

Frequency Reorganization Action Plan (FY2023 version)

December 20, 2023
Radio Policy Division,

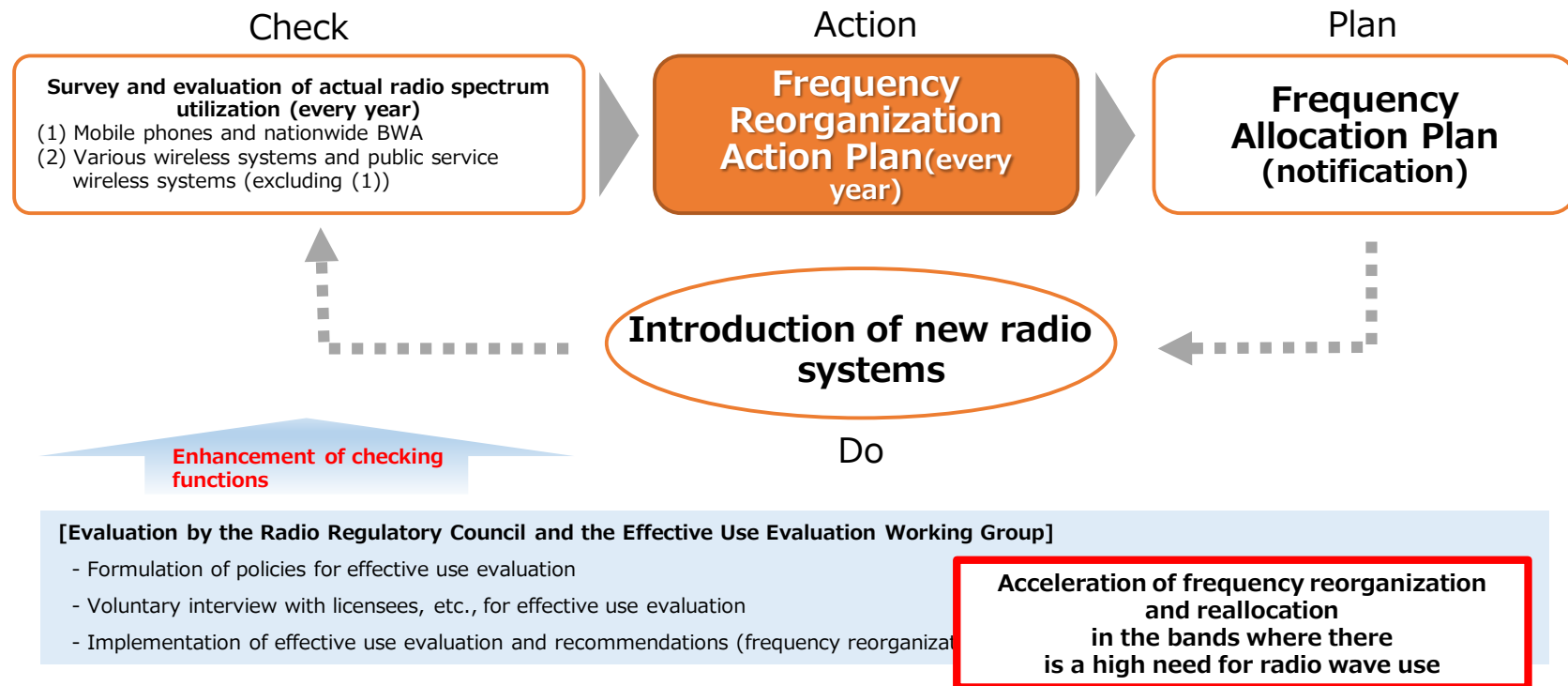
Radio Department, Telecommunications Bureau

Ministry of Internal affairs and Communications (MIC)

Outline

- In order to promote the effective utilization of finite and scarce radio wave resources, and to cope with the introduction of new radio spectrum utilization systems and increasing frequency demand, the Ministry of Internal Affairs and Communications (MIC) formulated and announced a frequency reorganization action plan from 2004 onwards.
- MIC has formulated a frequency reorganization action plan based on the evaluation results of the Survey of Actual Radio Spectrum Utilization conducted by the Minister for Internal Affairs and Communications, and the assessment of the extent of effective utilization of radio wave resources by the Radio Regulatory Council.

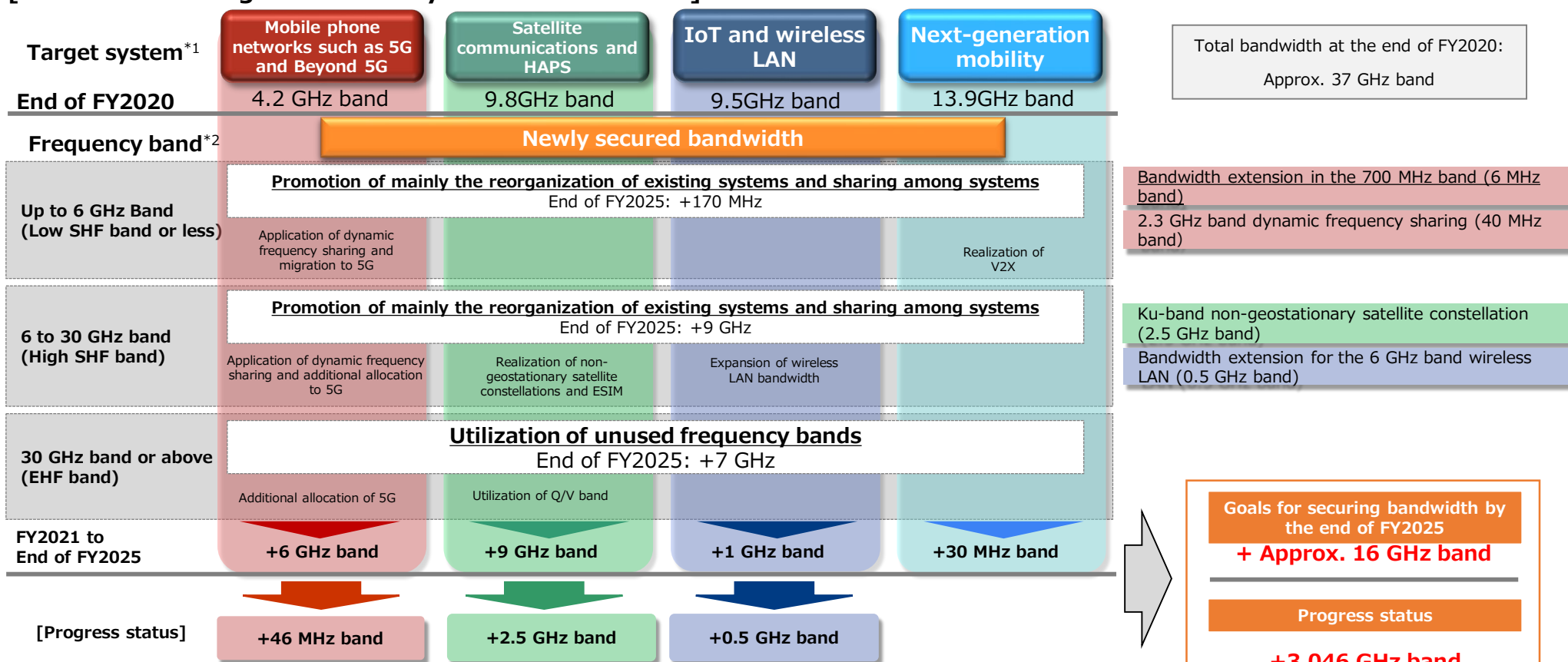
Frequency reorganization PDCA cycle



Goals for securing frequency bandwidth by the end of FY2025

- The Report of the Radio Spectrum Policy Council for Digital Business Expansion (August 2021) states that **the goal for securing bandwidth by the end of FY2025 is to secure bandwidth with an increase of a total of approximately 16 GHz**, compared to that at the end of FY2020, on four radio wave systems: mobile phone network systems such as 5G and Beyond 5G, satellite communications and HAPS systems, IoT and wireless LAN systems, and next-generation mobile systems.
- +3.04 GHz bandwidth has been secured** so far.

[Goals for securing bandwidth by the end of FY2025]



*1 Band shared among 4 systems is added to bandwidth for each system.

*2 Frequency bands are classified based on the current implementation status of wireless systems and the possibility of future introduction, and examples for each frequency band are added.

I. Securing of frequencies toward generalization of 5G

With regard to the 4.9 GHz, 26 GHz and 40 GHz bands, measures for migration of existing systems and frequency sharing will be examined with the aim of completing frequency allocation to 5G systems by the end of FY2025 through migration of existing systems and frequency sharing.

II. Further advancement and frequency extension of wireless LANs

Regulation revisions will be completed during FY2023 toward the advancement of wireless LAN systems in the 2.4 GHz, 5 GHz and 6 GHz bands. Technical conditions for outdoor use of 6 GHz band wireless LANs and bandwidth extension for 6.5 GHz wireless LANs will be examined.

III. Frequency use by drones in airspace

With regard to measures to expand the use of frequencies for 4G, 5G and 5/6 GHz band wireless LANs in airspace by drones, examinations will be carried out, and their direction will be formulated sequentially from FY2023.

IV. Promotion of examinations of V2X

Based on the interim report compiled by the Study Group on "Next-Generation ITS Communications" in the Autonomous Driving Era in August 2023, measures for migration of existing systems and frequency sharing will be examined with the aim of completing allocation of the 5.9 GHz band to V2X systems during FY2026.

V2X: Vehicle to X (everything)
ESIM: Earth Station in Motion

HAPS: High Altitude Platform Station
NTN: Non-Terrestrial Network

V. Advanced use of non-terrestrial networks (NTNs)

Toward the realization of NTNs, including HAPS, new non-geostationary satellite constellations and ESIM by geostationary satellite, research and development, engineering tests and examinations of technical conditions will be carried out.

VI. Realization of public safety mobile systems

With regard to public safety mobile systems, which aim to smoothly share information among public safety agencies in the event of a disaster, etc., by utilizing existing mobile phone technologies, the goal is to launch a service in FY2024. 555

VII. Effective use of frequencies for public services

With regard to national public service radio stations identified as "systems using frequencies for which demand has emerged in other applications" and "systems using analog formats", surveys of utilization will continue to be carried out.

VIII. Promotion of Beyond 5G (6G)

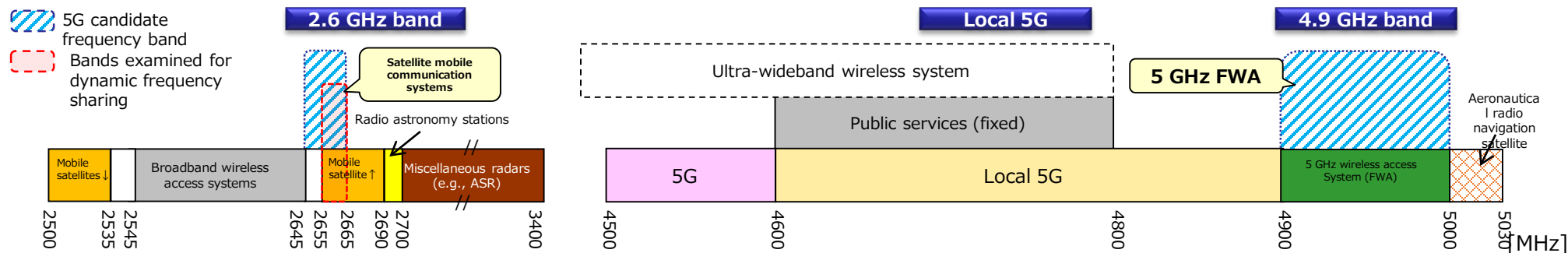
Based on the "Concept of Information and Communications Technology Strategies for Beyond 5G" compiled as a report from the Information and Communications Council in June 2022, research and development, and international standardization, will be carried out, and its practical use by society will be accelerated.

IX. Reorganization and migration of other major frequencies

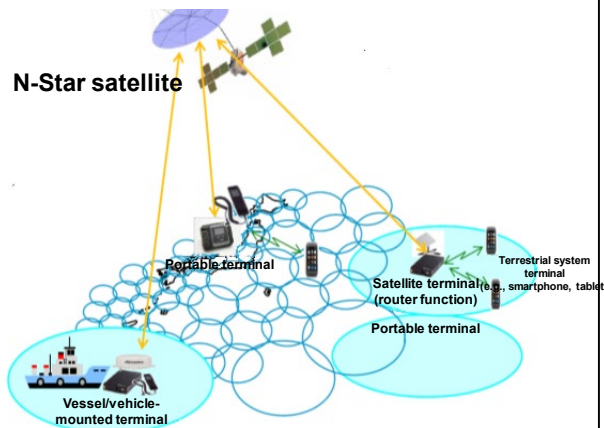
Measures based on the degree of effective use of radio waves evaluated in the Survey of Actual Radio Spectrum Utilization in FY2022 will be promoted.

I. Securing of frequencies toward generalization of 5G

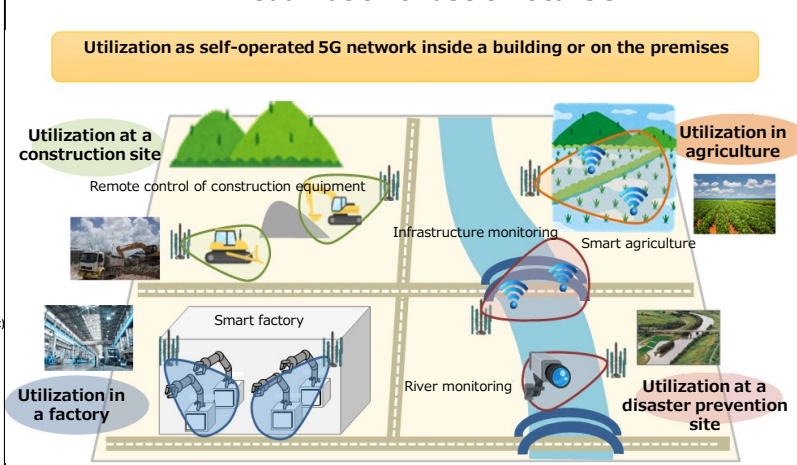
- With regard to the 2.6 GHz band (2645 to 2665 MHz), in the light of progress in migration of existing satellite mobile communication systems to upgraded systems, **examinations of the possibility of introducing mobile communication systems, including the application of dynamic frequency sharing at ordinary times and during disasters**, will be carried out, while taking account of its impact on existing wireless systems.
- For local 5G (4.6 to 4.9 GHz bands), regulations were revised to ensure flexible operation in August 2023, including the introduction of shared use of local 5G and the simplification of licensing procedures. **For more flexible operation, examinations of availability at sea and other matters will be continued.**
- With regard to the 4.9 GHz band (4.9 to 5.0 GHz), in order to **allocate frequencies to 5G systems by the end of FY2025, the deadline set for establishing a new GHz band wireless access system (registered station) will be the end of FY2025, and technical conditions for 5G systems to be introduced in the same frequency band will be arranged in FY2023.** For existing wireless systems, migration to other wireless systems using termination promotion measures will be further examined.



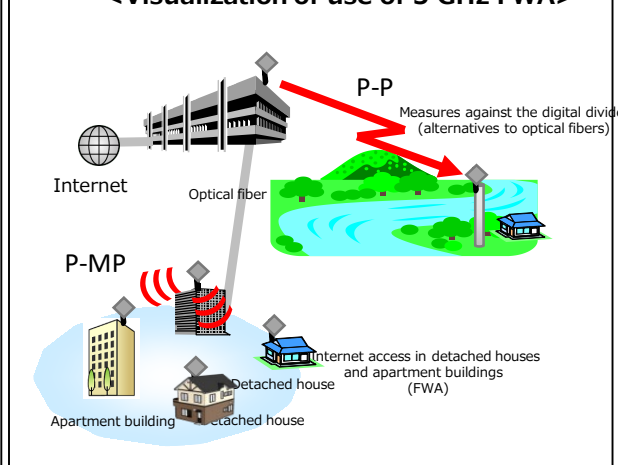
<Visualization of use of satellite mobile communications systems>



<Visualization of use of local 5G>

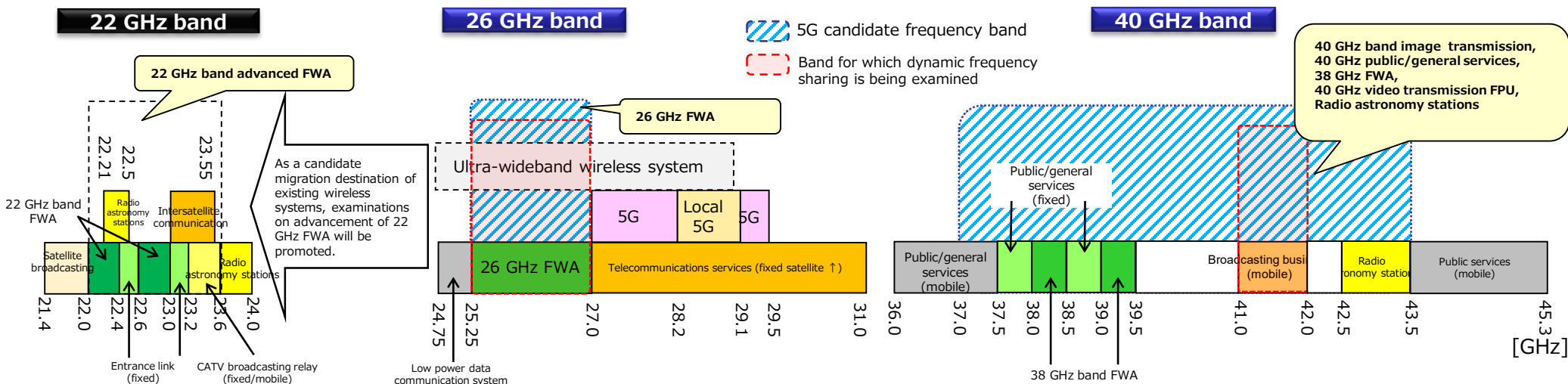


<Visualization of use of 5 GHz FWA>

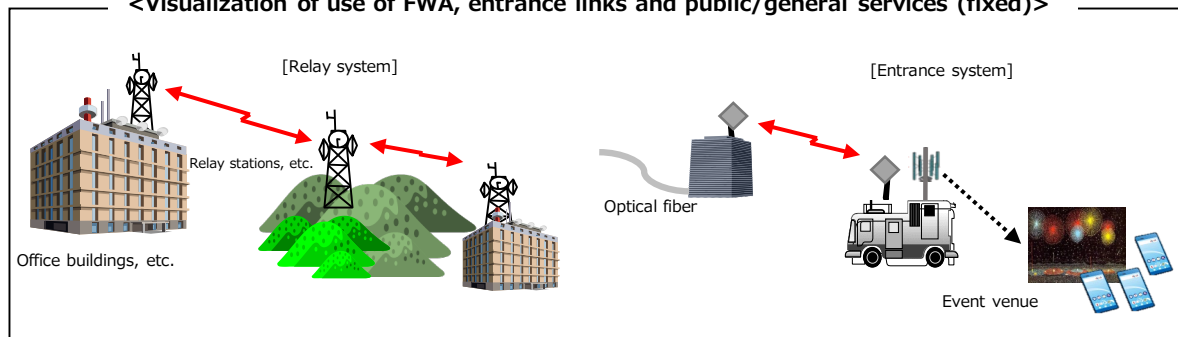


I. Securing of frequencies toward generalization of 5G (continued)

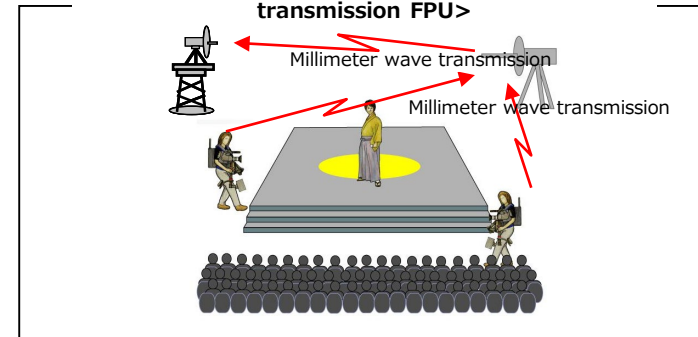
- With regard to the 26 GHz band (25.25 to 27 GHz) and 40 GHz band (37.0 to 43.5 GHz), in the light of specific needs and utilization status of the 28 GHz band by mobile-phone carriers, **examination tests** needed for examinations of sharing with existing wireless systems, and the requirements for bands applied to dynamic frequency sharing and sharing management systems **will start in FY2025 with the aim of completing frequency allocation to 5G systems by the end of FY2025**.
- In relation to advancement of the 22 GHz band fixed wireless access (FWA) system** as a candidate destination for migrating existing wireless systems in those bands, **engineering tests will start in FY2023**.



<Visualization of use of FWA, entrance links and public/general services (fixed)>

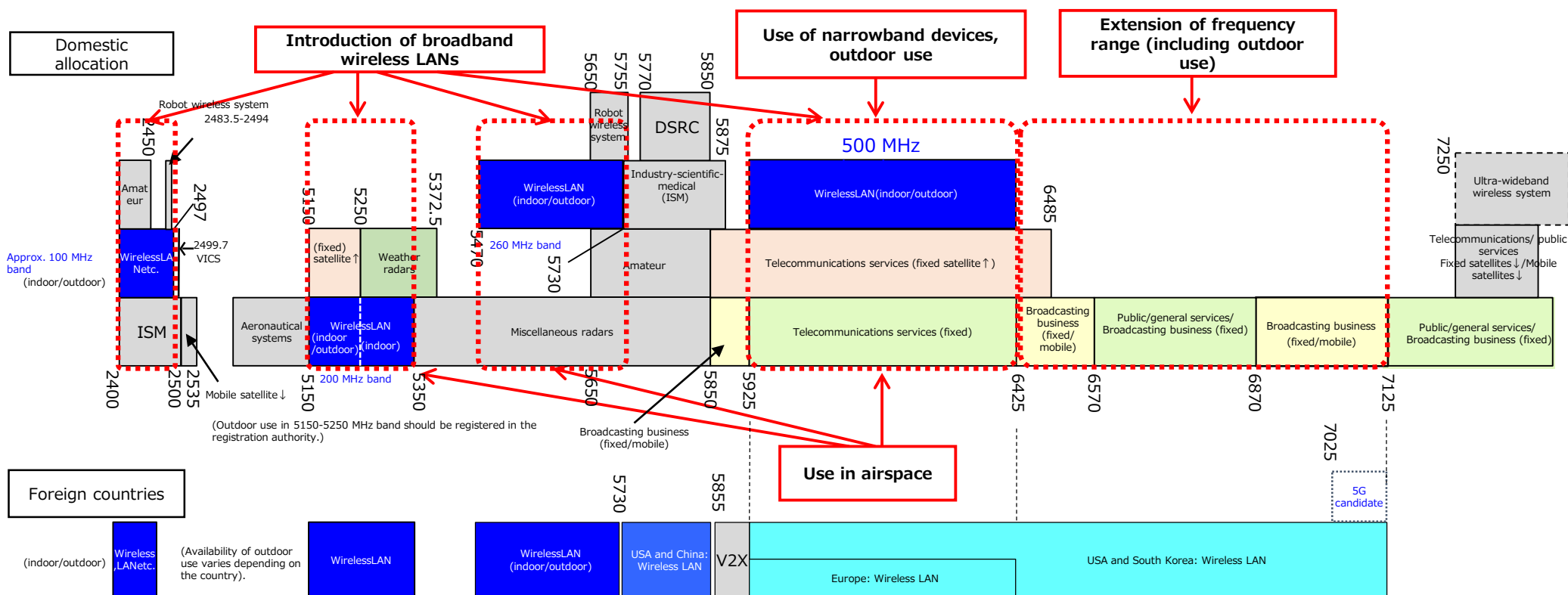


<Visualization of use of 40 GHz band video transmission FPU>



II. Further advancement and frequency extension of wireless LANs

- **Toward the introduction of broadband wireless LANs (IEEE 802.11be standards)** that improve the effective speed of wireless LANs in the 2.4 GHz band, 5 GHz band (5.2 GHz/ 5.3 GHz/ 5.6 GHz) and 6 GHz band, including the realization of a wireless LAN system with a width of 320 MHz in the 6 GHz band (5925 to 6425 MHz), **examinations of shared use with other wireless systems will be carried out, with the aim of completing regulation revisions during FY2023.**
- With regard to the frequencies used by wireless LANs in the 5 GHz band (5.2 GHz/ 5.6 GHz) and the 6 GHz band, measures to **further expand their use in airspace** while preventing interference with other wireless systems, etc., will be examined, and the direction to be taken by those measures will be formulated sequentially from around the end of FY2023.
- With regard to the **use of narrowband devices in the 6 GHz band** and the **outdoor use of wireless LANs, technical conditions, including the possibility of frequency sharing, will be examined** with attention to trends in other countries.
- In order to **extend the frequency range to the 6.5 GHz band (6425 to 7125 MHz), technical conditions** for frequency sharing, including outdoor use of wireless LAN systems, will be further examined and **will be summarized in FY2024**, with attention to trends in other countries and the IMT-specified candidate frequency band (7025 to 7125 MHz) of WRC-23.



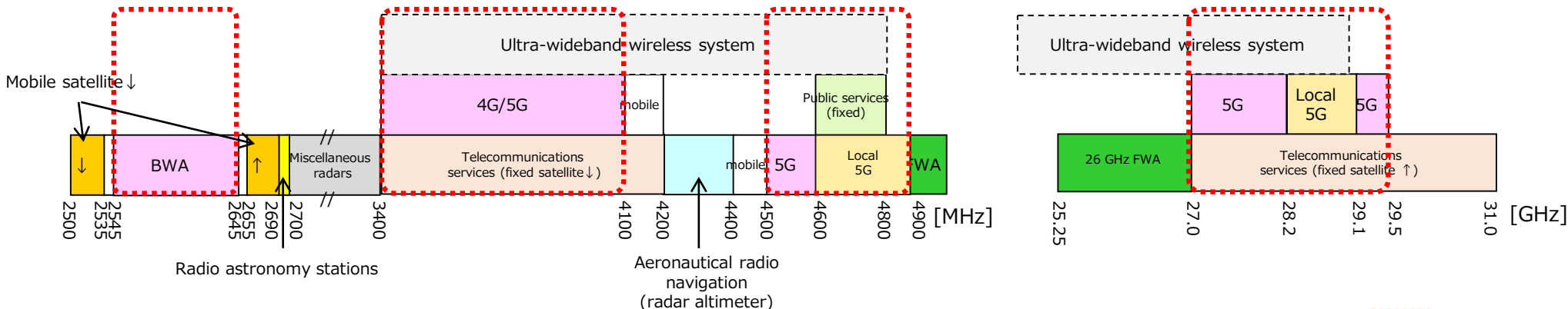
III. Frequency use by drones in airspace

- Examinations of the use of **broadband mobile wireless access (BWA) systems** by **drones, etc., in airspace**, which use **4G** (3.4 GHz/ 3.5 GHz band), **5G** (3.4 GHz/ 3.5 GHz/ 3.7 GHz/ 4.5 GHz/ 28 GHz band), **local 5G** (4.6 to 4.9 GHz/ 28 GHz band), and the 2.5 GHz band (2545 to 2645 MHz), will be carried out, while preventing interference with other wireless systems, etc.
- With regard to the frequencies used by **wireless LANs** in the 5 GHz band (5.2 GHz/ 5.6 GHz) and the 6 GHz band, measures to **further expand their use in airspace** while preventing interference with other wireless systems, etc., will be examined, and the direction to be taken by those measures will be formulated sequentially from around the end of FY2023.

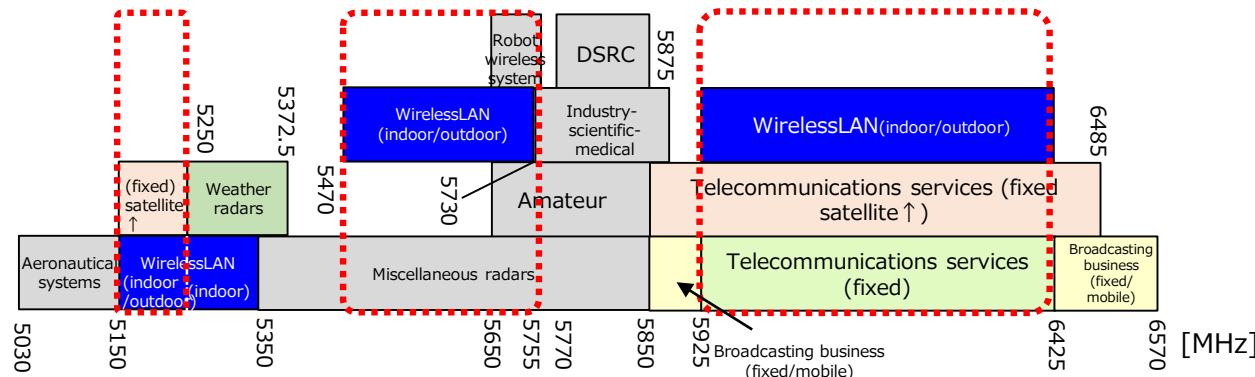
2.5 GHz band BWA

4G/5G/local 5G

5G/local 5G



5 GHz/6 GHz band wireless LAN

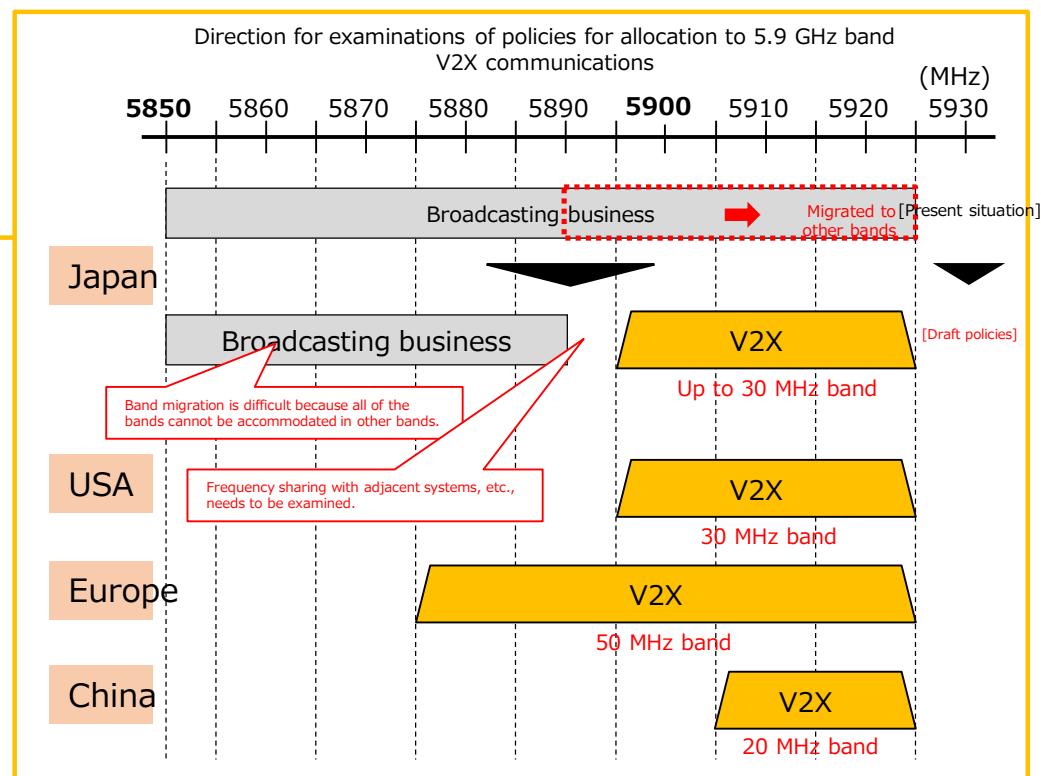
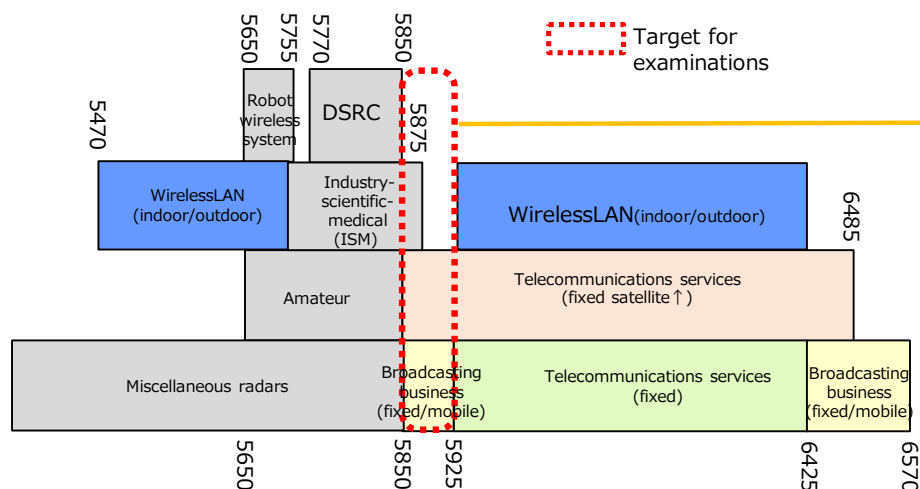


Target for examinations

(Outdoor use in the 5150-5250 MHz band should be registered with the registration authority).

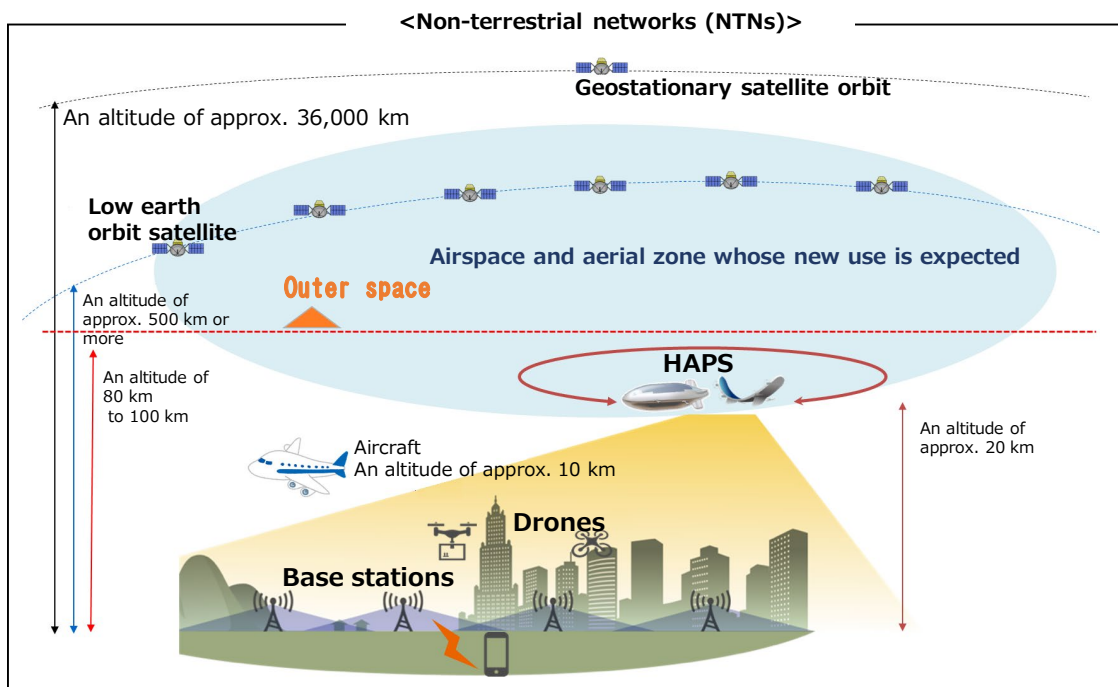
IV. Promotion of examinations of V2X

- In light of the development and importance of autonomous driving systems (including safe driving assistance), additional allocation to the 5.9 GHz band (5850 to 5925 MHz) has been examined internationally in addition to the existing frequency bands for ITS (e.g., the 760 MHz band). To that end, the interim report compiled by the Study Group on "Next-Generation ITS Communications" in the Autonomous Driving Era (August 2023) states that **the allocation of frequencies for V2X communications with a maximum bandwidth of 30 MHz (5895 to 5925 MHz) should be examined** in view of international frequency harmonization, and avoiding interference with existing radio stations. In response to this, specific examinations will be continued.
- Specifically, with regard to part of the 5.9 GHz band (5888 to 5925 MHz), the path to introduction and dissemination of V2X systems in the 5.9 GHz band will be provided by **creating an environment that quickly enables securing of frequencies for existing wireless systems to be migrated, while seeking migration measures, examining frequency sharing with systems adjacent to 5.9 GHz band V2X systems, and carrying out demonstration experiments**. After that, **frequency allocations to V2X communications will be implemented during FY2026**.



V. Advanced use of non-terrestrial networks (NTNs)

- With regard to high-altitude communication platform station (HAPS), whereby communication can be achieved between the ground and a base station installed on an unmanned aircraft which stays at an altitude of approximately 20 km above ground, research and development will be carried out in order to realize a communication service that is highly resilient to disasters and enables flexible development of advanced information infrastructure in rural areas. This service will be provided by a **fixed communication system that uses the 38 to 39.5 GHz band, and a mobile communication system that uses a frequency band below 2.7GHz. In order to examine sharing with other wireless systems, engineering tests will start from FY2023.**
- With regard to non-geostationary satellite systems, **toward the early realization of direct communication with mobile phones, etc., using part of IMT-specified frequency bands, necessary examinations will be carried out from FY2023 onwards** regarding appropriate technical conditions and licensing procedures, including frequency sharing, while striving to come into line with the international community based on the WRC-23 resolution.
- In preparation for **extension of the frequencies (17.7 to 19.7 GHz and 27.5 to 29.5 GHz) for broadband mobile satellite communications systems** using geostationary satellites (ESIM: Earth Stations in Motion), technical conditions for frequency sharing with existing wireless systems **will start to be examined in FY2023**, taking account of the results of engineering tests carried out in FY2021 and FY2022, as well as the progress of discussions at the ITU World Radiocommunications Conference.
- In preparation for the **introduction of a non-geostationary satellite communication system in the Ka band** that uses an orbit at an altitude of approximately 600 km, technical conditions for frequency sharing with existing wireless systems **will start to be examined in FY2023.**



EXIM: Earth Station in Motion
HAPS: High Altitude Platform Station

NTN: Non-Terrestrial Network
HIBS: HAPS as IMT Base Station

HAPS

Service links

Frequency bands discussed and specified as those for IMT base stations (HIBS)
(e.g., 700 to 900 MHz, 1.7 GHz, 2 GHz and 2.5 GHz bands)

Feeder links

Frequency bands specified for HAPS, which are allocated to fixed services

C2 links

Under consideration

Non-geostationary satellite communication systems

Service links

Part of the Ka-band and IMT-specified frequency bands (e.g., 1.7/1.8 GHz band)

Feeder links

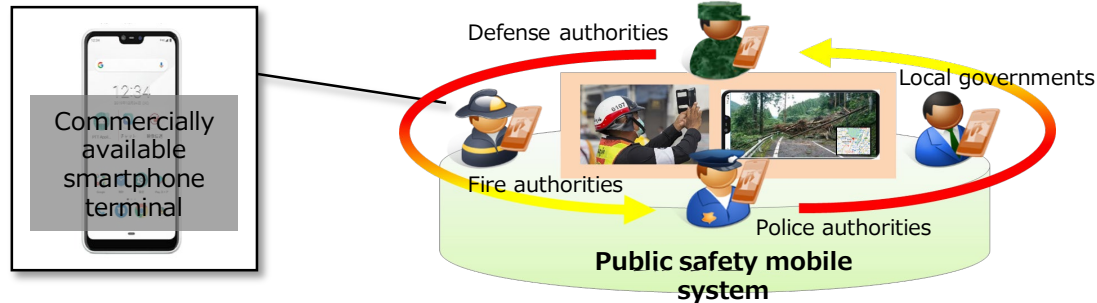
Ka-band

ESIM

Service links 17.7 to 19.7 GHz and 27.5 to 29.5 GHz

VI. Realization of public safety mobile systems

- With regard to public safety mobile systems, which aim to smoothly share information among public safety agencies in the event of a disaster, etc., by utilizing existing mobile phone technologies, it is expected that introduction and promotion of these systems will lead to more effective use of public use frequencies. To that end, technology demonstrations will be carried out in cooperation with relevant ministries and agencies, aiming at **launching a service in FY2024**.



- Supports several mobile phone carrier (multi-carrier) lines
- Developing a network infrastructure dedicated to public safety mobile systems
- Available for priority telephone links in a disaster

VII. Effective use of frequencies for public services

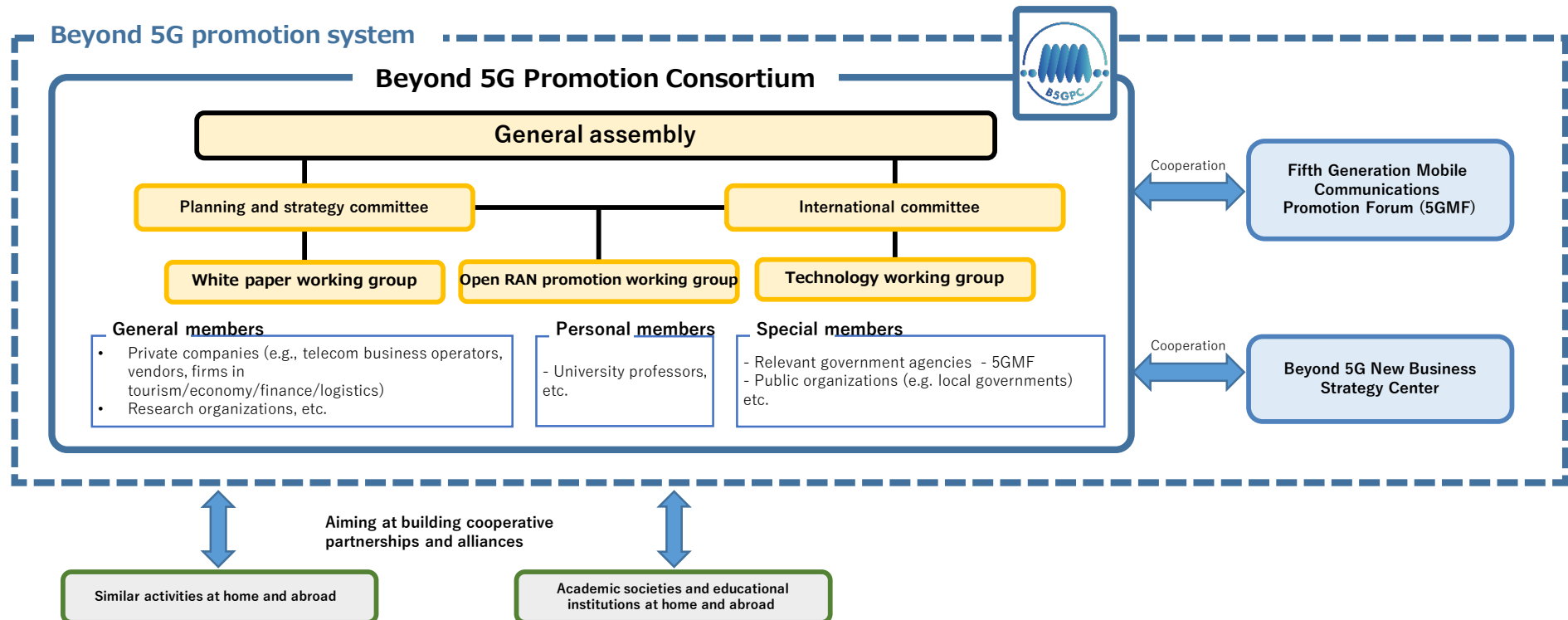
- The Digital Transformation Era's Radio Spectrum Policy Council has formulated the direction to be taken for termination, frequency migration, frequency sharing, and digitalization, etc. **With regard to "systems using frequencies for which demand has emerged in other applications", and "systems using analog formats", the Survey of Actual Radio Spectrum Utilization will be conducted every year, for the time being, from FY2023 onwards.**

System	Frequency band	Demand in other applications	Future direction	Progress status
5 GHz band FWA	5 GHz band	5G	Termination or Migration to another wireless system	Migration to alternative means is under consideration.
Weather radars (C-band)	5.3 GHz band	Wireless LAN	Frequency sharing	Examinations on sharing conditions is completed.
6.5 GHz band fixed microwave	6.5 GHz band	Wireless LAN	Frequency sharing	Examinations of frequency sharing will be continued.
(4) Mobile TV	37 GHz band	5G, satellite	Termination or Migration to another wireless system	Termination has been completed. (July 2022)
40 GHz band fixed microwave	40 GHz band	5G, satellite	Migration to another wireless system	Frequency migration is completed.
38 GHz band FWA	38 GHz band	5G, satellite	Frequency sharing	Examinations on frequency sharing will be continued.

System	Frequency band	Future direction	Progress status
Roadside communication	1620 kHz band	Digitalization, termination or Migration to another wireless system	Termination has been completed, or migration to FM format is under consideration.
60 MHz band telemeter	60 MHz band	Migration to another wireless system	Migration is underway.
Telemeter	60/400 MHz band	Digitalization	
Flood prevention	60/150 MHz band	Digitalization	
Mobile radio communication for dam and sediment control	60 MHz band	Digitalization	Administrative procedures for engineering tests for the introduction of digital format are in progress.
150 MHz central anti-disaster	150 MHz band	Digitalization or public safety mobile systems, etc.	Termination has been completed. (November 2022)
Interdepartmental communication (for disaster communications)	150 MHz band	Digitalization or Public safety mobile systems, etc.	The possibility of substitution by public safety mobile systems is under consideration.
Oil reserves	150 MHz band	Digitalization or public safety mobile systems etc.	Digitalization is in progress.
Disaster prevention intercom radio	150/400 MHz band	Public safety mobile systems, etc.	The possibility of substitution by public safety mobile systems is under consideration, or the system is scheduled to be terminated.
Heli-tele communication	400 MHz band	Digitalization	
Weather radio robot	400 MHz band	Digitalization	Administrative procedures for engineering tests for the introduction of a digital format are in progress.
15 GHz band heli-tele video transmission	15 GHz band	Digitalization or termination	Digitalization is in progress, or the system is scheduled to be terminated (March 2024).

VIII. Promotion of Beyond 5G (6G)

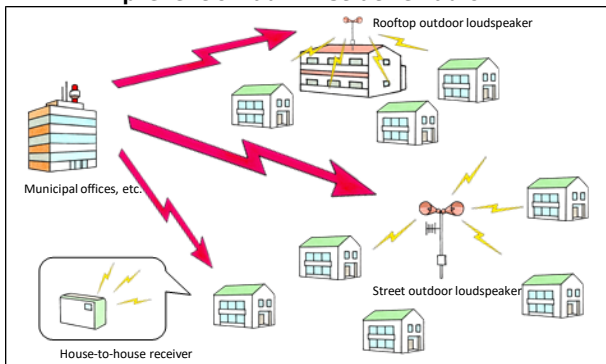
- Beyond 5G (6G), which is the next-generation information and communication infrastructure scheduled to be introduced in the 2030s, is expected to become the foundation of all industries and social activities. In order to promote it, the "Concept of Information and Communications Technology Strategies for Beyond 5G - Aiming for a Resilient and Vibrant Society in the 2030s" was compiled as a report from the Information and Communications Council in June 2022. Research and development of various technologies in priority areas, including optical networks, photonics-electronics convergence, and satellite/HAPS networks, will be rapidly accelerated, and the results will be practically utilized by society sequentially from 2025. Moreover, international joint research and international standardization will be strongly promoted.
- In 2024, efforts for practical use of next-generation mobile communications by society will be further promoted by reviewing the promotion framework, including integration of the Beyond 5G Promotion Consortium with organizations that promote and disseminate the use of new wireless communication technologies, such as the 5th Generation Mobile Communications Promotion Forum (5GMF).
- Efforts for Beyond 5G will be promoted by taking advantage of the opportunity of Expo 2025 Osaka, Kansai to be held in 2025 to set up an exhibition booth as a "Beyond 5G Ready Showcase" in order to provide an experience of cutting-edge technologies.
- In light of the situation worldwide where discussions are currently underway at the ITU to explore bands that can be specified for IMT with a view to Beyond 5G (6G), specification of such bands will be examined in Japan as well. If they are specified, responses to international conferences such as the ITU will be made to achieve global harmonization with frequency usage in other countries.



IX. Reorganization and migration of other major frequencies

- With regard to municipal disaster administrative radio (60 MHz band (only for the broadcast system)), **early migration to a digital format will be promoted**. As promotion measures, based on the degree of effective use of radio waves evaluated by the Survey of Actual Radio Spectrum Utilization (714 MHz or below) in FY2022, **efforts to confirm and grasp the background circumstances of issues related to digitalization will be made by devising the best way to carry out the survey in FY2024**.
- It is expected that tight frequency use for VHF band aeronautical mobile (R) service radio will become more serious in the future due to an increase in communication demand arising from the increased use of flying vehicles and other factors. For this reason, based on the degree of effective use of radio waves evaluated by the Survey of Actual Radio Spectrum Utilization (714 MHz or below) in FY2022, **examinations on channel arrangements (channel plans) for band narrowing** will be carried out in advance for areas where communication demand is expected to be tight, while taking account of introduction and renewal plans for radio equipment by licensees. Specifically, **with an eye on application to flying vehicles that are scheduled to be operated at Expo 2025 Osaka, Kansai to be held in FY2025, coordination with relevant operators will be promoted from FY2023 onwards**.

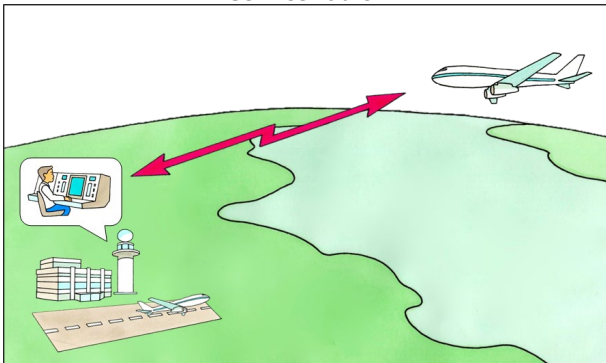
<Visualization of use of municipal disaster prevention administrative radio>



Evaluation results of the degree of effective use of radio waves in FY2022
<Municipal disaster prevention administrative broadcast radio (60 MHz band) (fixed stations)>

The Frequency Reorganization Action Plan states that **information on the advantages of digitalization and other alternative means and applicable financial measures will be given to local governments** and early migration to digital formats will be promoted. Based on the Plan, although there are no urgent issues even if an analog format continues to be used, digitalization is essential in order to improve convenience, including transmission of disaster information in text or image format. Therefore, municipalities in which the usage rate of digital formats is 0% will be **encouraged to facilitate the introduction of a digital format**. In order to pay close attention to the status of transition and termination in those municipalities and specifically clarify the issues related to digitalization, it is important to **confirm and grasp the background circumstances by devising the best way to carry out surveys** in the future. By disseminating information to municipalities to encourage them to transition to a digital format, including the perspectives of advancement, diversification and multiplexing of disaster prevention administrative radio as well as applicable fiscal measures, it is **appropriate to promote efforts to further facilitate the early transition to a digital format**.

<Visualization of use of aeronautical mobile service radio>



Evaluation results of the degree of effective use of radio waves in FY2022
<Aeronautical radio (120 MHz band)>

At present, there are many radio stations that do not plan to introduce narrowband-compatible equipment, while the number of international flights and foreign tourists is expected to increase again due to the **situation of the new coronavirus infection**, and introduction of **flying vehicles** and other applications is being examined. Under the circumstances, new uses for aeronautical radio (120 MHz band) are expected. **If the number of radio stations and the communication traffic volume increase** due to the reasons above, it is possible that tight frequency use will become more serious. If the demand for frequency become apparent, it is desirable to **promote the introduction of narrowband-compatible equipment in cooperation with licensees** when their equipment is renewed or partially renovated.

In light of this situation, it is **necessary to steadily proceed with examinations of a channel plan for band narrowing** described in the Frequency Reorganization Action Plan.