September 2022. The first report, compiled and published in December 2022, set forth the basic policy of introducing Full Inter-carrier Roaming, which allows for emergency calls, general calls, data communication, and call-backs from emergency response agencies as early as possible during emergencies.

Furthermore, the second report, compiled in June 2023, outlined the policy of introducing a roaming method that allows emergency calls even if there is a failure in user authentication of the core network necessary for

call-backs from emergency response agencies, alongside Full Inter-carrier Roaming. The third report, compiled in May 2024, detailed the basic concept of inter-carrier roaming and the schedule aiming for the introduction of both methods around the end of FY2025.

Moving forward, efforts will be made to promote technical studies and verifications, ensure interconnectivity between base stations and terminals, and other initiatives to achieve “inter-carrier roaming.”

(3) Analysis and verification of telecommunications accidents

To prevent telecommunications accidents and minimize their impact, appropriate measures are necessary both before and after an accident occurs. Since 2015, the MIC has been holding the “Telecommunications Accident Verification Meeting” to analyze and verify reports related to “Serious Accidents” and “Situations Recognized as Likely to Cause Serious Accidents” as defined by the Telecommunications Business Act, as well as “Quarterly Report Accidents” as defined by the Telecommunications Business Reporting Regulations. The verification results of telecommunications accidents that occurred in FY2022 were compiled and published in the “Verification Report on Telecommunications Accidents in FY2022” in August 2023. Continuous verification of telecommunications accidents that occurred in FY2023 was also conducted. Based on these accidents, administrative guidance was provided to implement necessary measures from the perspective of preventing recurrence.

Common issues such as risk identification and evaluation, prevention of human errors, training, and maintenance and operation systems are considered to be behind the frequent occurrence of telecommunications accidents. Therefore, from December 2022, the Tele-

communications Accident Verification Meeting has been examining structural issues related to organizational and system aspects behind individual accidents, as well as reviewing technical standards and management regulations based on these structural issues, and considering ways to strengthen governance over maintenance and operation systems related to safety measures. In March 2023, the “Report on the Verification of Structural Issues Related to Telecommunications Accidents” was compiled. Based on this report, in addition to various initiatives by telecommunications operators themselves, the administration also aims to implement monitoring of compliance with laws and regulations related to ensuring the safety and reliability of telecommunications services. In July 2023, the “Basic Policy on Monitoring the Safety and Reliability of Telecommunications Services” was formulated, and the first year’s verification began in August. Additionally, in September, the Ordinance for Enforcement of the Telecommunications Business Act etc. were revised to include the inspection and evaluation of compliance with management regulations by telecommunications operators as part of the notification items for management regulations.

6. Creation of a safe and secure usage environments in telecommunication services

(1) Ensuring governance in the telecommunications sector

The telecommunications industry is an essential sector that promotes innovative advancements across various fields, including information and communication technology. To foster the provision of innovative services through the introduction of digital technologies and to promote the DX of society, it is crucial to ensure the provision of reliable and trustworthy telecommunications services that users can rely on.

The MIC has been working to ensure secure, safe, and reliable communication services and networks in the digital age. To this end, the MIC has been examining the governance of cybersecurity measures and data handling by telecommunications operators. In May 2021, the MIC established the “Study Group on the Telecommunications Business Governance” to discuss future measures based on these examinations. Following the committee’s recommendations, the MIC introduced new regulations to promote the proper handling of user infor-

mation, particularly by telecommunications operators who manage large volumes of data. These regulations align with international standards and include mandatory formulation and submission of regulation for handling information. Additionally, the MIC has established rules to ensure the smooth provision of telecommunications services, such as measures against cyberattacks and accident reporting systems. These amendments to the Telecommunications Business Act were enacted in June 2022. Subsequently, from June to September 2022, the MIC convened the “Working Group on the Proper Handling of Specified User Information” to discuss detailed regulations regarding the handling of specified user information. The Ordinance for Enforcement of the Telecommunications Business Act was amended to specify the following: (1) items to be included in regulations for handling information, (2) items to be included in information handling policies, (3) evalua-

tion items for the handling of specified user information, (4) requirements for the general manager of specified user information, and (5) reporting requirements in the event of a data breach. The revised Telecommunications Business Act and the revised Ordinance for Enforcement

of the Telecommunications Business Act came into effect in June 2023. Furthermore, in December 2023, the MIC designated telecommunications operators who should handle specified user information properly, with the designation taking effect in January 2024.

(2) Establishing consumer protection rules in the telecommunications sector

A Overview

The advancement and diversification of telecommunications services have brought increased convenience and more options for many users. However, this has also led to issues such as information asymmetry between users and operators and inappropriate solicitations by operators, resulting in various troubles. To prevent such

issues and ensure that consumers can benefit from the advanced and diversified telecommunications services, the MIC has been establishing and appropriately enforcing consumer protection rules related to telecommunications services, and revising them as necessary.

B Ensuring the effectiveness of consumer protection rules

(A) Handling complaints and consultations, coordination with stakeholders, and administrative guidance

The MIC has established the “MIC Telecommunications Consumer Consultation Center” to receive information from consumers⁶. Additionally, the telecommunications consumer support liaison meetings⁷ are held twice a year in various regions across the country to facilitate information sharing and exchange of opinions among stakeholders. Based on the information obtained

through these initiatives, the MIC provides administrative guidance and coordinates with the Consumer Affairs Agency to ensure the effectiveness of consumer protection rules related to telecommunications services.

Furthermore, the MIC promotes voluntary efforts by related organizations to comply with consumer protection rules.

(B) Monitoring

The MIC has formulated the “Basic Policy for Supervising User Protection Regulations in the Telecommunications Business” and monitors the implementation status of consumer protection rules. The “Regular Monitoring Meetings on the Implementation Status of Consumer Protection Rules,”⁸ which include experts and related business organizations, are held twice a year to share and evaluate the status among stakeholders.

These meetings analyze complaints and consultations in the telecommunications sector, not only in general trends but also by service type, such as MNO, MVNO, and FTTH. They also conduct thematic analyses⁹, on-site investigations (mystery shopping), ad-hoc investigations of individual cases, and analyze complaints and

consultations received by business organizations¹⁰. The results are summarized to evaluate and review the implementation status of consumer protection rules. Follow-up on the improvement efforts by operators is also conducted.

Based on the evaluations from these meetings, the MIC provides guidance to telecommunications operators identified in on-site investigations on areas needing improvement. The MIC also requests industry-wide efforts and dissemination of information to members from business organizations. The analysis results and evaluations from these meetings are utilized to review consumer protection rules and promote voluntary efforts by operators.

C Review of consumer protection rules

The MIC has been reviewing and expanding consumer protection rules in response to changes in the telecommunications market and the situation of consumer disputes. From June 2020, the “Study Group on the Review of Consumer Protection Rules” has been intensively examining the revision of the system, and in September 2021, the “Report on the Review of Consumer Protection Rules in 2021” was compiled. Based on this report, in February 2022, the MIC amended the Ordinance for Enforcement of the Telecommunications Business Act to: (1) mandate the use of written explanations

in telemarketing for providing terms and conditions; (2) mandate measures to allow users to cancel without delay; and (3) institutionalize limits on the amounts that can be charged upon cancellation (effective from July 1, 2022).

Furthermore, in response to the “Study Group on the Review of Consumer Protection Rules,” the MIC has been conducting follow-ups on the implementation and evaluation of the Telecommunications Business Act amended in 2019, as well as the “Recommendations on Efforts Based on the ‘Report on the Review of Consum-

⁶ 13,348 complaints have been received by phone and online (FY2023).

⁷ A liaison group organized by the MIC to exchange opinions on how to support consumers in telecommunications services, with members of consumer centers and telecom operator organizations in various regions.

⁸ Regular Monitoring Meetings on the Implementation Status of Consumer Protection Rules: https://www.soumu.go.jp/main_sosiki/kenkyu/shouhisha_hogorule/index.html

⁹ The 15th meeting, held in July 2023, dealt with (1) complaints about communication speeds, (2) complaints from the elderly, (3) complaints about FTTH telemarketing, and (4) complaints about in-person sales visit.

¹⁰ Telecommunications Carriers Association and National Association of Mobile-phone Distributors

er Protection Rules 2021” compiled in July 2022. In August 2023, the “Report on the Review of Consumer Protection Rules 2023” was compiled based on this report. In line with this, the Ministry amended the Ordinance for Enforcement of the Telecommunications Business Act to clarify the necessary capabilities and systems required of sales agents, and also revised the “Guidelines on Consumer Protection Rules of the Telecommunica-

(3) Protection of secrecy of communication and user information

A Overview

With the proliferation of smartphones and IoT devices, a wide array of people, objects, and organizations are increasingly connected to the internet, leading to an exponential growth in the generation and accumulation of digital data. Concurrently, the results derived from data analysis using AI are being fed back into the real world, aiming to solve various societal challenges and realize Society 5.0.

In this context, the presence of platform operators offering various services for free is becoming more prominent, and there is a growing trend of user information being collected and accumulated. As essential services

B Further considerations for the protection of user information

In the “Study Group on Platform Services” held by the MIC, a “Working Group on the Handling of User Information Related to Platform Services” was established to discuss issues. Based on the results of these discussions, the “Interim Report” (September 2021) was compiled. This report suggested that it would be appropriate to advance considerations for the concrete institutionalization of the handling of user information, including cookies and location information, by referring to discussions on the ePrivacy Regulation (draft) in the EU, and examining the content and scope of regulations under the Telecommunications Business Act and other laws. Based on this report, a law to partially amend the Telecommunications Business Act was enacted in June 2022. This amendment mandates that when telecommunications carriers provide telecommunications services to users and transmit telecommunications that give instructions to send information externally, they must provide users with opportunities for notification and publi-

(4) Measures against illegal and harmful information

A Overview

The circulation of illegal and harmful information on the internet remains a serious issue. The MIC has been continuously implementing measures against various

B Measures Against Defamation on the Internet

Given the increasing severity of issues related to defamation on the internet, particularly on social networking services (social media) and other platform services, the MIC has been implementing the following measures based on the “Policy Package for Addressing Defamation on the Internet,” which was compiled and published in September 2020.

tions Business Act” to clarify that inappropriate business operations contrary to the principle of compliance may lead to issues regarding whether the telecommunications business operators, as the commissioning party, are effectively carrying out guidance and other measures. The Ministry will continue to advance monitoring and other initiatives to enhance consumer protection.

for daily life are increasingly provided by platform operators via smartphones and other devices, the importance of these operators in people’s daily lives is rising, leading to the collection and accumulation of more sensitive information.

To ensure a balance between user convenience and the protection of secrecy of communication and personal data, it is crucial for platform operators to enhance the attractiveness of their services and ensure the proper handling of user information. This will allow users to utilize services with peace of mind, thereby enabling the full potential of platform functions to be realized.

cation (hereinafter referred to as “external transmission regulations”). Subsequently, from June to September of the same year, the MIC held the same working group to discuss the details of the external transmission regulations. The Ordinance for Enforcement of Telecommunications Business Act were amended to specify the subjects of the regulations, the matters to be notified and published, and the methods of notification and publication. The amended Telecommunications Business Act and the revised Ordinance for Enforcement of Telecommunications Business Act came into effect in June 2023.

From February 2024, the “Study Group on Improving the Usage Environment for ICT Services” and the “Working Group on User Information” established under this study group, both held by the MIC, have been discussing further protection of user information. These discussions take into account changes in the domestic and international landscape of privacy measures on smartphones and various incidents.

types of illegal and harmful information, such as defamation and piracy, in collaboration with relevant parties.

- (1) Awareness activities for improving information morality and ICT literacy among users
- (2) Support for voluntary efforts by platform operators and enhancement of transparency and accountability (continuous monitoring of platform operators)
- (3) Efforts related to disclosure of sender information

(smooth operation of the revised Provider Liability Limitation Act of 2021¹¹)

- (4) Enhancement of consultation services (strengthening the system of the illegal and harmful information consultation center, enhancing collaboration among multiple consultation agencies, and publicizing a guide to multiple consultation windows)

As part of initiative (1), the MIC created an awareness video featuring a VTuber to inform the public about how to deal with defamation and other harms, which was released in late September 2023.

Additionally, in August 2022, the “Second Interim Report” was published by the “Study Group on Platform Services,” summarizing future directions for addressing illegal and harmful information based on hearings with platform operators.

Based on this report, the “Working Group on Measures Against Illegal and Harmful Information, Including Defamation” was established in December 2022 to conduct specialized and intensive discussions on key is-

ssues such as (1) ensuring the transparency and accountability of deletions by platform operators and (2) the roles platform operators should play in effectively curbing the circulation of illegal and harmful information. As a result of the discussions in this working group, it was concluded that it is appropriate to require certain large-scale service providers among those with a purpose of communication between unspecified persons, to: (1) speed up responses by imposing obligations such as response deadlines within a certain period; and (2) enhance transparency by establishing standards and publicizing operational status (including legal measures). Following the working group’s conclusions, the “Third Interim Report on Platform Services” was published in February 2024. Based on this report, a partial amendment to the Provider Liability Limitation Act was enacted in May 2024. This amendment also renamed the act to the “Act on Measures Against Rights Infringements Arising from the Distribution of Information via Specified Telecommunications” (abbreviated as the Information Distribution Platform Measures Act).

C Measures against online piracy

The MIC has been working on the following measures based on the “MIC’s Policy Menu for Measures Against Online Piracy” (December 2020): awareness-raising activities to improve information ethics and ICT literacy among users; promotion of the introduction of access deterrence functions through security software; review of the sender information disclosure system; and

promotion of international cooperation through discussions in international forums such as ICANN.

Additionally, based on the “Current Summary” by the “Study Group on Access Deterrence to Online Piracy Sites” (September 2022), the MIC has been confirming the progress of its policy menu and the initiatives of relevant businesses.

7. Mediation and arbitration by the Telecommunications Dispute Settlement Commission

(1) Functions of the Telecommunications Dispute Settlement Commission

The Telecommunications Dispute Settlement Commission (hereinafter referred to as the “Commission”) is a specialized organization established to promptly and fairly handle increasingly diverse disputes in the telecommunications field, where technological innovation and the competitive environment are rapidly advancing. Disputes are currently handled by five members and eight special members appointed by the Minister for Internal Affairs and Communications.

The Commission has three functions: (1) mediation and arbitration, (2) deliberation and reporting on inquiries from the Minister for Internal Affairs and Communications, and (3) recommendations to the Minister for In-

ternal Affairs and Communications.

The Commission Secretariat has established a consultation service for communications and broadcasting business operators and others, which can be accessed by dedicated phone or email. The secretariat responds to inquiries and regarding disputes between telecom operators, and has established a website dedicated to the committee. In order help resolve disputes smoothly, the Commission has established the “Telecommunications Dispute Settlement Manual” and various pamphlets that provide a collection of dispute cases and explanations of procedures (1), (2), and (3) above.



Figure (related data) Overview of the function of the Commission

URL: https://www.soumu.go.jp/main_sosiki/hunso/outline/about.html

A Mediation and arbitration

Mediation is a procedure whereby, in the event of a dispute between telecom operators or broadcasters, the

¹¹ An Act to amend the Act on the Limitation of Liability for Damages of Specified Telecommunications Service Providers and the Right to Demand Disclosure of Identification Information of the Senders (No. 27 in 2021)

commission appoints a “mediator” from among its members and special members, and the mediator encourages the parties to come to terms with each other in order to achieve a prompt and fair resolution of the dispute. If necessary, the mediator also presents a mediation proposal. The procedure is not compulsory and requires the approval of both parties to proceed. However, if agreement is reached between both parties following the mediation procedure, a settlement will have been

reached under the Civil Code.

Arbitration is generally conducted after the commission designates three members from among the members and special members as “arbitrators” and then an agreement is reached following the decision of the arbitrators (arbitral tribunal). In this case, the arbitral decision would have the same effect as a final and binding judgment between the parties, as applied *mutatis mutandis* by the Arbitration Act.

B Deliberation and reporting on inquiries from the Minister for Internal Affairs and Communications

Based on the provisions of the Telecommunications Business Act or the Broadcast Act, a party may file a petition for a negotiation order or an application for a ruling with the Minister for Internal Affairs and Communications in the event that negotiations between telecom operators or broadcasters fails.

The Minister for Internal Affairs and Communications is required to consult with the Commission when issuing these negotiation orders and rulings. The commission is consulted by the Minister for Internal Affairs and Communications, and deliberates and reports on these matters.

C Recommendations to the Minister for Internal Affairs and Communications

The Commission may make recommendations to the Minister for Internal Affairs and Communications regarding improvements in rules of competition that have been identified through mediation, arbitration, and de-

liberation / reporting on inquiries. The Minister for Internal Affairs and Communications publicizes the content of recommendations received from the Commission.

(2) Commission Activities

In FY2023, there were no applications for mediation or arbitration, but the Commission was consulted by the Minister for Internal Affairs and Communications regarding decisions related to detailed provisions concerning interconnection agreements, and the Commission is currently deliberating on this matter. There were also 10 inquiries handled using the consultation service.

From when the Commission was established in November 2001 to the end of March 2024, 72 mediation cases and 3 arbitration cases were handled, while 11 inquiries to the Minister for Internal Affairs and Communications and 3 recommendations to the Minister for Internal Affairs and Communications were submitted.



Figure (related data) Mediation handling

URL: https://www.soumu.go.jp/main_sosiki/hunso/case/number.html

Section 3 Trends in radio policy

1. Summary

(1) Initiatives so far

Radio waves are a finite and scarce resource that is widely used to provide essential services for the public, such as mobile phones, police, and fire services. As a shared national asset, it is necessary to ensure their fair and efficient use. Specifically, radio waves have the characteristic of causing interference when the same frequency is used in the same area, making it impossible to use them indiscriminately. Therefore, a system to ensure proper use is required. Additionally, the way radio waves propagate and the amount of information they can transmit vary depending on the frequency band, necessitating the use of each frequency band for suitable purposes. Furthermore, since radio waves can propagate across national borders depending on their power, international agreements and coordination are necessary for their use.

(2) Future challenges and directions

In the era of digital transformation, where advanced technologies such as IoT, big data, and AI, as well as digital technologies necessary for the “new normal,” are integrated into various industries and aspects of daily life to solve national issues and achieve further economic growth, radio waves are an indispensable infrastructure.

In this era of digital transformation, it is expected that the radio wave utilization industry will further develop, and the demand for radio wave use will expand dramatically. Given that radio waves are a finite and scarce national asset, there is a growing need to promote their fair and efficient use.

Additionally, with the continued increase in traffic for land mobile radio stations, such as mobile phones, main-

The Radio Act, established in 1950 to replace the old Wireless Telegraphy Act, which stated “Wireless telegraphy and wireless telephony shall be managed by the government,” aims to promote public welfare by ensuring the fair and efficient use of radio waves. Since then, Japan has promoted the private use of radio waves, which are now indispensable to the public.

The MIC has been working on various initiatives, including the allocation of frequencies under international cooperation, licensing of radio stations, radio wave management to ensure a good radio wave usage environment free from interference and disturbances, research and development to expand radio wave resources, and technical testing for the effective use of radio wave technology.

taining a comfortable radio wave usage environment for mobile phones and other devices is crucial. This includes not only the more effective use of currently utilized frequencies but also the sharing of frequencies used for other purposes and the exploration of unused frequencies such as terahertz bands, making frequency allocation a significant challenge.

Furthermore, it is important to maintain a good radio wave usage environment while adapting to changes in the situation surrounding radio wave use. To achieve this, it is necessary to advance initiatives such as radio wave monitoring and test purchases of wireless equipment to respond to new radio wave uses and changes in the distribution of wireless equipment.

2. Radio policy toward expansion of digital businesses

(1) Examination of promoting effective use of radio waves for expanding digital business

With the advancement of technology, the use of radio waves has proliferated and evolved across all spaces and socio-economic activities, including land, sea, air, and space, becoming a source of innovation. Therefore, it is crucial to leverage radio waves as a growth foundation for the digital society, thereby expanding business opportunities further.

In light of this, the MIC has been holding the “Radio Wave Policy Roundtable for Expanding Digital Business” since November 2023. This council aims to discuss the future vision of radio wave utilization and set new goals and implementation strategies for effective use of radio waves to expand digital business. The council is considering future visions such as “Evolved Businesses Spreading Worldwide,” “a Truly Rich and Exciting Life,” and “a Reliable Society without Unforeseen

Risks.” To achieve these visions, the main perspectives include: (1) measures to expand the use of radio waves in all kinds of space, including land, sea, air, and universe, starting with NTN (Non-Terrestrial Networks); (2) transitioning, reorganizing, and sharing radio waves for flexible use amid increasing demand and frequency congestion; (3) establishing a safe, secure, and stable environment for using wireless networks as infrastructure; and (4) examining the spectrum user fee system to ensure the appropriate use of radio waves, which is the source of expanding digital business (**Figure 2-2-3-1**). The roundtable plans to compile its findings by around the summer of 2024. Based on these findings, the MIC intends to implement the necessary institutional arrangements and other measures.

Figure 2-2-3-1 Future image discussed in the Radio Policy Roundtable for Expanding Digital Business



3. Spread and development of 5G and B5G

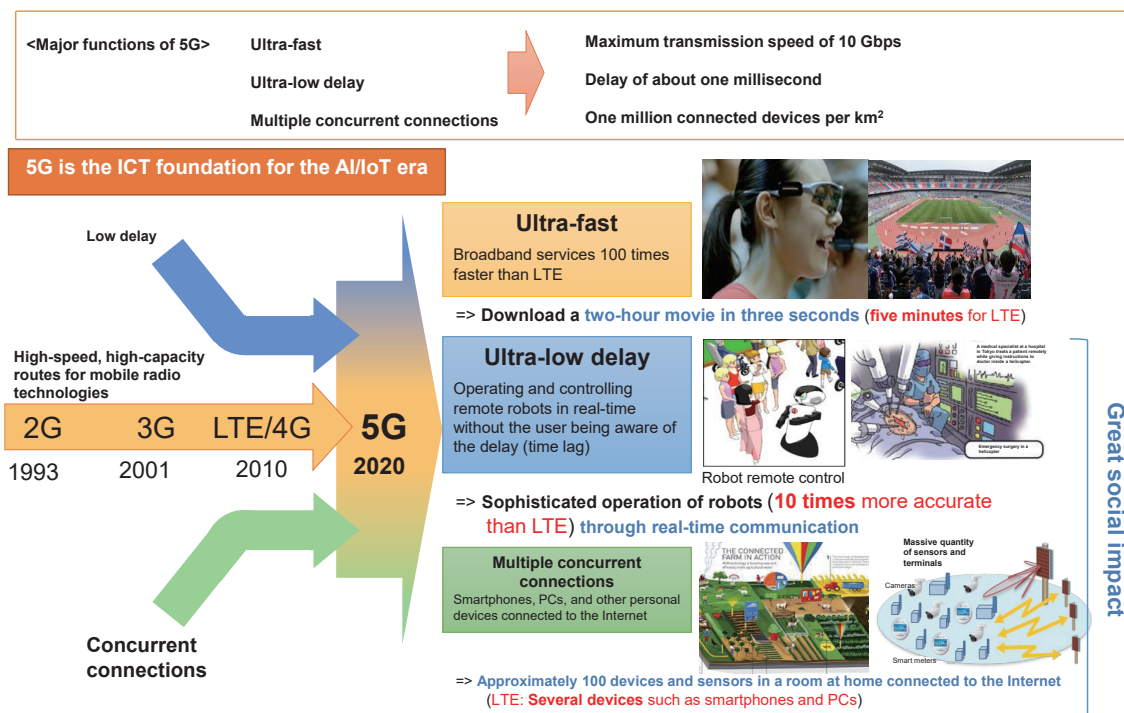
(1) Promotion and deployment of 5G based on the Infrastructure Development Plan for a Digital Garden City Nation

A Formulation of the “ICT Infrastructure Regional Deployment Master Plan”

5G not only offers “Ultra-high Speed” as an evolution of 4G but also enables “Ultra-low Latency” for smooth operation of robots and other devices in remote areas, and “Massive Simultaneous Connections” where numerous devices can connect to the network simultaneously (Figure 2-2-3-2). Therefore, 5G is highly anticipated

as an essential infrastructure for realizing an IoT society where all “Things” are connected to the internet. In practice, various initiatives utilizing 5G are progressing in different regions and fields, such as autonomous driving of tractors, product inspection using AI-based image analysis, and remote control of construction machinery.

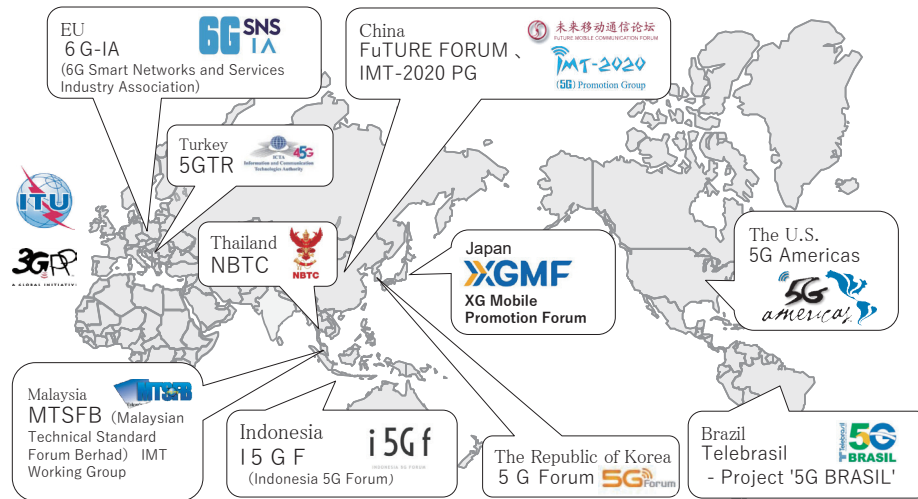
Figure 2-2-3-2 Features of 5G



The MIC recognizes 5G as a global economic and social foundation and actively contributes to the International Telecommunication Union (ITU) activities for 5G international standardization while strengthening international cooperation with Europe, the U.S., and Asian countries (Figure 2-2-3-3). Additionally, to deploy ICT

infrastructure nationwide as early as possible, the MIC formulated the “ICT Infrastructure Regional Deployment Master Plan” in June 2019, with revisions in July and December 2020, integrating support measures for ICT infrastructure development and 5G utilization promotion.

Figure 2-2-3-3 Promotion organization of 5G in each country and region



B Formulation of the “Infrastructure Development Plan for a Digital Garden City Nation”

In December 2021, Prime Minister Kishida announced the goal of raising the 5G population coverage rate to 90% by the end of FY2023 to realize the Vision for a Digital Garden City Nation. Following this, the MIC requested mobile phone operators to actively develop more 5G base stations and submit plans for the number of 5G base stations and 5G population coverage rates by FY2025. Based on the plans submitted by each company, the MIC formulated and published the “Infrastructure Development Plan for a Digital Garden City Nation” on March 29, 2022, as a follow-up to the “ICT Infrastructure Regional Deployment Master Plan.” This plan was revised on April 25, 2023, considering changes in social conditions.

The infrastructure development plan aims to achieve a world-class 5G environment through a two-phase strategy: Phase 1 involves nationwide development of the 5G foundation (4G/5G parent stations), and Phase 2 involves regional deployment of child stations to expand area coverage nationwide (Figure 2-2-3-4). Specifically, Phase 1 aims to make 4G available in all residential areas and deploy parent stations nationwide in almost all areas with demand for 5G. Phase 2 aims to achieve a 5G population coverage rate of 95% nationwide and establish 5G base stations in all municipalities by the end of FY2023, and 97% nationwide and at least 90% in each prefecture by the end of FY2025. As of the end of FY2022,

the nationwide coverage rate was 96.6%, achieving the target one year ahead of schedule. Additionally, the plan sets a coverage target for non-residential areas, aiming for a 99% (100% for highways) coverage rate of roads (highways and national roads) with 4G/5G by the end of FY2030. To achieve these targets, the MIC has been working on specific measures such as allocating new 5G frequencies like the 2.3GHz band, providing subsidies for 5G base station development in disadvantaged areas through the “Mobile Phone Area Development Project,” supporting tax measures, and promoting infrastructure sharing (Figure 2-2-3-5).

Furthermore, to implement wireless and IoT solutions tailored to regional needs in a way that residents can experience their convenience, the MIC aims to flexibly combine various wireless systems, including local 5G, to develop regional digital infrastructure and promote the practical application of advanced solutions utilizing this digital infrastructure. Specific measures include promoting the development of digital infrastructure for social implementation of autonomous driving and drones in collaboration with relevant ministries, agencies, and local governments, as outlined in the interim summary of the Digital Lifeline National Comprehensive Development Realization Conference’s Early Harvest Project.

Figure 2-2-3-4 Image of deployment of 5G

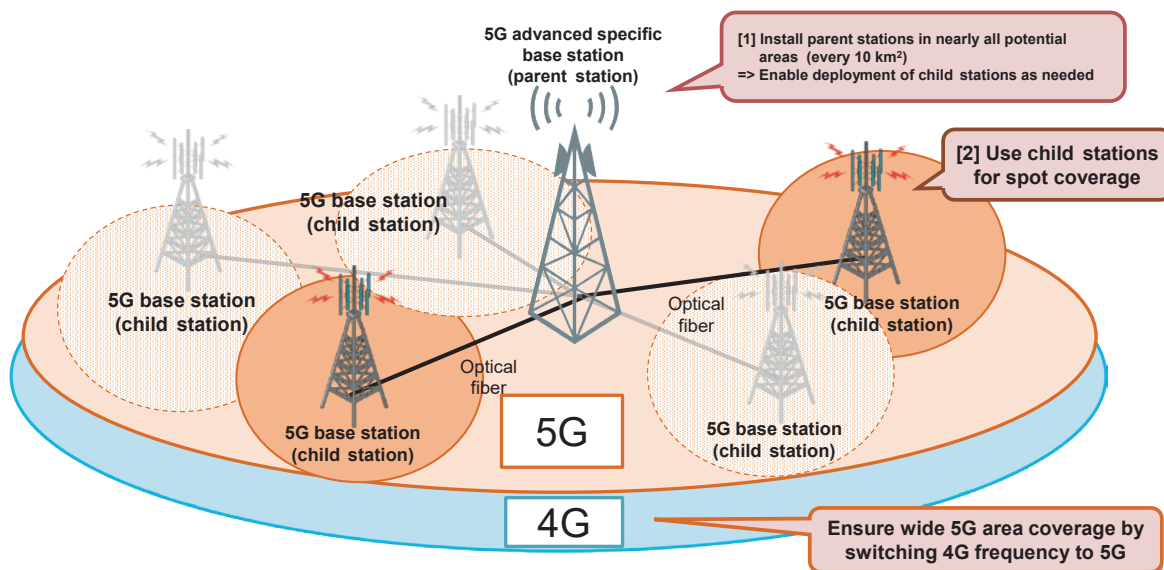


Figure 2-2-3-5 Infrastructure Development for a Digital Garden City Nation (roadmap)

	FY2023	FY2024	FY2025	FY2026	FY2027	Fiscal 2030
Comprehensive initiatives	Regional Council consisting of carriers, local governments, people involved in social implementation and other players is held to promote optical fiber/base station development based on the local needs.					
	(99.72% at the end of FY2021)	Household coverage: 99.85%		99.90% *		Maintain optical fiber network
(1) Fixed broadband (optical fiber, etc.)	Support maintenance through subsidies, use subsidy system to support maintenance and management expenses					
	Develop communications environment for "GIGA School Program"	Aim to further improve communication environment in accordance with communications conditions				
	Promote transition of equipment from public to private					
	Make 4G available in all residential areas			*Aim also to develop all necessary regions		
	Complete development of 5G parent stations in all areas with needs/infrastructure deployment rate: 98%)			Maintain 5G infrastructure		
	Population coverage: 95% nationwide. Development of 5G base stations in all municipalities	97% nationwide	Over around 90% in each prefecture	Nationwide/individual prefectures: 99%*		
	Number of base stations: 280,000		300,000		600,000 *	
				Road coverage (highways and national roads): 99% *, 100% for highways		
	Develop a regional digital infrastructure that flexibly combines various wireless systems including local 5G, and promote the practical application of advanced solutions that utilize this infrastructure					
	(2) Wireless IoT infrastructure (5G, etc.)	+6 GHz (3 GHz => 9 GHz width) for mobile phone frequencies compared to fiscal 2021				
Review development of system for 5G relay base stations, etc.		Necessary measures based on results of review				
Support development through subsidies (promote infrastructure sharing) and tax systems						
Review system policy based on results of local 5G development demonstration		Necessary measures based on results of review				
Necessary measures for local 5G flexibility		Study on maritime usage				
Use subsidies to promote development of areas in non-residential areas and measures to block radio waves in railway and road tunnels						
Review implementation schedule for intercarrier roaming in emergencies, and take necessary measures based on results of review				Start operation		
Promote development of local digital infrastructure and social implementation of advanced solutions						
		Promote social implementation of Level 4 autonomous driving in limited areas				
		Review expanding the use of mobile phones and wireless LANs in the air	Complete sequential processes forward	Necessary measures based on results of review		
(3) Data centers, submarine cables, etc.	Promote decentralization of data centers (MIC, METI)					
	Develop third and fourth core sites to complement Tokyo and Osaka and provide alternates (MIC, METI)	*Support maintenance through subsidies			Start operation	
	Review support required for further decentralization and site development, while focusing on greening and cooperation with MEC (MIC, METI)					
	Install cables in Sea of Japan			*Support maintenance through subsidies		Start operation (fiscal 2026)
(4) Non-terrestrial networks (NTN)	Promote installation of submarine cables to strengthen Japan's role as a hub for international data distribution, promote multi-routing of international submarine cables to strengthen safety measures, protect international submarine cables and landing stations, and promote efforts to strengthen international submarine cable installation and maintenance systems					
	Prepare to verify and demonstrate HAPS at Expo 2025 held in Osaka			Continue to deploy and enhance HAPS throughout country		
	Review securing satellite communications frequencies, developing systems, and building Japan's own satellite communications constellation					
(5) Beyond5G (6G)	Use Beyond 5G R&D Promotion Project to support and establish related technologies for R&D for social implementation and overseas implementation, focusing on priority technology areas					
	Promote international standardization and development of an environment for international consensus and rulemaking					
				Disseminate results of Expo 2025 held in Osaka, and implement in networks		
						Start B5G operation

(2) Beyond 5G

The next generation of information and communication infrastructure, "Beyond 5G (6G)," is expected to become the foundation for all industries and social activities in the 2030s. In June 2020, the MIC compiled the

"Beyond 5G Promotion Strategy - Roadmap to 6G" and has been promoting this strategy in collaboration with relevant ministries and agencies¹.

4. Promotion of advanced radio use system

(1) Advancement of wireless LAN

Wireless LAN, standardized by the IEEE (Institute of Electrical and Electronics Engineers), is globally used

and embedded in devices such as smartphones and tablets. Access points are installed in public places like sta-

¹ Refer to Section 7 "Trends in ICT technology policy" in Chapter 2, Part 2 for more information on efforts related to Beyond 5G.

tions, airports, tourist spots, commercial facilities, and schools, making it an essential communication infrastructure for the public. It is utilized not only in offices and homes but also in outdoor services, school education, and ensuring communication in disaster-stricken areas.

The MIC continuously examines the advancement of wireless LAN, considering the implementation status in other countries and domestic needs. Recently, there has been a global trend towards expanding the frequency bands available for wireless LAN. This aims to enable stable, high-speed, and large-capacity communication even in highly congested environments. In response to this trend, in 2022, regulations were established to allow the use of the 6GHz band in addition to the 2.4GHz and 5GHz bands. Furthermore, technical conditions for introducing the next-generation wireless LAN standard (IEEE 802.11be), which enables low-latency and ultra-high-speed communication, were discussed, leading to amendments in the Ordinance Regulating Radio Equipment (Radio Regulatory Commission Rules No. 18 of 1950) in December 2023. The expansion to the 6GHz

band and the realization of the latest technology IEEE 802.11be are expected to create new services and applications in scenarios requiring real-time operations, such as AR (Augmented Reality)/VR (Virtual Reality)/MR (Mixed Reality) services, e-sports, and the control of robotic arms in factories (**Figure 2-2-3-6**).

Additionally, the expansion of the use of drones and other devices utilizing wireless LAN technology has increased the demand for outdoor and aerial use of wireless LAN-equipped devices. However, there is a shortage of frequency channels available for outdoor use. Therefore, since 2023, discussions have been underway to expand the use of the 5GHz band for outdoor applications, with plans to proceed with regulatory considerations towards implementation by FY2024.

Moreover, to realize a wireless LAN system capable of accommodating future increases in mobile communication traffic and diverse usage needs, efforts are being made to further expand the 6GHz band, including its use outdoors, while considering coexistence with other wireless systems.

Figure 2-2-3-6 Examples of new possible applications in the advanced wireless LAN



(2) Non-Terrestrial Networks

Non-Terrestrial Networks (NTN), such as High Altitude Platform Stations (HAPS) and satellite communications, extend mobile communication networks beyond the ground to include the sea, air, and space. These networks are useful for efficiently covering remote islands, maritime areas, and mountainous regions, as well as ensuring redundancy in communication networks during emergencies such as natural disasters.

The MIC is promoting initiatives to facilitate the early domestic deployment of NTN and related services based on the “Infrastructure Development Plan for a Digital Garden City Nation” (formulated in March 2022 and revised in April 2023).

Specifically, for HAPS, the MIC is advancing domestic regulatory frameworks through research and development support and technical demonstrations. The ministry is also working on international deployment in collaboration with relevant government agencies and through demonstrations at events such as the Osaka-

Kansai Expo in 2025. Additionally, efforts are being made to secure frequencies for HAPS. At the World Radiocommunication Conference 2023 (WRC-23), held from November to December 2023, Japan led discussions resulting in the allocation of the 1.7GHz, 2GHz, and 2.6GHz bands for global use, and the 700MHz band for use in Region 1 (Europe, Africa), Region 2 (the Americas), and 14 countries in Region 3 (Asia), including Japan, for HAPS as mobile phone base stations.

Regarding satellite communications, the MIC has been establishing the necessary regulatory frameworks for the introduction of satellite constellations, which operate numerous non-geostationary satellites to provide high-speed, large-capacity communication services. The ministry continues to promote the allocation of frequencies and the establishment of necessary regulations to enable direct communication services between mobile phone terminals and satellites.

(3) Advanced road traffic systems

Intelligent Transport Systems (ITS) use information

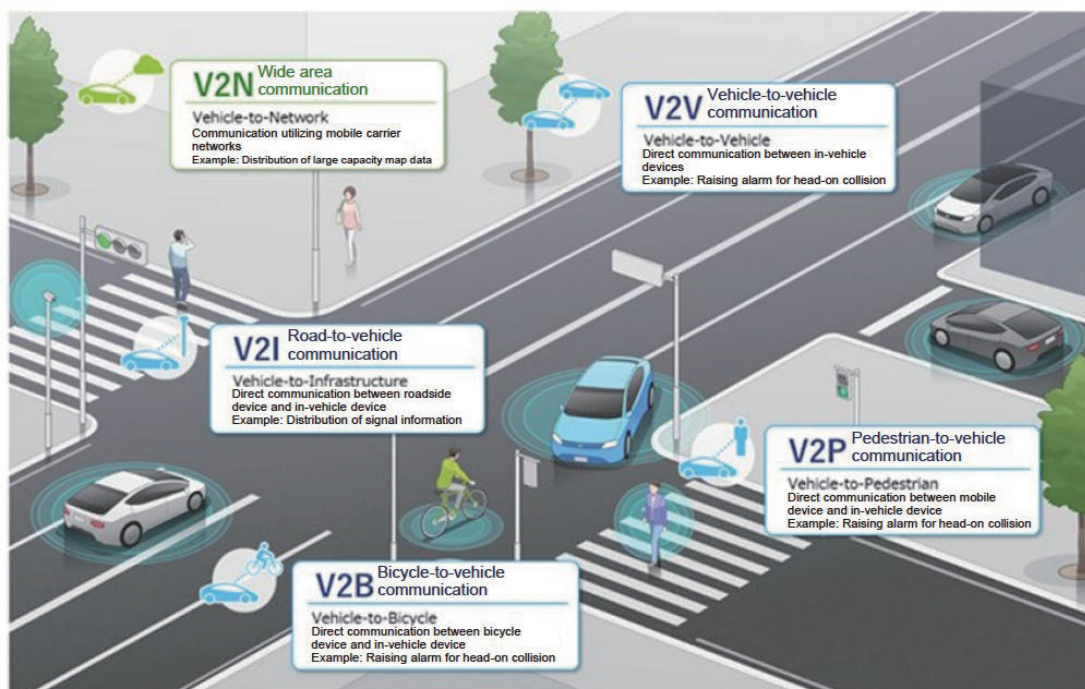
and communication technology to connect people,

roads, and vehicles, contributing to safer and more comfortable movement of people and goods by reducing traffic accidents and congestion.

The MIC has allocated frequencies and established technical standards for systems such as VICS (Vehicle Information and Communication System), ETC (Electronic Toll Collection System), in-vehicle radar systems, and the 700MHz band advanced road traffic systems. The ministry has also promoted the widespread adoption of these systems.

Globally, particularly in Europe and the U.S., there are ongoing demonstrations and implementations aimed at realizing autonomous driving. For advanced autonomous driving, such as merging and diverging support, V2X (vehicle-to-everything) communication, which exchanges information with surrounding vehicles and roadside infrastructure in addition to in-vehicle sensors like cameras and radars, is expected to play a crucial role (Figure 2-2-3-7).

Figure 2-2-3-7 Image of communication by V2X



In Japan, the practical application of the 700MHz band advanced road traffic system as a V2X communication system has been progressing since 2015, ahead of the rest of the world. However, globally, the 5.9GHz band is being used for V2X communication systems. Therefore, to allocate the 5.9GHz band for V2X communication, the “Study Group on ‘Next-Generation ITS Communication’ for the Autonomous Driving Era” was established in February 2023. In August of the same year, an interim report was issued, stating that “considering international frequency harmonization and interference with existing radio stations, the allocation of up to 30MHz bandwidth in the 5,895MHz-5,925MHz range for V2X communication will be considered.” Based on this inter-

im report, the MIC has allocated 20.5 billion yen in the FY2023 supplementary budget for “Promoting Digital Infrastructure Development for the Social Implementation of Autonomous Driving” and will work with relevant government agencies to conduct demonstrations of autonomous driving trucks on the Shin-Tomei Expressway and other locations.

Additionally, to contribute to the international standardization and overseas deployment of Japan’s ITS technology, the MIC is involved in submitting input to ITU-R reports and recommendations, disseminating information at international conferences such as the ITS World Congress, and promoting the spread of Japanese technology in Asia, including India.

(4) Public Safety Mobile System (Formerly: Public Safety LTE)

In Japan, major public institutions individually develop and operate wireless systems specialized for their respective operations, making inter-agency communication challenging. These systems are primarily voice-based due to constraints on available frequencies and development costs.

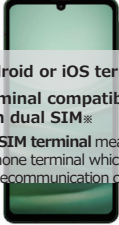
In countries like the U.S. and the UK, agencies responsible for public safety, such as fire departments and police, are adopting shared mobile communication net-

works that utilize the same communication technology as mobile phones. These networks enable high-speed data communication, including voice, image, and video transmission. Such Public Safety networks, using mobile phone technology, are expected to ensure inter-agency communication during terrorism or major disasters, facilitating smoother rescue operations. Additionally, using globally standardized technology offers benefits such as reduced equipment costs.

Since FY2019, the MIC has been collaborating with relevant agencies to examine the functions required for a public safety network in Japan and has conducted demonstrations. During the 2024 Noto Peninsula Earthquake, the demonstration terminals of the Public Safety Mobile System were utilized in the disaster area, confirming their usefulness.

From April 2024, some telecommunications operators have started providing communication services compatible with the Public Safety Mobile System. This system is expected to become an effective means of information sharing among public safety agencies during disasters (Figure 2-2-3-8).

Figure 2-2-3-8 Major function of the Public Safety Mobile System

Major functions of public safety mobile system		
 <p>✓ Android or iOS terminal ✓ Terminal compatible with dual SIM※ ※Dual SIM terminal means smartphone terminal which can use multi telecommunication carriers.</p> <p>Terminal image</p>	Function items	Major functions of public safety mobile system
	Communication line	Multi carrier lines (2 carriers are available) <u>Easily connected communication line</u> comparing to normal ones
	Voice communication function	Voice telephone using <u>070,080,090</u> (emergency call is available)
	Preferential connection	<u>Preferentially connected telephone in emergency is available</u> ※ ※The number of provided lines is limited.
	App	<u>User organizations can select and download publicly available app</u>
	Others	Can use the Internet and mails etc. the same as normal mobile phones

(5) Spatial transmission wireless power transfer system

The spatial transmission wireless power transfer system transmits power over a distance of several meters without wired connections through radio wave transmission and reception. It is expected to be used for powering sensor devices in factories. This system allows for low-power supply without the need for charging cables or battery replacement, improving convenience and enabling flexible installation of sensor devices. It is anticipated to contribute to the realization of Society 5.0 through the utilization of IoT.

The MIC has been examining the practical application of this system, including frequency sharing with other wireless systems, radio wave safety, technical conditions, and the establishment of smooth operational coordination mechanisms. Based on these examinations, regulatory measures were implemented in May 2022 to allow indoor use of the system under certain conditions in the 920MHz, 2.4GHz, and 5.7GHz frequency bands as on-premises radio stations.

5. Promotion of expansion of radio systems overseas

To ensure the safe and secure use of radio waves, the role of technologies and systems, including radio wave monitoring systems, has become increasingly significant. This importance is recognized not only in Japan but also in various foreign countries, particularly in Southeast Asian nations where the use of radio waves is rapidly expanding. Therefore, it is a crucial task for Japan to contribute internationally by deploying its advanced radio wave systems overseas, while also fostering Japan's wireless infrastructure and services into internationally competitive and promising businesses, thereby further boosting the domestic economy.

From this perspective, Japan is strategically promoting initiatives in cooperation with both the public and private sectors to globally expand radio wave systems in fields where Japan has strengths, focusing particularly on Asian countries. Specifically, to ensure that highly efficient frequency utilization technologies, which align with Japan's frequency circumstances, are established as international standards, the "Frequency International Harmonization Promotion Project" is being implement-

ed. This project aims to secure the international superiority of these technologies through the overseas deployment of radio wave systems, conducting demonstration experiments both domestically and internationally, and facilitating human resource exchanges at the user level of the technology.

Moreover, considering the global demand for safe, secure, and highly reliable ICT infrastructure, the MIC plans to intensively promote the overseas deployment of 5G network solutions by Japanese companies using Open RAN and vRAN over the next three years. Leveraging the achievements of domestic 5G deployments, including local 5G, the ministry is advancing the openness of 5G by proposing 5G models tailored to specific needs.

Additionally, to promote the Open RAN ecosystem in Japan with an eye on overseas expansion, a testing and certification center "Japan OTIC" was established within the Yokosuka Telecom Research Park in December 2022 by multiple domestic telecommunications operators. This center conducts tests and certifications in

compliance with O-RAN Alliance standards, and the first certification was issued in June 2023. Various training sessions to promote the use of Japan OTIC are also being held regularly.

Furthermore, starting from FY2024, the MIC is con-

ducting technical tests related to an interoperability verification environment that can simulate the networks of multiple domestic and international telecommunications operators.

6. Development of radio wave usage environment

(1) Promotion of measures for electromagnetic environment protection for human health

The MIC is promoting the establishment of an environment where radio waves can be used safely and securely.

Specifically, to ensure that radio waves do not adversely affect human health, the MIC has formulated the “Radio Wave Protection Guidelines²” and established part of these guidelines as safety standards concerning the strength of radio waves under the Radio Act. These standards reflect the results of long-term investigations into the safety of radio waves³ and are aligned with international guidelines. To date, no causal relationship has been confirmed between radio waves below these safety standards and health effects. The MIC continues to raise public awareness about the safety of radio waves through telephone consultations, explanatory meetings, and the distribution of leaflets⁴.

Additionally, to prevent the impact of radio waves from radio equipment on medical devices, the MIC conducts annual “Research on the Impact of Radio Waves on Medical Devices⁵.” In FY2023, the MIC investigated the impact of radio waves from mobile phone terminals in the 2.3GHz and 3.4GHz-3.5GHz bands, as well as wire-

less LAN in the 6GHz band, on implantable medical devices (such as pacemakers and defibrillators). They also examined the impact of radio waves from mobile phone terminals in the 3.7GHz, 4.5GHz, and 28GHz bands on in-hospital medical devices (such as general-purpose infusion pumps) and home medical devices (such as personal dialysis machines). The findings from these investigations have been compiled into the “Guidelines for Preventing the Impact of Radio Waves from Various Radio Equipment on Implantable Medical Devices⁶.” Furthermore, as the use of radio waves in medical institutions progresses, the MIC is conducting on-demand explanatory sessions for medical professionals on the proper management and precautions for using medical telemetry, mobile phones, and wireless LAN to ensure safe and secure use of radio waves. Since FY2017, the MIC has been implementing radio wave shielding measures for medical facilities through the “Subsidy for the Promotion of Wireless System Utilization,” creating an environment where mobile phones can be used safely and securely in medical facilities.

(2) Promotion of measures against electromagnetic interference

With the proliferation of various electrical and electronic devices, it has become increasingly important to protect radio usage from unwanted radio waves emitted by various devices and equipment. To this end, the “Radio Wave Utilization Environment Committee⁷,” established under the Information and Communications Technology Subcommittee of the Information and Communications Council, conducts research and deliberations on measures against electromagnetic interference. The committee also contributes to the deliberation of international standards at the International Special Committee on Radio Interference (CISPR: Comité International Spécial des Perturbations Radioélectriques). Based on the recommendations of the Information and Communications Council, the MIC promotes the standardization of measures to eliminate interference with radio equipment and prevent disruptions to electrical and electronic devices caused by unwanted radio waves.

In terms of international activities related to the CIS-

PR, Japan is actively leading the technical discussions to ensure that leakage radio waves from wireless power transmission systems for electric vehicles (EVs) do not interfere with existing radio stations, amidst the full-scale examination of international standards for wireless power transmission systems used in EVs, multimedia equipment, and home appliances.

Additionally, following the “Regulatory Reform Implementation Plan” (approved by the Cabinet on June 16, 2023), the MIC established a system in December 2023 to relax the installation requirements for broadband power line communication (PLC) equipment, which is connected only to power lines maintained and operated by general transmission and distribution operators. Simultaneously, the MIC expanded the scope of type approval for high-power IH cookers, which are increasingly being used, by establishing a system in December 2023.

² Radio wave protection guidelines: <https://www.tele.soumu.go.jp/j/sys/ele/medical/protect/>

³ Radio wave safety research at the MIC: <https://www.tele.soumu.go.jp/j/sys/ele/seitai/index.htm>

⁴ Radio wave safety efforts: <https://www.tele.soumu.go.jp/j/sys/ele/index.htm>

⁵ Research study on the effects of radio waves on medical devices: <https://www.tele.soumu.go.jp/j/sys/ele/seitai/chis/index.htm>

⁶ Guidelines for preventing radio waves from devices from affecting implantable medical devices, etc.: <https://www.tele.soumu.go.jp/resource/j/ele/medical/guide.pdf>

⁷ Radio Use Environment Committee: https://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/joho_tsusin/denpa_kankyou/index.html

(3) Prevention of radio wave interference and disruption

As the use of new radio waves, such as the fifth-generation mobile communication system (5G), expands, the MIC is working to monitor radio waves, eliminate interference, and strengthen measures against non-compliant radio equipment (non-compliant equipment) to maintain a favorable radio wave utilization environment.

Specifically, to prevent general consumers from purchasing and using non-compliant equipment, which would constitute a violation of the Radio Act (illegal establishment of a radio station) and cause significant interference and other disruptions, the MIC purchases widely sold radio equipment from the market, including online sales, and measures whether the strength of their radio waves complies with the standards for “Extremely Low-power Radio Stations⁸” as defined by the Radio Act.

The results are published annually as part of the “Radio Equipment Test Purchase Program⁹” to provide information for consumer protection.

For radio equipment found to be non-compliant and publicly disclosed, the MIC requests the sellers to handle only radio equipment that meets technical standards and to refrain from selling non-compliant equipment. Furthermore, in FY2020, the MIC formulated the “Guidelines for preventing the distribution of wireless devices that do not conform with technical regulations” to clarify the responsibilities of manufacturers, importers, and sellers of radio equipment, as well as the voluntary efforts of internet shopping mall operators, thereby promoting measures to suppress the distribution of non-compliant equipment.

⁸ Weak radio equipment: <https://www.tele.soumu.go.jp/j/ref/material/rule/>

⁹ Tested from FY2013. Result of wireless equipment purchase tests: <https://www.tele.soumu.go.jp/j/adm/monitoring/illegal/result/>

Section 4 Trends in broadcasting policy

1. Summary

(1) Initiatives so far

Broadcasting has played a role as a social capital, sharing essential societal information such as disaster and local news, and is the foundation of democracy.

The traditional analog television broadcasting was completely digitized by the end of March 2012, leading to advancements in broadcasting services such as high-definition images and data broadcasting. The MIC has been promoting 4K/8K broadcasting services to enhance the collaboration with broadcasters and manufacturers, disseminate information about 4K/8K satellite broadcasting reception methods and 4K/8K content, and certify operators providing 4K broadcasting. Efforts have also been made to promote the overseas expansion of broadcasting content in collaboration with relevant government agencies and organizations.

The overseas expansion of content can significantly enhance the appeal of Japan abroad, leading to an increase in inbound tourism and the expansion of exports of agricultural, forestry, and fishery products, as well as local products. The MIC has been promoting the overseas expansion of broadcast content in collaboration

with relevant ministries and agencies.

Furthermore, measures have been taken to strengthen the resilience of broadcasting networks with a focus on radio which is recognized to be useful in disasters, such as initiatives to address hearing impairments in radios, disaster prevention measures for transmission facilities, and promoting equal access to information through broadcasting. This includes providing subsidies for the production costs of subtitled programs, commentary programs, sign language programs, and the installation of captioning equipment for live broadcasting programs by private broadcasters, as well as setting dissemination targets for subtitled broadcast, etc. and establishing the “Guidelines for Information Accessibility in the Broadcasting Field”.

In addition, as it is important to have not only the existence of “Sender” of the broadcast program but also the “Receiver” of it, the MIC has been focusing on improving media literacy, particularly for elementary, junior high, and high school students, by providing educational materials and practical teaching packages.

(2) Future challenges and directions

The broadcasting environment is undergoing significant changes due to the widespread adoption of broadband, the growth of internet video streaming services, and the diversification of viewing devices. Viewers are increasingly obtaining information from the internet, leading to a potential long-term decline in terrestrial television advertising expenditure and accelerating the trend of viewers moving away from traditional television. Meanwhile, issues such as fake news in the online space have become apparent, highlighting the challenge of ensuring information health. In this context, broadcasting plays a crucial role in providing reliable information,

guaranteeing the “Freedom to Know”, sharing “Fundamental Societal Information”, and promoting mutual understanding of diverse values, and the expectations for its role have increased in the digital age.

In response to these changing circumstances, it is necessary to consider the future outlook of broadcasting and the system of broadcasting from a medium- to long-term perspective, as well as address challenges such as strengthening the foundation of broadcasting business, promoting the distribution of broadcasting content, and enhancing the resilience and disaster resistance of broadcasting networks.

2. Examination of future vision of broadcasting institution in the digital age

The MIC has been holding the “Study Group on the Future of Broadcasting Systems in the Digital Age” (hereinafter referred to as the “Broadcasting System Study Group”) since November 2021, in order to examine the future vision of broadcasting and the ideal state of broadcasting systems from a medium- to long-term perspective, amidst the rapid advancement of digitalization across society.

In the “Summary of the Future Vision and Ideal State of Broadcasting in the Digital Age” (hereinafter referred to as the “First Summary”), published by the Broadcasting System Study Group in August 2022, the results of the examination were compiled based on the perspective of what measures should be taken for broadcasting to continue meeting the expectations of viewers regarding its social role, even as the information space expands beyond broadcasting to include the internet¹. Based on the First Summary, the MIC revised ministerial ordinances to relax the principle of excluding concentration of mass media ownership^{2,3}, and also enacted partial amendments to the Broadcasting Act and the Radio Act (Act No. 40 of 2023), which include measures such as enabling multiple specified basic terrestrial broadcasters to jointly use relay station equipment in a single broadcasting region.

Regarding the joint use of relay station equipment, efforts are being made towards its realization, including the establishment of a national council in December 2023, as well as the formation of regional councils across the country. These efforts focus on creating a roadmap for the realization of joint use, defining the roles and responsibilities of stakeholders, and formulating and implementing relay station renewal plans in each region.

Furthermore, in October 2023, the Broadcasting System Study Group published the “Summary of the Future Vision and Ideal State of Broadcasting in the Digital Age (Second Summary)” (hereinafter referred to as the “Second Summary”). The Second Summary includes recommendations on issues such as “Satellite Broadcasting and Cable Television,” “Effective Use of Frequencies for Broadcasting,” “Ensuring the Truthfulness of Broadcasting,” and “Information Disclosure by Private Operators.” Additionally, it presents the results of specialized examinations on the following topics: (1) the potential for small relay stations to be replaced by broadband (cable TV, optical fiber, etc.); (2) the ideal state of NHK’s internet distribution; (3) measures to promote the production and distribution of broadcasting content; and (4) NHK’s role as a “platform related to the broadcasting industry.”⁴

3. Future vision of public broadcasting

In the MIC, based on the First Summary of Broadcasting System Study Group, a “Public Broadcasting Working Group” has been held under the Broadcast System Review Committee since September 2022, to consider the manner of NHK’s internet distribution. In the two subsequent “Summaries” released in October 2023 and February 2024⁵, it was concluded that, under the dual broadcasting system framework, NHK should generally make all broadcasts available for internet distribution to fulfill its role of providing broadcast programs to viewers via the internet.

Based on the conclusions of these summaries, a law amending part of the Broadcasting Act was enacted in May 2024 (Act No. 36 of 2024), which adds the distribution of NHK’s broadcast programs and program-related information to essential operations of NHK, and strengthens NHK’s obligation to cooperate with measures taken by private broadcasters to eliminate poor

broadcast reception, such as the joint use of relay stations (referred to as the “Amendment Broadcasting Act”).

Furthermore, the Amendment Broadcasting Act establishes a mechanism for NHK to independently establish its own operating rules for the distribution of program-related information via the internet⁶, ensuring that its content conforms to the requirement of ensuring there is not hindrance to fair competition. To ensure the smooth functioning of the framework for competition assessment, the MIC has been conducting discussions on the framework for competition assessment and related matters since November 2023 through the “Preparatory Meeting on Competition Assessment of the Japan Broadcasting Corporation’s Internet Utilization Operations.”

The MIC will continue to consider the manner in which public broadcasting should respond to the demands of the times.

¹ “Summary of the Future Vision of Broadcasting and the Ideal Broadcasting System in the Digital Age” (August 5, 2022) https://www.soumu.go.jp/menu_news/s-news/01ryutsu07_02000236.html

² The Principles aim to ensure that the opportunity to broadcast is secured for as many individuals as possible, thereby allowing the freedom of expression through broadcasting to be enjoyed by a broader audience. To achieve this, the number of key broadcasting stations that can be owned or controlled by a single entity is restricted.

³ An ordinance amending some provisions of the Ministry of Internal Affairs and Communications Ordinance regarding the definition of specific officers and control relationships related to basic broadcasting operations and exceptions to the standards for the enjoyment of freedom of expression. (Ministry of Internal Affairs and Communications Ordinance No. 13 of 2023)

⁴ “Summary of the Future Vision of Broadcasting and the Ideal Broadcasting System in the Digital Age (Second summary)” (October 18, 2023): https://www.soumu.go.jp/menu_news/s-news/01ryutsu07_02000269.html

⁵ “Summary of Public Broadcasting Working Group” (October 18, 2023): https://www.soumu.go.jp/main_content/000907572.pdf “Summary of Public Broadcasting Working Group (Second Summary)” (February 28, 2024): https://www.soumu.go.jp/main_content/000931107

⁶ Information that is closely related to the content of broadcast programs that NHK broadcasts or has broadcasted, and is composed of materials necessary for the editing of the broadcast program (excluding the broadcast program itself, but including edited versions of the broadcast program).

4. Strengthening of the foundation of broadcasting businesses

(1) Efforts related to AM radio broadcasting

Many of the AM transmission facilities used by private AM radio broadcasters have been in place for over 50 years and are in a state of severe deterioration. Amidst this situation, private AM radio broadcasters are facing cost burdens associated with both AM and FM facilities due to the introduction of FM complementary broadcasting, which was implemented to resolve poor AM radio reception. Additionally, with a declining trend in business revenue, the cost of updating AM radio broadcasting facilities has become a management issue.

Given these challenging business conditions, the MIC has established special measures to allow private AM radio broadcasters to suspend AM station operations for a period of more than six months. This is to assess the

impact if broadcasters decide, as a management decision, to switch from AM to FM broadcasting (switching to FM) or to discontinue AM relay stations without switching to FM. The MIC published the “Basic Policy on Special Measures Concerning the Suspension of AM Station Operations (March 2023)” outlining the content, requirements, and procedures for these special measures. During the simultaneous re-licensing of broadcasters in November 2023, applications for these special measures were accepted, and for AM stations where the application was approved, operations have been sequentially suspended from February 2024. The MIC plans to evaluate the impact on residents and local governments based on the results of these suspensions.

(2) Addressing issues in satellite broadcasting

A Examination of the future of sustainable satellite broadcasting

Based on the Second Summary published in October 2023, the MIC established a new “Working Group on Satellite Broadcasting” under the Broadcasting System Review Committee in November 2023. This was done to address issues in satellite broadcasting and to envision a sustainable future for satellite broadcasting amidst changing environmental conditions.

The “Working Group on Satellite Broadcasting” is

conducting specific and specialized discussions on topics such as “reducing infrastructure costs related to satellite broadcasting,” “utilizing satellite broadcasting as an alternative to terrestrial broadcasting,” “effective use of the dextrorotation bandwidth,” “handling of shopping programs in the approval of basic satellite broadcasting,” and “utilization of satellite broadcasting during disasters.”

B Efforts to promote 4K8K satellite broadcasting

Regarding 4K8K satellite broadcasting, which began on BS broadcasting and 110-degree east longitude CS broadcasting in December 2018, the MIC recognized three new basic satellite broadcasters to conduct 4K broadcasting in the dextrorotation bandwidth of BS broadcasting in November 2023, as part of efforts to expand this service.

Additionally, the cumulative shipment of receivers capable of viewing 4K8K satellite broadcasting reached approximately 19.21 million units by the end of March 2024. The MIC, in collaboration with broadcasters, manufacturers, and related organizations, is working to fur-

ther promote the appeal of ultra-high-definition video, which is a characteristic of 4K8K satellite broadcasting, and to improve the reception environment.

Moving forward, through discussions on the effective use of the dextrorotation bandwidth (promotion of 4K broadcasting) within the “Working Group on Satellite Broadcasting,” the MIC will consider the effective use of bandwidth to enhance 4K broadcasting, keeping in mind the need to accommodate advanced video encoding methods. The MIC will continue to work towards further expansion and promotion of 4K8K satellite broadcasting.

5. Promotion of the production and distribution of broadcasting contents

(1) Promotion of production and distribution of broadcasting content

A Initiatives for effective online distribution of broadcasting content

In the First Summary of the Broadcasting System Study Group, it was mentioned that it is important to reduce the equipment burden on broadcasters, including local stations, and to create an environment where they can focus on content production.

From the perspective of creating such an environment, it is considered important not only to promote the production of content by broadcasters but also to further promote the distribution of such content on both broadcasting and the internet so that it can be viewed more widely. In particular, local broadcasters are expected to play a significant role in disseminating regional information in the future.

As the environment surrounding broadcasting changes, including the growth of internet video distribution services and the diversification of viewing styles, it is considered important for Japanese broadcast content to be widely distributed both domestically and internationally by promoting the use of various platforms on the Internet, not just broadcast waves, in order to continue fulfilling the role of broadcasting as a social infrastructure.

Under this concept, the “Working Group on the Promotion of Production and Distribution of Broadcasting Content” has been held since December 2022 under the Broadcasting System Study Group to discuss ways to promote the production and distribution of broadcast

content in the internet age, with the cooperation of relevant businesses.

In the First Summary of the review, it was concluded that “to realize an environment where viewers can easily watch broadcast content via the internet at an early stage, it is necessary to ensure the proper guidance from a virtual platform that secures the list of broadcast content distributed by multiple internet distribution platforms on TV receivers connected to the internet. From the perspective of viewer convenience, it is necessary for the

public and private sectors to work together to examine and verify the display and operability that allows viewers to easily watch broadcast content within a framework of cooperation among broadcasters and various stakeholders. In doing so, attention should be paid to the viewer’s perspective (viewing habits, ways of viewing, and understanding of the above initiatives), and consideration should be given to creating a mechanism that makes it easy for local viewers to access broadcast content such as regional information provided by local stations”

B Utilization of viewing data in the broadcasting field and privacy protection

By collecting and analyzing viewing histories of broadcast programs from TV receivers connected to the internet, for example, it is possible to effectively utilize this data for program production that caters to the detailed viewing needs of viewers in each region and for providing disaster information. However, there is also the issue that it is technically possible to infer sensitive personal information such as individual viewers’ political beliefs or medical histories.

The MIC has established specific rules for the broadcasting field that all those handling personal information of broadcast receivers must comply with, in addition to the minimum rules under personal information protection laws that apply to browsing histories on video-sharing sites, considering the public nature of broadcasting.

These rules are set out in the “Guidelines on Personal Information Protection of Broadcast Recipients etc.,” which have been revised multiple times (the most recent revision was based on the enforcement of the revised Enforcement Rules for the Act on the Protection of Personal Information in April 2024). Additionally, since April 2021, the “Study Group on the Utilization of Viewing Data in the Broadcasting Field and the Ideal State of Privacy Protection” has been held to discuss the rules for handling viewing histories collected in connection with broadcasting, as well as the rules for handling distribution histories in the online distribution of broadcast content, from the perspective of forming balanced rules between data utilization and privacy protection.

C Facilitation of rights processing for simultaneous distribution of broadcasting programs

Considering the changes in viewing environments due to the spread of smart devices, broadcasters are advancing efforts for simultaneous distribution of broadcasting programs on the Internet (including simultaneous distribution, catch-up distribution, and missed distribution. The same as below.). This initiative expands opportunities to view high-quality content and is important from the perspective of improving viewer convenience, promoting the content industry, and ensuring international competitiveness. However, broadcast programs use a diverse and large number of copyrighted works, and there are challenges in rights processing, such as the inability to process copyrights for simultaneous distribution, leading to “blackouts.” To promote simultaneous distribution, it was

necessary to create an environment where copyrighted works could be used more quickly and smoothly.

Therefore, the MIC, in cooperation with the Agency for Cultural Affairs, which oversees the Copyright Act, gathered opinions from stakeholders and examined the direction of system reforms. As a result, the Act to Partially Amend the Copyright Act (Act No. 52 of 2021) was enacted in the regular session of the Diet in 2021, and measures to facilitate rights processing were implemented. Following the amendment, simultaneous distribution by all five commercial broadcasting networks was realized in April 2022, and further examination is being conducted to facilitate rights processing while monitoring trends in simultaneous distribution.

D Promotion of proper production transactions for broadcasting content

The MIC has been holding the “Study Group on Verification and Review on Promotion of Production and Trade of Broadcast Content,” composed of experts, to improve the production environment and enhance production motivation in the broadcast content field. Based on discussions at the meeting, the “Guidelines for Regulation on Production and Trade of Broadcast Content” (7th edition) (hereafter referred to as “Guidelines”) were formulated to encourage broadcasters and program production companies to promote proper production transactions.

Specifically, regular surveys are conducted to under-

stand the status of production transactions for broadcast content, and hearings are held with broadcasters and program production companies to understand the status of compliance with the Guidelines. Guidance is provided based on the Article 4 of the Act on the Promotion of Subcontracting Small and Medium-sized Enterprises (Act No. 145 of 1970) for identified issues, and training sessions are held to raise awareness of the guidelines. Additionally, a hotline for free legal consultation with lawyers on specific production transaction issues, the “Legal Consultation Hotline for Transaction of Produced Broadcast Content,” has been established.

(2) Overseas expansion of broadcasting content

With the growth of video distribution services, the

cross-border distribution of content is progressing, and

the presence of foreign content is increasing in Japan. In this context, for the Japanese content industry to develop, it is necessary to produce high-quality content with a global perspective and actively promote overseas expansion to capture the growth of expanding markets.

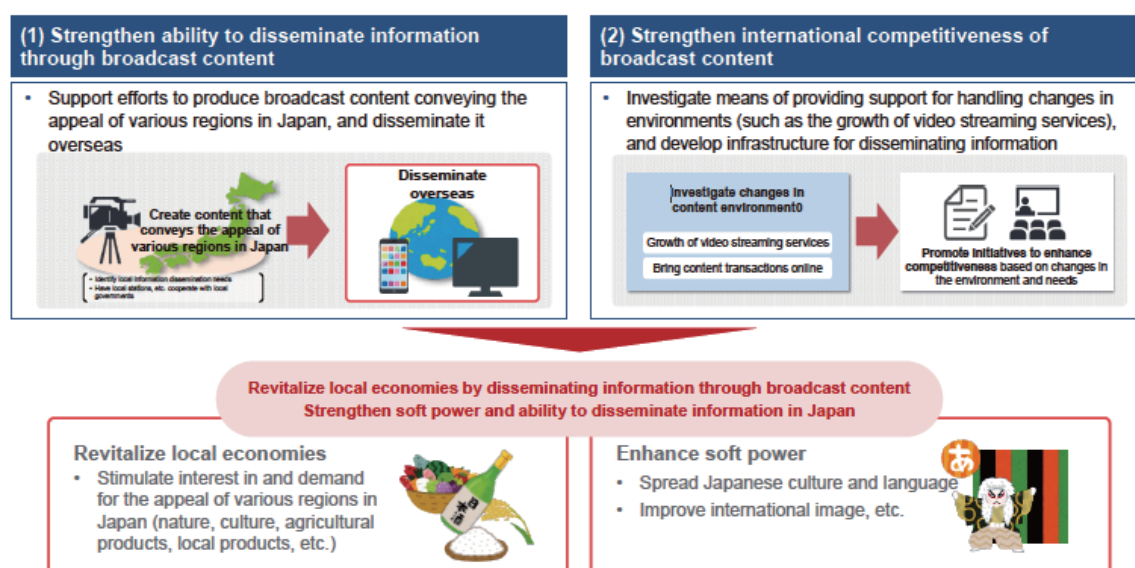
Moreover, the overseas expansion of content helps convey the appeal of Japan to the world, increasing interest in Japan's nature and culture, leading to economic effects such as an increase in foreign tourists visiting Japan and the expansion of sales channels for agricultural, forestry, and fishery products and local products. It also contributes to improving Japan's image and strengthening soft power, making it extremely important from a diplomatic perspective.

The MIC, in collaboration with the "Broadcast Program Export Association of Japan" (BEAJ) and related ministries and agencies, continuously supports initiatives where Japanese broadcasters and others collabo-

rate with local governments to produce broadcast content that conveys the appeal of Japanese regions and disseminate it through overseas broadcasters. Additionally, at international content trade fairs such as MIP-COM (Cannes, France) and TIFFCOM (Tokyo) in October 2023, and ATF (Singapore) in December 2023, PR activities such as seminars were conducted in collaboration with the public and private sectors to widely promote Japanese content overseas. From FY2023, an online common platform has been established and is being operated and improved to disseminate information on Japanese broadcast content to overseas businesses, in collaboration with broadcasters and production companies actively engaged in overseas expansion.

Including these initiatives, the goal is to increase overseas sales by 1.5 times (compared to FY2020) by FY2025, and efforts to promote the overseas expansion of content will continue (Figure 2-2-4-1).

Figure 2-2-4-1 Promotion of overseas expansion of broadcasting contents



6. Promotion of broadcasts for people with the audiovisual disabilities

To enable people with audiovisual disabilities, etc. to smoothly access information through television broadcasts, the MIC established the "Guidelines for Information Accessibility in the Broadcasting Field" in February 2018. These guidelines set dissemination targets for subtitled broadcasts, commentary broadcasts, and sign language broadcasts, encouraging voluntary efforts by broadcasters. Additionally, since November 2022, the "Study Group on Enhancing Broadcasting for People with Audiovisual Disabilities, etc.," composed of experts, disability organizations, and broadcasters, has been discussing policies to enhance broadcasting for people with audiovisual disabilities, etc. This includes reviewing the guidelines based on recent achievements in subtitled broadcasts and technological trends. A report was compiled in August 2023, and the guidelines

were revised in October 2023 based on this report. Currently, broadcasters are advancing their efforts in accordance with these guidelines.

Furthermore, under the Act on Advancement of Facilitation Program for Disabled Persons' Use of Telecommunications and Broadcasting Services, with a View to Enhance Convenience of Disabled Persons (Act No. 54 of 1993), subsidies are provided for the production costs of subtitled programs, commentary programs, and sign language programs. Given that live broadcasts require significant manpower and costs, as well as specialized skills, since FY2020, subsidies have also been provided for the costs of equipment necessary for adding subtitles to live broadcasts, including systems utilizing cutting-edge ICT.

7. Improvement to the resilience of broadcasting networks and enhancement of disaster resistance

(1) Optical fiber installation for cable networks

The MIC is implementing the “Disaster Resilience Enhancement Project through Optical Fiber Installation for Cable Television Networks and Remote Area Shared Viewing Facilities” in the supplementary budget for the FY2023 and the initial budget for FY2024, with the aim of ensuring reliable and stable information transmission through broadcasting during disasters (**Figure 2-2-4-2**). From the supplementary budget for the FY2023, measures have been taken to relax the financial strength index requirements and to provide support for cable television operators to expand the service areas of

shared viewing facilities and to independently install optical fiber for shared viewing facilities. Additionally, provisions have been made to support “Successor Operators,” which are private entities, in the event they receive the transfer of already optically-fibered cable television networks owned by municipalities for maintenance. Furthermore, support has been provided for the restoration of cable television networks affected by the 2024 Noto Peninsula Earthquake, including raising the subsidy rate for disaster recovery efforts.

Figure 2-2-4-2 Disaster Resilience Enhancement Project through Optical Fiber Installation for Cable Television Networks and Remote Area Shared Viewing Facilities

Project illustration

○ Project operator

Municipalities, municipality collaboration entities or a third sector (including entities that continue to fulfill the role pertaining to the provision of cable television services through transfer of the relevant facilities from these entities (Succeeding business operators))

○ Target regions

Regions satisfying all of (1) to (3) below:

- (1) Municipalities where cable television is positioned in their regional disaster prevention plan
- (2) Regions with unfavorable conditions
- (3) Municipalities with financial index 0.8 or lower and other regions where the subsidy is found particularly necessary

○ Subsidy rate

- (1) Municipalities or municipality collaboration entities (Succeeding business operators): 1/2

* Municipalities with financial index over 0.5 and less than 0.8: 1/3

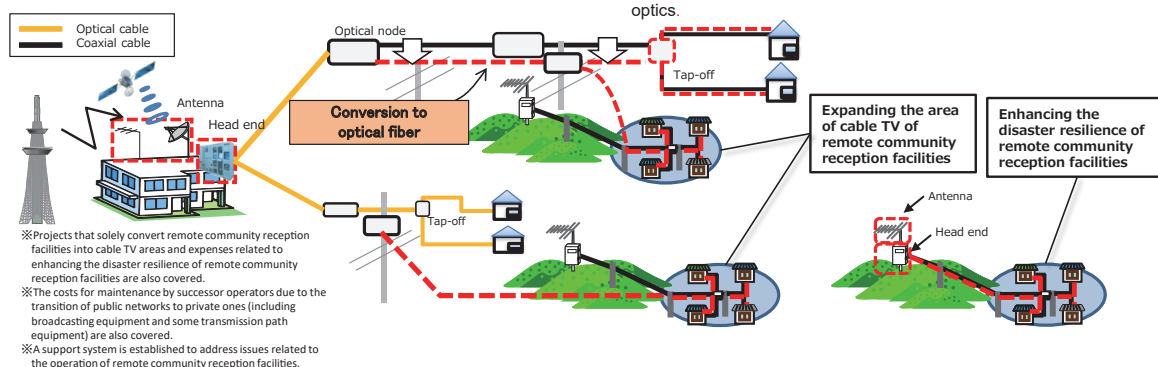
* The case of succeeding business operators associated with privatization of publicly established network which was converted to optical cables,

- (2) Third sector (Succeeding business operators): 1/3

○ Subsidized costs (shown in red in the figure below)

Optical fiber cable, transmitting/receiving facilities, antennas, etc.

*Includes transmission line equipment necessary for converting remote communal reception facilities (coaxial cable) into cable television areas implemented simultaneously with the switch to fiber optics.



(2) Support for initiatives by broadcasters

The MIC is implementing the “Broadcast Network Development Support Project (Basic Terrestrial Broadcasting Network Development Project and Regional Cable Television Network Development Project)” (**Figure 2-2-4-3**) and the “Support Project for the Elimination of Difficulties to Listen to Radio in Commercial Radio

Broadcasting” as well as the “Disaster Resilience Enhancement Support Project for Basic Terrestrial Broadcasting, etc.” in the initial budget for FY2024 to support initiatives by broadcasters and local governments aimed at strengthening broadcast networks.

Figure 2-2-4-3 Broadcast Network Development Support Project

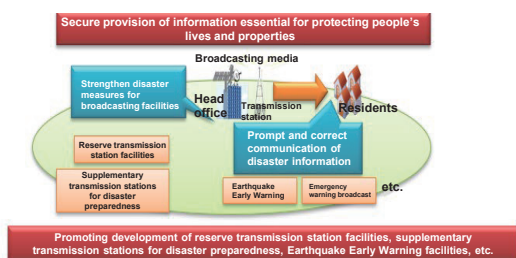
- In order to reliably provide disaster information, evacuation information, and other information essential for protecting the lives and property of citizens, the projects to support broadcast network development provide partial subsidies for the following maintenance costs, in order to bring resilience to the broadcast networks that serve as important means of transmitting information locally in the event of a disaster.
 - [1] Emergency earthquake early warning equipment, such as spare transmitting station equipment and supplementary disaster response transmitting stations involved in new radio and television development
 - [2] Doubling routes for cable television trunk lines

Subsidy rate

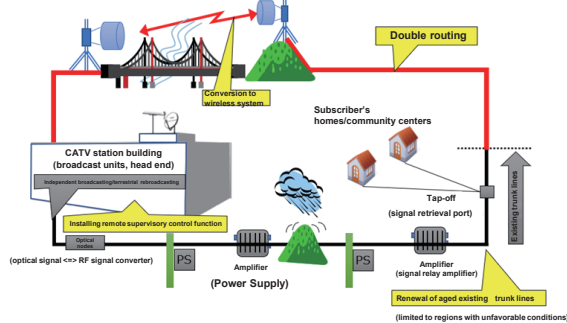
- Local governments (*) : 1/2
 - Third sector(*), commercial broadcasters, (item [1] only): 1/3
- *Item [2] also includes entities that continue to fulfill the role pertaining to the provision of cable television services through transfer of the relevant facilities from these entities (succeeding business operators).

Project name/image

[1] Project to develop basic terrestrial broadcasting networks



[2] Project to develop regional cable television networks



Section 5 Trends in cybersecurity policy

1. Summary

(1) Initiatives so far

In response to the increasing global threat of cybersecurity, the Basic Act on Cybersecurity (Act No. 104 of 2014), which outlines the fundamental principles of Japan's cybersecurity policy, was enacted. Consequently, in 2015, the Cybersecurity Strategic Headquarters was established under the Cabinet. Since then, taking into account changes in the economic and social landscape as well as the growing cybersecurity threats, the “Cybersecurity Strategy¹,” which sets forth the goals and implementation policies of various measures, has been revised every three years. Currently, cybersecurity policies are being promoted based on the “Cybersecurity Strategy” approved by the Cabinet in September 2021.

Additionally, the “Cybersecurity Policy for Critical Infrastructure Protection²” (approved by the Cybersecurity Strategic Headquarters in June 2022 and revised in March 2024), which outlines the basic framework for protecting critical infrastructure, designates the information and communication sector (telecommunications, broadcasting, and cable television) as one of the 15 critical infrastructure sectors. This designation is due to the significant impact on national life and socio-economic activities if these functions are halted or become unavailable. As one of the ministries responsible for critical infrastructure, the MIC is required to continue promoting efforts to ensure the safety and reliability of information and communication networks.

Furthermore, the National Security Strategy, approved by the Cabinet in December 2022, emphasizes the need to “enhance the response capabilities in the

field of cyber security to a level comparable to or exceeding that of major Western countries to ensure the safety of the nation and critical infrastructure.” The government is collectively advancing discussions to realize the initiatives based on this strategy.

Since 2017, the MIC has convened the “Cyber Security Task Force,” composed of experts in the security field. This task force has periodically compiled issues and measures that the MIC should address, considering various changes in circumstances, the Tokyo Olympic and Paralympic Games, and responses to the COVID-19 pandemic. Most recently, to address the frequent cyberattacks targeting IoT devices, the “Subcommittee on Cybersecurity Measures in Information and Communication Networks” was held under the task force starting in January 2023. Based on these discussions, the “Comprehensive ICT Cybersecurity Measures 2023³,” which includes measures to ensure the safety and reliability of information and communication networks and to enhance autonomous response capabilities to cyberattacks, such as a comprehensive measures to deal with IoT botnets, was formulated in August 2023. Moreover, anticipating significant changes in the cybersecurity environment due to the rapid spread of new technologies and services such as generative AI and the increasing diversity and complexity of supply chains, the “ICT Cybersecurity Policy Subcommittee” has been convened since February 2024. This subcommittee is examining the direction of cybersecurity policies that the MIC should pursue in the medium to long term.

(2) Future challenges and directions

With the promotion of DX across society, cyberspace has become a part of everyday life for everyone. However, the risks surrounding cyberspace have evolved with the times and environment, as evidenced by the increasing reports of phishing scams and ransomware attacks.

In recent years, cyberspace has become a battleground for international conflicts, reflecting severe security environments and geopolitical tensions. Many countries have experienced cyberattacks targeting government agencies and critical infrastructure. Japan has also faced serious cyber incidents targeting ports, medical institutions, and government agencies. Moreover, while new technologies such as generative AI have in-

creased convenience, they have also raised concerns about the expansion of risks due to their misuse.

As cyberspace becomes a public space, it is increasingly important to ensure cybersecurity so that every citizen can safely utilize ICT (Information and Communication Technology), including IoT and 5G, which form the foundation of this space.

In light of these considerations, it is necessary to ensure the safety and reliability of information and communication networks, enhance autonomous response capabilities to cyberattacks, promote international cooperation, and advance public awareness and education, as outlined below.

¹ Cybersecurity Strategy: <https://www.nisc.go.jp/active/kihon/pdf/cs-senryaku2021.pdf>

² The Cybersecurity Policy for Critical Infrastructure Protection: https://www.nisc.go.jp/pdf/policy/infra/cip_policy_2024.pdf

³ Comprehensive ICT Cybersecurity Measures 2023: https://www.soumu.go.jp/main_content/000895981.pdf

2. Ensuring safety and reliability of information and communications networks

(1) Promotion of comprehensive IoT botnet countermeasures

In order to ensure the safety and reliability of the information and communication networks that support the cyber space, concerns are also raised about the impact of large-scale cyberattacks that disrupt the functionality of the information and communication networks, such as DDoS attacks. In the case of a typical large-scale cyberattack like a DDoS attack, there are two stages: (1) the expansion of the attack infrastructure by infecting a large number of IoT devices with malware (expansion of the attack infrastructure); and (2) the execution of attacks through the network using this attack infrastructure. In fact, with the increase in the number and functionality of IoT devices, cyberattacks exploiting IoT devices have been on the rise, and the NICTER, which is the cyberattack observation network operated by NICT, observed that attacks targeting IoT devices (especially DVR/NVR) remained the most common type of cyberattacks in the cyberattack-related communications observed in 2023.

To address these large-scale cyberattacks, it is necessary to promote comprehensive IoT botnet countermeasures from both the terminal side (IoT devices) to prevent the expansion of the attack infrastructure, and the network side to deal with the Command and Control (C&C) servers that issue instructions to the attack infrastructure.

On the terminal side, the MIC and the NICT have been implementing an initiative called “NOTICE (National Operation Towards IoT Clean Environment)” in collaboration with Internet Service Providers (ISPs) since February 2019. Under this initiative, based on the Act on the National Institute of Information and Communications Technology (hereinafter referred as to “NICT Act”), the NICT has been conducting investigations into IoT devices on the Internet that have easily guessable passwords such as “password” or “123456,” as

well as devices conducting communications due to malware infections, and has been promoting measures such as alerting device users to prevent these devices from being exploited for cyberattacks, achieving certain results.

However, the risk of cyberattacks exploiting IoT devices remains high, with an increase in cyberattacks targeting vulnerabilities in IoT device software. In response to this, in the 212th session of the National Diet in 2023, a revision of the NICT Act was carried out to continue the investigation of IoT devices with vulnerabilities in ID and password settings beyond FY2024, and to expand the scope of investigation to include IoT devices with software vulnerabilities or those already infected with malware. In addition to alerting IoT device administrators, efforts are being made to promote security measures for IoT devices in collaboration with manufacturers and system vendors, as well as to raise awareness of IoT device security measures through video distribution and online advertising.

On the network side, since FY2022, telecommunications service providers have been analyzing flow information related to communication traffic (IP addresses, port numbers, timestamps, etc.) to verify the effectiveness of technology for detecting Command and Control (C&C) servers that are the source of cyberattacks, as well as to study the sharing and utilization of information about detected C&C servers among operators. The effectiveness of flow information analysis has been confirmed, with successful detection of a certain number of C&C servers, and efforts will continue in FY2024 to further improve detection accuracy through the expansion of telecommunications service providers conducting flow information analysis and the active analysis of detected C&C servers.



Figure (related data) Awareness raising of IoT security countermeasures with the use of video distribution

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00399>
(Data collection)

(2) Promotion of proactive cybersecurity measures by telecommunications operators

To make the security measures for IoT devices more effective, it is considered necessary to establish an environment that allows for more agile responses on the network side, where communication traffic passes through, in addition to the comprehensive IoT botnet measures mentioned earlier⁴.

In FY2023, following FY2022, comprehensive demonstrations of cybersecurity measures were conducted to enable telecommunications operators to respond more

efficiently and proactively to increasingly large-scale, sophisticated, and complex cyberattacks. In the “Demonstration of Detection Technologies and Sharing Methods for Malicious Websites such as Phishing Sites,” a phishing response practical reference for web service providers was created, and awareness-raising activities for the general public were carried out. In the “Demonstration of Network Security Measures,” guidelines for the introduction and operation of network security tech-

⁴ “Comprehensive ICT Cybersecurity Measures 2021” (formulated in 2021) stated that “it is necessary to consider measures to realize advanced and flexible responses in information and communications networks managed by ISPs on the Internet” through “implementing active measures by telecom operators against cyberattacks”. https://www.soumu.go.jp/menu_news/s-news/02cyber01_04000001_00192.html

nologies such as RPKI⁵, DNSSEC⁶, and DMARC⁷, which are being implemented internationally but have not yet been widely adopted in Japan, were drafted based on the

(3) Initiatives for supply chain risk measures

The MIC conducted technical verifications considering the entire 5G network, including virtualization infrastructure and management systems, from FY2019 to FY2021. In April 2022, the “5G Security Guidelines Version 1⁹” was published, summarizing the security issues and countermeasures that operators should be aware of. These guidelines were approved as a new work item for standardization at ITU-T SG17 in September 2022, and efforts are currently underway to promote international standardization in collaboration with specialized agencies.

In the field of communications, the system configurations are becoming more complex due to the increasing sophistication and diversification of required functions. Various commercial software and open-source software (OSS)¹⁰ are being used as software components. With these changes in the software supply chain, cyberat-

knowledge gained through technical demonstrations⁸. Efforts to promote their widespread adoption will continue in FY2024.

tacks targeting vulnerabilities in software components or the insertion of malicious code into software components have occurred. However, if the composition of software components within a system is not understood, it becomes difficult to respond quickly to attacks.

In light of this situation, the MIC has been conducting demonstration projects to introduce SBOM¹¹ in telecom sector since FY2023 to strengthen cybersecurity by understanding the software supply chain using SBOM.

Furthermore, from FY2023, considering the widespread use of smartphones and the limited methods available to verify whether smartphone apps are transmitting user information against the user's intent when concerned, demonstration projects are being conducted to understand the actual behavior of apps through technical analysis by third parties.

(4) Initiatives to ensure the safety of cloud services

A Evaluation of the safety of cloud services in government information systems

Under the principle of cloud by default, the government deliberated on the evaluation of the safety of cloud services in the “Study Group on the Safety Evaluation of Cloud Services” and established the “Basic Framework for the Security Evaluation System for Cloud Services in Government Information Systems” (the Cybersecurity Strategic Headquarters Decision of January 30, 2020). This decision included the basic framework of the system, the approach to usage by each government agency, and the administrative and operational structure.

Based on the basic framework, various regulations were determined by the ISMAP Operating Committee, consisting of experts and the ministries and agencies responsible for the system (the NISC, the Digital Agency, the MIC, and the METI), and the “Information system Security Management and Assessment Program (ISMAP)” was launched. From March 2021, the registration of cloud services that have been confirmed to have implemented security measures based on the criteria set by this system began, and as of May 1, 2024, a total of 68 services have been published as the ISMAP

cloud service list¹².

In November 2022, the operation of “ISMAP for Low-Impact Use (ISMAP-LIU)” began, which is a system for SaaS that handles mainly confidential level 2 information and is used for processing tasks and information with low security risks. ISMAP-LIU is designed to be more lenient than the current ISMAP in terms of the overall audit for services that are extremely limited in their usage and functionality or handle relatively low-importance information.

Furthermore, with the maintenance of the reliability and stability of ISMAP as a premise, efforts to rationalize and clarify the system operation have been ongoing through the “ISMAP System Improvement Initiatives” since October 2022. As part of this, a full-scale operation of the improved framework, which includes “reducing the burden of external audits” and “streamlining and enhancing the efficiency of reviews”, began in October 2023. Going forward, the promotion of further expansion of cloud by default will be pursued through system improvement initiatives and other efforts.

⁵ Resource Public-Key Infrastructure (RPKI). A technology that verifies the IP addresses and AS numbers of autonomous networks using digital certificates, preventing issues such as route hijacking.

⁶ DNS Security Extensions (DNSSEC): A technology that verifies the association between domain names and IP addresses using digital certificates to prevent server impersonation and other related threats.

⁷ Domain-based Message Authentication, Reporting & Conformance (DMARC): A technology that verifies the authenticity of the sender's domain in emails and automatically handles cases of impersonation and other similar threats.

⁸ The 5th ICT Cybersecurity Policy Subcommittee Reference Materials 2-4 include: (1) Guidelines for Countermeasures against Illegitimate Routes on the Internet Using RPKI's ROA; (2) Guidelines for DNS Response Authentication Technology Using DNSSEC; and (3) Guidelines for Email Spoofing Countermeasures and Anti-Spam Technologies, including DMARC (including SPF and DKIM) Email Authentication Technology. https://www.soumu.go.jp/main_sosiki/kenkyu/cybersecurity_taskforce/02cyber01_04000001_00286.html

⁹ 5G Security Guidelines Version 1: https://www.soumu.go.jp/main_content/000812253.pdf

¹⁰ Software whose source code is freely available to the public, allowing anyone to use, modify, and redistribute it.

¹¹ Software Bill of Materials

¹² ISMAP Cloud Service List: https://www.ismap.go.jp/csm?id=cloud_service_list

B Development of guidelines for cloud security

The MIC has formulated the “Guidelines for Information Security Measures in Cloud Service Provision” as part of its efforts to promote the use of safe and secure cloud services. In September 2021, a revised version (3rd edition) was published, taking into account the actual provision and usage of cloud services. Moreover, due to cases where inappropriate use of cloud services by users has led to potential information leaks, a guide-

line for promotion of appropriate configuration in cloud service usage was formulated in October 2022 with the examination by wide range of stakeholders such as providers and users. In April 2024, a “Cloud Misconfiguration Prevention Guidebook” was published to provide a clear explanation of the content of the guidelines for cloud service users.

(5) Initiatives related to trust services

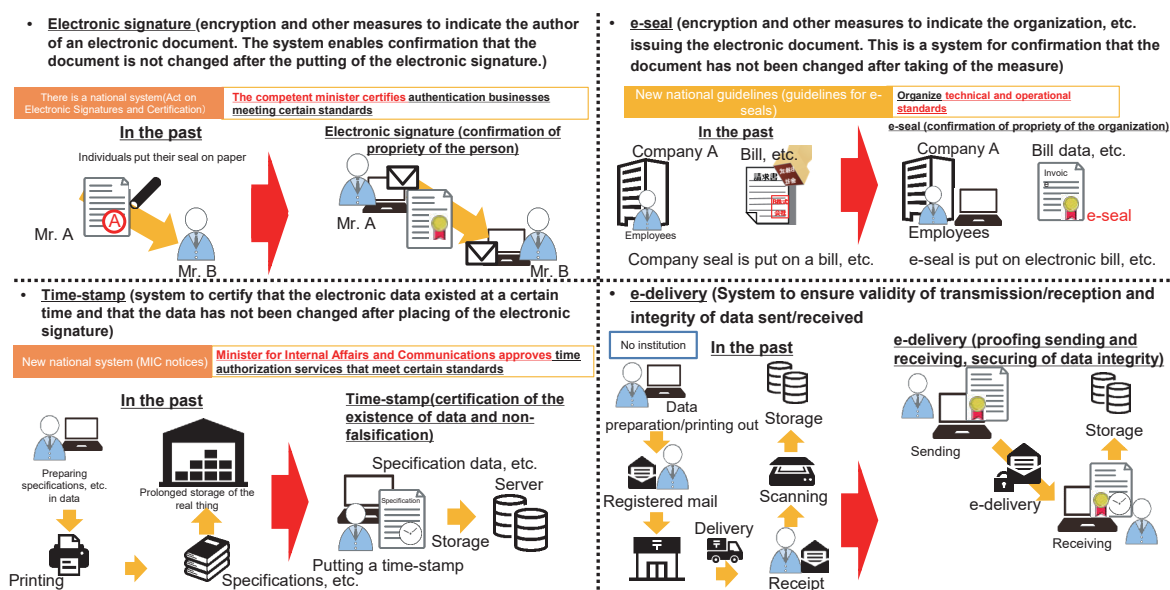
In Society 5.0, where the physical and cyber spaces are highly integrated, it is essential to seamlessly facilitate various interactions in the cyber space as well. To achieve this, it is crucial to establish a foundation that allows data to circulate safely and securely. The importance of trust services, which are mechanisms to prevent data tampering and spoofing of the sender (**Figure 2-2-5-1**), is increasing.

As a government-wide effort, the “Sub-working Group for Trust-Assured Digital Transformation” was established in November 2021 under the “Data Strategy Promotion Working Group” based on the Digital Society Promotion Council Order (Cabinet Order No. 193 of

2021). This sub-working group examines the digitalization needs and required assurance levels for various public and private procedures and transactions. In July 2022, the “Report of the Sub-working Group for Trust-Assured Digital Transformation¹³” was published.

The MIC is advancing discussions on the appropriate operation of the electronic time stamps certification system and the establishment of standards and conformity assessments to evaluate the reliability of private electronic seals (e-Seals) services, based on the “Priority Plan for Realization of a Digital Society” (Cabinet decision on June 9, 2023)¹⁴.

Figure 2-2-5-1 Image of trust service



A Establishment of a national certification system on electronic time stamps

Regarding time stamps, further discussions were held in the “Study Meeting on the Time Stamp Certification System,” which was launched in March 2020. In April 2021, the “Rules Concerning the Certification of Time-stamping Services (MIC Notice No. 146 of 2021)” were established, creating a certification system by the national government (Minister of Internal Affairs and Communications). Additionally, due to the tax reform in FY2022, the electronic time stamps based on the national certification system was positioned to replace the

electronic time stamps based on the certification system by the private sector (Japan Data Communications Association) for the scanner storage system related to tax documents. In February 2023, the first national certification for time authentication services was granted. Moving forward, the national certification system will continue to be operated appropriately and reliably, and necessary efforts will be made to further expand the use of electronic time stamps.

¹³ Report of the Sub-working Group for Trust-Assured Digital Transformation: <https://www.digital.go.jp/councils/trust-dx-sub-wg/>

¹⁴ Priority Plan for Realization of a Digital Society: https://www.digital.go.jp/assets/contents/node/basic_page/field_ref_resources/5ecac8cc-50f1-4168-b989-2bcaabfe870/b24ac613/20230609_policies_priority_outline_05.pdf

B Initiatives for institutionalizing e-Seals

Regarding e-Seals, the “Study Meeting on a System for Ensuring the Reliability of Data Issued by Organizations” was launched in April 2020 to discuss the ideal state of e-Seals in Japan. In June 2021, the “Guidelines on e-Seals” were formulated, indicating certain standards for the technology and operation of e-Seals in Japan. Furthermore, in September 2023, the “Study Group on e-

Seals” was established to discuss the establishment of standards and conformity assessments to evaluate the reliability of private e-Seals services. In April 2024, the final report of the study group¹⁵ and the “Guidelines on e-Seals (2nd Edition)”¹⁶ were published. Based on these study results, efforts will be made to start the operation of a national certification system for e-Seals.

3. Improvement of ability to handle cyberattacks autonomously

(1) Initiatives for developing security personnel

As cyberattacks become more sophisticated and complex, Japan faces a significant shortage of cybersecurity personnel both in terms of quality and quantity. Addressing this issue is an urgent priority. To this end, the MIC

is actively promoting initiatives for cybersecurity personnel development through the National Cyber Training Center of the NICT, including programs such as CYDER, CIDLE, and SecHack365.

A Practical cyber defense exercises for information system personnel (CYDER)

CYDER is a practical cyber defense exercise targeting information system personnel from national agencies, local governments, independent administrative agencies, and critical infrastructure operators. Participants join the exercise in teams and experience a series of responses to cyberattacks, from detection to response, reporting, and recovery, in a large-scale virtual LAN environment that simulates an organization's network environment (Figure 2-2-5-2). In FY2023, in addition

to the existing beginner, intermediate, and pre-advanced group exercise courses and the online introductory course, a trial implementation of “Pre-CYDER” was conducted, which allows participants to learn the basics of cyberattack mechanisms, trends, and incident handling (Figure 2-2-5-3).

The number of participants in CYDER group exercises in FY2023 was 3,742, bringing the total number of participants since FY2017 to over 20,000.

Figure 2-2-5-2: Practical cyber defense exercises (CYDER Cyber Defense Exercise with Recurrence)

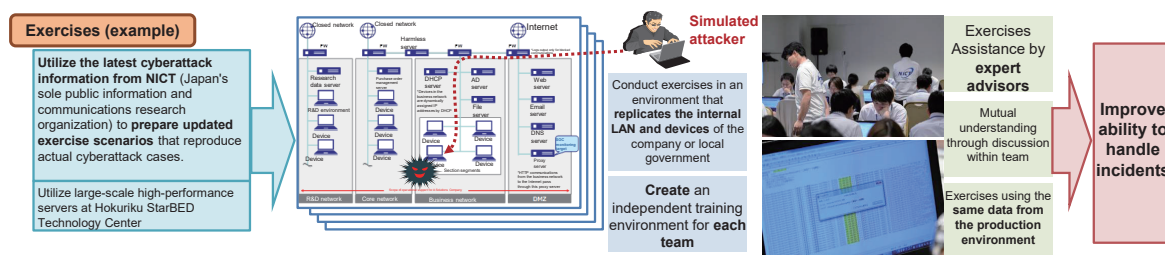


Figure 2-2-5-3 Implementation status of CYDER in FY2023

Course	Type of exercise	Level	Intended audience (topics covered)	Intended organizations	Location	Frequency	Period
A	Group exercises	Beginner	Individuals beginning to work with systems (Procedure for responding to incidents)	All organizations	47 prefectures	68 times	From Jul. to Jan. of the following year
B-1		Intermediate	System administrators and operators (Autonomous incident response and security management)	Local governments	11 regions nationwide	21 times	From Oct., to Jan. of the following year
B-2				Organizations other than local governments	Tokyo, Osaka, Nagoya	13 times	Jan. of the following year
C		Semi-advanced	Security specialists (Advanced security technology)	All organizations	Tokyo	4 times	From Nov., to Jan. of the following year
Online Standard	Online exercises	Equivalent to beginner	Individuals beginning to work with systems (Procedure for responding to incidents)	All organizations	(Participant workplaces, etc.)	As needed	From Mar. to Jul.
Pre CYDER		—	Individuals just beginning to work with systems (Prerequisite knowledge, basic matters)	National agencies etc., local government			From Dec., to Jan. of the following year

¹⁵ Final Report of Study Group on e-Seal: https://www.soumu.go.jp/main_content/000942601.pdf

¹⁶ Guidelines on e-Seals (2nd Edition): https://www.soumu.go.jp/main_content/000942602.pdf

B Cyber defense training for the Expo (CIDLE)

CIDLE is a cyber defense training program aimed at ensuring a robust security posture for the 2025 World Exposition (Osaka-Kansai Expo). It targets information system personnel from organizations related to the Osaka-Kansai Expo. Utilizing the legacy of the Tokyo 2020 Olympic and Paralympic Games, lecture and exercise programs have been provided since FY2023.

C Young security talent development program (SecHack365)

SecHack365 is a program aimed at developing cutting-edge security personnel (security innovators) who can create new security countermeasure technologies. It targets young ICT talents under the age of 25 residing in Japan. Utilizing actual cyberattack-related data held by the NICT, researchers and engineers at the forefront of

the field provide continuous and intensive guidance on security technology research and development over the course of a year. In FY2023, 38 participants completed the program, bringing the total number of graduates since FY2017 to 289.

(2) Building an integrated cybersecurity intelligence and human resource development platform (CYNEX)

In Japan, security businesses primarily adopt and operate overseas security products. Consequently, the country's cybersecurity measures heavily rely on foreign products and information, leading to insufficient collection and analysis of domestic cyberattack information. The continued use of overseas security products results in domestic data being transferred to foreign businesses, leading to the analysis of Japan's security-related information abroad. Meanwhile, Japan continues to purchase threat information obtained from these analyses from foreign businesses.

This situation also results in a lack of accumulation of core knowledge and insights within domestic security businesses, making it difficult to effectively contribute to global-level information sharing and develop internationally recognized engineers. Furthermore, user companies also face a shortage of personnel capable of handling security products and information appropriately. To enhance Japan's autonomous response capability to cyberattacks, it is essential to accelerate the establishment of an ecosystem for accelerating the generation of domestic cyber security information and personnel development.

The MIC, in collaboration with the NICT, which conducts top-level research and development in cybersecurity, is promoting the CYNEX initiative. This initiative aims to enhance Japan's cybersecurity response capabilities by constructing and operating an advanced platform, the "Integrated Cybersecurity Intelligence and Human Resource Development Platform," which serves as a major nexus for industry-academia-government collaboration in cybersecurity, leveraging the technology and know-how accumulated by the NICT. In October 2023, the "CYNEX Alliance," composed of organizations from industry, academia, and government participating in CYNEX, was launched, marking the full-scale deployment of CYNEX. In the FY2024, the MIC will continue to expand collaboration with private companies and educational institutions, broadly collect and analyze Japan's cybersecurity information, promote the development of domestic security products using this information, and support the development of advanced security personnel and human resource development in private companies and educational institutions, aiming to further strengthen Japan's cybersecurity response capabilities.



Figure (related data) Building an integrated cybersecurity intelligence and human resource development platform (CYNEX)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00403>
(Data collection)

Additionally, from FY2023, the "Project to Involve the Verification of Sensors Capable of Ensuring Safety and Transparency in Collecting and Analyzing Cybersecurity Information from Government Terminals (CYXROSS)", was initiated to aggregate and analyze the obtained information in the NICT's CYNEX, strengthen-

ing Japan's security measures. In FY2024, efforts will continue to expand the aggregation and analysis of cyber security information and increase the adoption of sensors in government agencies to enhance Japan's unique cyberattack analysis capability.



Figure (related data) Project to Involve the Verification of Sensors Capable of Ensuring Safety and Transparency in Collecting and Analyzing Cybersecurity Information from Government Terminals (CYXROSS)

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00404>
(Data collection)

4. Promotion of international collaboration

Given the global nature of cyberspace, collaboration with other countries is essential for establishing robust cybersecurity measures. To this end, the MIC actively engages in discussions, information dissemination, and information gathering at various international conferences and cyber consultations to contribute to the formation of international consensus on cybersecurity.

Additionally, supporting capacity building in the field of cybersecurity for developing countries is crucial to reducing global cybersecurity risks. MIC promotes initiatives to enhance cybersecurity capabilities, particularly in the ASEAN region, through projects such as the

ASEAN-Japan Cybersecurity Capacity Building Centre (AJCCBC)¹⁷. In FY2023, leveraging the expertise and know-how accumulated through AJCCBC activities, MIC has expanded its capacity-building support activities to include trial exercises for island nations in the Pacific region.

Furthermore, to promote international information sharing on cybersecurity at the private sector level, MIC organizes workshops involving ISPs from ASEAN countries and holds opinion exchange meetings with ISACs (Information Sharing and Analysis Centers) between Japan and the U.S. as well as between Japan and the EU.

5. Promotion of awareness raising

(1) Initiatives for telework security

According to a survey conducted on companies that have introduced telework¹⁸, security assurance is considered the biggest challenge when implementing telework. In response to these security concerns, the MIC has been formulating and publishing the “Telework Security Guidelines” since 2004.

With the expansion of telework, which becomes prevalent due to the spread of COVID19 and is positioned as the central focus of workstyle reform, and considering the advancement of cloud utilization and the increasing sophistication of cyber-attacks, the guidelines were revised in May 2021 to comprehensively review the necessary security measures and specific trouble cases.

Additionally, for small and medium-sized enterprises where there may not be dedicated security personnel or where the responsible individuals may not have a deep

understanding of security measures, a “Telework Security Guide for Small and Medium-sized Enterprises and Others (Checklist)” was formulated and published in 2020, focusing on ensuring the minimum level of security. In May 2022, the checklist was revised to ensure readable design and words with a view of universal design, and an “Employee Handbook” that employees can actually use was newly created as an appendix. Furthermore, to assist in implementing security measures according to the checklist, a “Configuration Explanation Document” was published to explain how products used in telework should be configured. In October 2023, the range of products covered by the “Configuration Explanation Document” was expanded, and updates were made to the content of the already published products.

(2) Formation and promotion of locally rooted security communities (Regional SECURITY)

From the perspective of ensuring a safe and secure cyber space in Japan, ensuring cybersecurity at the local level is also an important issue. On the other hand, in local businesses and municipalities, there is an information disparity regarding cybersecurity compared to companies operating on a metropolitan or national scale. Additionally, due to reasons such as a lack of management resources such as personnel, it may be difficult for them to take sufficient security measures on their own or they may not recognize the necessity of security measures.

The MIC is promoting the formation of security com-

munities (“Regional SECURITY”) based on a “mutual assistance” relationship among stakeholders in the security field. By the end of FY2022, the establishment of Regional SECURITY had been completed in 11 regions based on the jurisdiction of the Regional Bureau of Telecommunications etc. In FY2023, 16 seminars, 10 incident response exercises, and 7 CTF (Capture The Flag) events for young people were conducted, and large-scale cross-regional events were also held. To further expand the activities of Regional SECURITY, support for events will continue to be provided in FY2024¹⁹.



Figure (related data) Security communities in each region

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#00405>
(Data collection)

¹⁷ Regarding the AJCCBC, refer to Section 8 “Promotion of ICT International Strategy” in Chapter 2, Part 2.

¹⁸ Survey on actual conditions of remote work security: https://www.soumu.go.jp/main_sosiki/cybersecurity/telework/

¹⁹ Details on the latest events can be found at the following URL.
https://www.soumu.go.jp/main_sosiki/cybersecurity/localsecurity/index.html

(3) Appropriate promotion of sharing and disclosure of information related to cyberattack damages

As the threat of cyberattacks increases, it is beneficial for both the affected organizations and society as a whole for organizations that have suffered from cyberattacks to share and disclose information related to the damage with cybersecurity-related organizations. This helps in fully understanding the attack and strengthening countermeasures. However, due to concerns about their own reputation, affected organizations are often cautious about sharing and disclosing such information.

In response, in April 2022, the “Guidance Review Committee on Sharing and Disclosure of Information Related to Cyber Attack Damages” was established under the steering committee of the “Cybersecurity Coun-

cil,” a collaborative body involving various public and private entities. This committee compiled and published the “Guidance on Sharing and Disclosure of Information Related to Cyber Attack Damages” in March 2023, which serves as a practical reference for organizations that have suffered from cyberattacks²⁰.

Moving forward, relevant government agencies will work together to promote and raise awareness of this guidance. Additionally, based on feedback from organizations that utilize the guidance after suffering from cyberattacks, the necessity of revising the guidance will be considered.

(4) Initiatives related to wireless LAN security

Wireless LAN is widely used not only at home and workplaces but also in public wireless LAN services in urban areas. However, if appropriate security measures are not taken, there is a risk of attacks using wireless LAN devices as stepping stones or information theft. Therefore, the MIC has formulated guidelines for both users and providers of Wi-Fi to ensure security²¹.

In March 2024, the content of the “Simple Manual for Wireless LAN Users” was updated and subdivided into two separate manuals: the “Simple Manual for Public Wireless LAN Users” and the “Simple Manual for Home Wireless LAN Users.” This allows users to check appropriate content according to their wireless LAN usage

situation.

The “Security Measures Guide for Wireless LAN Providers,” aimed at a wide range of wireless LAN providers including restaurants and retail stores, was also updated, and the revised version was published in March 2024.

Additionally, to raise awareness and promote understanding of wireless LAN security measures, a free online course is held annually during the Cybersecurity Month (from February 1 to March 18). In FY2023, the online course “Learn Wireless LAN Security Measures Now” was held from March 1 to March 24, 2024.

²⁰ Guidance on sharing and disclosing information on damages by cyberattacks (formulated March 8, 2023): https://www.soumu.go.jp/menu_news/s-news/01cyber01_02000001_00160.html

²¹ Guidelines on Wireless LAN (Wi-Fi) security: https://www.soumu.go.jp/main_sosiki/cybersecurity/wi-fi/index.html

Section 6 Promotion of ICT usage

1. Summary

(1) Initiatives so far

Since the establishment of the Information and Communication Technology Strategy Headquarters in 2000 and the enactment of the Basic Act on the Formation of an Advanced Information and Telecommunications Network Society (Act No. 144 of 2000)¹, Japan has been promoting the utilization of ICT through various national strategies such as the e-Japan Strategy and the Comprehensive Strategy for the Vision for a Digital Garden City Nation. Based on these policies, the MIC has been pro-

moting the utilization of ICT in various fields, including the digitalization of local communities, new information and communication technologies, and the revitalization of society through data circulation, in order to address social and economic issues such as the declining workforce due to an aging population, the increase in medical and nursing care costs, and the exacerbation of natural disasters.

(2) Future challenges and directions

Japan faces a challenging economic environment, including a declining workforce due to an aging population and a projected shrinkage of the domestic market. Additionally, there are mounting challenges such as coping with severe and frequent disasters, and addressing the aging public infrastructure that has been in place for over 50 years.

Furthermore, as digitalization progresses in society, including the widespread adoption of smartphones and the advancement of network sophistication, the role of information and communication in the lives of citizens and economic activities is increasing. Digitalization has the potential to significantly enhance the productivity and convenience of local communities, improve the quality of industries and livelihoods, and enhance the attractiveness of regions. Moreover, services provided by platforms such as social media and searching engines contribute to the improvement of daily convenience.

On the other hand, issues such as defamation, slander, and dis-/mis-information have become apparent in the information circulated on the Internet. Additionally, the emergence of new information and communication technologies such as generative AI and the metaverse is

significantly transforming the digital space.

The government has raised the banner of the “Comprehensive Strategy for the Vision for a Digital Garden City Nation,” and is actively promoting DX in local areas through the rapid development of digital infrastructure by both the public and private sectors.

Considering these challenges and the potential of digitalization, it is important to promote the implementation of digital solutions as a key to solving social issues in local communities, contributing to the revitalization of regional societies and economies. Furthermore, it is crucial to comprehensively address new challenges associated with the advancement of the digital space, such as the circulation of dis-/mis-information, the proliferation of generative AI, and the metaverse.

Moreover, in order to achieve a society where everyone can enjoy the benefits of various digital services that utilize data, and to ensure that users can utilize information in a safe and secure environment, it is important to promote the realization of a society where everyone can enjoy the benefits of various digital services that utilize data, and to ensure that users can utilize information in a safe and secure environment.

2. Promotion of DX to contribute to stimulate local areas and economy

(1) Examination for the realization of vibrant local communities

The MIC has been implementing initiatives that contribute to the “Vision for a Digital Garden City Nation” and “Digital Administrative and Fiscal Reforms.” However, there have been criticisms that these various initiatives have not necessarily led to the resolution of local issues.

Against this backdrop, the MIC has been holding the “Study Group on the Ideal State of Information and Communication Infrastructure and Utilization for the Realization of Vibrant Local Communities”² since December 2023. The purpose of this conference is to examine the policy direction necessary to improve the quality of life for local residents and realize vibrant and diverse local

communities through the necessary information and communication infrastructure and its utilization. The study group discusses issues such as the direction of improving the usage environment based on the actual usage of communication and broadcasting services, including end-to-end services in local areas, creating an environment where digital talents nurtured in the region can thrive, promoting industries using the digital infrastructure established in the region, addressing social issues such as labor shortages using digital technology, and building and strengthening the collaboration system among stakeholders for promoting regional DX.

¹ This act was abolished by the Basic Act on the Formulation of a Digital Society (Act No.35 of 2021).

² Conference on the Ideal State of Information and Communication Infrastructure and Utilization for the Realization of Vibrant Local Communities https://www.soumu.go.jp/main_sosiki/kenkyu/chiikikon/index.html

A Solving issues using local digital infrastructure

(A) Promotion of local 5G

Local 5G, institutionalized in 2019, is a 5G system that can be flexibly constructed on a spot basis within buildings or premises by various entities such as local companies and municipalities, according to the specific needs of the region or industry, unlike the nationwide 5G service provided by mobile phone operators.

To promote the spread of Local 5G, the MIC has been conducting technical studies on radio wave propagation in various usage environments assuming various real-world scenarios from FY2020 to FY2022. Additionally, the MIC has been implementing the “Development and Demonstration for the Realization of Problem-Solving Local 5G,” which aims to create solutions using Local

5G.

Furthermore, to promote the introduction of safe and reliable 5G and solve various social issues faced by regions using 5G, as well as to strengthen the international competitiveness of Japan’s economy, a tax system to promote the introduction of 5G was established in FY2020. In the FY2022 tax reform, revisions were made to promote the establishment of base stations in rural areas to realize the “Vision for a Digital Garden City Nation.” The tax incentives, including corporate tax and income tax credits or special depreciation and special measures for fixed asset tax, have been extended until the end of FY2024.

(B) Implementation of advanced digital technologies using local digital infrastructure

To realize the “Vision for a Digital Garden City Nation,” it is important to promote the establishment of local digital infrastructure and the practical application of advanced solutions using this digital infrastructure in an integrated manner, so that residents can experience the convenience of digital technologies according to local needs. Therefore, the MIC has started the “Regional Digital Infrastructure Utilization Promotion Project” from FY2023 to comprehensively support local governments’ efforts to solve regional issues using digital technologies. This project supports (1) the formulation of digital technology introduction plans, (2) the practical

application of advanced solutions (demonstration projects), and (3) the establishment of local digital infrastructure (subsidy projects), in order to comprehensively support local governments’ efforts to solve regional issues using digital technologies. Furthermore, from FY2024, the MIC will also work on building DX promotion systems through the collaboration of municipalities and verifying the reliability of communications necessary for safe autonomous driving to contribute to solving social issues aimed at by digital administrative and fiscal reforms.

(C) Promotion of smart cities

Since FY2017, the MIC has been promoting smart cities that solve regional issues and create new value leading to regional revitalization through the use of digital technologies and data. The MIC, in collaboration with relevant ministries and agencies such as the Cabinet Office, has been implementing the “Smart City Promotion Project for Solving Regional Issues,” which supports local governments etc.’ efforts to introduce City OS and develop service assets. In FY2023, the MIC supported the projects of eight organizations.

In FY2023, the MIC, together with relevant ministries and agencies, revised and published the second editions of the “Smart City Reference Architecture (White Paper) and Smart City Guidebook.”³ Additionally, aiming for further development and implementation of smart cities, the MIC formulated the “Smart City Policy Roadmap” looking beyond 2030. In FY2024, the MIC revised the “Smart City Security Guidelines” based on these trends.

(D) Social implementation of information banks

From the perspective of promoting the appropriate utilization of personal data, including personal information, the MIC and the METI established a study group on the certification scheme for information trust functions. In June 2018, they compiled the “Guidelines for Certification of Information Trust Functions ver1.0,” which outlines a voluntary certification system for information banks by private organizations. These guidelines focus on data utilization starting from individual users and consist of certification criteria, items to be included in the model contract, and the certification scheme. Based on these guidelines, the General Incorporated Association Information Technology Federation of Japan, a

certification body, decided on the first “Information Bank” certification in June 2018, and as of March 2024, two companies have been certified as “Information Banks.”

The MIC and the METI have been continuously reviewing the guidelines and considering the utilization of information banks. In July 2023, they published the “Guidelines for Certification of Information Trust Functions Ver3.0,” which stipulates the requirements for information banks to handle sensitive personal information in the health and medical fields. In FY2024, they are verifying the issues of the certification guidelines by demonstrating use cases where information banks con-

³ Publication of the revised version of Smart City Reference Architecture (White Paper) and Smart City Guidebook

<https://www8.cao.go.jp/cstp/stmain/20230810smartcity.html>

Videos of case study / interview articles <https://www.mlit.go.jp/scpf/efforts/index.html>

Case studies of smart city service https://www.soumu.go.jp/main_content/000808085.pdf

tribute to solving regional issues by safely and securely distributing sensitive personal information in the health

B Securing and developing human resources to support the DX of local communities

(A) Support project of external human resource recruitment

In September 2022, the MIC formulated the “Standards of External Human Resource Skill for Promoting Municipal DX” to serve as a reference for municipalities when securing external human resources. These standards categorize the desirable skills and experiences that external personnel should possess. Based on these standards, the MIC publicly recruited individuals from

and medical fields through data linkage in smart cities.

the private sector with certain skills and experiences, evaluated them through experts, and provided training on municipal operations and information systems. Information on those who completed the training was compiled and provided to municipalities as an “List of External Human Resource” starting in June 2023.

(B) Dispatch system of regional informatization advisor

Since FY2007, the MIC has been dispatching experts with knowledge and know-how in ICT (referred to as “Regional Informatization Advisors”) to municipalities and other entities upon request. These advisors provide advice, recommendations, and information to promote the use of ICT in solving regional issues, thereby contributing to the creation of vibrant and attractive communities and fostering human resources who can play a

central role in the region.

In FY2023, 196 private sector experts with knowledge and know-how in regional informatization through research activities at universities, business activities in the region, NPO activities, etc., were appointed as “Regional Informatization Advisors,” and 363 dispatches were conducted.

(2) Discovery and development of ICT startups

In Japan, 2022 was designated as the inaugural year for startup creation, with the goal of increasing investment in startups tenfold over five years. This goal was set forth in the “Startup Development Five-year Plan” (decided at the New Capitalism Realization Conference in November 2022), aiming to create an ecosystem that fosters and nurtures startups.

The MIC and the NICT host the “Entrepreneur Koshien” and “Entrepreneur Expo” to award and support excellent business plans from students aiming to start businesses and from startup companies, with the objective of solving regional issues and revitalizing the economy through the creation of ICT startups originating from local areas.

(3) Promotion of telework

A Overview of telework

Telework is a flexible working style that utilizes ICT to make effective use of time and location. It enables diverse working styles that fit the life stages and lifestyles of individuals, including those raising children, seniors, and people with disabilities. Additionally, it is effective in ensuring business continuity during disasters or infectious disease outbreaks. Telework also allows individuals to maintain their income while working in their preferred regions, potentially creating a flow of people from urban to rural areas, thereby offering various benefits to society as a whole. Since 2020, with the spread of COVID-19, telework has been widely adopted, especially in urban areas, as a means to reduce commuting. However, the image of telework as a measure to prevent infection has become prevalent. In May 2023, COVID-19 was reclassified as a Category 5 infectious disease, and a survey conducted by Persol Research Institute in July 2023 showed that the telework implementation rate among employees was at its lowest since April 2020⁴, indicating a trend towards returning to the office.

In response to this situation, the MIC established the “Task Force on the Future of Telework in the Post-COVID Era” in April 2021 to further expand and firmly estab-

lish telework. The task force, which gathered expert opinions on telework style that Japan should aim for in the future, issued a recommendation in August 2021 stating that “Japanese-style Telework,” which enhances communication through the use of ICT tools while maintaining the strengths of Japan’s employment practices and work styles, should be the future direction for Japan.

To foster momentum for telework, the Telework Month Executive Committee (comprising the Cabinet Bureau of Personnel Affairs in the Cabinet Secretariat, the Office for Promotion of Regional Revitalization in the Cabinet Office, the Digital Agency, the MIC, the Ministry of Health, Labour and Welfare, the METI, the Ministry of Land, Infrastructure, Transport and Tourism, the Japan Tourism Agency, the General Incorporated Association Japan Telework Association, and the Japan Telework Society) designates November each year as “Telework Month,” a period for concentrated telework initiatives. During this month, they conduct surveys on the effects of telework (such as contributions to work style reform and operational efficiency) and hold events and seminars organized by related ministries and agencies. Additionally, since 2015, the MIC has been recog-

⁴ “8th Telework Survey/Mask Survey at Work” (Persol Research Institute)
<https://rc.persol-group.co.jp/thinktank/assets/telework-survey8.pdf>

nizing companies with significant telework achievements to incentivize telework adoption and provide reference examples for other companies considering telework.

In 2023, considering the widespread adoption of telework, the MIC selected and announced companies and organizations that not only implemented telework systems and achieved significant utilization but also demon-

strated management effectiveness through telework, addressed communication challenges during telework, and contributed to solving regional issues such as revitalizing local industries and promoting regional informatization. These entities were recognized as “Telework Top Runners 2023,” with the most outstanding initiatives receiving the “Minister of Internal Affairs and Communications Award.”

B Support for the spread of telework

To support the adoption of telework among SMEs and in regional areas, where implementation rates remain low, the MIC has established regional consultation desks in collaboration with local chambers of commerce and local governments nationwide. These desks provide consultation services and other support. Additionally, the MIC offers free individual consulting by experts (telework managers) to companies considering the introduction or improvement of telework, aiming to promote the effective use of telework. Since FY2022, these

support services have been integrated with the Ministry of Health, Labour and Welfare’s labor-related telework consultation services and jointly implemented as the “Telework One-Stop Support Project.”

Furthermore, to address the common concern of information security in telework, the MIC has developed the “Telework Security Guidelines” and the “Telework Security Handbook for SMEs (Checklist)” to serve as references for companies implementing telework.

3. Responses to address the new issues along with the advancement of digital space

(1) Promoting the spread of AI and addressing risks

In recent times, the development and proliferation of AI technology have been advancing at a rapid pace, to the extent that there is hardly a day without news about AI. The “AI Networking,” where AI systems connect and collaborate with other AI systems via the internet, is expected to bring significant benefits to individuals, communities, nations, and the international society by addressing various challenges. Since the launch of OpenAI’s ChatGPT in November 2022, global attention towards the potential and risks of AI has significantly increased.

In this context, during the G7 Digital and Technology Ministers’ Meeting held in Takasaki, Gunma, Japan, in April 2023, six themes, including “Promoting Responsible AI and AI Governance,” were discussed under Japan’s leadership as the chair country. The meeting resulted in the adoption of the G7 Digital and Technology Ministers’ Declaration. Furthermore, following the outcomes of the G7 Hiroshima Summit in May of the same year, the “Hiroshima AI Process” was initiated to discuss generative AI. In December, the “Comprehensive Policy Framework for the Hiroshima AI Process” was compiled and approved by the G7 leaders. The Hiroshima AI Pro-

cess will continue to advance with the cooperation of G7 countries, the OECD, the GPAI, and the United Nations, among other multilateral platforms, under the “Work Plan to Advance the Hiroshima AI Process.”⁵

Domestically, in response to the rapid changes in AI technology and international discussions, the government established the AI Strategic Council as a command center to conduct intensive discussions with experts possessing a wide range of knowledge on various issues. Based on the “Tentative Summary of AI Issues” (May 2023) compiled by the AI Strategic Council, the MIC and the METI have been working on integrating and updating existing guidelines^{6,7} to address concerns and risks related to AI. They have held the “AI Network Society Promotion Council” and the “AI Business Operator Guidelines Review Committee” to develop unified and comprehensible guidelines for AI business operators. The “AI Guidelines for Business” Version 1.0 was formulated and published in April 2024. These guidelines will be updated as a Living Document, reflecting ongoing trends, issues, and international discussions surrounding AI.

(2) Organizing issues related to the utilization of the metaverse and other technologies

Recognizing the need to ensure a safe and secure cyberspace, the MIC has been working to identify and organize new issues related to cyberspace, anticipating the

future widespread adoption of the metaverse. From August 2022 to July 2023, the “Study Group on the Utilization of Metaverse toward the Web3 Era⁹” was held.

⁵ Regarding the discussion in G7, also refer to Section 8 “Promotion of international strategy” in Chapter 2, Part2.

⁶ AI R&D Guidelines for International Discussions https://www.soumu.go.jp/main_content/000499625.pdf

⁷ AI Utilization Guidelines https://www.soumu.go.jp/main_content/000809595.pdf

⁸ Governance Guidelines for Implementation of AI Principles ver. 1.1 https://www.meti.go.jp/shingikai/mono_info_service/ai_shakai_jisso/pdf/20220128_1.pdf

⁹ Holding “Study Group on the Utilization of Metaverse toward the Web3 Era” (Press release) https://www.soumu.go.jp/menu_news/s-news/01icp01_02000109.html

The study group focused on improving user convenience, ensuring the appropriate and smooth provision of services, and fostering innovation in the utilization of virtual spaces like the metaverse. It addressed issues related to information and communication administration from the perspectives of user understanding and digital infrastructure, considering various use cases. In July 2023, the study group compiled a report¹⁰.

The report outlined six key points and issues related to the development of the metaverse, including challenges associated with avatars, and proposed directions for resolving these issues, such as forming an interna-

tional common understanding of the metaverse's principles. Based on the report, a new "Study Group on Realizing Safe and Secure Metaverse"¹¹ was launched in October 2023 to examine principles based on the democratic values of the metaverse, follow up on technological trends, and contribute to international discussions on the metaverse toward the realization of safe and secure metaverse for users. The group presented the first draft of the metaverse principles in March 2024 and plans to publish a report around the summer of the same year.

(3) Comprehensive measures to address dis-/mis-information on the Internet

A Response to the 2024 Noto Peninsula Earthquake

Following the Noto Peninsula Earthquake in January 2024, concerns were raised about the circulation of dis-/mis-information that could hinder swift life-saving, rescue, and smooth recovery and reconstruction efforts.

The MIC issued warnings about dis-/mis-information on the Internet through social media on the day after the disaster, January 2, and requested major social media platform operators to take appropriate measures in accordance with their terms of use. Subsequently, various layered public relations efforts have been implemented, primarily targeting the affected areas, to raise aware-

ness about dis-/mis-information.

The "Package for Supporting the Lives and Livelihoods of Disaster Victims"¹² published on January 25, 2024 also incorporates measures to address dis-/mis-information circulating on the Internet. It includes ongoing follow-ups on the response status of platform operators in relation to the requests and the development and verification of technologies to identify deepfake videos circulating on the Internet, utilizing the supplementary budget for FY2023.

B Examination of the healthiness of information circulation in digital spaces

As various services utilizing digital spaces become widespread in society and new technologies such as generative AI continue to advance, new challenges such as the circulation and dissemination of dis-/mis-information have become apparent, with their impact on society growing. Taking into account international trends, a new "Study Group on the Healthiness of Information Circulation in Digital Spaces"¹³ was launched in November 2023 to examine comprehensive measures, including institutional aspects, to address the circulation and dissemination of dis-/mis-information. The study group has been discussing the basic principles for ensuring the healthiness of information circulation in digital spaces, the roles and responsibilities expected of various stakeholders, and specific measures. In May 2024, a "Multi-Stake-

holder Effort Collection for Addressing Dis-/mis-information on the Internet" was compiled and published to make it more accessible for a wide range of stakeholders from the private sector, academia, government, and civil society to refer to, with the aim of promoting collaboration and cooperation domestically and internationally. Concrete measures, including ensuring the transparency and accountability of platform operators' efforts, promoting fact-checking, raising awareness, improving literacy, nurturing talent, conducting research and development of technology, addressing challenges related to digital advertising, and strengthening international cooperation, are expected to be compiled and published around the summer of 2024.

C Promotion of international cooperation

In the ministerial declaration of the G7 Digital and Technology Ministers' Meeting held in Gunma Takasaki in April 2023, it was announced that the "Existing Practices against Disinformation (EPaD)" by stakeholders, including private companies and civil society, would be collected and edited, and then announced at the IGF Kyoto 2023. In response to this declaration, the Japanese government, as the G7 chair, compiled EPaD at the MIC

and publicly announced it at the session "Sharing Existing Practices against Disinformation (EPaD)" held on Day 0 of IGF Kyoto 2023 (hosted by the MIC). The session discussed the importance of regional and cross-border collaboration and cooperation among a wide range of stakeholders, including platform operators, private companies, media, journalists, fact-checking organizations, legal professionals, academia, individuals, civil

¹⁰ https://www.soumu.go.jp/main_content/000892205.pdf

¹¹ Holding "Study Group on Realizing Safe and Secure Metaverse" (Press release) https://www.soumu.go.jp/menu_news/s-news/01iicp01_02000121.html

¹² "Package for Supporting the Lives and Livelihoods of Disaster Victims" (The 2024 Noto Peninsula Earthquake Emergency Disaster Countermeasures Headquarters decision) https://www.bousai.go.jp/pdf/240125_shien.pdf

¹³ Holding "Study Group on the Healthiness of Information Circulation in Digital Spaces" (Press release) https://www.soumu.go.jp/menu_news/s-news/01ryutsu02_02000374.html

Publication of "Multi-Stakeholder Effort Collection for Addressing Dis-/mis-information on the Internet" (Press release) https://www.soumu.go.jp/menu_news/s-news/01ryutsu02_02000405.html

society, and governments.

Furthermore, in bilateral dialogues such as the “14th Japan-the U.S. Dialogue on the Digital Economy” and the “29th Japan-EU ICT Policy Dialogue” held in Febru-

ary 2024, discussions were held on strengthening cooperation on measures against dis-/mis-information in the European and American regions, as well as in the Asia-Pacific region, including ASEAN.

4. Realization of data distribution society toward the stimulation of Japan

(1) Development of disaster information systems

Japan is one of the world’s most disaster-prone countries, and each time a large-scale natural disaster occurs, it suffers significant social and economic damage. Given the ongoing predictions of large-scale natural disasters,

such as the Nankai Trough Earthquake, it is crucial to efficiently utilize ICT to mitigate human and material damage caused by disasters.

A Development of a disaster-resilient fire and disaster prevention communication network

To collect and transmit information related to damage situations, a communication network that can reliably function even during disasters is essential. Therefore, the current infrastructure includes several key communication networks that connect the national government, the Fire and Disaster Management Agency, local governments, and residents. These networks are: (1) the Central Disaster Prevention Radio Network for collecting and transmitting information within the government; (2) the Fire and Disaster Prevention Radio Network connecting the Fire and Disaster Management Agency with

prefectures; (3) the Prefectural Disaster Prevention Administrative Radio Network connecting prefectures with municipalities; (4) the Municipal Disaster Prevention Administrative Radio Network connecting municipalities with residents; and (5) the Satellite Communication Network connecting the national government with local governments or between local governments. Additionally, efforts are being made to introduce high-performance and cost-effective next-generation systems for the satellite communication network.

B Deployment of mobile communication equipment for disaster response

The MIC lends mobile communication equipment for disaster response to local governments to ensure communication in affected areas even if mobile phone networks are disrupted (As of April 2024, 1,065 simple radios, 179 MCA radios, and 106 satellite phones are deployed across the Regional Bureau of Telecommunications etc. nationwide). Following the 2024 Noto Penin-

sula Earthquake, the number of satellite phones was increased, and satellite internet equipment and public safety mobile systems were established. These devices are used to build communication environments in evacuation centers and to support the collection and transmission of disaster information and the smooth execution of emergency recovery activities.

C Securing emergency communication means during disasters

To prepare for situations where public telecommunication services become difficult to use during disasters, the MIC has been deploying ICT units (attaché case type) to regional communication bureaus nationwide since FY2016. These units are lent to disaster-related or-

ganizations upon request to ensure necessary communication means (As of April 2024, 25 units are deployed across the Regional Bureau of Telecommunications etc.).

D Stable operation of the Nationwide Instantaneous Warning System (J-Alert)

The Fire and Disaster Management Agency has established the “Nationwide Instantaneous Warning System (J-Alert)” to instantly transmit information on urgent situations, such as ballistic missile alerts, emergency earthquake warnings, and major tsunami warnings, from the national government to residents via emergency alert emails to mobile phones and municipal

disaster prevention administrative radios. To ensure the rapid and reliable transmission of emergency information via J-Alert, municipalities are urged to thoroughly check the proper functioning of J-Alert-related equipment, and efforts are being made to promote the redundancy of J-Alert information transmission methods.

E Promotion of the use of L-Alert

The MIC promotes the use of the common platform (L-Alert) that allows local governments to simultaneously send disaster-related information, such as evacuation orders, to various media, including numerous broadcasters and internet service providers. L-Alert has achieved nationwide operation across all 47 prefectures and has become an essential part of the disaster infor-

mation infrastructure.

To further promote the use and utilization of L-Alert, the MIC has conducted demonstrations related to mapping disaster-related information provided through L-Alert and has held training sessions for local government officials and other users. Additionally, considering the high public value of quickly and accurately convey-

ing disaster information to the public, the MIC is also examining the expansion of L-Alert functions to contrib-

(2) Promotion of ICT utilization in the medical field

Japan has entered a super-aging society, facing challenges such as increasing medical and nursing care costs and the uneven distribution of medical resources. To address these issues, the MIC is working to build and enhance a foundation for utilizing medical, nursing, and health data to improve and streamline medical and health services. The main focus is on promoting “Telemedicine” and “Utilization of PHR¹⁴ data.”

Specifically, as a research project by the Japan Agency for Medical Research and Development (AMED), the development and demonstration of an 8K endoscope system have been conducted since FY2022 to promote telemedicine, which is expected to be a significant solution to the uneven distribution of doctors. Additionally, efforts are being made to organize the necessary communication environments and network conditions for the realization of remote surgery. From FY2023, re-

(3) Promotion of ICT utilization in the education field

To promote the utilization of ICT in the education field, the MIC, in collaboration with the MEXT, conducted the “Smart School Platform Demonstration Project” from FY2017 to FY2019. This project aimed to verify safe, effective, and efficient data linkage methods between the “School Administration System” used by teachers and the “Classroom and Learning System” used by students. In FY2020, the “Smart School Platform Technical Specifications,” which are the results of the demonstration, were published on the website to promote and disseminate the initiative. Additionally, from FY2021 to FY2022, the necessary technical speci-

(4) Promotion of cashless payments

In the “Follow-up of the Growth Strategy” decided by the Cabinet in June 2019, it was aimed to double the cashless payment ratio to about 40% by June 2025, promoting the shift to cashless payments.

Among cashless payment methods, code payments face the issue of operational complexity for stores due to the coexistence of multiple services. To address this, the “Payments Japan Association” (observers: the MIC, the METI, etc.) was established as a promotion body by related organizations and businesses. In March 2019, the “Unified Technical Specification Guidelines for Code

ute to the government’s overall disaster DX efforts.

search and development are being conducted to build a data distribution infrastructure necessary for obtaining PHR data required by doctors from various PHR services to enhance medical care and refine diagnostic content.

Furthermore, considering the increasing complexity and diversification of information systems and services handling medical information and the emergence of new threats such as ransomware attacks, the “Guidelines for Safety Management in Information Systems and Service Providers Handling Medical Information” (the MIC and the METI) were revised in FY2023. Additionally, to promote the safe and secure utilization of private PHR services, discussions and improvements are being made to the “Basic Guidelines for Handling Health Checkup Information by Private PHR Service Providers” (the MIC, Ministry of Health, Labour and Welfare, and the METI).

cations (reference model) were examined to realize the “Digital Education Platform,” which enables data linkage between digital learning systems held by businesses outside of school.

From FY2023 onwards, to realize personalized education through the safe and secure utilization of educational data, investigations and studies are being conducted on the utilization of PDS (Personal Data Store) in the education field. Future efforts will include demonstrations to address the technical and institutional challenges specific to the education field.

Payments” were formulated, and the unified code based on these guidelines was named “JPQR.” Subsequently, efforts have been made to promote JPQR in industries with high compatibility, such as dining, retail, beauty, and taxis, as well as at local government offices where various document issuance fees are handled. By the end of FY2023, approximately 15,000 stores have adopted JPQR. Additionally, from FY2023, local tax payments using the unified QR code for local taxes have started, and the unified JPQR standard is also utilized in this QR code.

(5) Promotion of safe and reliable cloud services

With the widespread adoption of cloud services such as ASP, SaaS, PaaS, and IaaS, the range of available service options has expanded. Consequently, it has become necessary to establish an environment where users can obtain sufficient information to compare, evaluate, and select cloud services. In this context, the MIC has formulated and published a total of eight guidelines known

as the “Guidelines for Information Disclosure Concerning the Safety and Reliability of Cloud Services” since 2011 (partially revised in 2022). In 2022, an additional guideline titled “Guidelines for Information Disclosure Concerning the Safety and Reliability of AI-based Cloud Services (ASP/SaaS Edition)” was added to address the diversification of cloud services. Based on these guide-

¹⁴ The abbreviation for “Personal Health Record” is PHR. It generally refers to an individual’s lifelong health and medical information, including health check-up, vaccination history, medication information, test results, and other medical-related information, as well as personal vital signs measured daily. It is expected to be accurately understood by the individual as an electronic record and utilized for their own health promotion.

lines, the Japan Cloud Industry Association (ASPIC) has established and operates a certification system where third parties certify whether cloud service providers comply with the aforementioned guidelines. To date, over 310 services have been certified.

Furthermore, to promote the further adoption of cloud services, efforts are being made to disseminate and publicize exemplary cases of cloud services in collaboration with industry associations and other relevant organizations.

5. Creation of the safe and secure environment of ICT usage

(1) Improvement of support for digital utilization by the elderly and others

As the digitalization of society progresses, the MIC has been working on the “Project on Digital Utilization Support for Users” since FY2021 to provide support in the form of advice and consultations for the elderly and others who are anxious about using smartphones for online administrative procedures, with the aim of eliminat-

ing the digital divide and creating an environment where everyone can benefit from digitalization. In FY2023, these efforts were expanded to include conducting training sessions at over 6,000 locations nationwide, with a focus on mobile phone shops.

(2) Promotion of ICT literacy for a wide range of generations

To address the expanding opportunities for ICT use across a wide range of generations and the issue of the circulation of dis-/mis-information on the Internet, the MIC has been holding a “Study Group on Improving ICT Literacy for ICT Utilization¹⁵” since November 2022 and established a “Working Group on Improving ICT Literacy for Youth” in December 2022. Based on the results of

these discussions, a “Roadmap for Improving ICT Literacy for ICT Utilization” was compiled and published in June 2023, outlining the direction for short- or medium and long-term initiatives. In FY2023, efforts were made to develop learning content to address the capabilities necessary for improving ICT literacy and common challenges across a wide range of generations.

(3) Establishment of a safe internet environment for the youth

The MIC has been conducting “e-Net Caravan” free outreach sessions at schools and other educational institutions for children, students, parents, and educators to ensure a safe and secure internet environment. Additionally, they have created and published an “Internet Trouble Case Collection” that summarizes methods for preventing internet-related issues. Furthermore, they have conducted research to promote responses using parental controls¹⁶, including filtering.

In 2021, the MIC launched the website “Let’s Use the Internet Wisely! - A Guide to Safe and Secure Internet Use -¹⁷” to promote awareness of safe and secure internet use, featuring content tailored to preschoolers, their parents, youth, parents and educators, and seniors. The

site also includes special features on “Current Topics” such as “Cyberbullying including social media,” “Measures against Piracy on the Internet,” and “Dis-/mis-information,” contributing to efforts to improve literacy¹⁸.

Additionally, in FY2011, the MIC developed the “Internet Literacy Assessment Indicator for Students (ILAS)”¹⁹ to visualize the internet literacy of youth, focusing on their ability to respond to dangers and threats on the Internet. This assessment measures seven risks, including illegal information risk, inappropriate use risk, and privacy risk, and has been conducted annually since FY2012 for first-year high school students nationwide. In FY2023, it was conducted at 75 schools with 13,108 participants, achieving an overall correct answer rate of 71.4%.

(4) Support for research and development towards information barrier-free

The MIC provides partial subsidies to companies conducting research and development of technologies related to communication and broadcasting services for people with disabilities and the elderly, as part of the “Research and Development for Eliminating the Digital Divide” program. In FY2023, subsidies were provided to five entities.

Additionally, under Act on Advancement of Facilitat-

tion Program for Disabled Persons’ Use of Telecommunications and Broadcasting Services, with a View to Enhance Convenience of Disabled Persons (Act No. 54 of 1993), the NICT provides subsidies to companies and organizations developing and providing communication and broadcasting services for people with disabilities. In FY2023, subsidies were provided to six entities.

¹⁵ Study Group on Improving ICT Literacy for ICT Utilization
https://www.soumu.go.jp/main_sosiki/kenkyu/ict_literacy/index.html

¹⁶ It means that parents oversee their children’s internet use appropriately, considering their developmental stage and life cycle. This includes preventing troubles that may arise from children’s information dissemination. Management methods are divided into technical means (such as filtering, billing restriction functions, and time management functions) and non-technical means (such as creating rules between parents and children). (General Principles for Child-Related Measures (Cabinet Decision on December 22, 2023), P50)

¹⁷ Let’s Use the Internet Wisely! - A Guide to Safe and Secure Internet Use -
https://www.soumu.go.jp/use_the_internet_wisely/

¹⁸ Refer to the section 2 in Chapter 2, Part 2.

¹⁹ https://www.soumu.go.jp/use_the_internet_wisely/special/ilas/

(5) Improvement of information accessibility

To make it easier for everyone, including the elderly and people with disabilities, to use public institution websites, the MIC conducted a partial revision of the “Guidelines for Operating Everyone’s Public Websites” in the FY2023. In the same fiscal year, a survey on JIS compliance of public institution websites and workshops for public institutions were held at five locations nationwide. Efforts are also being made to promote the dissemination of self-assessment forms for information accessibility among companies and organizations. The “Information Accessibility Self-Assessment Form” is a tool for companies and organizations to publicly disclose the results of their self-assessment of whether their ICT

equipment and services meet information accessibility standards, serving as a reference for companies, public institutions, and people with disabilities when selecting ICT equipment and services. This self-assessment form was created by the MIC, drawing on the Voluntary Product Accessibility Template (VPAT) used in the U.S. In the U.S., the law mandates that the government must procure accessible electronic information equipment. The MIC has been promoting the use of these forms through the establishment of support centers, seminars, and the collection of good practices, as well as the updating of guidebooks.

(6) Provision of telephone relay services as public infrastructure

The “Telephone Relay Service” is a service where sign language interpreters and other operators act as intermediaries, interpreting sign language and text from individuals with hearing impairments or other disabilities affecting auditory, speech, or vocal functions, to facilitate communication via telephone between these individuals and those without such impairments.

To ensure the proper and reliable provision of the “Telephone Relay Service,” the Act on Facilitating the Use of Telephones by Persons with Hearing Impair-

ments, etc. (Act No. 53 of 2020) was enacted in December 2020. From July 2021, the Japan Foundation Telephone Relay Service, designated as the service provider, began offering the Telephone Relay Service as public infrastructure. To further promote the use of the Telephone Relay Service, the MIC, in collaboration with relevant ministries and agencies, has been conducting awareness and publicity activities. As of the end of FY2023, the number of registered users reached 15,267. (Figure 2-2-6-1)

Figure 2-2-6-1 Illustration of promotion of telephone relay service



Section 7 Trends in ICT technology policy

1. Summary

(1) Initiatives so far

The MIC has been promoting technology policies in the field of information and communication, focusing on efforts towards Beyond 5G, which is expected to become the next-generation fundamental information and communication infrastructure, serving as the foundation for various industries and social activities and being utilized across borders.

Specifically, since the establishment of the “Beyond 5G Promotion Strategy” by the MIC in June 2020, discussions on the “Strategy for Information and Communication Technology towards Beyond 5G” have been progressing within the Information and Communication Council. Additionally, a research and development fund has been established based on this strategy, aiming to strengthen support for research and development activities related to Beyond 5G and international standardization efforts by private entities and others.

Furthermore, in March 2021, the “6th Science, Tech-

nology, and Innovation Basic Plan” was approved by the Cabinet, aiming to promote research and development in advanced fields to ensure the safety and security of the public and to achieve a sustainable and resilient society. Relevant government ministries and agencies are collaborating and cooperating to advance research and development in advanced fields such as AI, quantum technology, remote sensing, and space.

The NICT is promoting fundamental and foundational research and development in five key areas (advanced electromagnetic wave technology, innovative networks, cybersecurity, universal communication, and frontier science) during the 5th medium- to long-term plan period (from April 2021 to March 2026).

Additionally, the MIC is providing support for the creation of technological innovations and for startups, which are one of the key players in implementing advanced ICT and fostering next-generation industries.

(2) Future challenges and directions

Regarding Beyond 5G, it is necessary to address the lesson learned from the past that even if Japan’s information and communication industry has established internationally excellent technologies, it has not always been able to translate them into significant business results. From the perspective of ensuring Japan’s economic security, it is also essential to demonstrate competitiveness in the global market. Therefore, it is imperative to comprehensively address research and development, international standardization, social implementation,

and overseas expansion to achieve its early realization.

In addition, for advanced fields such as AI, quantum technology, and space, early social implementation is considered a challenge for various issues, including strengthening the development of large LLMs, achieving simultaneous interpretation in anticipation of the Osaka-Kansai Expo, realizing highly reliable quantum communication, and achieving advanced space network technology.

2. Beyond 5G

In September 30, 2021, the MIC consulted the Information and Communications Council on the “Strategy for Information and Communication Technology Toward Beyond 5G,” and the council’s Information and Communication Technology Subcommittee on Technology Strategy deliberated on various activities and insights of industry, academia, and government, including the “Beyond 5G Promotion Consortium,” major companies, universities, and national research and development institutions, to discuss technology strategies such as research and development, intellectual property, and standardization. As a result, an interim report was com-

pleted on June 30, 2022, containing recommendations for Japan’s focus on key technology areas for Beyond 5G and the establishment of a framework enabling multi-year budgeting.

Subsequently, the “Act to Amend the Act on the National Institute of Information and Communications Technology, National Research and Development Agency and the Radio Act” (Act No. 93 of 2022) was enacted in December 2022, leading to the full-scale operation of the research and development fund established at the NICT in March 2023, as well as progress in the efforts of private sector entities and international discussions.

(1) Implementation of the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund Program

The MIC is implementing the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund Project based on the “Act to Amend the Act on the National Institute of Information and Communications Technology, National Research and Development Agency and the Radio Act” (Act No. 93 of 2022), which established a permanent fund at the NICT in March 2023 as a succes-

sor to the temporary fund set up in February 2021.

Under the aforementioned fund project, three programs have been established: the “Social Implementation and Overseas Deployment-Oriented Strategic Program” that provides focused support for research and development projects with strategic commitment for social implementation and overseas deployment; the “Element Tech-

nology and Seed Creation-Oriented Program” targeting the establishment of long-term element technologies and the creation of technology seeds; and the “Radio Effective Utilization Research and Development Program” targeting the research and development of technologies specified in Article 103-2, Paragraph 4, Item 3 of the Radio Act.

In particular, for the main target of the fund project, the “Social Implementation and Overseas Deployment-Oriented Strategic Program,” strong promotion of research and development aimed at social implementation and overseas deployment is being pursued, focusing on the following key technology areas based on the interim report of the Information and Communications Council, with the aim of sequentially implementing social implementation of the development results after 2025:

- (1) All photonics network technology to achieve ultra-high-speed, ultra-low-latency, and ultra-low-power consumption of communication infrastructure
- (2) Non-terrestrial network (NTN) technology such as satellite and HAPS for seamless connection of land, sea, and air communication coverage
- (3) Secure virtualization and integrated network tech-

(2) Promotion of intellectual property and standardization activities for Beyond 5G

The international standardization activities for Beyond 5G are expected to intensify, with major companies from around the world focusing their efforts on this. To achieve success in international standardization activities related to our country’s development achievements, it is important to support strategic projects with investments, business strategies, and management commitments in research and development projects. This support is crucial for the social implementation and overseas deployment of strategic products. The MIC has expanded the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund project through the supplementary budget for FY2023, and has established a new menu to support international standardization activities in addition to research and development. The operation of this support menu will be based on the “Approach to Support for International Standardization Activities through the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund Project,” which was compiled in March 2024 based on discussions in the Information and Communication Technology Subcommittee of the Information and Communication Council, the Technology Strategy Committee, and the Innovative Information and Communication Technology Project Business Evaluation WG.

Furthermore, in preparation for Beyond 5G, a “Business Strategy” in organizations and companies is essential as a strategic promotion of international standardization and intellectual property activities through collaboration between industry, government, and academia is being pursued. In line with this principle, the “Beyond 5G New Business Strategy Center” was estab-

nology to ensure a safe and highly reliable communication environment for users

In carrying out these activities, the MIC has established the “WG on Innovative Information and Communication Technology Project Business Evaluation¹⁾” within the Information and Communications Council (Information and Communication Technology Subcommittee on Technology Strategy) and compiled the “Appropriate Evaluation of Business Aspects of the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund Project” (announced on March 10, 2023), taking into account the interim report. In FY2023, 17 major research and development projects have been adopted in the Social Implementation and Overseas Deployment-Oriented Strategic Program, and the operation of the fund project is in full swing.

Furthermore, the fund will be expanded with FY2023 supplementary budget, and new initiatives will be launched, including the development of common infrastructure technology for inter-operator cooperation in all-optical networks, as well as support for strategic projects in international standardization activities.

lished in December 2020 to develop talent leading standardization and intellectual property activities, promote industry collaboration, raise awareness, and disseminate information. Specific activities include cross-organizational training programs for young talent at the core of next-generation corporate management, such as the “Leaders Forum,” and awareness-raising and information dissemination seminars for companies, especially in management and business departments, known as the “New Business Strategy Seminar.” Additionally, a new industry collaboration activity, “XG Ignite,” bridging information and communication, digital, and diverse fields and industries, was initiated from FY2023.

To advance international standardization activities from the early stages of research and development, international joint research with trustworthy and synergistic strategic partners in countries and regions is being conducted. Specifically, international joint research has been conducted with the U.S. and Germany since FY2022. Furthermore, based on the “Japan-EU Digital Partnership” in May 2022, joint research themes were solicited for the Innovative Information and Communication Technology (Beyond 5G (6G)) Fund project “Element Technology and Seed Creation Program.”

The “Beyond 5G Promotion Consortium,” established in December 2020 to vigorously and actively promote Beyond 5G through collaboration between industry, government, and academia, has been conducting studies on future technological trends and prospects for Beyond 5G as part of its activities. It has contributed to the development of the IMT-2030 framework recommendation²⁾ at the ITU-R based on input of contribution docu-

¹⁾ Changed the name of the WG from “WG Innovative Information and Communications Technology Project” (February 22, 2024)

²⁾ The recommendation ITU-R M.2160-0 “Framework and overall objectives of the future development of IMT for 2030 and beyond” was newly approved at the ITU Radiocommunication Assembly (RA-23) held in November 2023. Its purpose is to provide an overview, including the capabilities and use cases required for the next-generation mobile phone standards expected to be realized around 2030.

ments derived from the study results, following the 38th meeting of ITU-R SG5 WP5D in June 2021. Additionally, a “Beyond 5G White Paper” summarizing the study results on usage methods and performance targets was created in March 2022. Furthermore, to contribute to the discussion and promotion of the ITU-R WRC-27 Agenda Item 1.7, which focuses on the consideration of new frequency allocations for IMT beyond 5G, a survey of the usage status of existing wireless systems in the frequency bands under consideration, 7,125MHz-8,400MHz and 14.8GHz-15.35GHz, was conducted. Based on this survey, an updated version of the “Beyond 5G White Paper ver. 3.0” was published in March 2024. In addition, to promote the spread and advancement of Open RAN in our country and the overseas expansion of

(3) Trends in Japan and overseas surrounding Beyond 5G

A Initiatives by private sector entities

The number of domestic and international participants in the industry forum “IOWN Global Forum,” established by NTT, Intel, and Sony in 2019 as part of NTT’s IOWN concept, has been steadily increasing. In addition, Japan’s telecommunications industry has been making efforts as a whole, with KDDI joining in March 2023, following Rakuten Mobile’s participation.

In March 2023, NTT East and West commenced commercial services for “IOWN 1.0,” an all-optical network that achieves ultra-low latency. Furthermore, KDDI and SoftBank announced the introduction of all photonics

B Initiatives towards societal implementation

Various private sector entities and organizations are advancing efforts towards societal implementation for Beyond 5G.

The IOWN Global Forum is collaborating with various industries to consider use cases for the realization and proliferation of the IOWN concept, targeting practical use and commercialization around 2025, in addition to envisioning the future around 2030. They have cited early adoption examples around 2025, such as data center connections for the financial industry and remote/cloud media production for the broadcasting industry. They plan to proceed with specification development and verification towards commercialization.

In June 2023, Tokyu Land Corporation agreed to collaborate with NTT and its affiliates on new urban development utilizing IOWN-related technologies and service-

C Efforts toward overseas expansion

Regarding Open RAN, NTT DOCOMO established OREX as a brand to globally deploy Open RAN architecture and announced the establishment of a joint venture company “OREX SAI” with NEC in February 2024 to provide it in response to the requests of overseas telecommunications operators. Rakuten Mobile is also aiming to promote and expand the adoption of Open RAN

domestic companies, the “Open RAN Promotion Subcommittee” was established in March 2022 to discuss various issues related to Open RAN. The results of these discussions were compiled in the “Open RAN Promotion Subcommittee Activity Report” in March 2023. Furthermore, an “Beyond 5G International Conference” was held in February 2024 with the aim of strengthening collaboration between domestic and international stakeholders. In FY2024, the consortium plans to integrate with the 5th Generation Mobile Communications Promotion Forum (5GMF) to enhance the promotion structure for next-generation mobile communications and further accelerate efforts toward the social implementation of Beyond 5G technologies.

networks into their core networks. Regarding non-terrestrial network (NTN) technologies such as low-earth orbit satellites and HAPS, SoftBank is promoting the utilization of HAPS through alliances such as the “HAPS Alliance,” aiming to integrate various communication technologies into a single system to provide ubiquitous communication on land, at sea, and in the air. Additionally, Rakuten Mobile announced plans to provide domestic services using satellite-to-mobile direct communication in 2026 in collaboration with AST SpaceMobile in February 2024.

es, with the initial implementation being the introduction of IOWN 1.0 to “Shibuya Sakura Stage” in December 2023.

Furthermore, towards international standardization, organizations such as the NICT and the “Beyond 5G Promotion Consortium” have been contributing to the international vision for Beyond 5G. In November 2023, a framework recommendation was approved by ITU-R, reflecting proposals from Japan, outlining the capabilities and use cases for “IMT-2030,” with 6G in mind.

Additionally, at the 2023 World Radiocommunication Conference (WRC-23), frequencies and other resources were secured for the realization of Beyond 5G, including non-terrestrial network (NTN) technologies such as HAPS.

technology, establishing facilities for showcasing Open RAN technology and flexible technical verification environments to meet requests domestically and internationally. Against this backdrop, the adoption of Open RAN-related products by major telecommunications operators in North America and Europe is progressing (Figure 2-2-7-1).

Figure 2-2-7-1 Status of promotion of Open RAN to foreign telecommunication operators

Dish (the U.S.) adapted Open RAN of Fujitsu <ul style="list-style-type: none"> Dish, the U.S. telecommunication carrier, started to introduce the RU of Open RAN by Fujitsu (March 2021). 	NEC & Mavenir constructed the examination environment of Open RAN of Orange (France) <ul style="list-style-type: none"> NEC and Mavenir, who provides network software, constructed Open RAN in the 5G examination environment (September 2022).
1 & 1 (Germany) started commercial service using fully virtual technology by Rakuten <ul style="list-style-type: none"> 1&1 (German telecommunication carrier) constructed fully virtual mobile network of Open RAN technology by Rakuten and launched 5G commercial service (December 2022). 	Deutsche Telekom (Germany) adapted Open RAN of Fujitsu <ul style="list-style-type: none"> Deutsche Telekom selected Fujitsu and Nokia as the first commercial partner of Open RAN (February 2023).
NEC & Freshwave (the UK) demonstrated Open RAN in London <ul style="list-style-type: none"> DSIT (the UK) selected NEC & Freshwave (the UK telecommunication carrier), as a project to demonstrate technology, trust and possibility of realization of Open RAN in the center of London, and supported approximately 600 million yen (September 2023). 	AT&T (the U.S.) collaborate with Ericsson & Fujitsu in Open RAN <ul style="list-style-type: none"> AT&T announced a plan to lead the development of Open RAN in the U.S. It is planned to collaborate with suppliers such as Fujitsu and Ericsson to expand the Open RAN environment to full of wireless network (December 2023).
Fujitsu & Rakuten joined consortium of the U.S Open RAN construction <ul style="list-style-type: none"> NTIA (the U.S.) selected consortium (Fujitsu, Mavenir etc.) led by Dish, as a project to integrate and construct Open RAN, and supported approximately 76 hundred million yen (January 2024). Moreover, NTIA (the U.S.) selected a consortium led by AT&T (Verizon and docomo etc.), as a project to promote compatibility and commercialization of Open RAN, and supported approximately 64 hundred million yen (February 2024). Fujitsu & Rakuten collaborate as a supplier. 	White paper published by the European major telecommunication carriers <ul style="list-style-type: none"> Deutsche Telekom (Germany), Orange (France), TIM (Italy), Telefonica (Spain), Vodafone (the UK) published white paper on a process of Open RAN (February 2023) Europe plans many pilot projects of Open RAN after 2023, and also plans to implement commercially until 2025 in the all of Europe.

(Source) Compiled from various press materials

In preparation for Beyond 5G, NTT and its group companies are working on global deployment, including the establishment of the IOWN Global Promotion Office. NTT and NTT Data Group have conducted demonstrations of data center interconnection using all-optical networks in the U.S. and the UK. In October 2023, NTT and Chunghwa Telecom in Taiwan signed a basic agreement to realize international network connections based on IOWN. Additionally, in February 2024, Fujitsu announced joint discussions with Chunghwa Telecom to

build all-optical networks based on the IOWN concept in Taiwan. In the optical field, Japanese companies have been expanding their share of major transmission equipment in the global market, particularly in North America.

At the G7 Digital Technology Ministers' Meeting held in Gunma Takasaki in April 2023, a future vision for next-generation networks, including both wireless and wired networks, based on the vision of Beyond 5G, was formulated, and agreement was reached on the G7 Action Plan for building safe and resilient digital infrastructure.

(4) Formulation of a new information and communication technology strategy

Based on these trends related to Beyond 5G, a new strategy for research and development, international standardization, social implementation, and overseas expansion of Beyond 5G was formulated through organic collaboration. In November 2023, discussions were re-

sumed at the Information and Communication Council, and in June 2024, the final report "Approach to Information and Communication Technology Strategy for Beyond 5G" was compiled.

3. AI technologies

Since the proposal of deep learning in 2006, the third AI boom has arrived, leading to significant technological innovations in fields such as image recognition and natural language processing. Furthermore, in 2022, the trend of generating AI³, which can automatically generate images and text based on training data, began to gain popularity worldwide, intensifying the competition in the development of generating AI. In Japan, the development of generating AI has become active in numerous private companies, academia, and other entities. Simultaneously, the utilization of generating AI in a wide range of industrial sectors is progressing, showing signs of

bringing about a major transformation in society.

The MIC, based on the "AI Strategy 2022" (decided by the Integrated Innovation Strategy Promotion Council in April 2022) and the "Tentative Summary of AI Issues" (AI Strategic Council in May 2023), is collaborating with the NICT, a core center for AI-related activities, to conduct a wide range of research and development and social implementation related to natural language processing technologies such as large-scale language models and multilingual speech translation, distributed federated machine learning technologies, and AI technologies based on cognitive models of the brain.

³ In 2022, "Stable Diffusion" which can automatically generate images, and "ChatGPT" which can automatically generate sentences appeared.

(1) Strengthening the development capability and risk response capability of LLMs

The NICT has accumulated a vast amount of language data through years of research and development in AI technology. In addition, in July 2023, it prototyped LLMs based on high-quality Japanese data created from the language data, demonstrating expertise in constructing high-quality training language data required for LLMs development. Leveraging the data and expertise possessed by the NICT, efforts are underway to enhance

the development capability of LLMs in Japan by establishing and expanding a large amount of high-quality, safe Japanese-centric training language data required for LLMs development and providing access to LLMs developers in Japan. Additionally, research and development efforts are being made to address various risks associated with LLMs.



Figure (related data) Process of the development and use of LLMs and initiatives by the NICT
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00408>
(Data collection)

(2) Research and development for advanced multilingual translation technology

The MIC, in collaboration with the NICT, is working on research and development of multilingual translation technology to eliminate the “Language Barrier” worldwide and achieve free global exchange. The NICT’s multilingual translation technology, utilizing the latest AI technology, has achieved practical-level translation accuracy for 18 languages, considering visits to Japan, foreign residents, and diplomatic responses. Furthermore,

the MIC and the NICT are promoting the social implementation of multilingual translation technology. The NICT provides “VoiceTra,” a research app for individual travelers, and over 30 private services have been deployed through technology transfer⁴, utilized in a wide range of fields such as government agencies, disaster prevention, transportation, and healthcare.



Figure (related data) Multilingual translation technology
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00409>
(Data collection)

In anticipation of the 2025 Osaka-Kansai Expo, the MIC formulated the “Global Communication Plan 2025” in March 2020. Based on this plan, the MIC is establishing a computing environment for the NICT to conduct AI research and development at the world’s top level and

is conducting research and development from FY2020 to achieve “Simultaneous Interpretation” that goes beyond the conventional sequential translation, addressing business and international conference discussions.



Figure (related data) Initiatives to further advance multilingual translation technology
URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00410>
(Data collection)

Additionally, plans are in place to add three more languages, along with research and development for multilingual simultaneous interpretation, for the languages

with practical-level translation accuracy, considering responses to foreign residents.

⁴ Council for the Promotion of Global Communication Development: Examples of Products and Services by Private Companies Utilizing Multilingual Translation Technology from the NICT https://gcp.nict.go.jp/news/products_and_services_GCP.pdf

4. Quantum technologies

(1) Trends in quantum security and network policy

Quantum technology is an innovative technology that will dramatically and discontinuously advance future society and the economy. It is also crucial for economic security. Countries such as the U.S., Europe, and China have significantly expanded their investments in research and development and have strategically developed research and development bases and talent in various countries.

The government as a whole, based on the “Quantum Technology Innovation Strategy” (decided by the Integrated Innovation Strategy Promotion Council in January 2020), the “Vision for a Quantum Future Society - Vision for the Future Society to be Aims by Quantum Technology and Strategies for its Realization -” (decided by the Integrated Innovation Strategy Promotion Council in April 2022), and the “Quantum Future Industry Creation Strategy” (decided by the Integrated Innova-

tion Strategy Promotion Council in April 2023), as well as the “Promotion Measures for the Creation and Development of the Quantum Industry” (reported by the Quantum Technology Innovation Conference to the Integrated Innovation Strategy Promotion Council in April 2024), have been working to strengthen and complement these three strategies. They are also promoting activities to support the strengthening of research and development and commercialization in various technology fields (quantum computers, quantum software, quantum security networks, quantum measurement/sensing/quantum materials, etc.), and are working to create innovation through a comprehensive approach involving industry, academia, and government, from basic research to technology verification and talent development.

(2) Research and development of quantum cryptographic communication technology

In the era of quantum computers, where the security of modern cryptography is at risk, quantum cryptography that can reliably detect eavesdropping based on the physical properties of quantum is required. The MIC is promoting research and development of quantum cryptographic communication technology (quantum key dis-

tribution technology) in collaboration with the NICT. Based on the government’s overall strategy, a “Quantum Security Base” was established at the NICT in FY2021, and efforts are being made to promote social implementation, talent development, and a wide range of activities through the construction and use of test beds.

A Research and development of long-distance and networked quantum cryptographic communication

To realize the social implementation of quantum cryptographic communication, extending the communication distance is a major challenge. Therefore, the MIC has been working on the research and development of long-distance link technology and relay technology for ground-based quantum cryptographic communication since FY2020. In addition, research and development for the use of quantum cryptographic communication in se-

cure satellite communication networks has been underway since FY2018, and in FY2023, a demonstration test of cryptographic key sharing technology between the International Space Station (ISS) and the ground was conducted. Efforts will continue to advance research and development for the construction of a global-scale quantum cryptographic communication network.

B Establishment of quantum cryptographic communication test beds and promotion of social implementation

The NICT has been conducting research and development of quantum cryptographic communication technology from an early stage, and has been operating the “Tokyo QKD Network”, a quantum cryptographic communication test bed, since 2010 for the purpose of verifying the principles of quantum cryptographic communication. The basic specifications of quantum cryptographic communication equipment, based on the long-term operation results of the Tokyo QKD Network, were adopted as international standards (ITU-T Y.3800 series) in 2020, and have high international competitive-

ness.

Quantum cryptographic communication is expected to be deployed not only for information exchange between important domestic institutions, but also for commercial services such as finance and healthcare. Therefore, the MIC has been working on the construction of a wide-area test bed for quantum cryptographic communication that can conduct network configuration verification since FY2021, and is accelerating social implementation through the use of practical environments.

C Research and development for the realization of a quantum internet

A quantum internet, which stably realizes long-distance communication while maintaining quantum states, is expected to serve as the foundation for various quantum technologies, such as secure communication and distributed quantum computing. Therefore, the MIC

has started research and development of essential technologies to realize a quantum internet that maintains quantum states and achieves stable long-distance quantum communication from FY2023.



Figure (related data) Image of communication network of quantum cryptographic at the global level

URL: <https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r06/html/datashu.html#f00411>
(Data collection)

5. Remote sensing technologies

At the NICT, research and development of remote sensing technology are being conducted to observe conditions such as rainfall, water vapor, wind, and the earth's surface with high temporal and spatial resolution. This is aimed at early detection and understanding of the development mechanisms of sudden atmospheric phenomena such as linear precipitation zones and localized torrential rainfall, as well as rapid assessment of damage situations during disasters.

Research and development efforts include the deployment of dual-polarization phased array weather radar

(MPPAWR) capable of high-speed and high-precision three-dimensional observation of rain clouds and promoting the utilization of its data. Other efforts include technology to estimate the amount of water vapor in the atmosphere using the propagation delay of digital terrestrial broadcasting waves, wind profiler technology capable of observing wind speed in the upper atmosphere, and ground-based water vapor and wind LiDAR technology using eye-safe infrared pulse lasers capable of simultaneously observing water vapor and wind.



Figure (related data) Deployment of a network for observing water vapor in linear precipitation zones - A challenge to improve the accuracy of short-term rainfall forecasts

URL: <https://www.nict.go.jp/press/2022/06/29-1.html>

6. Space ICT

Based on the Basic Plan for Space Policy under the Basic Act on Space (Act No. 43 of 2008), the MIC is promoting research and development related to space development and utilization, including the following:

- (1) Research and development of radio and optical hybrid communication technology for small satellite constellations and the use of unused frequency bands for space networks to effectively utilize frequency resources and realize future ultra-wide-band satellite communication systems;
- (2) Research and development to establish the foundational technology for satellite-based quantum cryptography and to realize a quantum cryptography network using satellite networks;
- (3) Research and development of terahertz wave-based lunar water and energy resource exploration technology to contribute to the international space exploration program proposed by the U.S. (Artemis program);
- (4) Research and development of satellite communication systems for the Technology Experiment Satellite 9 and optical communication technology capable of 10Gbps-class ground-to-satellite and inter-satellite data transmission;
- (5) Development of space environment monitoring sensors for 24/7 manned operation for space weather forecasting and for the successor to the

Himawari geostationary meteorological satellite, which involves observing and analyzing the ionosphere, magnetosphere, and solar activity; and

- (6) Research and development of foundational technologies such as optical amplifiers to further enable high-speed, high-capacity, and long-distance satellite optical communication technology in conjunction with the practical application of satellite optical communication technology.

Furthermore, to maintain and strengthen the independence of Japan's space activities and to strongly support the efforts of private companies and others in advanced technology development, technology demonstration, and commercialization, the Japan Aerospace Exploration Agency (JAXA) established the Space Strategy Fund in March 2024 as a focal point for academia, industry, and government. Going forward, in collaboration with relevant government ministries (the Cabinet Office, the MEXT, the METI), the aim is to accelerate the commercialization of private companies targeting the space-related market, expand access and utilization of space by academia, industry, and government, and actively engage in and strategically collaborate on cutting-edge technology development by a wide range of players.

7. Supports for ICT startups

Based on the “Startup Development Five-year Plan” (decided by the New Capitalism Realization Conference in November 2022), the MIC is implementing the “Startup and Budding Researchers Support Program” to foster next-generation industries through the creation and utilization of advanced ICT, with a division of roles between the public and private sectors, providing comprehensive support from seed research and development to business implementation.

Through public solicitation, individuals or startups aiming to start businesses or expand them are selected to receive research and development funding for ICT-

related projects. Additionally, leveraging the results of the “INNO-vation Program” implemented for 10 years until FY2023, the ministry is providing comprehensive support in collaboration with support organizations nationwide and across various fields, promoting joint public-private support.

Furthermore, to enhance the ripple effects of the measures, the MIC is promoting initiatives under the name “ICT Startup League,” in collaboration with willing private companies and others, to support private sector activities and industry revitalization.

Section 8 Promotion of international strategies for ICT

1. Summary

(1) Initiatives so far

Based on the “Infrastructure System Overseas Promotion Strategy 2025” (decided by the Ministerial Meeting on Strategy relating to Infrastructure Export and Economic Cooperation on December 10, 2020, revised on June 17, 2021, and supplemented on June 1, 2023) and the “Ministry of Internal Affairs and Communications Overseas Promotion Action Plan 2025” (established by the MIC on July 21, 2022), the MIC has been actively engaged in the overseas expansion of ICT infrastructure systems. This includes activities such as project discovery, proposal, and formation, as well as providing comprehensive support for companies, including human resource development, maintenance, and finance, from the

(2) Future challenges and directions

The global spread of the novel coronavirus has accelerated the digitalization of society and the economy, leading to an increased demand for the development and enhancement of communication networks and effective digital solutions for problem-solving. Moreover, the importance of high-quality infrastructure has been highlighted in the context of discussions on economic security. In this context, leveraging bilateral and multilateral frameworks to expand our country’s high-quality infrastructure overseas not only contributes to addressing social issues in various countries but also helps tackle global challenges such as climate change, and further contributes to the realization of the SDGs. Additionally, enhancing the international competitiveness of our country through the dissemination and development of digital technologies is crucial for the economic development of our nation.

In light of these circumstances, the MIC aims to pro-

mote the strengthening of our country’s international competitiveness in digital technology and the advancement of global problem-solving through international cooperation. Specifically, as part of the promotion of the “Ministry of Internal Affairs and Communications Overseas Promotion Action Plan 2025,” we are placing emphasis on the overseas expansion of ICT infrastructure systems such as 5G and submarine optical cables, as well as the one-stop deployment of ICT solutions in fields such as healthcare and agriculture. We believe it is essential to leverage our country’s technology and experience to contribute to the economic development and problem-solving efforts worldwide. Furthermore, taking a leading role in international rule-making in the digital field is crucial, and we will actively participate in international discussions and utilize international conferences as platforms for engagement.

Furthermore, we have actively participated in policy dialogues between countries, including bilateral dialogues with the U.S., as well as multilateral forums such as the G7 and G20, contributing to the formation of international rules related to the digital economy and international rule-making discussions.

In addition, as digital infrastructures such as submarine optical cables and 5G networks have become essential infrastructures supporting national life and economic activities, we have worked to ensure their safety and reliability from the perspective of economic security through international cooperation.

2. Expansion of digital infrastructures overseas

In the context of the increasing global demand for communication infrastructure and services due to the advancement of digitalization in society and the economy, the MIC is promoting the enhancement of the inter-

national competitiveness of Japan’s digital industry and the promotion of global problem-solving using digital technology. This includes supporting the overseas promotion of digital infrastructure.

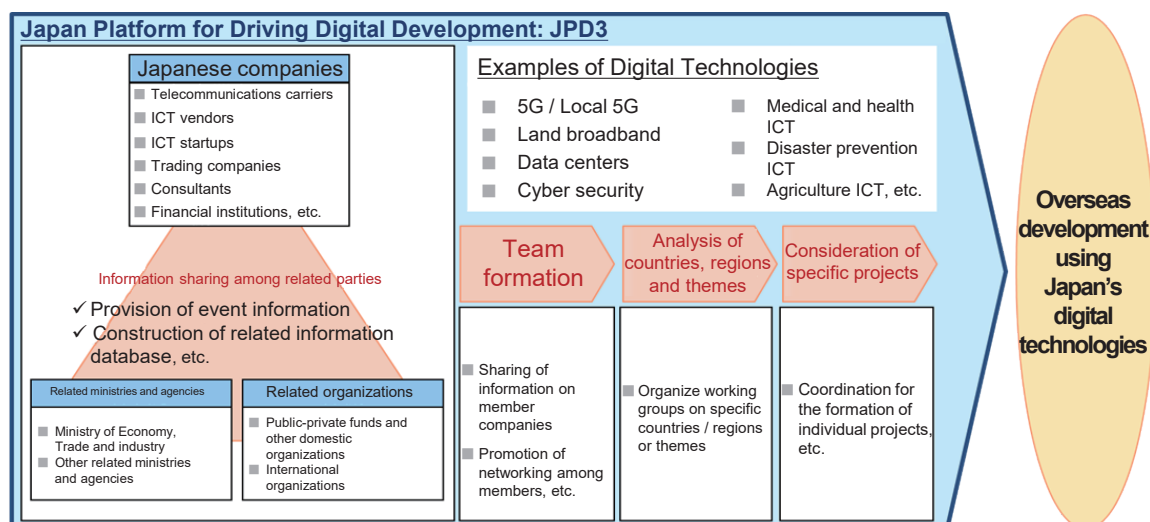
(1) Overseas promotion support tools by the MIC

The MIC is implementing initiatives that take into account the circumstances and challenges of each country, providing support tailored to each phase from basic research to demonstration projects for the overseas expansion of Japan’s high-quality digital infrastructure.

Additionally, in February 2021, the MIC established the “Digital Overseas Promotion Platform,” a public-private partnership framework to support the overseas ex-

pansion of Japan’s ICT (**Figure 2-2-8-1**). As of the end of March 2024, this framework includes over 200 members, primarily Japanese ICT companies, as well as related ministries and agencies. The platform facilitates information sharing on 71 countries and regions through a database, holds workshops, forms teams, and discusses specific projects.

Figure 2-2-8-1 Digital Overseas Promotion Platform



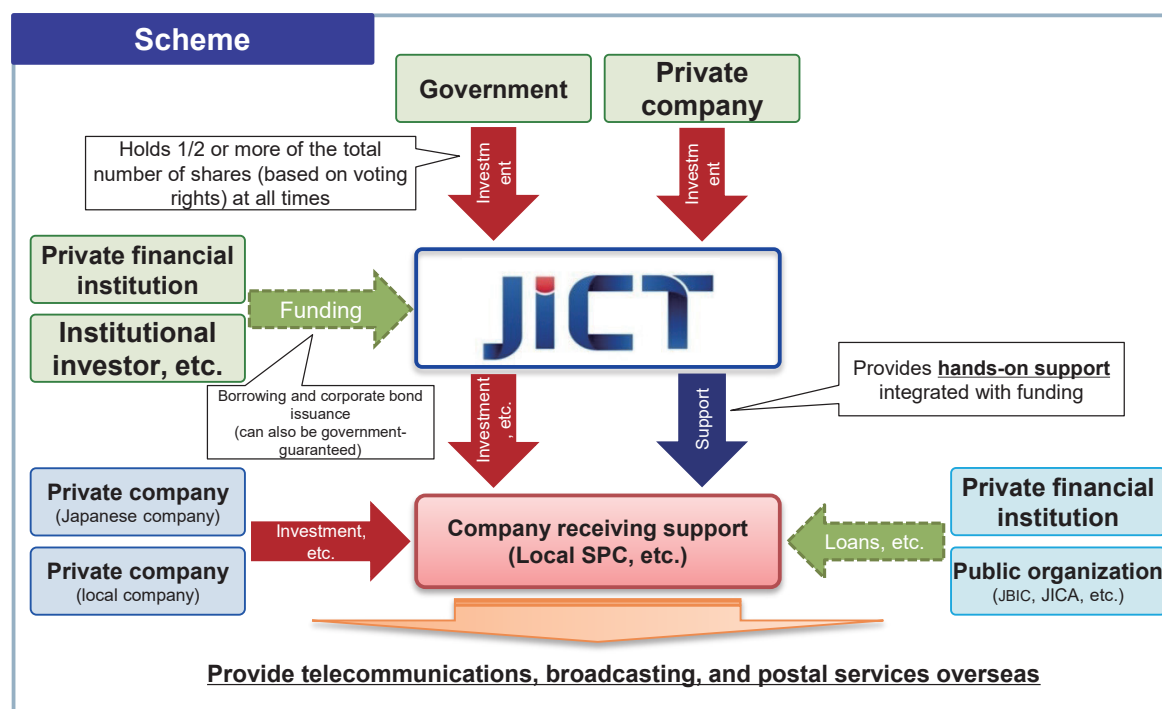
(2) Fund Corporation for the Overseas Development of Japan's ICT and Postal Services (JICT)

The Fund Corporation for the Overseas Development of Japan's ICT and Postal Services (JICT), a public-private fund under the jurisdiction of the MIC, provides investment and hands-on support to those conducting or supporting communication, broadcasting, and postal services overseas (Figure 2-2-8-2). As of the end of March 2024, the JICT has decided to support a cumulative total of approximately 108.7 billion yen in investments and loans.

Furthermore, considering the recent developments in ICT, the needs, and the policy trends of various coun-

tries, the support criteria of the JICT were revised in February 2022 (Ministry of Internal Affairs and Communications Notification No. 34 of 2022). This revision allows the JICT to support projects that do not involve the construction of hard infrastructure (ICT service projects) and to make LP investments in funds. This has made it easier to support the overseas expansion of not only large enterprises but also medium-sized, small, and regional companies. In FY2023, three new support decisions were made.

Figure 2-2-8-2 Support through the Fund Corporation for the Overseas Development of Japan's ICT and Postal Services (JICT)



(3) Efforts for overseas expansion in each field

A Core communication infrastructure

Regarding mobile communication networks, in 2021, the Ethiopian government approved the granting of licenses to an international consortium, including Japanese companies, for the country's mobile phone business, and commercial communication services commenced in October 2022. This serves as an opportunity to promote the expansion of digital solutions in Ethiopia and the African region.

In the area of submarine optical cables, the JICT is supporting submarine optical cables projects in Southeast Asia, with a total project cost of approximately 400 million dollars, including support decisions for up to 78 million dollars in investment. Furthermore, Japan has been involved in a project in the Indian Ocean region announced by Prime Minister Modi of India in August 2020, with Japanese companies participating in the project, which was completed in July 2023. Efforts are also being made to improve communication environments in Pacific island countries with the cooperation of interested countries and relevant ministries and agencies. Additionally, Japan has signed a memorandum of cooperation with the European Commission for the establishment of safe, resilient, and sustainable global submarine cable connectivity¹.

Regarding 5G, as the importance of safe and secure 5G network is discussed internationally, efforts are being made to deploy "Open RAN" which is focused on as a technology to realize open and secure network and systems that utilize it for overseas expansion. Surveys

on the potential for Open RAN deployment were conducted in Vietnam and the Philippines in FY2022, and in Australia and Indonesia in FY2023.

In the U.K., the test environment for Open RAN and the conformance of RAN devices to the interface specifications defined by the O-RAN Alliance were conducted in FY2022.

In the Philippines, based on the results of the previous year's survey, a demonstration was conducted in FY2023 (FY2023) to verify the usefulness of Open RAN devices.

Regarding data centers, since March 2021, Japanese companies have been participating in projects aimed at improving the telecommunications environment in Uzbekistan, including the development of data centers and other telecommunications infrastructure. Additionally, through the JICT, we have been supporting the development and operation of data centers in India, with a decision made in October 2022 to provide funding of up to 86 million dollars.

The Japanese digital terrestrial television broadcasting standard has been adopted by 20 countries, primarily in Central and South America. In October 2022, Botswana completed the transition to digital broadcasting nationwide, becoming the first country outside Japan to do so. Costa Rica and Chile are also scheduled to complete the transition in January 2023 and April 2024, respectively. Continuous supports for smooth transitions to digital broadcasting will be conducted.

B Utilization models for digital technology

Regarding the utilization in the medical field, we have been receiving orders for smartphone-based telemedicine systems, primarily in the Central and South American region. Since FY2020, we have been working on the dissemination and deployment of endoscopes and diag-

nostic support systems using medical AI, leveraging high-definition imaging technology in Southeast and Southwest Asian countries. This effort includes conducting demonstrations in local hospitals. In FY2022, we conducted a survey and demonstration in Vietnam.

C Broadcasting content

Our country's broadcasting companies have been collaborating with local governments to produce broadcasting content that showcases the appeal of Japan, and disseminating it through overseas broadcasting stations. They have also been continuously supporting the overseas expansion of broadcast content through international trade fairs, resulting in various effects such as expanding the sales channels for local products and increasing the penetration of Japan's appeal. Further-

more, starting from FY2023, efforts have been made to establish an online platform for disseminating information about Japanese broadcast content to overseas companies. The goal is to increase the overseas sales revenue related to broadcast content by 1.5 times by FY2025 compared to FY2020, aiming to further promote the overseas expansion of broadcast content and strengthen soft power through these initiatives.

D Other areas

(A) Fire prevention

Since the signing of the "Memorandum of Cooperation in the Field of Firefighting between the Ministry of Internal Affairs and Communications of Japan and the Ministry of Public Security of the Socialist Republic of Vietnam" on October 8, 2018, we have been promoting the high quality of Japanese firefighting equipment through exchanges of opinions on preventive policies

and standards for firefighting equipment. Additionally, in February 2023, we conducted basic training on fire prevention technology. Moving forward, we will continue to engage with Vietnam and other Southeast Asian countries to promote the overseas expansion of firefighting equipment that meets Japanese standards.

¹ https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000155.html

(B) Postal service

Targeting mainly emerging and developing countries in Southeast Asia, Europe, and the Caucasus region, we are promoting the overseas expansion of the Japanese postal infrastructure system through a public-private partnership. This involves understanding the challenges and needs related to improving the quality of postal services and optimizing postal operations, and providing Japanese expertise, experience, technology, and systems to address and realize these needs. To date, we

(C) Administrative consultation

In the field of administrative consultation, we have been collaborating and cooperating with public ombudsmen from various countries. We have signed memorandums of cooperation on administrative complaint resolu-

tion with four countries: Vietnam, Uzbekistan, Iran, and Thailand. Based on these agreements, we have implemented initiatives such as accepting a total of approximately 310 trainees from Vietnam.

3. Contribution to formulation of international rules on the digital economy

(1) Data Free Flow with Trust (DFFT)

Regarding DFFT (Data Free Flow with Trust), an international framework for the realization of DFFT (Institutional Arrangement for Partnership: IAP) was agreed upon at the G7 Digital and Technology Ministers' Meet-

ing held in Gunma-Takasaki in April 2023. The establishment of the IAP was approved at the G7 Summit held in May, and the IAP was established under the OECD in December.

(2) Response to discussions on international rules in cyberspace

A Formulation of international rules in cyberspace

The MIC emphasizes two key points in the formulation of international rules in cyberspace: (1) ensuring the free flow of information, which not only supports democracy but also serves as a source of innovation and an engine for economic growth; and (2) the necessity of a multi-stakeholder framework that includes the participation of all the related stakeholders such as private companies, academia, and civil society, who actually use and manage the internet, to ensure sufficient cybersecurity. Based on these points, the Ministry has been ad-

ressing related topics in bilateral dialogues such as the U.S.-Japan Dialogue on Digital Economy (the U.S.-Japan DDE) and the Japan-EU ICT Strategy Workshop, strengthening cooperation with like-minded countries. Additionally, in April 2022, Japan, the U.S., Australia, Canada, the EU, and the UK, along with other willing countries, launched the "Declaration for the Future of the Internet," actively participating in discussions at multilateral meetings.

B Bilateral and multilateral dialogues on cybersecurity

Regarding bilateral government discussions on cybersecurity, the "8th Japan-the U.S. Cyber Dialogue"² was held in May 2023, the "5th Japan-India Cyber Dialogue"³ in September 2023, and the "7th Japan-France Cyber Dialogue"⁴ in November 2023. These dialogues included discussions on situational awareness, initiatives in both countries, international cooperation, and capacity-building support, thereby strengthening cooperation with various countries.

In terms of multilateral discussions on cybersecurity, the Japan-ASEAN Cybersecurity Policy Meeting has

been a platform for exchanging opinions and information on the status of initiatives in each country and capacity-building support for the ASEAN region. Additionally, under the framework of the so-called Quad (Japan, the U.S., Australia, and India), cooperation on cybersecurity has been agreed upon, and discussions aimed at strengthening cooperation with like-minded countries have been conducted. The "Japan-the U.S.-Australia-India Cybersecurity Partnership: Joint Principles"⁵ was announced in the joint statement of the Quad Leaders' Meeting in May 2022.

(3) Promotion of trade liberalization in the ICT sector

From the perspective of complementing the multilateral free trade system centered around the World Trade Organization (WTO) and promoting bilateral economic

partnerships, Japan is actively working on concluding Economic Partnership Agreements (EPAs) and Free Trade Agreements (FTAs).

² https://www.mofa.go.jp/mofaj/press/release/press4_009685.html

³ https://www.mofa.go.jp/mofaj/press/release/press4_009785.html

⁴ https://www.mofa.go.jp/mofaj/press/release/press5_000160.html

⁵ <https://www.mofa.go.jp/mofaj/files/100347891.pdf>

Specifically, since 2018, Japan has discussed and reached the signing and enforcement of several agreements, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Japan-EU Economic Partnership Agreement (Japan-EU EPA), the Japan-US Digital Trade Agreement, the Japan-UK Comprehensive Economic Partnership Agreement (Japan-UK EPA), and the Regional Comprehensive Economic Partnership (RCEP). Additionally, negotiations

(4) Promotion of strategic international standardization

International standardization in the information and communication sector is a crucial policy issue that leads to the creation of global markets through the unification of standards. Securing strategic initiatives in the formulation of international standards is extremely important from the perspective of enhancing international competitiveness. Therefore, Japan is strategically promoting

for the Japan-China-the Republic of Korea Free Trade Agreement are ongoing. In all EPA negotiations, Japan aims to achieve liberalization commitments exceeding WTO standards in the telecommunications sector, including demands for the removal or relaxation of foreign investment restrictions, negotiations on the establishment of competition-promoting regulations such as interconnection rules, and discussions on cooperation among the signatory countries.

international standardization activities.

Specifically, Japan is conducting trend surveys on de jure standards⁶ and forum standards⁷, fostering international standardization personnel, and implementing initiatives to deepen understanding of the importance of standardization activities.

4. Economic security in the digital field

In the MIC, in view of the importance of the economic security in the communication field, such as 5G, initiatives have been undertaken in the digital field. For example, the “Global Digital Connectivity Partnership” (GDGP) launched in April 2021 following the Japan-the U.S. summit, and the “Cooperation Memorandum on 5G Supplier Diversification and Open RAN” signed at the Japan-the U.S.-Australia-India (Quad) summit in May 2022. Building on these, in May 2023 at the Japan-the U.S.-Australia-India summit, a “Open RAN Security Report” was released, demonstrating efforts to ensure the safety and reliability of global digital infrastructure in

collaboration with allied countries, including the U.S.

Furthermore, under the Act on the Promotion of Ensuring National Security through Integrated Implementation of Economic Measures established in 2022, four systems were created. Among these, the system related to “Ensuring the Stable Provision of Specific Social Infrastructure Services” completed the establishment of the cabinet order and the ministerial ordinance⁸ in November 2023. Under this system, specific operators in the telecommunications, broadcasting, and postal business that meet the designated criteria have been designated. The operation of this system commenced in May 2024.

5. International cooperation in multilateral frameworks

The MIC actively leads international cooperation efforts in the ICT sector through policy discussions within multilateral frameworks such as G7/G20, APEC, APT, ASEAN, ITU, the United Nations, WTO, and OECD. These efforts aim to promote the free flow of informa-

tion, ensure a safe and secure cyberspace, develop high-quality ICT infrastructure, and contribute to the achievement of the United Nations Sustainable Development Goals (SDGs).

(1) G7/G20

Within the G7 framework, active discussions on policies for the development of the digital economy have been ongoing since the G7 ICT Ministers’ Meeting in Takamatsu, Kagawa in April 2016. Similarly, within the G20 framework, which includes countries like China and India, continuous discussions on the digital economy have been taking place. Specifically, at the “G20 Ministerial Meeting on Trade and Digital Economy in Tsukuba, Ibaraki” held in Tsukuba, Ibaraki Prefecture, in June 2019, the G20 agreed for the first time on AI principles based on a “human-centered” approach, which was also endorsed at the G20 Osaka Summit at the lead-

ers’ level. The concept of promoting the Data Free Flow with Trust (DFFT) was also supported at the leaders’ level and reaffirmed at the G20 Digital Economy Ministers’ Meeting (Saudi Arabia) in 2020.

In 2023, Japan chaired the G7, and at the G7 Digital and Tech Ministers’ Meeting in Takasaki, Gunma in April, discussions were held on six themes: (1) “Facilitation of Cross-Border Data Flows and Data Free Flow with Trust,” (2) “Secure and Resilient Digital Infrastructure,” (3) “Internet Governance,” (4) “Emerging and Disruptive Technologies in Innovating Society and Economy,” (5) “Responsible AI and Global AI Gover-

⁶ Standards formulated by official international standardization organizations such as the International Telecommunication Union (ITU).

⁷ Standards formulated through consensus among multiple companies, universities, and other stakeholders

⁸ “Cabinet Order of the Act on the Promotion of Ensuring Security by Taking Integrated Economic Measures” and “Ordinance of the Ministry of Internal Affairs and Communications on Specified Social Infrastructure Operators Based on the Act on the Promotion of Ensuring Security by Taking Integrated Economic Measures.”

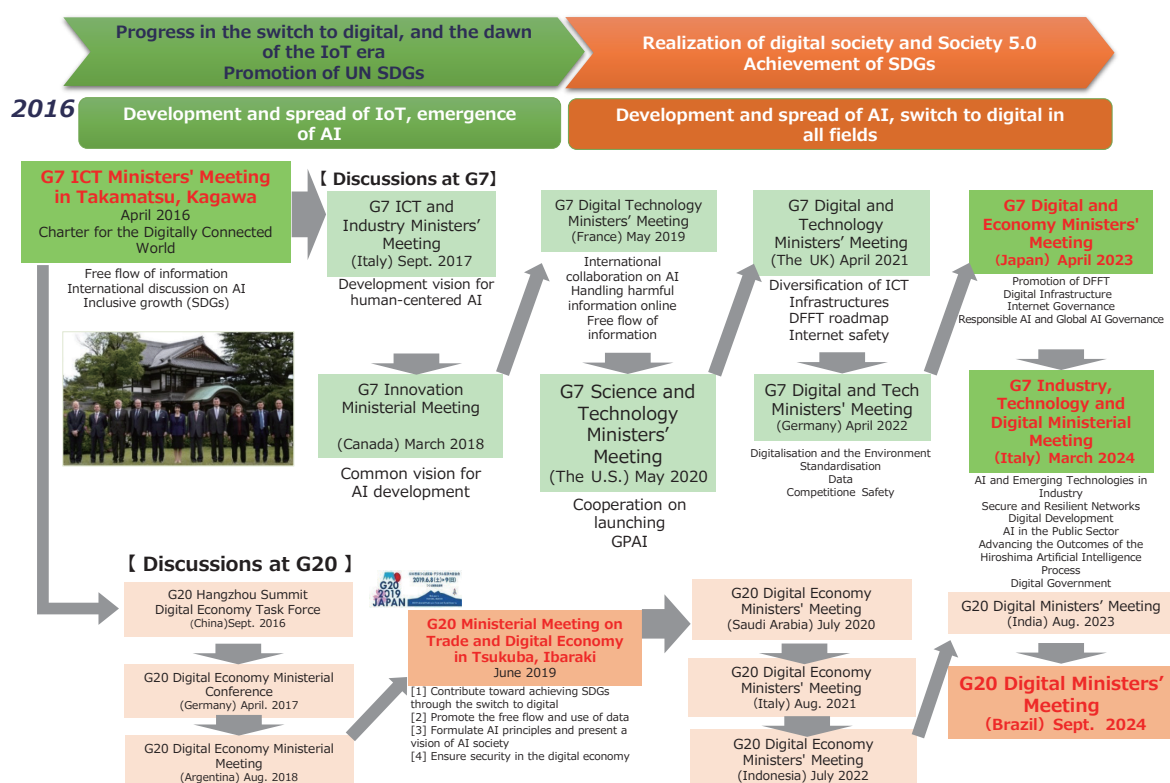
nance,” and (6) “Digital Competition.” As a result, the “Ministerial Declaration the G7 Digital and Tech Ministers’ Meeting,” including five annexes, was adopted, contributing to international discussions on rule-making for the digital economy (Figure 2-2-8-3).

Additionally, the “G7 Hiroshima Leaders’ Communiqué” issued in May of the same year, reflecting the outcomes of the G7 Digital and Tech Ministers’ Meeting in Takasaki, Gunma, agreed on the importance of global governance for emerging technologies such as AI and the metaverse, support for efforts to materialize DFFT, the need to build safe and resilient digital infrastructure,

and addressing the digital divide.

In 2024, the G7 Industry, Technology, and Digital Ministerial Meeting (Italy) was held, discussing six themes: (1) “AI and Emerging Technologies in Industry,” (2) “Secure and Resilient Networks, Supply Chains, and Key Input Factors,” (3) “Digital Development - Growing Together,” (4) “AI in the Public Sector,” (5) “Advancing the Outcomes of the Hiroshima Artificial Intelligence Process,” and (6) “Digital Government.” The “G7 Industry, Technology, and Digital Ministerial Declaration,” including four annexes, was adopted.

Figure 2-2-8-3 Overview of discussion on ICT and digital policy in G7/G20



(2) Hiroshima AI Process

In light of the rapid development and widespread adoption of generative AI becoming a significant issue for the international community, the “Hiroshima AI Process” was established to discuss international governance concerning generative AI. This process involved intensive discussions among G7 members starting in May 2023, culminating in the “G7 Hiroshima AI Process Digital and Tech Ministers’ Meeting” in September of the same year, where interim results were compiled. Subsequently, another G7 Digital and Tech Ministers’ Meeting was held in December 2023, under Japan’s G7 presidency, to finalize the “Hiroshima AI Process Comprehensive Policy Framework,”¹⁰ the first international policy framework addressing advanced AI systems like

generative AI. Additionally, the “Work Plan to advance Hiroshima AI Process” was formulated, outlining future G7 initiatives. These outcomes were endorsed in the G7 Leaders’ Statement issued in December. Based on this work plan, efforts will be made to increase the number of supporting countries and expand corporate support for international codes of conduct, further promoting the “Hiroshima AI Process.”¹¹

Italy, the G7 chair for 2024, has expressed its commitment to continuing the “Hiroshima AI Process.” The “G7 Industrial, Technology, and Digital Ministerial Declaration” adopted in March welcomed actions to promote the dissemination, adoption, and application of the Hiroshima AI Process outcomes among key partner coun-

⁹ Website of Hiroshima AI Process: <https://www.soumu.go.jp/hiroshimaaiaprocess/>

¹⁰ This policy framework consists of four components: the “OECD Report Towards a Common Understanding of Generative AI by the G7,” the “Hiroshima Process International Guidelines for All AI Stakeholders and Organizations Developing Advanced AI Systems,” the “Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems,” and “Project-Based Cooperation.”

¹¹ Regarding the initiatives on AI guidelines for Business, also refer to Section 6 “Promotion of ICT usage” in Chapter 2, Part 2.

tries and organizations, including developing and emerging economies.

At the OECD Ministerial Council Meeting held in May 2024, a side event titled “Towards Safe, Secure, and Trustworthy AI: Promoting Inclusive AI Governance”

(3) Asia-Pacific Economic Cooperation (APEC)

The Asia-Pacific Economic Cooperation (APEC) is an economic cooperation framework aimed at sustainable development in the Asia-Pacific region, involving major countries and regions within the area. Discussions on telecommunications are primarily conducted through the Telecommunications and Information Working Group (TEL).

Following the adoption of the “Aotearoa Plan of Ac-

(4) Asia-Pacific Telecommunity (APT)

The Asia-Pacific Telecommunity (APT) is an international organization in the Asia-Pacific region established in 1979, focusing on balanced development in telecommunications and information infrastructure. It aims to foster human resources through training and seminars and coordinate regional policies on standardization and wireless communications. Currently, Mr. KONDO Katsumori from the MIC serves as the Secretary-General.

(5) Association of South-East Asian Nations (ASEAN)

The Association of South - East Asian Nations (ASEAN) is a regional cooperation organization comprising ten Southeast Asian countries. Its main objectives are to promote economic growth, social and cultural develop-

ment, ensure political and economic stability, and foster cooperation on regional issues. Policies in the digital field are discussed at the “ASEAN Digital Ministers’ Meeting (ADGMIN).”

A Contribution to achieving the goals of the “ASEAN Digital Masterplan 2025”

To achieve the goals set out in the “ASEAN Digital Masterplan 2025,” formulated in January 2021, Japan annually proposes the “Japan-ASEAN Digital Work Plan” for cooperation and collaboration in the ICT field over the coming year. This plan is implemented with the ap-

proval of the ASEAN side. For example, utilizing the Japan-ASEAN ICT Fund established with contributions from Japan, various joint projects with ASEAN countries are carried out. In FY2023, the “Japan-ASEAN Open RAN Symposium” was held.

B Strengthening cooperation in the field of cybersecurity

Currently, the ASEAN-Japan Cybersecurity Capacity Building Centre (AJCCBC)¹² continuously conducts practical cybersecurity defense exercises (CYDER) and other cybersecurity exercises, both online and in-person, targeting cybersecurity personnel from government agencies and critical infrastructure operators in ASEAN countries. From 2023, under a new project framework, activities will continue until 2027, with ef-

forts to enhance exercise content.

Additionally, the MIC regularly holds Japan-ASEAN Information Security Workshops for ISP operators in ASEAN countries to promote information sharing and strengthen cooperation frameworks among stakeholders. A meeting was held in March 2024 to maintain and develop cooperative and collaborative relationships in the field of cybersecurity between Japan and ASEAN countries.

C 50th Anniversary of Japan-ASEAN Relations

The year 2023 marks the 50th anniversary of Japan-ASEAN friendship and cooperation, a significant milestone that calls for further strengthening of Japan-ASEAN relations and presents an excellent opportunity to expand Japan’s digital technology in the ASEAN region. The MIC, based on the “Japan-ASEAN Digital Work Plan 2023” approved at the Japan-ASEAN Digital Ministers’ Meeting (February 2023, Philippines), utilized the

Japan-ASEAN ICT Fund to hold the “Japan-ASEAN Open RAN Symposium” as part of the 50th-anniversary projects. This support was aligned with the digital policy goals of the ASEAN region, contributing to the deepening of Japan-ASEAN relations and bilateral relations with ASEAN countries. Additionally, at the Japan-ASEAN 50th Anniversary Special Summit held in Tokyo in December 2023, a Joint Vision Statement on Japan-ASEAN

¹² AJCCBC: <https://ajccbc.ncsa.or.th/>

Friendship and Cooperation was adopted, which included support for access to innovations such as Open RAN

(6) International Telecommunication Union (ITU)

The International Telecommunication Union (ITU), headquartered in Geneva, Switzerland, is a specialized agency of the United Nations (UN) with 193 member countries and regions. Its mission is to promote international cooperation for the improvement and rational use of telecommunications, enhance the efficiency of telecommunication operations, and promote the development and efficient operation of technical means to increase the use and dissemination of telecommunications. The ITU is composed of the following three sectors, which engage in activities such as frequency allocation, telecommunication technology standardization, and

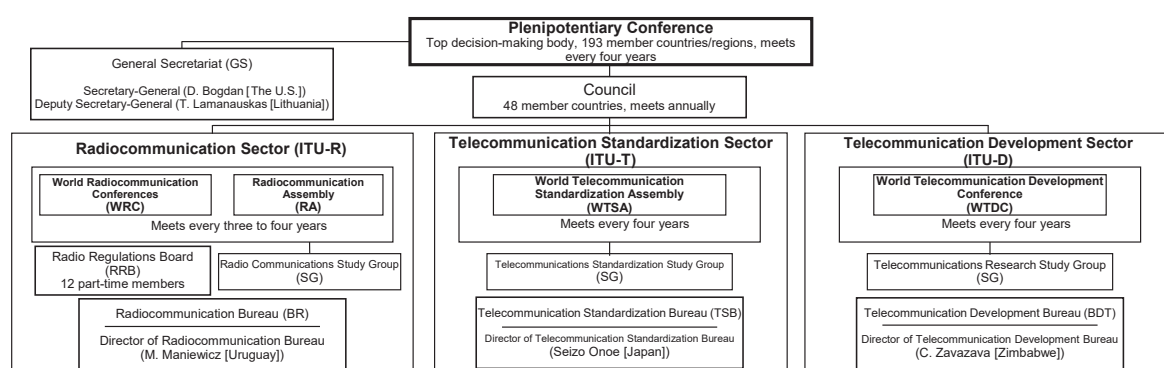
in ASEAN member countries.

support for the development of telecommunications in developing countries (**Figure 2-2-8-4**).

- (1) Radiocommunication Sector (ITU-R)
- (2) Telecommunication Standardization Sector (ITU-T)
- (3) Telecommunication Development Sector (ITU-D)

In September 2022, elections were held at the Plenipotentiary Conference, and Mr. ONOE Seizo from Japan (former Chief Standardization Strategy Officer of Nippon Telegraph and Telephone Corporation) was elected as the Director of the Telecommunication Standardization Bureau. He assumed office in January 2023 (the term is four years, with a maximum of two terms).

Figure 2-2-8-4 Organizations in ITU



* As of April 2023

A Initiatives in ITU-R

In ITU-R, activities are conducted to ensure the effective, efficient, economical, and fair use of radio frequencies by all radiocommunication services. This includes conducting studies on frequency usage and developing standards related to radiocommunication. Among these activities, the Radiocommunication Assembly (RA), which approves draft recommendations submitted by various Study Groups (SGs) and deliberates on issues and structures for the next study period, and the World

Radiocommunication Conferences (WRC), which aim to revise the Radio Regulations governing international frequency allocation, are the largest meetings held by ITU-R every 3-4 years. The MIC has actively contributed to these discussions. At RA-23, held in Dubai, the UAE, in November 2023, draft recommendations, including those providing an overall picture of the capabilities and use cases required for the next-generation mobile phone systems expected to be realized around 2030, were approved.

B Initiatives in ITU-T

ITU-T conducts technical studies necessary for the formulation of international standards related to communication network technologies and operational methods.

The World Telecommunication Standardization Assembly (WTSA), the highest decision-making meeting of ITU-T, is held every four years, with the next WTSA-24 scheduled to be held in New Delhi, India, from October 15 to October 24, 2024. The Telecommunication Standardization Advisory Group (TSAG), which advises

on WTSA resolutions and the standardization activities of various ITU-T Study Groups (SGs), held two meetings in FY2023. At the third meeting of this study period, held in January 2024, Japan submitted a contribution to integrate SG9 (Broadband cable and TV) and SG16 (Multimedia and related digital technologies) to improve the efficiency of ITU-T's standardization activities, which was approved, and work towards the reorganization of SGs at WTSA-24 was advanced.

C Initiatives in ITU-D

ITU-D provides support for the development of the information and communication technology (ICT) sector in developing countries.

The World Telecommunication Development Conference (WTDC), the highest decision-making meeting of ITU-D, is held every four years, with the most recent

WTDC-22 held in Kigali, Rwanda, in June 2022¹³. During the current study period (2022-2025), activities such as the implementation of ICT development support projects and ICT human resource development are being promoted based on the strategic goals and action plans adopted at WTDC-22. Specific projects include the Connect2Recover initiative, which has been ongoing since 2022 in cooperation with the ITU and the MIC to

strengthen digital infrastructure and resilience¹⁴. Additionally, from 2023, various projects aimed at providing technical support and entrepreneurship support through the Innovation and Entrepreneurship Alliance and strengthening ICT infrastructure resilience and cybersecurity human resource development in the Asia-Pacific region are being supported.

(7) United Nations

A United Nations General Assembly Second Committee, Economic and Social Council (ECOSOC)

The United Nations General Assembly Second Committee, which deals with economics and finance, focuses on discussions related to the promotion of inclusive global digital cooperation and issues such as the public nature of the internet, primarily through the “Commission on Science and Technology for Development”

(CSTD) established within the Economic and Social Council (ECOSOC). Japan contributes to the advancement of international discussions on information and communication fields, including internet governance, through its participation in the annual CSTD meetings.

B Internet Governance Forum (IGF)

The Internet Governance Forum (IGF) is one of the most important international conferences in the field of internet policy, where governments, private sector, technical and academic communities, and civil society engage in dialogue on various public policy issues related to the internet on an equal footing.

In October 2023, Japan hosted the 18th meeting at the Kyoto International Conference Center in Kyoto, with a record number of over 6,000 local participants attending the meeting. During the opening ceremony, Prime Minister Kishida emphasized the importance of the internet as the foundation of democratic society and expressed strong support and commitment to “multi-stakeholder approach discussions” to maximize the benefits of the internet and address its negative aspects.

Additionally, during a special AI session following the opening ceremony, Japan shared the Hiroshima AI Process, which it leads, with the international community. In his keynote speech, Prime Minister Kishida emphasized “leading international rule-making to ensure that the entire international community, including the Global South, can enjoy the benefits of trustworthy and secure AI and achieve further economic growth and improvements in living environments”. Furthermore, Minister of Internal Affairs and Communications Suzuki intro-

duced the status of discussions on “International Guiding Principles and Code of Conduct for AI Developers” and expressed the intention to continue seeking opinions from various stakeholders. Through this session, voices of support and expectations for the Hiroshima AI Process were received from panelists representing multi-stakeholders, including governments, industries, international organizations, and academia from countries beyond the G7.

In addition, the MIC hosted 10 sessions covering diverse themes for discussions (themes of each session: Beyond 5G, HAPS (High Altitude Platform Station), Resilience, Security, Metaverse, AI, Disinformation, DFI (Declaration for the Future of the Internet), O-RAN, WSIS (World Summit on the Information Society)).

Furthermore, an exhibition area called the “IGF Village” was set up during the IGF, with 72 companies and organizations from around the world participating. Japan had 25 companies and organizations, including telecommunications companies and research institutions, showcasing remote robots and measures against manga piracy, actively promoting Japan’s technological capabilities and initiatives through interactions with participants from various countries who visited the booths.

(8) World Trade Organization (WTO)

In the field of telecommunications, progress has not been observed since the basic telecommunications negotiations agreed upon in 1997, due to the stagnation of the Doha Round negotiations that began in 2001. However, in light of the increasing attention to electronic

commerce, which handles data flows on the Internet, a group of like-minded countries initiated electronic commerce negotiations at the WTO in 2019. Japan, along with Australia and Singapore, has taken the lead as co-chair in these discussions.

(9) Organisation for Economic Co-operation and Development (OECD)

The Digital Policy Committee (DPC, former Committee on Digital Economy Policy (CDEP)) of the Organisation for Economic Co-operation and Development (OECD) has been conducting pioneering discussions in

the field of ICT. The MIC actively contributes to policy discussions at the OECD by providing personnel and financial support to the OECD Secretariat, as well as appointing the chair of the DPC (from January 2020) and

¹³ The event, originally scheduled to be held in 2021, was postponed by one year due to the global spread of COVID-19.

¹⁴ Originally, the main focus of support was on the low internet connectivity rates in the African region, but the project has expanded to include support from countries in the Asia-Pacific islands, Central and South America, Europe, and worldwide.

vice-chairs of various working groups from the ministry.

The DPC has been working on initiatives related to AI since 2016, outlining principles that those involved in AI should share and the issues that governments should address. In May 2019, the first intergovernmental agreement on AI, the “Council Recommendation on AI,” was adopted and made public. Subsequently, proactive initiatives have been undertaken, such as the launch of the online platform “OECD.AI” for AI policy (February 2020) and the establishment of the AI Governance Working Group (AIGO) (May 2022).

In December 2022, a ministerial meeting on the digital economy was held in Gran Canaria, Spain, where a ministerial declaration on “A Reliable, Sustainable, and Inclusive Digital Future” was adopted, outlining the challenges and directions for DFFT, trustworthy AI, and the development of next-generation infrastructure.

(10) GPAI

The Global Partnership on Artificial Intelligence (GPAI) is an international public-private partnership organization established to realize the development and utilization of “Responsible AI” based on a human-centric approach. The launch of GPAI was proposed at the Biarritz Summit (France) in 2019, and after the G7 Science and Technology Ministers’ Meeting in May 2020 agreed on G7 cooperation for its establishment, it was officially founded in June of the same year.

In November 2022, Japan hosted the GPAI Summit 2022 and served as the chair country for one year start-

In March 2023, the 4th OECD Global Forum on Digital Security for Prosperity, co-hosted by the MIC and the OECD, was held in Paris, France. It focused on three themes: digital security for IoT products, digital security for AI, and the exchange between policy makers and technologists¹⁵.

In May 2024, the Meeting of the OECD Council at Ministerial Level (MCM) was held in Paris, France, with Japan, celebrating its 60th anniversary as an OECD member, serving as the chair country. Discussions were held in the MCM, taking into account the achievements of the “Hiroshima AI Process,” and the ministerial declaration expressed the support of the OECD member countries for its achievements and the cooperation in advancing practical efforts, as well as the revision of the “Council Recommendation on AI.”

ing from that month. At the Ministerial Council, under the initiative of Japan as the chair country, the first-ever ministerial declaration at a GPAI Summit was adopted. This declaration included agreements among countries on promoting AI based on human-centric values, opposing the illegal and irresponsible use of AI, and contributing to a sustainable, resilient, and peaceful society.

In December 2023, the GPAI Summit 2023 was held in India, and at the Ministerial Council, it was approved to establish the first GPAI Expert Support Center in the Asian region in Tokyo.

(11) ICANN

For internet resources such as IP addresses and domain names, which are essential for internet use, it is crucial to manage and coordinate them globally to prevent duplicate allocations. Currently, the international management and coordination of these internet resources are carried out by ICANN (Internet Corporation for Assigned Names and Numbers), a non-profit organization established in 1998. ICANN is responsible for the allocation of IP addresses, coordination of domain names, operation and deployment of the root server system, and the formulation of policies related to these ac-

tivities.

The MIC actively participates and contributes to discussions in ICANN’s Governmental Advisory Committee, which includes participation from national governments and international organizations. For example, regarding the DNS Abuse, the MIC has submitted opinions on proposed amendments to the Registrar Accreditation Agreement (RAA) between ICANN and registrars and has raised the need for ongoing discussions within ICANN to mitigate illegal activities on the Internet.

6. International cooperation in bilateral relationships

(1) Policy cooperation with the U.S.

Following the “the U.S.-Japan Competitiveness and Resilience (CoRe) Partnership”¹⁶ issued after the the U.S.-Japan Summit on April 16, 2021, the “Global Digital Connectivity Partnership (GDGP)”¹⁷ was launched in May of the same year to promote secure connectivity and a vibrant digital economy (Figure 2-2-8-5).

The MIC, in cooperation with relevant ministries and

agencies, has been continuously holding the “the U.S.-Japan Dialogue on Digital Economy (the U.S.-Japan DDE)”¹⁸ with the U.S. Department of State since 2010. Since the launch of the GDGP, the the U.S.-Japan DDE has been positioned as a framework for promoting the GDGP.

The 14th the U.S.-Japan DDE public-private and inter-governmental meetings were held in a hybrid format

¹⁵ <https://www.oecd.org/digital/global-forum-digital-security/>

¹⁶ https://www.mofa.go.jp/mofaj/na/na1/us/page1_000951.html

¹⁷ https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000119

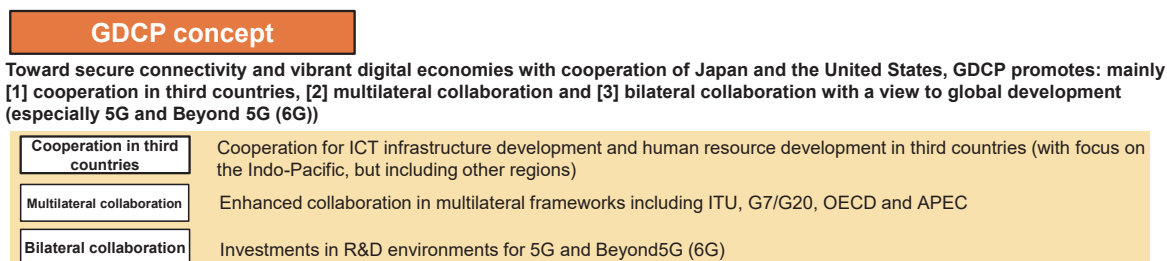
¹⁸ In the joint statement issued at the “13th the U.S.-Japan Policy Cooperation Dialogue on the Internet Economy” held on March 6 and 7, 2023, it was decided to rename the meeting to the “the U.S.-Japan Dialogue on Digital Economy.”

(both in-person and online) on February 6 and 7, 2024. During these meetings, a wide range of topics were discussed, including 5G and Beyond 5G (6G), AI governance, Cross-Border Privacy Rules (CBPR), cooperation on government access, international cooperation, and cooperation within the United Nations. As a result of these discussions, a “Joint Statement from the 14th the U.S.-Japan Dialogue on Digital Economy” was published¹⁹.

At the the U.S.-Japan Summit held in April 2024, a joint statement by the leaders and a fact sheet were published²⁰, confirming further collaboration between the U.S. and Japan in the field of information and communication.

In May 2024, the 8th GDCP Expert-Level Working Group was held, where opinions were exchanged on further promoting the U.S.-Japan cooperation with third countries.

Figure 2-2-8-5 Global Digital Connectivity Partnership (GDCP)



(2) Cooperation with Europe

A Cooperation with the European Union (EU)

The MIC has been holding the “Japan-EU ICT Policy Dialogue” (the most recent one was the 29th in February 2024) as a platform for exchanging information and opinions on ICT policies, and “Japan-EU ICT Strategy Workshop” (the most recent one was the 13th in April 2022) to promote collaboration and cooperation between the public and private sectors in digital field, with the Directorate-General for Communications Networks, Content and Technology of the European Commission.

During the 29th Japan-EU ICT Policy Dialogue, discussions were held on topics such as 5G/Beyond 5G (6G), cybersecurity, online platforms, AI, and submarine cables.

Furthermore, in May 2022, the Japan-EU Digital Partnership was established between Japan and the EU. On the Japanese side, the Digital Agency, the MIC, and the METI are the main participants, while on the EU side, the Directorate-General for Communications Networks, Content and Technology of the European Commission takes the lead. This partnership addresses joint priorities in the digital field between Japan and the EU. At the 2nd Ministerial Meeting held in April 2024, discussions were conducted on 5G/Beyond 5G (6G), AI, and submarine cables, among other topics. As a result of this meeting, a joint statement²¹ was issued.

B Bilateral cooperation with European countries

(A) The UK

In May 2022, the MIC, along with the Digital Agency and the METI, established the Japan-UK Digital Group to address joint priority areas in the digital field. The first meeting was held in October of the same year. Subsequently, in December, a ministerial-level meeting was conducted to accelerate cooperation between Japan and

the UK, leading to the launch of the Japan-UK Digital Partnership. The 2nd ministerial-level meeting was held in January 2024, resulting in the issuance of a document²² outlining the progress and future direction of initiatives in the aforementioned areas.

(B) Germany

In March 2023, a “Japan-Germany Inter-Governmental Consultations” on economic security was held in Tokyo, with a participation of the Japanese and German leaders, along with relevant ministers including the Minister of Internal Affairs and Communications, where a joint statement was announced, emphasizing the importance of protecting critical infrastructure, including communication infrastructure.

Additionally, in April 2023, the MIC and the Federal

Ministry for Digital and Transport signed a memorandum of cooperation on ICT²³, agreeing to promote collaboration in areas such as building open and secure communication infrastructure for 5G network development and deployment, promoting Beyond 5G/6G, and cooperation in the field of AI.

Furthermore, to deepen mutual understanding in the policy aspects of the information and communication field and promote cooperation between Japan and Ger-

¹⁹ https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000172.html

²⁰ https://www.mofa.go.jp/mofaj/na/na1/us/pageit_000001_00501.html

²¹ https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000175.html

²² https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000167.html

²³ https://www.soumu.go.jp/menu_news/s-news/01tsushin08_02000152.html

many, the MIC has been holding the “Japan-Germany ICT Policy Dialogue” with the Federal Ministry for Digital and Transport.

The 7th meeting was held in June 2023, where discussions on various topics, including Open RAN, progress in research and development towards Beyond 5G, AI, illegal and harmful information (defamation, disinformation, etc.) and the utilization of ICT in smart cities and

(C) France

The MIC has been holding the “Japan-France ICT Consultations” with the Ministry for the Economy, Finance, and the industrial and digital Sovereignty of the

(3) Cooperation with Asian-Pacific countries

The MIC is engaged in cooperation with information and communication authorities of Asian-Pacific coun-

A The Republic of Korea

In December 2023, the MIC held the “Japan-the Republic of Korea ICT Policy Dialogue” with the Ministry of Science and ICT of the Republic of Korea. The dia-

B India

In May 2022, the MIC and the Ministry of Communications of India held the 7th Japan-India Joint Working Group meeting online to share the progress of initiatives in the field of ICT, such as 5G/Beyond 5G and Open RAN, and exchanged views on future cooperation be-

C Southeast Asian countries

With the Philippines, a memorandum of cooperation regarding ICT cooperation, including the construction of Open RAN and support for building 5G networks, was signed in February 2023. Additionally, during the Japan-US-Philippines Summit in April 2024, a “Joint Vision Statement by Japan, the Philippines, and the United States” was announced, confirming the strengthening of cooperation in the field of information and communication, including cooperation related to Open RAN.

With Indonesia, a memorandum of cooperation in the field of information and communication technology was signed in October 2023, adding the construction of Open RAN as a new area of cooperation and agreeing to further deepen cooperation in 5G, AI, and big data.

With Cambodia, a joint record of discussions on future cooperation in the digital field was exchanged in December 2023, aiming to further promote cooperation

D Australia

Following a joint statement in July 2022, the “Japan-Australia Telecommunications Resilience Policy Dialogue” was established. This framework involves the MIC from Japan, and the Department of Home Affairs, and the Department of Infrastructure, Transport, Regional Development and Communications and the Arts from Australia. The dialogue aims to regularly share information and hold discussions on information and com-

the metaverse, took place.

Moreover, joint research and development cooperation for the advancement of 5G has been ongoing with the Federal Ministry for Economic Affairs and Climate Action since FY2022. In May 2023, a letter of intent on Beyond 5G/6G and future communication technologies²⁴ was signed with the Federal Ministry of Education and Research.

French Republic to facilitate information sharing on important themes in the ICT field. The most recent meeting was the 22nd session in November 2023.

tries in the field of ICT, including communication infrastructure development and the utilization of ICT.

logue aimed to exchange views on mutual interests in the field of ICT, such as AI and Open RAN, and agreed to hold regular dialogues in the future.

tween Japan and India. In August 2023, a sub-group meeting on Open RAN, with the participation of Japanese and Indian companies, was held to facilitate specific cooperation.

between the two countries for the development of the digital economy and society.

With Malaysia, a memorandum of cooperation regarding information and communication cooperation was signed in November 2023, agreeing to further strengthen cooperation in the field of information and communication, including 5G security and future advanced networks. In March 2024, the “Japan-Malaysia” ICT Joint Working Group meeting was held to share the progress of initiatives in the fields of ICT, broadcasting, and cybersecurity, and exchange views on future cooperation between the two countries. In conjunction with the working group, the Japan-Malaysia ICT Collaboration Conference was held, providing an opportunity to introduce the initiatives of Japanese and Malaysian companies to both governments and share the latest efforts in broadcasting and ICT.

munication fields, including Open RAN, 5G, submarine optical cables, and satellite communications, and to consider the implementation of joint projects as needed. The dialogue also aims to achieve “Free and Open Indo-Pacific” (FOIP) by ensuring and improving digital connectivity in the Indo-Pacific region.

The second meeting of this policy dialogue was held in April 2024, where information sharing and exchange

²⁴ https://www.soumu.go.jp/menu_news/s-news/01tsushin04_02000145.html

of views on initiatives in the field of information and communication, such as Open RAN, Beyond 5G (6G), submarine cables, cybersecurity, and inter-operator

(4) Cooperation with countries in Central and South America

In Central and South America, the adoption of Japan's terrestrial digital broadcasting standard (ISDB-T) was implemented in Brazil in 2006, and the Japan standard has been adopted in 14 countries. Currently, support is provided for efforts towards the cessation of analog broadcasting in each country, as well as assistance in the introduction of disaster prevention ICT utilizing the Emergency Warning Broadcast System (EWBS), a feature of the Japan standard, in countries such as Costa Rica and El Salvador.

Furthermore, seminars on 5G have been conducted in various Central and South American countries, emphasizing the importance of establishing open and se-

roaming during emergencies, took place. Both countries agreed to continue collaborating on common policy issues in the future.

cure 5G networks. Support is also provided for the deployment of Japanese companies with advanced technology in this field in Central and South America. In FY2023, a demonstration of the 5G environment using Open RAN was conducted in Peru.

Additionally, to promote the use of Japan's advanced ICT to address social issues in each country, recent efforts include conducting demonstrations of agricultural ICT solutions in Brazil, utilizing IoT data and AI to streamline the work of agricultural producers. Furthermore, demonstrations of disaster prevention solutions utilizing local 5G with Open RAN have also been carried out.

(5) Cooperation with other regions

A Cooperation with African regions

Cooperation in the ICT sector with African countries has progressed, starting with the adoption of the Japanese standard for terrestrial digital broadcasting in Botswana (adopted in 2013, fully digitized in October 2022) and Angola (adopted in 2019). In August 2022, the 8th Tokyo International Conference on African Development (TICAD8) was held in Tunisia. The MIC hosted an online seminar on DX and an online exhibition to promote Japanese companies as official side events. As a result of the conference, the "TICAD8 Tunis Declaration," which includes cooperation between Japan and Africa in the ICT field, was adopted. In May 2023, a Memorandum of Cooperation (MoC) in the fields of ICT

and postal services was signed with the Ministry of Communications and Information Technology of Egypt. In February 2024, a MoC in the field of ICT was signed with the Ministry of Information, Communications, and the Digital Economy of Kenya.

Since FY2019, various demonstration projects have been conducted to address social issues in Africa and support the expansion of Japanese companies. These projects include communication infrastructure (Kenya, Senegal), agricultural ICT (Ethiopia, Botswana), medical ICT (Egypt, Ghana, Kenya, Democratic Republic of Congo), remote education (Senegal, Rwanda), and smart cities (Egypt).

B Cooperation with Middle Eastern regions

The MIC has been strengthening its cooperative relationship with Saudi Arabia. Based on the "Japan-Saudi Vision 2030" (2017) and the MoC on ICT cooperation signed with the Ministry of Communications and Information Technology of Saudi Arabia (2019), various initiatives have been undertaken. These include dispatching a public-private mission to Saudi Arabia (October 2018), holding ICT public-private workshops (January 2022), and participating in LEAP, the largest technology exhibition in the Middle East, with a Japanese booth and local public-private workshops (March 2024). These ef-

forts aim to build cooperative relationships between companies from both countries and support the deployment of Japanese technologies. Additionally, demonstration projects utilizing VR technology for ICT healthcare were conducted in FY2021, and projects related to perinatal remote healthcare were conducted in FY2022.

Taking the opportunity of the 70th anniversary of diplomatic relations with Israel, a MoC in the fields of telecommunications technology and postal services was signed with the Ministry of Communications of Israel in April 2023.

Section 9 Promotion of postal administration

1. Summary

(1) Initiatives so far

Since the establishment of postal services in 1871, the postal network that has been developed nationwide in Japan had over 24,000 offices before the privatization on October 1, 2007. Even after privatization, postal offices are intended to be established for widespread use

throughout the country.

The MIC is working to ensure the provision of universal services by postal offices and to utilize them as bases for public services in local communities.

(2) Future challenges and directions

In our country, the social environment has undergone significant changes, including an aging population, concentration of population in urban areas, frequent natural disasters, and the overall digitalization of society including the online processing of administrative procedures. Particularly in rural areas, the importance of postal offices as public infrastructure remaining in the community has increased due to the withdrawal of public enterprises fulfilling essential roles in daily life and the closure of local government branch offices providing administrative services.

Therefore, it is important for the Japan Post Group to ensure its performance as a private enterprise while maintaining the postal office network and universal services in the medium to long term. It is also crucial for

postal offices and the services they provide to contribute to the improvement of convenience for citizens and users, as well as to the local community.

The MIC continues to ensure the sound management of the Japan Post Group and fair and free competition, while also securing the stable provision of universal services by postal offices. Additionally, it is necessary to promote the improvement of convenience for citizens and users and the contribution to local communities through diverse and flexible service development and operational efficiency, while also responding to the advancement of digitalization in the new era, by effectively utilizing the network of approximately 24,000 postal offices.

2. Promotion of postal administration

(1) Ensuring universal service in postal business

A Review of postal rates

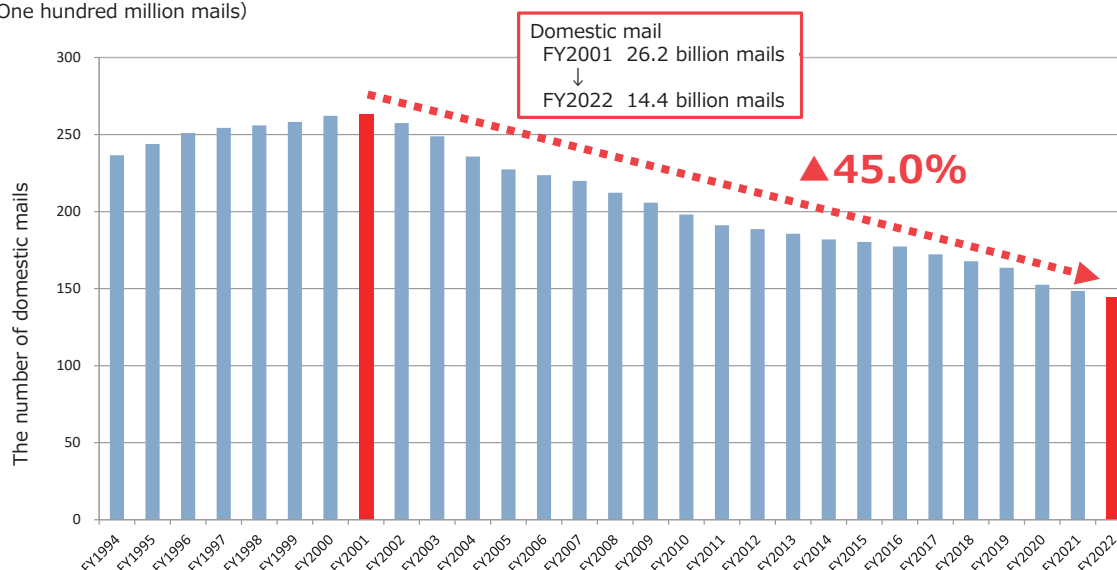
The volume of postal items has been decreasing annually since the peak in FY2001 due to the widespread use of the internet, social media, the advancement of web-based billing for various invoices, and a decline in personal communication, resulting in a reduction of approximately 45% for domestic mail by FY2022 (**Figure 2-2-9-1**). This decline in postal items, coupled with the impact of soaring fuel and other price increases, led to a deficit of 21.1 billion yen in the operating profit and loss of Japan Post's postal business for FY2022, marking the first deficit since privatization. Japan Post has been working on expanding postal usage and improving operational efficiency, and will continue to promote further

efforts. However, it is anticipated that the significant decrease in postal items will continue, making the outlook for the operating profit and loss of the postal business extremely challenging.

In light of this situation, the MIC has initiated the necessary procedures for amending the Ordinance for Enforcement of the Postal Act (Ministry of Internal Affairs and Communications Ordinance No. 5 of 2003) to set the upper limit for the rates of standard postal items weighing 25g or less. It is expected that postal rate revisions will be implemented in the future after Japan Post has taken sufficient measures to ensure widespread awareness and preparedness.

Figure 2-2-9-1 The trend of the number of postal items

(One hundred million mails)

**B Grant and contribution system to support the maintenance of the postal network**

In June 2018, a grant and contribution system was established to support the maintenance of the postal network and ensure the stable provision of universal postal services. The system began operation in April 2019. The Independent Administrative Institution Postal Savings and Postal Life Insurance Management Organization (hereinafter referred to as the “Postal Management and

Support Organization”) is responsible for the disbursement of grants and the collection of contributions. For FY2024, the amount of grants to Japan Post is approximately 303 billion yen, with contributions amounting to approximately 246.7 billion yen from Japan Post Bank and approximately 56.3 billion yen from Japan Post Insurance.

(2) Contribution of post offices to local communities**A Contribution of post offices to local communities in the digital society**

In our country, the aging population and declining birth rates, coupled with the spread of the COVID-19, have further exacerbated the exhaustion of local communities. As a result, there is increasing anticipation for the contribution of post offices, which are present throughout the country, to local communities. In this context, it is important to determine the role of post offices in contributing to local communities by leveraging the benefits of digitalization to overcome geographical and time constraints, as well as utilizing their usefulness as local hubs. In October 2022, the MIC consulted the Information and Communications Council on the contribution of post offices to local communities in the digital society, and discussions began in the Postal Policy Division of the same council. The division deliberated on various points, including (1) the collaboration between local public infrastructure and post offices, (2) the contribution of post offices to local communities through DX and data utilization, and (3) the role of post boxes (mailboxes) in the contribution of post offices to local communities. Subsequently, a preliminary report on the

contribution of post offices to local communities was compiled in May 2024, and a public comment was conducted from May 3 to June 6, 2024. The preliminary report proposed strategies for furthering the contribution of post offices to local communities, such as “the Realization of Post Offices as “Community Hubs” in the region” and “the Utilization of Data Held by Post Offices”. Particularly in regions where maintaining an independent local economy has become difficult, it is desirable to realize and promote “Community Hubs” at post offices, where some of the public services provided by local governments, organizations, and companies are offered, as well as to utilize a variety of functions and digital technologies to promote the revitalization of the regional economy and society through new collaborations with private enterprises and organizations. Additionally, the report outlined the role of post offices in realizing “Community Hubs” and the approach to the cost burden of stakeholders, and called for the MIC and the Japan Post Group to conduct studies toward the realization of “Community Hubs.”

B Utilization promotion as an administrative service window

Post offices handle various local government office tasks, such as issuing copies of resident registers and other public certificates. As mentioned earlier, the im-

portance of post offices as remaining public infrastructure in regions has increased as local government branch offices providing administrative services have

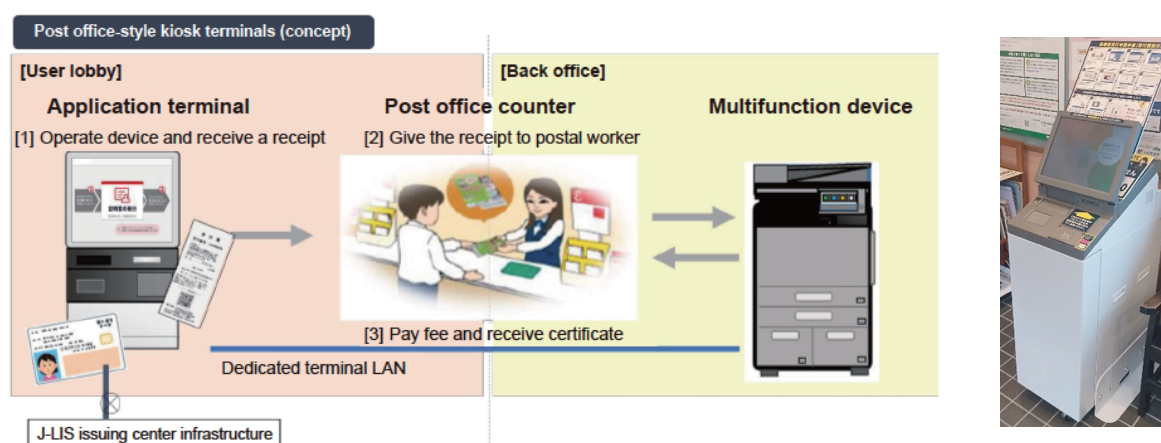
been abolished. In June 2023, Act on Handling of Certain Services of Local Governments at Postal Offices (Act No. 120 of 2001) was amended, expanding the specific affairs that post offices can undertake from local public entities to include new tasks such as accepting applications for the issuance of My Number cards.

The MIC conducted a demonstration of the development of “Post Office-type My Number Card Usage Terminals” (post office kiosk terminals), which can digitally issue certificates, as part of the FY2021 supplementary budget (Figure 2-2-9-2). As a result of the “Subsidy for the Installation of Certificate Issuance Service Terminals” in FY2022 second supplementary budget, support

was provided for the introduction of certificate issuance service terminals, including the post office kiosk terminals, mainly in municipalities without convenience stores, resulting in their introduction in 20 local governments and 36 post offices (post office kiosk terminals were introduced in 15 local governments and 28 post offices.).

Furthermore, to enhance resident services using My Number cards, local governments have been implementing special grant tax measures (at a rate of 0.7) from FY2023 to cover the expenses of introducing certificate issuance services at post offices and other locations.

Figure 2-2-9-2 Post office kiosk terminals



C Collaboration between post offices and the public infrastructure of local communities

The MIC has been conducting demonstrations under the “Post Office Activation Promotion Project (Post Office × Local Public Entities × ICT)” from FY2019 to FY2021 to promote the utilization of the strengths of post offices and to address various regional issues and improve user convenience. In January 2022, the “Post Office Monitoring Service using Smart Speakers,” developed through these demonstrations, was launched as a service for local governments by Japan Post. By May 1, 2024, this service had been entrusted by a total of 18 local governments.

Additionally, from FY2022, the MIC has been conducting demonstrations under the “Promotion Project for Collaboration between Post Offices and Public Regional Infrastructure” (Figure 2-2-9-3) to promote the resolution of regional issues by leveraging the power of digital technology through collaboration between post offices, which have bases throughout the country, and local public entities and other public infrastructure in the region. In FY2023, demonstration projects were conducted, including the utilization of data held or acquired by Japan

Post in the local community (Nagaoka City, Niigata Prefecture), the first implementation of online medical consultations at post offices nationwide in response to the revision of the system by the Ministry of Health, Labour and Welfare (Nanao City, Ishikawa Prefecture), the provision of information on disaster victims by post offices during disasters (Atami City, Shizuoka Prefecture), and the use of post office monitoring services for disaster prevention using digital technology (Yusuhara Town, Kochi Prefecture), to understand the issues and expansion of implementation (Figure 2-2-9-4)¹. In FY2024, based on the challenges and insights obtained from these demonstration projects, it is planned to further disseminate and expand the results nationwide and conduct demonstration projects such as smart water meter reading using postal delivery vehicles and the provision of necessary services in the region by utilizing post offices as “Community Hubs,” continuing to create model cases for solving regional issues through collaboration between post offices and the public infrastructure of local communities.

¹ Promotion Project for Collaboration between Post Offices and Public Regional Infrastructure: <https://www.soumu.go.jp/yusei/kasseika.html>

Figure 2-2-9-3 Promotion Project for Collaboration between Post Offices and Public Regional Infrastructure

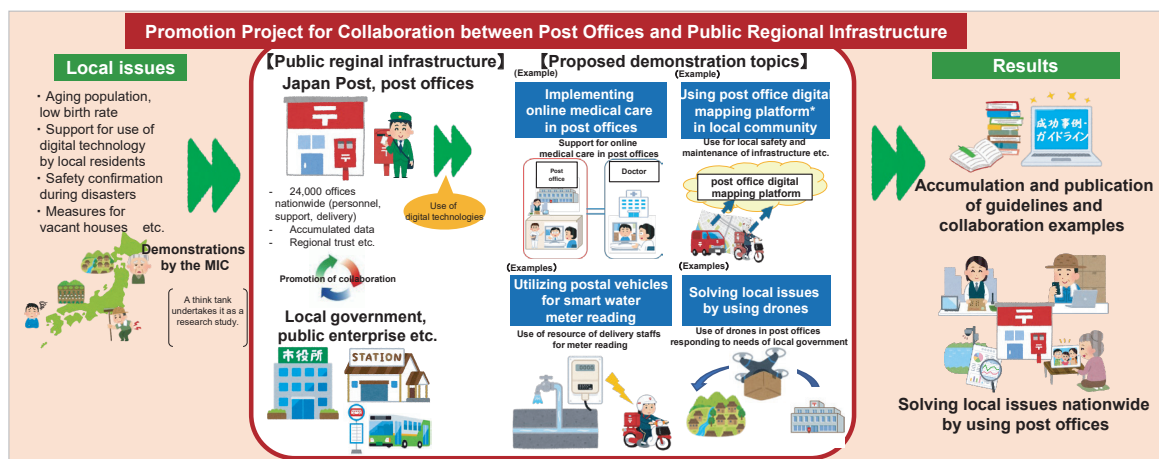


Figure 2-2-9-4 Regional demonstration

Implementing online medical care in post office
(Nanao City, Ishikawa Prefecture)



Using postal office monitoring service for disaster prevention
by use of digital technologies
(Yusuhara Town, Kochi Prefecture)



(3) Utilization of data acquired and held by post offices

The MIC is promoting the effective use of data acquired and held by post offices while ensuring the appropriate handling of the secrecy of correspondence, the secrets of others known through postal items, and personal information. Since December 2022, the ministry has been holding the “Post Office Data Utilization Advisory Board” to obtain advice from experts and others for the implementation of initiatives by Japan Post and the MIC. As a specific initiative for the utilization of post office data, in January 2024, during the Noto Peninsula Earthquake in the same year, the MIC closely collaborated with Ishikawa Prefecture, Japan Post, and relevant ministries and agencies. As a result, Japan Post improved the accuracy of the list of persons whose safety was unknown by comparing it with resident data held

by Japan Post and sent notifications to those who had moved out of the disaster area based on the information from change of address notifications to ensure that administrative information reached the affected individuals. Additionally, since June 2023, when a bar association inquired with Japan Post about the new address information of the opposing party in cases where it was difficult to ascertain the new address of the opposing party without changing the resident register (limited to cases where the bar association did not find any connection to domestic violence, stalking, or child abuse), Japan Post provided the new address information of the opposing party to the bar association. The Ministry will continue to work on the utilization of post office data, taking into account the needs of public institutions and others.

(4) Response to new initiatives by Japan Post Insurance and Japan Post Bank

In May 2023, the MIC and the Financial Services Agency granted approval to Japan Post Insurance for the “Ownership of an Investment Subsidiary” based on the Postal Services Privatization Act. Additionally, in Octo-

ber 2023, Japan Post Insurance submitted a notification² based on the Postal Services Privatization Act regarding the “Underwriting of Ordinary Whole Life Insurance with a Single Premium Payment Option.” This ordinary

² In June 2021, following the sale of more than half of its shares in Japan Post, Kanpo Life transitioned from a licensing system for new business to a notification system.

whole life insurance has been available at Japan Post Insurance and post offices nationwide since January 2024.

Japan Post Bank is promoting a new corporate business (Σ Business) that supports the growth of local businesses with growth aspirations by providing capital funds, thereby contributing to the revitalization of the regional economy from a medium- to long-term perspective. In February 2024, the MIC and the Financial Ser-

vice Agency received an application from Japan Post Bank for approval based on the Postal Services Privatization Act to own a subsidiary engaged in investment management operations and a specialized investment company under its umbrella, with the aim of advancing private equity investment management and operations in this business. Approval was granted in May 2024.

(5) Review of operations at the Organization for Postal Savings, Postal Life Insurance and Post Office Network for the refund of fixed-term postal savings deposited before postal privatization

The Postal Management and Support Organization, Postal Life Insurance and Post Office Network, which inherited fixed-term postal savings deposited before postal privatization, has been implementing operations to respond to refund claims for savings that have been treated as rights extinguished³ under certain criteria. If it is determined that there were truly unavoidable circumstances for not making a refund claim after notification, the organization has been responding to such claims.

Given that this operation has been in place for over ten years, the MIC requested the organization in Sep-

tember 2023 to review its operations to make the process less burdensome for claimants, including ensuring that the confirmation of circumstances is conducted in a manner that is more considerate of depositors⁴.

Subsequently, the organization announced a review of its operational criteria on December 20, 2023, and began implementing the new criteria in January 2024. Under the new criteria, the method of confirming truly unavoidable circumstances has been revised, and responses are now based on the content of the claim form rather than requiring the submission of certificates as a general rule (Figure 2-2-9-5).

Figure 2-2-9-5 Points of review of operations at the Postal Management and Support Organization

	Before review	After review
Subject to repay	<p>Five instances where it is deemed that there were truly unavoidable circumstances (※)</p> <p>※ Even after receiving a demand, cases where it is impossible to request a refund due to circumstances such as disasters, accidents, or illnesses.</p>	<p>Broadly categorized into three items (subject to any of the following being judged as truly unavoidable circumstances)</p> <ol style="list-style-type: none"> ① Not recognizing the existence of the saving. ② Not recognizing the existence or content of the demand notice. ③ Not making a claim for refund. <p>Additionally, newly exemplify in the standards cases such as "having to care for or nurse a relative."</p>
How to check situation	<p>Certificate is necessary for fact-checking</p>	<p>Check based on contents in statement</p> <p>Additionally checking situation even if the content is only "I did not know the rule".</p>

³ According to the provisions of the former Postal Savings Act (Act No. 144 of 1947), which is deemed to be in effect, if 20 years have passed since the maturity date and no claim for repayment is made within two months after a reminder is issued, the depositor's rights are considered to be extinguished.

⁴ Request for review of the handling of refunds for fixed-term postal savings deposited before the privatization of postal services: https://www.soumu.go.jp/menu_news/s-news/01ryutsu16_02000066.html

3. Promotion of postal administration in the international field

(1) Response to the Universal Postal Union (UPU)

The Universal Postal Union (UPU), a specialized agency of the United Nations, was established in 1874 with the aim of developing the global postal network and services, thereby contributing to international cooperation in cultural, social, and economic fields by improving the convenience of international mail. The UPU will celebrate its 150th anniversary in 2024. In recent years, despite the challenging situation where the total volume of international mail has not recovered post the COVID-19 pandemic, the UPU is increasingly expected to play a significant role in the development of international logistics by formulating appropriate international postal frameworks in response to the expansion of cross-border e-commerce.

In this context, since January 2022, Mr. METOKI Masahiko from Japan has been serving as the Director-General of the UPU (term: one term of four years, with a maximum of two terms), and it is expected that he will lead various initiatives within the UPU.

The MIC is actively supporting Director-General Metoki's leadership and aims to further contribute to the UPU. Based on the Memorandum of Cooperation with the UPU, MIC supports the implementation of cooperation projects among UPU member countries, such as efforts to build a disaster-resilient postal network, initiatives for the economic and social utilization of the postal network, and climate change measures through the construction of an environmentally friendly postal network. In June 2023, the Memorandum of Cooperation was updated to expand the implementation projects, including strengthening collaboration with external organizations.

Additionally, as part of the cooperation projects, in October 2023, Japan provided support to the postal sector in Morocco affected by an earthquake through contribu-

tions to the UPU's Emergency Solidarity Fund (ESF⁵). Through such support, Japan aims to contribute to the further development of the global postal network and services and actively participate in the formulation of fair and open rules for international mail within the UPU.

In October 2023, the 4th Extraordinary Congress was held in Riyadh, Saudi Arabia. Under the leadership of Director-General Metoki, discussions were held on expanding the involvement and collaboration of more diverse postal stakeholders (including private operators) in the postal sector, and the increase in the annual budget ceiling was realized. Japan actively participated in these deliberations, contributed to consensus-building, and, as the chair of the First Committee, summarized the committee's discussions and reported the results to the plenary session of the Congress, significantly contributing to the operation of the Congress.

Furthermore, the UPU has established a close relationship with the World Customs Organization (WCO). In June 2023, the WCO-UPU Global Conference, co-hosted by the UPU and WCO, was held in Tokyo. In light of the expansion of cross-border e-commerce, discussions were held among postal operators and customs authorities from various countries on how to enhance cooperation between postal services and customs to ensure the proper and smooth flow of international mail, including the use of Electronic Advanced Data (EAD) and other digital technologies for advanced border inspections. The MIC announced that projects to promote cooperation between postal services and customs in various countries would be implemented through voluntary contributions to the UPU and contributed to the formulation of the "Joint Declaration (Tokyo Declaration)," which is the outcome of the discussions.

(2) Support for overseas deployment of Japanese postal infrastructure

The MIC is promoting the overseas deployment of the Japanese postal infrastructure system as part of the government's "Infrastructure System Overseas Promotion Strategy 2025"⁶ (June 2022 Supplement) and the "Ministry of Internal Affairs and Communications Overseas Promotion Action Plan 2025"⁷ (July 2022). This initiative aims to provide emerging and developing countries with Japan's excellent postal-related technologies, systems, and operational know-how to support the improvement of postal service quality and the optimization of postal operations in the recipient countries. While the focus has primarily been on Asia, in recent years, efforts have been made to expand into new regions such as Europe and the Caucasus. By acquiring peripheral businesses such as equipment used in sorting centers, understanding the needs and challenges related to the overall postal

business in the recipient countries, and exploring new business opportunities in areas such as e-commerce, digital transformation, and greening, the initiative encourages the entry of Japanese companies with relevant technologies and expertise.

In FY2023, pilot projects were conducted to promote DX in Vietnam Post, to introduce electric vehicles for collection and delivery in Indonesia Post for the purpose of decarbonization, and to optimize operations at a new sorting center in Azerbaijan Post. The MIC will continue to deepen cooperation projects with various countries and, through active participation in international postal conferences and basic research on the postal situation in various countries, will build relationships with postal operators in other countries and promote the overseas deployment of the Japanese postal infrastructure system.

⁵ The fund was established by the Universal Postal Union (UPU) to provide emergency assistance to member countries affected by disasters or other crises.

⁶ Infrastructure System Overseas Promotion Strategy 2025 (June 2022 Supplement): <https://www.kantei.go.jp/jp/singi/keikyoku/dai54/infra.pdf>

⁷ Ministry of Internal Affairs and Communications Overseas Promotion Action Plan 2025 (July 2022): https://www.soumu.go.jp/main_content/000842643.pdf

(3) Global Postal Strategy Task Force

In recent years, governments and postal operators of major countries have been addressing common challenges such as the stable provision of universal postal services. Additionally, they are also required to respond to new challenges such as digital transformation, sustainability, economic security, and other emerging issues. Furthermore, various business entities are strategically and proactively utilizing platforms such as the Universal Postal Union (UPU) to explore new business opportunities in the postal, logistics, and financial sectors in the post-pandemic era.

In this context, Japan is also working to promote service provision that benefits users and to strengthen col-

laboration among domestic and international stakeholders for the strategic overseas expansion of Japan's strong postal infrastructure. To this end, the "Global Postal Strategy Task Force" has been convened since December 2023, with plans to compile immediate strategies and specific policies by this summer, addressing both international initiatives such as the overseas expansion of Japan's postal infrastructure and international cooperation through the UPU, as well as domestic initiatives including maintaining universal postal services, promoting digital transformation, and enhancing regional contributions within Japan Post's postal business.

4. Trends in correspondence delivery

Under the Act on Correspondence Delivery by Private Business Operators (Act No. 99 of 2002), private operators are also allowed to engage in the letter delivery business. As of the end of FY2023, 596 operators have entered the specified letter delivery business, which provides services that do not interfere with the provision of universal postal services. These services include a circulating collection and delivery service that meets customer needs by circulating a fixed route and sequentially collecting and delivering letters at each

point, an express delivery service for relatively short distances or within limited areas, and a telegram-like service that delivers messages such as congratulations or condolences along with decorated paper.

The MIC is promoting understanding of the purpose and system of the letter delivery business and is raising awareness about the definition of letters and the letter delivery system to ensure that letters are sent appropriately.

Appendix



Additional notes

Annotation 1: Research and study on the advancement of digital technologies and their utilization

Questionnaire to the general public

This survey of the general public in Japan, the U.S., Germany, the UK and China was conducted to ascertain the experience or intention of use of and images of digital technologies such as AI, metaverse, robot and fully autonomous driving.

Items	Overview		
Survey method	Internet questionnaire survey		
Survey period	January to February 2024		
Target area	Japan, the U.S., Germany, the UK and China		
Selection method	Selected by age group (20s, 30s, 40s, 50s, 60s and older) and gender (male and female) from among questionnaire survey company monitors.		
Valid response	A total of 1,000 samples were collected in each country, with 100 each by age (20s, 30s, 40s, 50s, 60s and older) and sex (male and female). The number collected in each country is as follows.		
	<Japan>		
	Age	Male	Female
	20-29	103	103
	30-39	103	103
	40-49	103	103
	50-59	103	103
	60-	103	103
	Total	515	515
		1,030	
	<the U.S., Germany, the UK, China>		
	Age	Male	Female
	20-29	52	52
	30-39	52	52
	40-49	52	52
	50-59	52	52
	60-	52	52
Total	260	260	
	520		
Main survey items	<div>[1] Basic attributes (sex, age, occupation, regional characteristics, annual household income)</div> <div>[2] Understanding of the terms of generative AI, metaverse, digital twins, NFT, smart speaker and fully autonomous driving, experiences of use of those services, and reasons why not to use them.</div> <div>[3] Thoughts to generative AI, thoughts to the proliferation of it, thoughts to the use of it at home and in entertainment, images to generative AI, and the promotion of policies to develop and help forward AI and generative AI</div> <div>[4] thoughts to the use of metaverse at home and in entertainment, thought to the use of it at work, and image to metaverse</div> <div>[5] Whether to use robots at home or not, thoughts to the introduction of home-use robot and thoughts to the proliferation of robot at home</div> <div>[6] Whether to drive a car or not, thoughts to fully autonomous driving and thought to proliferation of fully autonomous driving</div>		
Notes	The survey targeted monitors registered with the questionnaire survey company. Factors such as the small number of registered monitors may have biased the characteristics of the subjects and their responses, depending on the country, gender or age group.		

Annotation 2: Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally
(1) Survey research on the use of digital technologies domestically and internationally

a. Questionnaire to the general public

This survey of the general public in Japan, the U.S., Germany and China was conducted to ascertain the state of digital utilization in working style, private services and public services.

Items	Overview						
Survey method	Internet questionnaire survey						
Survey period	December 2023 to January 2024						
Target area	Selected without age bias from among questionnaire survey company monitor						
Valid response		20s	30s	40s	50s	60s	Total
	Japan	206	206	206	206	206	1030
	The U.S.	104	104	104	104	104	520
	Germany	104	104	104	104	104	520
	China	104	104	104	104	104	520
	Total	518	518	518	518	518	2590
	* Individuals under 20 and over 70 were excluded from this questionnaire.						
Main survey items	<ul style="list-style-type: none"> • Basic attributes (age) • Usage of digital service for work such as remote work • Usage of interactive entertainment services in virtual space • Usage of digital administrative services • Expectations and concerns about the digitalization in various services • Literacy in and thoughts on digital usage 						

b. Questionnaire to company

This survey of companies in Japan, the U.S., Germany and China on digital usage was conducted from the perspectives of technology/data, organization and human resources.

Items	Overview			
Survey method	Internet questionnaire survey			
Survey period	January 2024 to February 2024			
Target area	Selected without age bias from among questionnaire survey company monitor			
Valid response		Large enterprises	Small-to-medium-sized enterprises	Total
	Japan	361	154	515
	The U.S.	233	76	309
	Germany	213	96	309
	China	286	23	309
	Total	1093	349	1442
Main survey items	<ul style="list-style-type: none"> • Basic attributes (industry, number of employees) • Data and technology used in efforts to switch to digital • Effects of efforts to switch to digital • Organized efforts to promote the switch to digital • Shortage of digital human resources and efforts to secure them • Challenges in promoting the switch to digital 			

(2) Survey on the use of the digital technologies in the 2024 Noto Peninsula Earthquake

Questionnaire to the general public

This survey of the general public in Japan (not limited to disaster areas) was conducted to ascertain the use of the media in the 2024 Noto Peninsula Earthquake.

Items	Overview					
Survey method	Internet questionnaire survey					
Survey period	March 2024					
Target area	Selected without age bias from among questionnaire survey company monitor					
Valid response		20s	30s	40s	50s	60s
						Total
	Japan	412	412	412	412	412
* Individuals under 20 and over 70 were excluded from this questionnaire.						
Main survey items	<ul style="list-style-type: none"> • Basic attributes (age) • Whether to do the confirmation of safety or not and tools to do so • Media to use as a tool for information gathering after the earthquake • Information gathering and distribution on social media related to the earthquake • Status to encounter unverified information 					

References

Part 1

Chapter 1

- Cabinet Office Recovery and Reconstruction Support Headquarters (2nd meeting) (February 16, 2024), (3rd meeting) (March 1, 2024) handouts
- NTT West "Support and Guidance for Customers Affected and Evacuated due to the Effects of the 2024 Noto Peninsula Earthquake"
- Visual Communications Journal "Ishikawa Prefecture's Commercial Broadcasters and NHK: Relay Station Affected by Noto Peninsula Earthquake" (January 22, 2024)
- Nikkan Dempa Shimbun "Noto Peninsula Earthquake: the Regional Bureau of Telecommunications etc. including the One in Kinki Support CATV Stations" (February 15, 2024)
- NHK Broadcasting Culture Research Institute NHK Bunken Blog "Noto Peninsula Earthquake: What is the Situation of Local Media? ~ "Radio Nanao", Nanao City, Ishikawa Prefecture ~ [Researcher's Perspective] #527" (February 22, 2024)
- MIC "Roundtable on Information and Communications Infrastructure and its Utilization for the Realization of Vibrant Local Communities, Working Group on the Usage Environment of Digital Infrastructure to Support the Utilization of Digital Technology in Local Communities" materials
- NTT DOCOMO, KDDI "Regarding the Implementation of "Shipboard Base Station" Operations in Response to the 2024 Noto Peninsula Earthquake" (January 6, 2024)
- Softbank "We Want to Quickly Deliver Peace of Mind to Disaster-stricken Areas. The Current Situation in Noto and the Path to Early Recovery of the Communication Network as Seen by the Person in Charge" (January 12, 2024)
- ITmedia Mobile "Four Carriers Explained the Status of Area Restoration After the Noto Peninsula Earthquake: What Are the Factors that Are Making "Full-scale Restoration" Difficult?" (January 19, 2024)
- Ministry of Finance "Concerning the Use of Contingency Funds Based on the Package to Support the Lives and Livelihoods of Victims of the 2024 Noto Peninsula Earthquake"

Chapter 2

- Digital Agency "Summary of Press Conference by Minister for Digital Transformation KONO" (January 26, 2024)
- Axel Globe "The 2024 Noto Peninsula Earthquake Special Page"
- QPS Research Institute "Providing Satellite Images of the 2024 Noto Peninsula Earthquake Area"
- National Research Institute for Earth Science and Disaster Prevention "Disaster Prevention Cross-view on the 2024 Noto Peninsula Earthquake"
- Geospatial Information Authority of Japan "Crustal movement accompanied with the 2024 Noto Peninsula Earthquake by analyzing observed data of "Daichi 2" (updated on January 19, 2024)
- Tokyo Metropolitan Government "Visualization of the damage situation of the Noto Peninsula Earthquake using the Tokyo Digital Twin 3D Viewer" (February 2, 2024)
- National Research Institute for Earth Science and Disaster Resilience "FY2023 4th Disaster Resilience Co-Creation Research Meeting "2024 Noto Peninsula Earthquake" Reporting meeting" (March 5, 2024)
- MIC "Survey on the status of ICT utilization during the Kumamoto Earthquake" (March 2017)
- Blue Innovation, Liberaware, ACSL, Aeronext, NEXT DELIVERY "Regarding the initial disaster support activities of five drone-related companies related to the 2024 Noto Peninsula Earthquake"

Chapter 3

- "BIZ DRIVE" KAMEDA Kenji, Why did the third AI boom occur? (Part 1) (February 28, 2018), (Part 3) (April 16, 2018)
- SEQUOIA, "Generative AI's Act Two" (September 20, 2023)
- Center for Research and Development Strategy in Japan Science and Technology Agency "New Trends in Artificial Intelligence Research 2" (July 2023)
- SHIOZAKI Junichi "The Future Landscape Changed by Generative AI", "Nomura Research Institute" (December 2023)
- MIC "Report on Research and Study on the Impact of ICT Evolution on Employment and Work Styles" (March 2016)
- NIKKEI Tech Foresight, "Infrastructure models will be multimodal and integrated with robots: 24-year outlook," "Nihon Keizai Shimbun Inc." (January 24, 2024)
- SHINDO Tomonori "Editor-in-Chief's Outlook for 2024 (No. 11) Will Robots Change with Large-Scale Language Models? - Robots and AI in 2024 -, "Nikkei xTECH" (January 19, 2024)
- NEC "Examples of AI technology used in automobiles, such as autonomous driving, and future challenges"
- Jidouten LAB, "Autonomous Driving and AI (2023 Latest Edition)" (July 7, 2023)

Chapter 4

- Data provided by Statista
- National Institute of Advanced Industrial Science and Technology press release "Development of world-class generative AI begins using AIST's computing resource ABCI - AIST, Tokyo Institute of Technology, and LLM-jp (hosted by the National Institute of Informatics) cooperate" (October 17, 2023)
- NICT, "Prototype of a large-scale language model (generative AI) specialized for Japanese ~ Developing a 40 billion parameter generative large-scale language model trained only on Japanese web data ~" (July 4, 2023)
- CyberAgent, "CyberAgent releases Japanese LLM (Large-Scale Language Model) with up to 6.8 billion parameters to the public - Providing commercially usable models trained with open data -" (May 17, 2023)
- CyberAgent, "Version 2 of our unique Japanese LLM (large-scale language model) released to the public - Providing a commercially available chat model with 32,000 tokens -" (November 2, 2023)

- NTT, "NTT's commercial service using its unique large-scale language model "tsuzumi" will begin in March 2024" (November 1, 2023)
- Yomiuri Shimbun Online "Fake video of Prime Minister KISHIDA spread on social media using generative AI...NTV's logo misused: "We cannot forgive this,"" (November 4, 2023)
- Nikkei Online Edition "Fake video of Noto Peninsula Earthquake spread on social media, also soliciting remittances" (January 2, 2024)
- Nikkei Online Edition "European 5G base station destruction, the shadow culprit is the hoax of "spreading coronavirus"" (April 25, 2020)
- World Economic Forum "How to navigate an era of disruption, disinformation, and division" (January 15, 2024)
- "US companies agree to develop AI video identification system; President Biden announces, 'Measures to be taken'", "NHK News" (July 22, 2023 issue)
- MIC "Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space"
- "About the Concept of AI and Copyright," the Legal System Session, Copyright Subcommittee, Cultural Affairs Council (March 15, 2024)
- Ministry of Foreign Affairs, "G7 Leaders' Statement on the Hiroshima AI Process"
- MIC "Publication of Report by AI Network Society Promotion Council in 2017"
- MIC "Publication of Report by AI Network Society Promotion Council in 2019"
- Cabinet Office Integrated Innovation Strategy Promotion Council Decision, "Social Principles of Human-Centric AI"
- METI, "Governance Guidelines for the Implementation of AI Principles ver. 1.1"
- Cabinet Office AI Strategic Council "Tentative Summary of AI Issues"
- MIC "Study Group Report on Utilization of Metaverse toward the Web3 Era"
- MIC "Study Group on Realizing a Safe and Secure Metaverse"

Chapter 5

- MIC (2024) "Research and study on the advancement of digital technologies and their utilization"
- MEXT, "Survey on the actual situation regarding "Teacher Shortage"" (January 2023)

Chapter 6

- Tokyo Institute of Technology "Regarding development of large-scale language model distributed parallel learning method for supercomputer "Fugaku" policy response framework" (May 22, 2023)

Part 2

Chapter 1

- Data provided by Statista
- MIC (2024) "Survey on Economic Analysis of ICT in FY2023"
- MIC "ICT Inter-Industry Table" (for each FY)
- MIC "2023 Survey of Research and Development"
- MIC "Survey of Research and Development" for each FY
- Japan Science and Technology Agency, Research and Development Strategy Center "Overview of Research and Development Report (2023)"
- National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2023"
- NTT (2023) "IOWN Technology Report 2023"
- MIC "2023 Basic Survey on the Information and Communications Industry"
- MIC "Information and Communications Statistics Database"
- MIC "Survey on Broadband Infrastructure Coverage Rate at End of FY2022"
- OECD Broadband statistics
- MIC (2024) "Results of Aggregating Internet Traffic in Japan (for November 2023)"
- MIC "Publication of Quarterly Data on the Number of Subscriptions and Share of Telecommunications Services (Q3 of FY2023 (End of December))"
- MIC "FY2023 Survey on Domestic-Overseas Price Difference of Telecommunication Service"
- MIC "Voice Communication Usage in Japan by Communication Volume (FY2022)"
- MIC "Accidents in Telecommunications Services (FY2022)"
- MIC "Regular Monitoring Meetings on the Implementation Status of Consumer Protection Rules" Material
- MIC "Income and Expenditures of Private Broadcasters" and NHK "Financial Statements" for each FY
- Dentsu "Advertising Costs in Japan"
- MIC "Income and Expenditures of Private Broadcasters"
- MIC "Current State of Cable Television"
- Japan Electronics and Information Technology Industries Association, Japan Cable Laboratories, and NHK, and the MIC "Current State of Satellite Broadcasting" and "Current State of Cable Television"
- MIC "State of the Occurrence of Broadcasting Suspension Accidents" (FY2022)
- MIC Institute for Information and Communications Policy "Survey on Media/Software Production and Distribution"
- Dentsu Group "Global Advertisement Spend Growth Rate Forecast (2023-2026)"
- MIC "Analysis of the Current Status of Overseas Expansion of Broadcasting Content" (for each FY)
- Data provided by Omdia
- METI "Production Dynamics statistical Survey, Machinery Statistics Edition"
- Yano Research Institute Ltd., "Global Research on the Number of Mobile Phone Service Subscriptions and Shipment Volume of Smartphones" (2023) (published on March 27, 2024)
- Yano Research Institute Ltd., "The Market of HMDs (Head Mounted Displays) for XR (VR/AR/MR) and Smart Glasses (2023)" (published in July 5, 2023)
- CIAJ "Medium-term Demand Forecast for Communications Devices [FY2023-DY2028]"

- JEITA "Domestic Shipments of Consumer Electronic Devices"
- UNCTAD "UNCTAD STAT"
- Wright Investors' Service, Inc "Corporate Information"
- GEM Partners "Video Streaming (VOD) Market Forecast for Five Years (2024-2028) Report"
- Recording Industry Association of Japan "Japan's Recording Industry 2024"
- Research Institute for Publications (2024) "Publishing Monthly Reports"
- Japan Alternative Data Accelerator Association "Alternative Data FACTBOOK" (Overview)
- Yano Research Institute Ltd., "Metaverse Market Survey in Japan (2023)" (published on August 30, 2023)
- IDC Japan, July 2023 "Domestic Data Center Service Market Prediction 2023-2027" (JPJ49897923)
- Synergy "Cloud Market Gets its Mojo Back; AI Helps Push Q4 increase in Cloud Spending to New Highs"
- IDC "Investment in Edge Computing in the Domestic Market is Predicted to Reach 16 trillion yen in 2024 ~the Forecast for the Domestic Edge Infrastructure Market is Announced~" (March 22, 2024)
- MIC "Communications Usage Trend Survey"
- IDC Worldwide Edge Spending Guide-Forecast 2024 | Feb (V1 2024)
- Deloitte Tohmatsu MIC Research Institute "Reality and Future Prospects of Edge AI Computing Market in FY2023 (ver.3)"
- IDC "Announced Market Prediction of Domestic AI System in 2024" (April 25, 2024)
- Stanford University "Artificial Intelligence Index Report 2024"
- Canalys prediction
- IDC Japan, August 2023 "Japan IT Security Products Market Shares, 2022: Progress of Security Platform" (JPJ49213223)
- NICT "NICTER Observation Report 2023"
- National Police Agency, MIC and METI "Status of Unauthorized Access Activities and Research and Development of Access Control Technology"
- MIC (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"
- MIC "Survey on Household Income and Expenditures" (total households)
- MIC Institute for Information and Communications Policy "Survey on Usage Time of Information and Communications Media and Information Behavior"
- MIC "Survey Result of Teleworking Security in FY2023"
- UN e-Government Surveys
- Institute of Digital Government in Waseda University "World Digital Government Ranking"
- MIC "Overview of Promotion of DX and Use of Information by Local Governments: Summary of FY2023 Survey on Promotion of Use of Administrative Information by Local Governments"
- MIC "The Status of Issuance of My Number Card"
- Digital Agency "Dashboard on the proliferation of My Number Card"
- MIC "Promotion of Utilization of AI and RPA in Local Governments"
- MIC "Survey on Remote Work Initiatives by Local Governments"
- Japan Post Group "Financial Results for the Period Ending March 2024"
- Japan Post Group "Disclosure Report"
- Japan Post "Overview of Financial Results"
- Japan Post "Information on Number of Post Offices <open data>"
- Japan Post "Number of Accepted Postal Items" for each FY
- Japan Post Bank Securities Report
- Japan Post Insurance Securities Report

Chapter 2

- Partial recommendation of Information and Communications Council regarding "Technical conditions for telecommunications equipment that respond to the diversification and complexity of networks due to advances in virtualization technology, etc." (September 16, 2022)
- Results of soliciting opinions regarding partial revisions to the Ordinance for Enforcement of Telecommunications Business Act, etc. and recommendation of the Information and Communications Administration and Postal Administration Council (January 20, 2023)
- Partial recommendation of Information and Communications Council regarding "Technical conditions for telecommunications equipment that respond to the diversification and complexity of networks due to advances in virtualization technology, etc." (February 24, 2023)
- MIC (2022) "Summary of the Future Vision and Ideal State of Broadcasting in the Digital Age"
- MIC (2023) "Summary of the Future Vision and Ideal State of Broadcasting in the Digital Age (Second Summary)"
- MIC (2023) "Summary of Public Broadcasting Working Group"
- MIC (2024) "Summary of Public Broadcasting Working Group (Second Summary)"
- National center of Incident readiness and Strategy for Cybersecurity "Cybersecurity Strategy" (2021)
- National center of Incident readiness and Strategy for Cybersecurity, Cybersecurity Strategic Headquarters (2022) "The Cybersecurity Policy for Critical Infrastructure Protection"
- Digital Agency (2022) "Sub-working Group for Trust-Assured Digital Transformation" Report
- MIC (2024) "Final Report of Study Group on e-Seal"

