

## Section 3 Radio Policy Trends

### 1. Summary

#### (1) Initiatives so far

Radio waves are limited and scarce resources and common property of the people widely used for services that are indispensable for people's lives including mobile phones, police and firefighting. For this reason, it is necessary to ensure fair and efficient use of radio waves. Specifically, because use of the same frequency in the same area causes interference, radio waves should not be used randomly and require a system to ensure proper use. In addition, because how radio waves propagate and the transmittable quantity of information vary depending on the spectrum, it is necessary to use them for the purposes appropriate for each spectrum. Furthermore, due to their nature to propagate across borders, use of radio waves requires international rules and coordination including treaties.

The old Radiotelegraphy Act that stated "radiotelegraphy and wireless telephones shall be administered by the Government" was replaced by the Radio Act, the purpose of which is "to promote the public welfare by ensuring the fair and efficient utilization of radio waves" (Article 1) in 1950. Since its enactment, Japan has promoted the private sector use of radio waves that are common property of the public. Today, radio waves have become indispensable for people's daily lives.

MIC has allocated frequencies under international cooperation and licensed radio stations, and has been making efforts that include: radio wave supervision for good

radio use in an environment that is free of interference/jamming; R&D to expand radio resources; and technical examination work for effective radio use.

#### (2) Future challenges and direction

Information communication networks are core infrastructure for every socio-economic activity. Wireless communications, in particular, are essential for environments for easy use of information and communication services anytime and anywhere. The role of radio waves for improvement of people's lives is further expanding.

The trend of increasing the number of land mobile radio stations including mobile phones is expected to continue in the future, and traffic will increase accordingly. Traffic is also expected to increase due to the spread of new services such as subscription. In order to maintain the comfortable radio wave use environment for mobile phones, etc., it is necessary to promote further effective use of the frequencies currently in use, to share the frequencies used for other purposes and to develop terahertz and other unused frequencies

It is also important to maintain an appropriate radio use environment while handling changes in the circumstances of radio use. To this purpose, it is necessary to further advance radio wave monitoring, radio equipment trial purchase and other measures, while responding to new radio use and changes in radio equipment distribution.

### 2. Consideration of Promotion of Effective Radio Utilization in the Age of Digital Transformation

#### (1) Progress of digital transformation across society

In Japan it is expected that the COVID-19 pandemic and other factors will trigger further progress of digital transformation across society, which is necessary for establishment of "new normal" and maintenance/development of economic activities. In this context, it is necessary to effectively use radio waves that are limited and scarce resources shared by the people, while at the same time spreading their benefits broadly among the people, which will revitalize the economy and society of the country.

#### (2) Consideration at the Round-table Conference on Radio Policy in the Age of Digital Transformation

Since November 2020, MIC has held the "Round-table Conference on Radio Policy in the Age of Digital Transformation." The report compiled by the conference in August 2021 sets the goal to increase spectrums for four radio wave systems: mobile phone network system including 5G/Beyond 5G that especially need spectrums; satellite communication/HAPS system; IoT/wireless LAN system, and; the next-generation mobility system.

The goal is about 16GHz increase by the end of fiscal 2025 and about 102GHz increase by the 2030s compared with the end of fiscal 2020. For effective use of radio waves in the age of digital transformation, the report recommends: "introduction and spread of radio systems necessary for the age of digital transformation"; "validation of effective use of frequencies and allocation measures"; "measures for effective use of frequencies for public use"; "regulation and supervision of radio waves in the age of digital transformation"; and "review of the spectrum user fee system."

#### (3) Partial amendment of the Radio Act

In order to promote fair and efficient use of radio waves based on the recommendations of the report of the Conference, a bill for partial amendment of the Radio Act and the Broadcasting Act was submitted to the Diet in February 2022 and enacted in June of the same year. The bill includes strengthening of the functions of the Radio Regulatory Council, establishment of a system for frequency reallocation for mobile phones, and review of the spectrum user fee system. MIC plans

to make preparations for its smooth enforcement.

- Strengthening of the functions of the Radio Regulatory Council

Evaluation of the level of effective radio use (hereinafter “effective use evaluation”) has been made by the Minister of Internal Affairs and Communications based on the result of radio usage survey. However, in order to ensure appropriate evaluation in response to technology progress, the evaluation will be made by the Radio Regulatory Council consisting of members with extensive experience and knowledge.

- Establishment of a system for frequency reallocation for mobile phones

Reallocation may be made, when the result of the effective use evaluation by the Radio Regulatory Council regarding the frequencies used by base stations of a telecommunication business including mobile phones does not satisfy a certain level, or the minister found that reallocation examination is necessary considering overlapping applications. The amendment created responsibility of attested establishers to establish the specified base stations in places other than in the places included in the approved plan, and added matters relating to ensuring fair radio use to the matters to be stated in establishment guidelines.

- Review of the spectrum user fee system

The amount of spectrum user fees will be revised considering the expected total expenses for spectrum users and the prospect of radio station establishment for the three years from fiscal 2022 to fiscal 2024, while allowing the use of spectrum user fees for granting subsidies to R&D toward Beyond 5G.

### 3. Spread/development of 5G/B5G

#### (1) Spread/development of 5G based on the Infrastructure Development Plan for a Digital Garden City Nation

##### i Formulation of Master Plan 2.0 on the Regional Development of ICT Infrastructure

5G enables not only “ultra-high speed” communication extending 4G but also “ultra-low delay” for smooth operation of robots in a remote location and “multiple simultaneous connection” of a large number of devices to the network. Because of these advantages, there are great expectations for 5G as infrastructure indispensable for an IoT society where everything is connected to the Internet. Actually, specific initiatives using 5G are in progress in various regions and sectors including automated driving of tractors, product inspection through image analysis using AI and remote control of construction machines.

Recognizing that 5G will become global common infrastructure for economy and society, MIC has been actively contributing to 5G international standardization activities at the International Telecommunication Union (ITU), while at the same time making efforts to strengthen international cooperation with European, American

#### (4) Initiatives for effective use of frequencies for public use

The report of the conference confirmed the direction of “measures for effective use of frequencies for public use,” which are “abolishment,” “frequency migration,” “frequency sharing” or “digitalization” of the radio stations for public services operated by the state (relevant government agencies) and found it necessary to follow up the progress of the measures every year for the time being. In response, the working group on frequencies for public use conducted follow-up including hearing of relevant government agencies from March to June 2022 and plans to compile the result around the summer of 2022.

#### (5) Consideration of allocation method of new mobile phone frequencies

In Japan, needs for frequencies for mobile phones is rapidly increasing due to 5G introduction, technological innovation and other reasons. In order to further promote and ensure effective and fair radio use, there is an increasing need to consider new allocation methods of mobile phone frequencies.

In this context, MIC has held the “Study Group on New Allocation Methods for Mobile Phone Frequencies” since October 2021 to conduct a broad range of surveys and analysis of frequency allocation methods of other countries and to discuss allocation methods of mobile phone frequencies for Japan based on the result, while considering the advantages of the methods of other countries. The Study Group compiled the result of the surveys and analysis of mobile phone frequency allocation methods of other countries in its 1st report in March 2022 and plans to compile the 2nd report around summer of 2022.

and Asian countries. In order to develop ICT infrastructure across Japan as early as possible through integrated and effective use of the measures to support 5G and other ICT infrastructure development and the measures to promote 5G utilization, MIC formulated the “Master Plan on the Regional Development of ICT Infrastructure” for the period up to the end of fiscal 2023 in June 2019 (amended in July and December 2020).

##### ii Formulation of the Infrastructure Development Plan for a Digital Garden City Nation

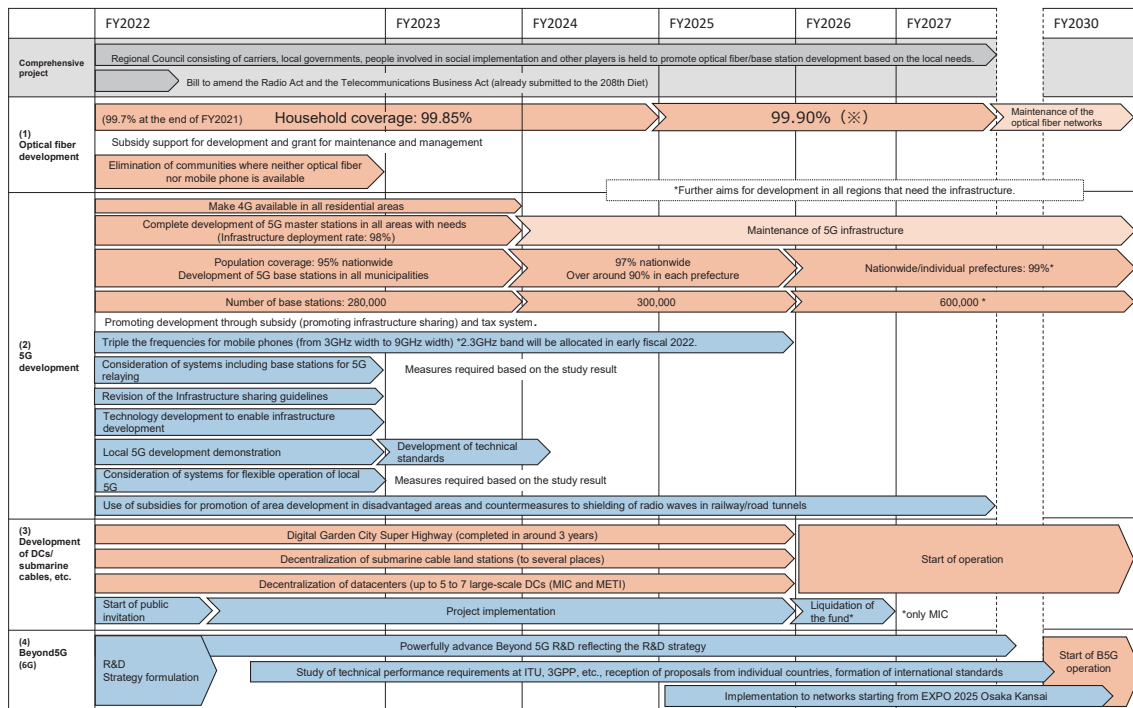
In December 2021, Prime Minister Kishida announced raising of the 5G population coverage to 90% by fiscal 2023 toward realization of the Vision for the Digital Garden City Nation. In response, at the end of the same month MIC asked mobile operators for more active development of 5G base stations and formulation and submission of a plan including the number of 5G base stations and population coverage up to 2025. Based on the plans submitted by the mobile operators, MIC formulated and released “Infrastructure Development Plan for a Digital Garden City Nation” on March

29, 2022, to succeed the “Master Plan 2.0 on the Regional Development of ICT Infrastructure.”

The Infrastructure Development Plan aims to realize the world’s top level 5G environment in a two-step strategy consisting of the 1st phase: nationwide development of 5G infrastructure (4G/5G master stations) and the 2nd phase: development of slave stations in rural areas to expand area coverage. Specifically, in the 1st phase, the plan aims to make 4G available in all residential areas, while developing 5G master stations that are the basis of 5G deployment in almost all areas with needs

across the country. In the second phase, the goals of population coverage of 5G are: 95% nationwide by the end of fiscal 2023 (from over 30% at the end of fiscal 2020) with development of 5G base stations in all municipalities; 97% nationwide and around 90% in each prefecture by the end of fiscal 2025. Specific measures to achieve the goals include: allocation of new frequencies for 5G; amendment of the Radio Act to stipulate the responsibility to establish base stations; encouragement by subsidy and tax measures; and promotion of infrastructure sharing (Figure 4-3-3-4).

Figure 4-3-3-4 Infrastructure Development Toward a Digital Garden City Nation (road map)



(2) Beyond 5G

Beyond 5G, following 5G, is expected to further advance the characteristic functions of 5G to: (1) 10-fold faster communication, (2) one tenth of delay, and (3) 10-fold multiple simultaneous connection. In addition, for creation of new values, it must realize (4) “ultra-low power consumption” (one hundredth of the existing system), (5) “ultra-safe and reliable” including instant recovery from failure, (6) “autonomy” to build optimal network instantaneously, and (7) “extensibility” for communication everywhere on land, sea, air and outer space. Beyond 5G is expected to be introduced around 2030. Because this is indispensable for development of Society 5.0 and is resilient and secure core ICT infrastructure in the future to support the “new normal” with and post COVID-19, it is important for Japan to be involved in its technology development and international standardization processes by maximizing the strength of the country.

Since January 2020, MIC has held the “Beyond 5G Promotion Strategy Roundtable” to discuss formulation of comprehensive strategy considering the needs and technological progress expected around the time of in-

roduction of Beyond 5G. In June 2020, MIC released “Beyond 5G Promotion Strategy—Roadmap towards 6G” consisting of the following three strategies. Various projects are in progress for realization of Beyond 5G based on the Promotion Strategy.

- ① “R&D strategy” to create the world’s top level R&D environment through intensive investments in advanced technologies and bold open spectrum policy toward implementation of advanced technologies with competitive advantage
- ② “Intellectual property and standardization strategy” to establish a network for cooperation with strategic partners at an early stage and work to gain the world’s top level share of patents necessary for Beyond 5G toward creation of opportunities to enter new markets
- ③ “Rolling out strategy” to create Beyond-5G-ready environments by establishing environments and systems necessary for development and expansion of use cases that will contribute to rolling out of 5G/optical fiber networks across society and to problem solving



Examples of vigorous activities include: establishment of the “Beyond 5G Promotion Consortium” in December 2020 to promote the strategy in industry-government-academia collaboration; release of the “Beyond 5G White Paper” compiling future visions and technologies of Beyond 5G as envisioned by Japan in March 2022; and holding of the “Beyond 5G International Con-

ference” aimed at strengthening of partnership among parties concerned at home and abroad in November 2021. In December 2020, the “Beyond 5G New Business Strategy Center” was established and has been working vigorously, which includes dissemination of information through new business strategy seminars as described in Chapter 4 Section 7.

## 4. Promotion of advanced radio use systems

### (1) Intelligent Transport System

Intelligent Transport Systems (ITS), which connect people, roads and vehicles by using information and communications technologies, contribute to safe and comfortable mobility of people and things through reduction in traffic accidents and solving of traffic congestion. Because it is expected that ITS and automated driving will require transfer and exchange of a large quantity of real-time data, development of information and communications infrastructure is essential. In addition, in order to meet the need of automated driving and connected cars, it is necessary not only to use existing ITS but also to upgrade the information and communications infrastructure including 5G. For this purpose, research and demonstration toward automated driving systems using LTE and 5G are conducted in many countries.

“Public-Private ITS Initiative/Roadmaps. Past initiatives and the basic concept of the future ITS Initiative”<sup>14</sup> formulated by the IT Strategic Headquarters in June 2021 identified the following three priority initiatives: “Creation of a digital platform for realizing a new mobility society,” “Further advancement of automated driving, etc.” and “Dissemination and use of diverse mobility” to promote specific measures from five perspectives including “technological development” and “traffic infrastructure development and implementation of connected cars.” The “Strategic Innovation Promotion Program Phase 2: Automated Driving for Universal Services” led by the Council for Science, Technology and Innovation (CSTI), Cabinet Office, aims to build a safe and comfortable automated-driving society through vehicle-infrastructure cooperation technology using signal information from transport infrastructure installed on general roads and information to support merging to highways.

While allocating frequencies for the Vehicle Information and Communication System (VICS), Electronic Toll Collection System (ETC), 76/79GHz-spectrum on-vehicle radar system, and 700MHz-spectrum intelligent transport system and developing their technical standards, MIC has promoted these systems.

Based on the “Public-Private ITS Initiative/Roadmaps. Past initiatives and the basic concept of the future ITS Initiative,” MIC has been taking actions to spread 5G. The ministry is also working for realization of an automated-driving society by conducting technical study on

frequency sharing that is necessary for introduction of a new V2X<sup>15</sup> system to 5.9GHz-spectrum that is considered for V2X globally, for example. Other activities in this field include: technical study of the required conditions for communications in use cases where automated driving needs communications; study for formulation of a draft information communication technology roadmap based on the realization timing of the communications and diffusion rate of self-driving cars; and R&D on technologies to recognize dynamic information from diverse sources continuously and correctly, collect and integrate necessary information in real-time according to the target area (narrow or medium) and distribute the result to vehicles to create panoramic views of the peripheral traffic situation toward safe and secure automated driving.

### (2) Public safety LTE

Because major public institutions of Japan separately develop and operate their radio systems specialized in their operations, intercommunication across the institutions is not easy. Furthermore, these systems are mostly based on voice due to the restrictions of available frequencies and development costs.

In the US, the UK and other countries, fire defense, police and other institutions for public safety introduce joint-use mobile communication networks that enable high-speed transmission of image/video data in addition to voice by using Long Term Evolution (LTE), which is a communication technology used for mobile phones. These networks for public safety using LTE are called “Public Safety LTE (PS-LTE).” PS-LTE is expected to secure intercommunication between public safety institutions in the event of terrorist attack or major disaster and thereby contribute to smoother rescue activities. Furthermore, use of the globally standardized technologies is expected to lower equipment costs.

Toward realization of PS-LTE in Japan, MIC constructed a demonstration system for basic functions of PS-LTE in fiscal 2020, implemented functional verification in the actual field in cooperation with bodies concerned and examined operational challenges for social implementation as well as response measures. Since fiscal 2021, MIC has continued demonstrations while ensuring safety, reliability and security toward full-scale operation in fiscal 2022.

<sup>14</sup> Public-Private ITS Initiative/Roadmaps. Past initiatives and the basic concept of the future ITS Initiative: [https://cio.go.jp/sites/default/files/uploads/documents/its\\_roadmap\\_20210615.pdf](https://cio.go.jp/sites/default/files/uploads/documents/its_roadmap_20210615.pdf)

<sup>15</sup> V2X stands for “vehicle to everything”. This is a general term for communications between vehicles and various things, which include vehicle to vehicle communication (V2V) and vehicle to network (V2N) communication.

### (3) Satellite constellation

Thanks to smaller and lighter equipment used for satellites and reduction in satellite launching costs, practical application of small satellites has become relatively easier. As a result, it is possible to construct “satellite constellation,” which refers to integral operation of a large number of small non-geostationary satellites launched into medium/low orbits. Because satellite constellation uses non-geostationary satellites following medium/low orbits with short communication delay, it is possible to provide diverse services including high-speed/large capacity communication globally on land, sea and airplane, both in emergency and at normal times. For this reason, various satellite constellation systems are planned around the world.

In November 2020, MIC established a system necessary for introduction of a system to upgrade the existing systems using L-band based on satellite constellation and its service started in 2022. In August 2021, MIC established a system necessary for introduction of a Ku-band non-geostationary satellite communication system based on satellite constellation that uses 500km high orbit. Its service is expected to start within 2022. In addition, MIC received a report of the Radio Regulatory Council regarding establishment of a system necessary

for introduction of a Ku-band non-geostationary satellite communication system based on satellite constellation that uses 1,200km-high polar orbit. MIC plans to establish the system shortly.

### (4) Space-transmission-type wireless electric power transmission system

A space-transmission-type wireless electric power transmission system transfers power through several-meter distance by radio wave transmission without wire connection. Its use is expected for power supply to sensors in factory. Through supply of low electric power without cable connection or charging battery, the system will improve convenience and enable flexible installation of sensors. It is expected to contribute to Society 5.0 through IoT.

Toward practical application of the system, MIC has been studying shared use of frequencies with other radio systems, radio wave safety, technical conditions, structure of smooth operation coordination and other related matters. Based on the studies, the ministry established a system for its indoor use meeting certain requirements as premise radio station of 920MHz, 2.4GHz and 5.7GHz bands in May 2022.

## 5. Promoting Overseas Deployment of Radio Wave Systems

The role of radio wave monitoring systems and other technologies and systems to ensure safe and secure radio use is growing. The importance is recognized also in other countries including Southeast Asian countries where radio use is rapidly expanding. In this context, it has become an important task to make contribution to international society through overseas deployment of radio wave systems where Japan has excellent technologies, while at the same time fostering our radio infrastructure services into a promising business with global competitiveness toward further growth of the domestic economy.

To this end, public and private sectors are cooperating to promote strategic initiatives for global deployment of the radio systems where the country has strength with focus on Asian countries. Specifically, the “program to promote internationally harmonized use of frequencies”

is implemented to globally spread technologies with high utilization efficiency of frequencies suitable to the circumstances in Japan so that the technologies will be established as international standard based on global superiority. The program includes survey on technology trends at home and abroad, overseas demonstration experiments, dispatch of public-private missions and exchange among technology users. Considering global rise in demand for safe, secure and reliable ICT infrastructure, MIC plans intensive overseas deployment of 5G network solutions by Japanese enterprises using open RAN and vRAN for the next three years. Taking advantage of the results of domestic 5G deployment including local 5G, MIC is promoting 5G open architecture including proposal of 5G models according to the need.

## 6. Establishment of Radio Usage Environments

### (1) Promoting measures for the electromagnetic environment of living organisms

MIC is promoting initiatives to develop environments for safe and secure radio use.

Regarding danger of radio waves to public health, laws and regulations have established safety standards on radio wave strength, etc. according to the radio-wave protection guidelines.<sup>16</sup> The standards are equivalent

with international guidelines and reflect the results of surveys on radio safety over many years.<sup>17</sup> Existing surveys and research have found no causal relationship between radio waves below the level of the safety standards and health impact. MIC conducts educational campaigns for the public on the safety of radio waves used by mobile phones including 5G through telephone consultations, briefing sessions and leaflets.<sup>18</sup>

<sup>16</sup> Radio-wave protection guidelines: [radio-wave protection guidelines https://www.tele.soumu.go.jp/j/sys/ele/medical/protect/](https://www.tele.soumu.go.jp/j/sys/ele/medical/protect/)

<sup>17</sup> Study on radio safety at MIC: <https://www.tele.soumu.go.jp/j/sys/ele/seitai/index.htm>

<sup>18</sup> Radio use website (survey and evaluation technology of radio wave safety): <https://www.tele.soumu.go.jp/j/sys/ele/index.htm>

A survey on the influence of radio waves to medical appliances<sup>19</sup> is conducted every year. In fiscal 2021, MIC measured the influence of radio waves from 5G mobile phone terminals (3.7GHz, 4.5GHz and 28GHz bands) on implanted cardiac pacemakers and home medical care apparatus. To ensure safe and secure radio use when radio usage in medical institutions is progressing, MIC is disseminating points to be noted about medical tele-meters, mobile phones, wireless LAN, etc. and desirable radio wave regulations by holding briefing sessions for medical workers in various places. Since fiscal 2017, medical facilities have been subject to radio wave barrier measures using “subsidy for operating cost of projects to support spread of radio systems” in order to develop an environment for safe and secure use of mobile phones in medical facilities.

## (2) Promoting countermeasures against electromagnetic interference

With the spread of various electric/electronic appliances, measures to protect radio use against unnecessary radio waves emitted from various appliances/equipment have become important. For this purpose, The Radio Wave Utilization Environment Committee<sup>20</sup> set up under the Department of Information and Communications Technology of the Information and Communications Council conducts surveys and studies on electromagnetic interference countermeasures and contributes to deliberation on international standards at the Comité International Spécial des Perturbations Radioélectriques (CISPR). In response to the report by the Information and Communications Council, MIC takes measures to eliminate interference by unnecessary radio waves on radio equipment and prevent interference with electric/electronic appliances through standardization in Japan.

Internationally, the discussions on international standards regarding wireless power transmission systems used for electric vehicles, multimedia equipment and home appliances are becoming serious at CISPR. Here, Japan is leading the vigorous discussions on technologies to prevent interference with existing radio stations by radio waves leaked from wireless power transmission systems for electric vehicles.

Domestically, study was conducted on domestic standardization related to the revisions of CISPR standards. MIC received partial report on “Technical requirements of radio-frequency interference and immunity measuring devices: auxiliary device-conducted interference,” “Technical requirements of radio-frequency

interference and immunity measuring method: measurement method of conducted interference” and “Technical requirements of radio-frequency interference and immunity measuring method: measurement method of radiated interference” from the Information and Communications Council in February 2022.

## (3) Preventing radio wave interference/jamming

In recent years, interference/jamming with important radio communications by three types of illegal radio stations (illegal citizen’s band, illegal personal radio and illegal amateur radio) that was once a social issue has decreased as a result of rapid spread of mobile phones and strengthened radio wave monitoring. However, jamming/interference with radio communications caused by radio equipment that is easily available through on-line shopping but not conforming to technical standards of the Radio Act has become a big challenge.

In order to exclude jamming/interference and maintain good radio wave use environments when spectrum use is expanding, MIC is strengthening measures pertaining to the distribution of radio equipment that may cause jamming/interference in addition to radio wave monitoring and elimination of jamming/interference.<sup>21</sup> Specific measures include: educational campaigns to prevent general consumers from purchasing and using radio equipment not conforming to the technical standard and violating the Radio Act (illegal establishment of a radio station) or causing jamming/interference with other radio stations; “Trial purchase test of radio equipment”<sup>22</sup> to purchase radio equipment in the market, measure the strength of its radio waves to determine whether the equipment conforms to the standard specified in the Radio Act, and publish the result every year to provide information for protection of general consumers (since fiscal 2013). Since fiscal 2021, the test includes measurement to determine conformance with the technical standard of Chapter 3 of the Radio Act. Furthermore, MIC calls on manufacturers, distributors and importers of the equipment to handle only conforming radio equipment and refrain from selling non-conforming equipment. In addition, in order to prevent distribution of radio equipment not conforming to the technical standard, MIC formulated guidelines specifying actions required from radio equipment manufacturers, etc. as obligation to make effort, and voluntary actions by internet shopping mall operators to promote actions to prevent distribution of non-conforming equipment.

<sup>19</sup> Research study on the influence of radio waves on implanted medical appliances: <https://www.tele.soumu.go.jp/j/sys/ele/seitai/chis/index.htm>

<sup>20</sup> The Radio Wave Utilization Environment Committee: [https://www.soumu.go.jp/main\\_sosiki/joho\\_tsusin/policyreports/joho\\_tsusin/denpa\\_kankyou/index.html](https://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/joho_tsusin/denpa_kankyou/index.html)

<sup>21</sup> MIC radio use website: Outline of radio wave monitoring <https://www.tele.soumu.go.jp/j/adm/monitoring/index.htm>

<sup>22</sup> Results of radio equipment trial purchase test: <https://www.tele.soumu.go.jp/j/adm/monitoring/illegal/result/>