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Special Feature

Emergency Roaming for Mobile Communications

Intercarrier Roaming in Emergencies

About "JAPAN Roaming™"

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CONTENTS

Special Feature — Emergency Roaming for Mobile Communications

1 Intercarrier Roaming in Emergencies

5 About "JAPAN Roaming™"

Greetings from New Members of the ITU-AJ

10 Space Infrastructure Built with Launch Vehicle and Satellite Vertical Integration: Launching and connecting satellites in-house

Column

12 = A Serial Introduction Part 1 =
Winners of ITU-AJ Encouragement Awards 2026

About ITU-AJ

The ITU Association of Japan (ITU-AJ) was founded on September 1, 1971, to coordinate Japanese activities in the telecommunication and broadcasting sectors with international activities. Today, the principle activities of the ITU-AJ are to cooperate in various activities of international organizations such as the ITU and to disseminate information about them. The Association also aims to help developing countries by supporting technical assistance, as well as by taking part in general international cooperation, mainly through the Asia-Pacific Telecommunity (APT), so as to contribute to the advance of the telecommunications and broadcasting throughout the world.

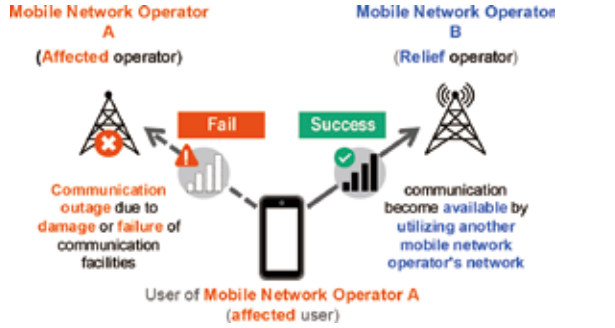
Intercarrier Roaming in Emergencies

Telecommunication Systems Division
Telecommunications Business Department
Telecommunications Bureau
Ministry of Internal Affairs and Communications

1. Introduction

Mobile communications services are an essential lifeline for daily life and economic activity. It is therefore important to ensure that communications services remain continuously available even in emergencies such as network outages and disasters resulting from natural hazards. In particular, mobile phones account for approximately 60% of emergency calls, underscoring their growing importance. Intercarrier Roaming in Emergencies is a mechanism that enables users to temporarily access another mobile network to make voice calls and use other communications services when the network of their mobile operator becomes unavailable due to a major disaster, communications outage, or other emergency. Since April 1, 2026, Japan's domestic mobile network operators, including NTT DOCOMO, INC., KDDI Corporation, Okinawa Cellular Telephone Company, SoftBank Corp., and Rakuten Mobile, Inc., have been providing Intercarrier Roaming in Emergencies under the service name "JAPAN Roaming™".

Figure 1: Overview of Intercarrier Roaming in Emergencies

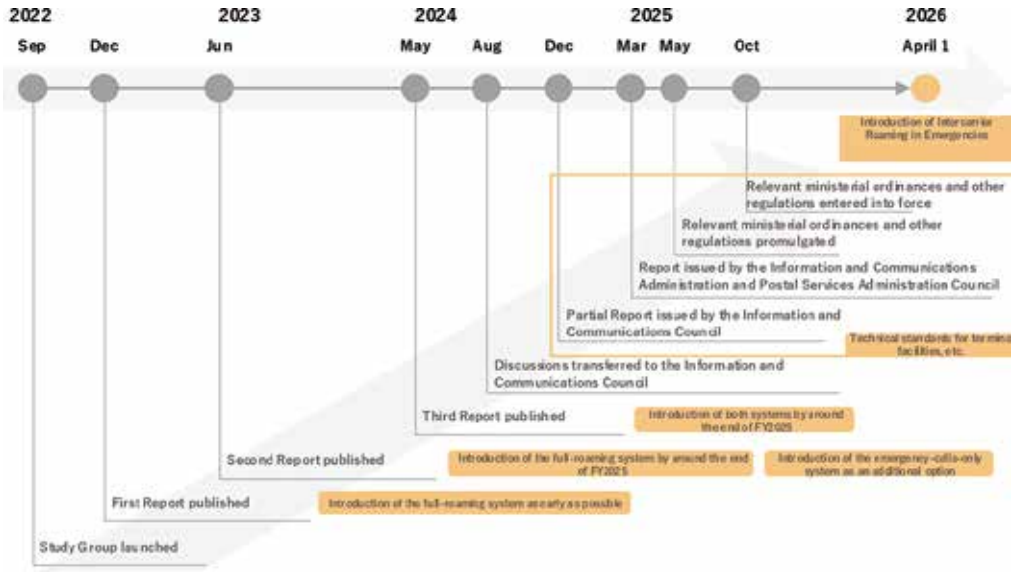


2. Background and development of the initiative

In September 2022, the Ministry of Internal Affairs and Communications (MIC) established the "Study Group on Intercarrier Roaming in Emergencies" (hereinafter, the "Study Group"). The Study Group has examined a broad range of measures to ensure communications during emergencies, including intercarrier roaming for mobile communications and the use of Wi-Fi. In December of the same year, the Study Group compiled and published its First Report, establishing basic policies that included introducing full-roaming intercarrier service in emergencies as early as possible, enabling emergency calls, ordinary voice calls, data communications, and callback calls from Public Safety Answering/Access Points (PSAPs); operating the service within the capacity limits of the relief operator's network; and providing the same roaming service to users of Mobile Virtual Network Operators (MVNOs).

In June 2023, the Study Group's Second Report set out a policy to introduce, alongside the full-roaming system, a roaming system that enables emergency calls even when a failure occurs in the core network (emergency-calls-only roaming). In May 2024, the Third Report outlined the basic concept for Intercarrier

Figure 2: Initiatives leading to the introduction of Intercarrier Roaming in Emergencies



Roaming in Emergencies and a target schedule for introducing both systems by around the end of FY2025. The report also examined measures to simplify user operations when switching between mobile carrier networks at the start and end of roaming. The Second Report had proposed assigning a new common PLMN number (Public Land Mobile Network: an identifier for a telecommunications network) for roaming. Subsequent studies, however, identified cases in which this approach could disadvantage users. The Third Report therefore concluded that, for Intercarrier Roaming in Emergencies, it would be appropriate to assign different PLMN numbers to the emergency-assistance networks of each mobile carrier.

In addition, institutional measures concerning telecommunications business facilities and terminal equipment were examined to enable Intercarrier Roaming in Emergencies. In August 2024, as discussions on policy decisions, including the development of technical standards based on the study findings, were expected to intensify, the Working Group on Intercarrier Roaming in Emergencies was established within the IP Network Facilities Subcommittee under the ICT Subcommittee of the Information and Communications Council. The discussions were thereby transferred to the Information and Communications Council, which examined technical standards and other requirements for terminal equipment. Ultimately, amendments to the relevant ministerial ordinances and notifications concerning technical standards for terminal equipment were promulgated in May 2025 and entered into force in October of the same year.

3. Overview of the full-roaming and emergency-calls-only systems

Intercarrier Roaming in Emergencies provides two service provision methods: the full-roaming system and the emergency-calls-only system.

Under the full-roaming system, data communications (up to 300 kbps for both transmission and reception), SMS (Short Message Service), and voice calls, including emergency calls, are available to users. For emergency calls, the caller's telephone number is displayed on the PSAP's console, enabling the PSAP to call the user back at that number. However, when a failure occurs in the core network, providing service under the full-roaming system may be difficult. Even in such situations, it is highly desirable to ensure that users involved in an incident, accident, sudden illness, or other emergency can reliably make emergency calls. Accordingly, a service provision method that enables emergency calls only was examined, based on the recognition that, despite certain limitations, depending on the location of the core network failure, this may be the only means available for users to make emergency calls from their mobile devices. This is the emergency-calls-only system. In an emergency, even when data communications, SMS, and voice calls are unavailable, emergency calls may still be available under the emergency-calls-only system. However, PSAPs cannot call the user back.

Under the emergency-calls-only system, two scenarios are envisaged: authentication available and authentication unavailable, depending on whether authentication through the HSS (Home Subscriber Server: a subscriber database used for mobile device location registration and user authentication) is functioning. When authentication is available, the caller's telephone number is displayed on the PSAP's console. (However, the PSAP cannot call back that number.) When authentication is unavailable, the caller's IMSI (International Mobile Subscriber Identity) number (subscriber identification number) is provided instead. Intercarrier Roaming in Emergencies is operated within the capacity limits of the relief operator's network. Accordingly, while priority is given to

Figure 3: Overview of the full-roaming system

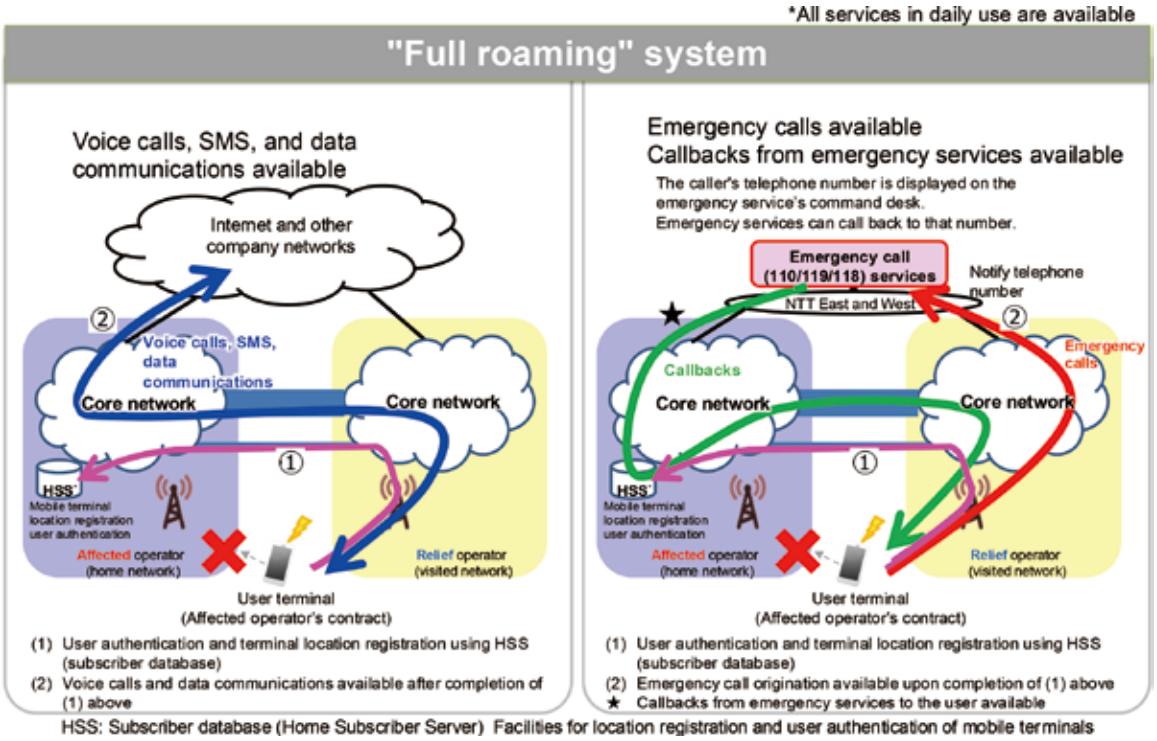
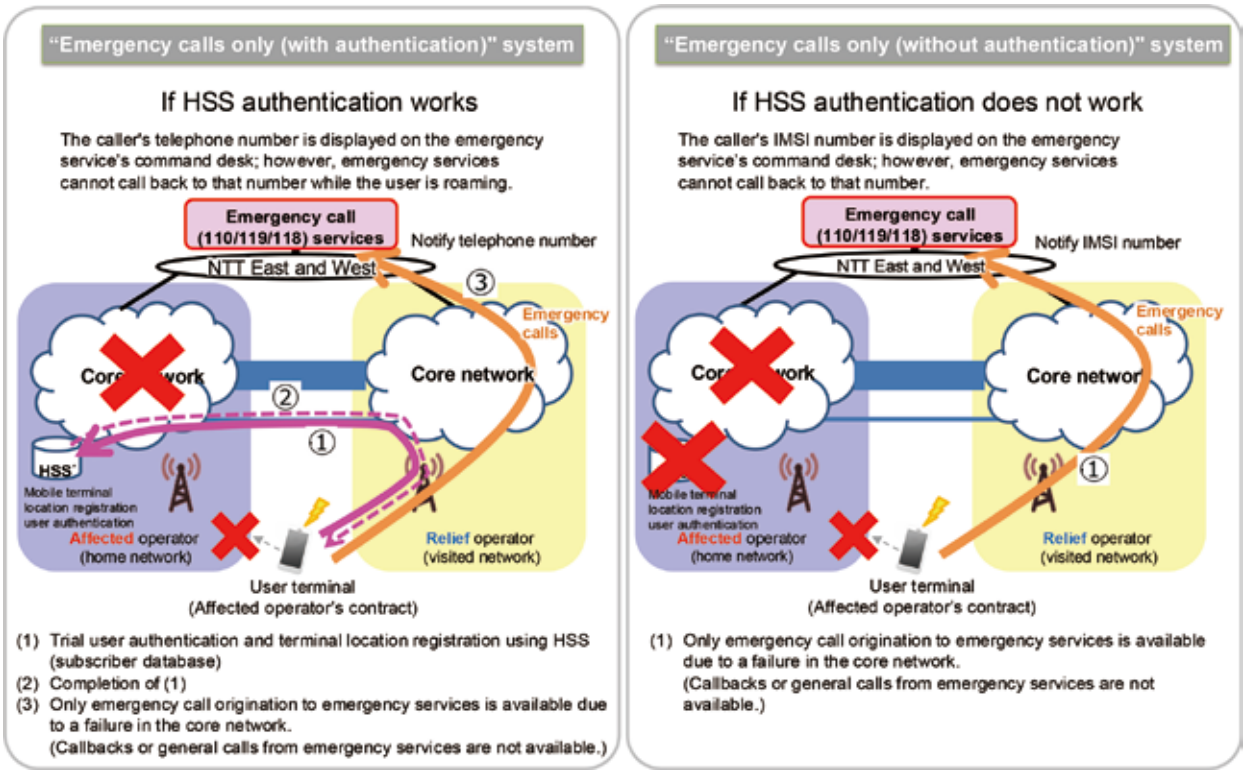


Figure 4: Overview of the emergency-calls-only system



ensuring sufficient network capacity for the relief operator's own users, capacity is also allocated to users of the affected operator. The service therefore does not guarantee connectivity for all users.

For MVNO users, SMS and voice calls (including emergency calls) are also available. However, data communications are limited to users subscribed to certain MVNO services.

4. Regulatory framework for Intercarrier Roaming in Emergencies

To promote Intercarrier Roaming in Emergencies, MIC amended the Ordinance for Regulating Terminal Facilities, and related notifications, and the Ordinance for Regulating Telecommunications Business Facilities. The amended ministerial ordinances and notifications were promulgated on May 29, 2025, and entered into force on October 1, 2025.

4.1 Amendments to the Ordinance for Regulating Terminal Facilities

Additional functional requirements for terminal equipment to support Intercarrier Roaming in Emergencies were examined from the following perspectives:

- The functions must be essential to providing Intercarrier Roaming in Emergencies.
- The functions must not interfere with the operation of telecommunications business facilities (i.e., must not place excessive load on the relief network).

Table: Additional functional requirements for terminal equipment to support Intercarrier Roaming in Emergencies

#	Function name	Function outline	Target system
1	Emergency Attach	Function to enable emergency calling via the relief network in the absence of location registration	Emergency calls only
2	IMSI Transmission	Function to send IMSI at the time of emergency calling	Emergency calls only
3	Attach to Home Network after Emergency Call	Function to return to the home network after emergency call termination	Emergency calls only
4	Non-detectable / Detectable Emergency Calls	Function to enable emergency calling with Local Break Out even if a prefix such as 184 is attached	Full Roaming
5	Cell Reserved	Function to prevent connection to the relief network during normal times	Both systems
6	ACB per PLMN	Function to control presence so as not to overload the relief network	Full Roaming
7	SSAC per PLMN	Function to control connections on a service-by-service basis so as not to overload the relief network	Full Roaming
8	Carrier Indicator	Ability to display and select the presence in a relief network	Both systems
9	Excessive Retransmission Suppression	Function to avoid overloading the relief network	Full Roaming

Based on these considerations, nine additional functional requirements were established. Beginning in August 2024, the IP Network Facilities Subcommittee under the ICT Subcommittee of the Information and Communications Council deliberated on the technical standards and other requirements for terminal equipment. In December 2024, the Information and Communications Council issued a partial report on technical standards and other requirements for terminal equipment. The Ordinance for Regulating Terminal Facilities was subsequently amended to require these nine functions to be incorporated into VoLTE (Voice over LTE) terminals, such as smartphones (IP mobile telephone terminals), and LTE-based data communication terminals. For data communication terminals, only certain of the nine functions are required.

4.2 Covered terminals, exemptions, and transitional measures

For VoLTE terminals, such as smartphones, and LTE-based data communication terminals, such as mobile routers, the new technical standards will apply to both voice and data communications when technical standards compliance certification or equivalent certification is obtained on or after October 1, 2025 (the effective date). Such terminals will therefore be required to support roaming functionality. However, as described below, certain terminals are exempt from the requirements, while others are subject to transitional measures providing a two-year exemption. Existing smartphones can continue to be used without modification (Figure 5).

4.3 Amendments to the Ordinance for Regulating Telecommunications Business Facilities

In the course of examining measures to implement Intercarrier Roaming in Emergencies, it was determined that, when providing intercarrier roaming during emergencies, mobile carriers may in some cases be temporarily unable to comply with the technical standards for emergency calls stipulated in the Ordinance for Regulating Telecommunications Business Facilities. Accordingly, a regulatory framework was developed to account for such situations, and the Ordinance for Regulating Telecommunications Business Facilities was amended to permit the following technically unavoidable limitations in emergency calling when Intercarrier Roaming in Emergencies is provided. (Article 35-20 of the Ordinance was amended.)

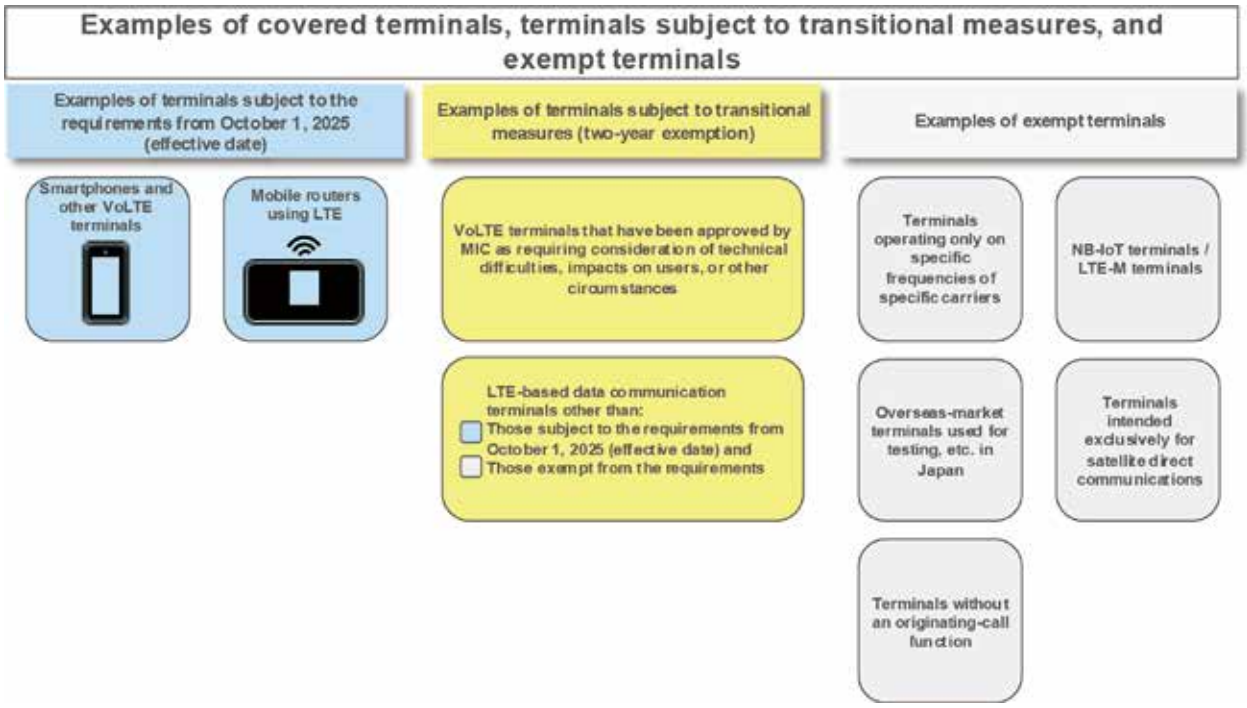
The telecommunications number (telephone number or IMSI number) and location information may not be transmitted when making an emergency call. (Related to Article 35-6, Item 2 of the Ordinance.)

A callback from PSAPs (police, Japan Coast Guard, or fire department) may not be possible. (Related to Item 3 of the same Article.)

5. Conclusion

This article has provided an overview of Intercarrier Roaming in Emergencies, including the background to its development and the regulatory framework established to support its implementation. Although the development of Intercarrier Roaming in Emergencies has involved numerous technical challenges, solutions have been identified through coordination among the many stakeholders involved, including mobile carriers, terminal equipment vendors, and chip vendors. Going forward, it is hoped that Intercarrier Roaming in Emergencies will be fully utilized and that further progress will be made in establishing an environment that ensures communications during emergencies, including through the use of communication means other than Intercarrier Roaming in Emergencies, as well as in strengthening cooperation among the relevant industry stakeholders.

Figure5 : Examples of covered terminals, terminals subject to transitional measures, and exempt terminals



About "JAPAN Roaming™"

Tomoyuki Yoshikawa
Planning Department
Telecommunications Carriers Association



1. Introduction

The Telecommunications Carriers Association (TCA) was established in 1987 with the aim of contributing to the sound development of the telecommunications industry and improving convenience for the public by addressing issues common to telecommunications carriers. The Association has established committees, working groups, and other bodies composed of personnel responsible for practical operations at member telecommunications carriers to facilitate discussions among carriers on addressing common or mutually related issues.

Building on this framework for collaboration, the Association has participated in discussions led by the Ministry of Internal Affairs and Communications (MIC) and promoted the related initiatives. As a result, five mobile carriers; namely, NTT DOCOMO, INC., KDDI CORPORATION, Okinawa Cellular Telephone Company, SoftBank Corp., and Rakuten Mobile, Inc., launched "JAPAN Roaming™" on April 1, 2026. JAPAN Roaming™ is an intercarrier roaming service under which the five carriers mutually provide network access when the network of one mobile carrier becomes unavailable due to a major disaster, communications outage, or other emergency.

This article provides information on where to find technical documents and other reference materials related to "JAPAN Roaming™," explains its technical aspects, and describes how to obtain the logo and other materials.

2. Technical documents and other information related to "JAPAN Roaming™"

The following are technical documents related to "JAPAN Roaming™" covering both the network and terminal sides. Of particular use is the following partial report, which summarizes the results of discussions held by the MIC IP Network Facilities Committee from August through December 2024 on the "Technical Conditions for Telecommunications Equipment Related to Intercarrier Roaming of Mobile Phone Services in Emergencies."*1 (The links for the documents and other information are added below for reference.)

- Partial Report from the Information and Communications Council on "Technical Conditions for Telecommunications Equipment Supporting the Transition to IP-Based Networks" (December 17, 2024)
  https://www.soumu.go.jp/menu_news/s-news/01kiban05_02000351.html

On the basis of this partial report, the Information and Communications Administration and Postal Services Administration Council issued its report in March 2025 on the proposed amendments to ministerial ordinances concerning technical standards for terminal facilities. The following ministerial ordinance and notices were subsequently promulgated.

[Ministerial ordinance (May 29, 2025)]
https://www.soumu.go.jp/menu_hourei/s_shourei.html (in Japanese)

- Ordinance Partially Amending the Ordinance for Regulating Telecommunications Business Facilities and the Ordinance for Regulating Terminal Facilities (MIC Ordinance No. 54 of 2025)
  Overview: https://www.soumu.go.jp/main_content/001011941.pdf (in Japanese)
  Ordinance: https://www.soumu.go.jp/main_content/001011932.pdf (in Japanese)
  Date of promulgation: May 29, 2025
  Effective date: October 1, 2025, except Article 4 of the Supplementary Provisions (Article 4: date of promulgation)

[Notices (May 29, 2025)]
https://www.soumu.go.jp/menu_hourei/s_kokuji.html (in Japanese)

- Notice Partially Amending the Notice Prescribing Testing Methods for Technical Standards Compliance Certification, etc., for Terminal Facilities (MIC Notice No. 174 of 2025)
  https://www.soumu.go.jp/main_content/001011959.pdf (in Japanese)
- Notice Partially Amending the Notice Prescribing Electrical Conditions, etc., for Fixed Telephone Terminals and Terminals of Dedicated Telecommunications Line Facilities, etc. (MIC Notice No. 175 of 2025)
  https://www.soumu.go.jp/main_content/001011951.pdf (in Japanese)

*1 The documents reflect the information compiled at the time of the respective discussions. For the latest information, please refer to the TCA website and other sources.

- Notice Partially Amending the Notice Prescribing Internet Protocol Mobile Telephone Terminals, etc., for Which Compliance with the Ordinance for Regulating Terminal Facilities Is Significantly Unreasonable, and the Conditions, etc., Thereof (MIC Notice No. 176 of 2025)
  https://www.soumu.go.jp/main_content/001011952.pdf (in Japanese)
- Notice Prescribing Functions Related to Intercarrier Roaming in Emergencies for Internet Protocol Mobile Telephone Terminals and Self-Operated Telecommunications Facilities Connected to Internet Protocol Mobile Telephone Facilities (MIC Notice No. 177 of 2025)
  Date of promulgation: May 29, 2025
  Effective date: October 1, 2025
  https://www.soumu.go.jp/main_content/001011953.pdf (in Japanese)

In addition, MIC has prepared guidelines on the scope of certification and other procedures and review methods for functions related to "JAPAN Roaming™" to ensure a common understanding among relevant parties, including registered certification bodies and terminal equipment manufacturers. The guidelines provide further details, including the correspondence between the aforementioned partial report and the relevant ministerial ordinances and notices.

- Guidelines for Certification of Terminal Equipment Standards under the Telecommunications Business Act (Third Edition) https://www.soumu.go.jp/main_content/001033053.pdf (in Japanese)
  (Guidelines published October 1, 2025) https://www.soumu.go.jp/menu_news/s-news/01kiban05_02000380.html (in Japanese)

The following material also provides an explanation of these regulatory developments and should be consulted as a reference.

- MIC IP Network Facilities Committee
  Working Group on Intercarrier Roaming in Emergencies, Meeting 4
  https://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/joho_tsusin/02kiban05_04000706.html (in Japanese)
  Distributed Materials (Document 4-3)
  https://www.soumu.go.jp/main_content/001013678.pdf (in Japanese)

3. Operation of "JAPAN Roaming™"

With "JAPAN Roaming™," one of two service provision methods—the full-roaming system or the emergency-calls-only system—is selected depending on the nature of the communications outage. This chapter explains each system.

3.1 From the occurrence of a communications outage to the request for relief, confirmation of the service provision method, and commencement of relief network provision

In the event of an emergency such as a communications incident or disaster resulting from natural hazards, the affected operator, after assessing the situation, requests the relief operators to provide a relief network through "JAPAN Roaming™" and discusses the arrangements with them. The service provision method, service areas, and other details are then coordinated. In principle, each relief operator agrees to provide a relief network through "JAPAN Roaming™" insofar as doing so does not affect its own subscribers.

3.2 Provision of a relief network under the full-roaming system

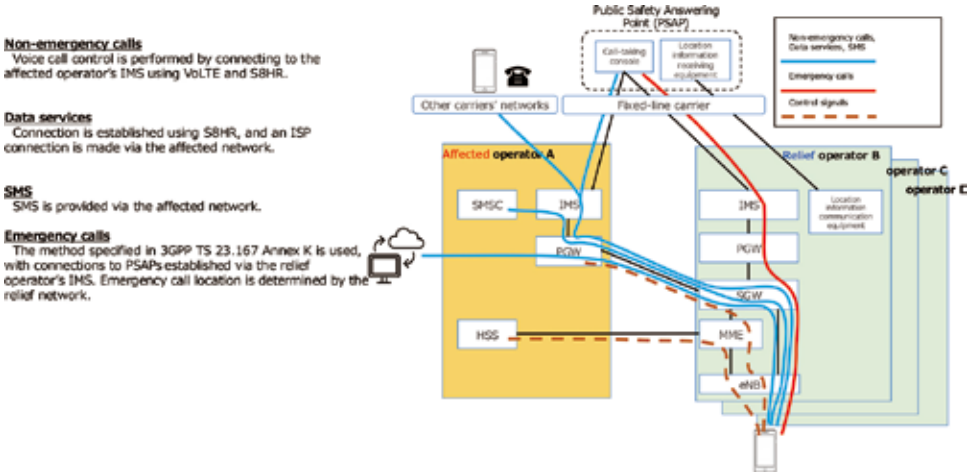
In the case of relief provided in the full-roaming system, the affected operator's core network must remain operational. The following services are provided: non-emergency calls, emergency calls, data services, and SMS.

The connection architecture for the full-roaming system is illustrated below (Figure 1).

The carrier network to which a terminal connects is identified by its Public Land Mobile Network (PLMN) ID. A PLMN ID identifies the network provided by a telecommunications carrier and consists of a five- or six-digit number formed by combining the Mobile Country Code (MCC), which identifies the country (440/441 for Japan), and the Mobile Network Code (MNC), which identifies the domestic carrier's network.

When "JAPAN Roaming™" is provided, the relief operator's Home PLMN (HPLMN) is likely to have been configured as forbidden for SIMs issued by other carriers, meaning that those terminals would be unable to connect. In addition, it would not be possible to impose access restrictions while distinguishing between the carrier's own users (users of the relief operator) and users of other carriers (users of the affected operator).

Figure 1: Connection architecture (Full roaming)
[Adapted and excerpted from materials accompanying the Partial Report (December 17, 2024).]



Therefore, each carrier has newly obtained one PLMN ID specifically for "JAPAN Roaming™." The PLMN IDs assigned to the relief networks are shown below.

Table: PLMN IDs assigned to relief networks

PLMN ID	Carrier	Carrier name display	
		In 10 characters	In 8 characters (For terminals with small displays, etc.)
44091	NTT DOCOMO, INC.	JPN-ROAM D	JpnRoamD
44092	KDDI CORPORATION	JPN-ROAM K	JpnRoamK
44093	SoftBank Corp.	JPN-ROAM S	JpnRoamS
44094	Rakuten Mobile, Inc.	JPN-ROAM R	JpnRoamR

Added to information on PLMN ID assignments published by MIC.
https://www.soumu.go.jp/main_content/000749615.pdf (in Japanese)

Once a relief network is provided in the full-roaming system, the PLMN ID of the relief network is broadcast in System Information Block Type 1 (SIB1) transmitted by base stations within the designated service area. At the same time, cellReservedForOperatorUse is set to notReserved, allowing terminals of other carriers eligible for relief to connect to the network.

3.3 Terminal connection when the full-roaming system is provided

When a communications outage occurs on the affected operator's network and the terminal (User Equipment, UE) loses its connection to the affected operator's HPLMN, the terminal is assumed to repeatedly search for available PLMNs to connect to. If data roaming is enabled on the terminal, it is expected to detect the PLMN of the relief network provided through "JAPAN Roaming™" and attempt to connect to it.

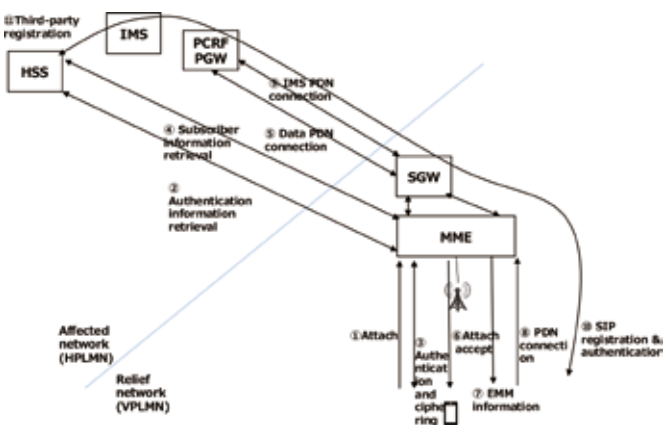
Once the terminal connects to the relief network and the Packet Data Network (PDN) for data communications can connect to the affected network's Packet Data Network Gateway (PGW) via the S8 interface between the relief and affected networks (⑤ in Figure 2), data roaming becomes available. This is the roaming connection procedure specified by 3GPP, in which the relief network serves as the Visited PLMN (VPLMN) and the affected network as the HPLMN.

At present, data communication speeds are limited to a maximum of 300 kbps for both uplink and downlink.

Once the terminal has connected to the relief network and the terminal's location registration information has been registered with the Home Subscriber Server (HSS) on the affected network (Figure 2), non-emergency calls also become available through roaming. Non-emergency calls are made and received via the IMS of the affected network, and the caller's telephone number can also be transmitted when making a call. However, while relief is being provided through "JAPAN Roaming™," the service-area information of the relief network cannot currently be appropriately translated into the information required for the destination network. As a result, calls cannot currently be made to service numbers (0120, 0800, 0570, etc.) or short codes (#7119, #9110, etc.).

SMS is also provided via the affected network.

Figure 2: Full-roaming system
[Excerpted from materials accompanying the Partial Report (December 17, 2024).]

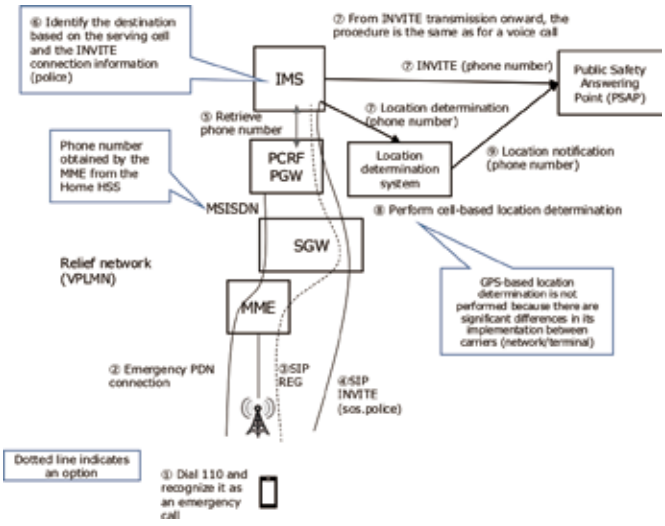


3.4 Making emergency calls under the full-roaming system

Next, the procedure for making emergency calls is described. When connected under the full-roaming system (i.e., once the terminal has attached to the PLMN), emergency calls are classified into two types: UE-detectable emergency calls and non-UE-detectable emergency calls.

A UE-detectable emergency call is an emergency call that the terminal recognizes as such when the number is dialed. A non-UE-detectable emergency call is one that the terminal does not recognize as an emergency call when the number is dialed. The source of information used by the terminal to identify an emergency number when dialing is the Emergency Number List (ENL), which is transmitted to the terminal via NAS signaling while it is attached to a PLMN. With "JAPAN Roaming™," when a terminal attaches to the PLMN of a relief network, the numbers 110 (police), 119 (fire and ambulance), and 118 (Japan Coast Guard) are transmitted to and stored by the terminal. The terminal retains these numbers as emergency numbers and identifies calls to them as emergency calls.

Figure 3: UE-detectable emergency call
[Excerpted from materials accompanying the Partial Report (December 17, 2024).]



(1) UE-detectable emergency calls

For emergency calls made while roaming, local breakout (LBO) is used, employing the method described in 3GPP TS 23.167, Annex K, which enables connection to an emergency call-handling organization (Public Safety Answering Point, PSAP) through the relief network alone.

When a UE-detectable emergency call is made (① in Figure 3), the terminal connects to the Emergency PDN via the relief network's PLMN (② in Figure 3), and then connects to the PSAP through the relief network's IMS (④ and ⑦ in Figure 3).

(2) Non-UE-detectable emergency calls

Even for a non-UE-detectable emergency call, the terminal ultimately recognizes the call as an emergency call and connects from the relief network to the PSAP using local breakout. However, as the term non-UE-detectable emergency call indicates, numbers such as 184110, which are not included in the ENL used to identify emergency calls, cannot be recognized by the terminal as emergency calls when dialed. Accordingly, the call is initially placed as a non-emergency call to the affected network's IMS (② in Figure 4). The terminal then receives a redirection instruction (③ and ④ in Figure 4), recognizes the call as an emergency call, and places it again (⑤ and ⑧ in Figure 4). This second call follows the same procedure as a UE-detectable emergency call.

For both (1) UE-detectable emergency calls and (2) non-UE-detectable emergency calls, when a PSAP calls back the telephone number of the terminal that made the emergency call, the call must pass through the affected network, as is the case for an incoming non-emergency call. Therefore, under the emergency-calls-only system described below, where the affected carrier's core network is assumed to be impaired, call-backs cannot be made.

3.5 Provision of relief and emergency calls under the emergency-calls-only system

When relief is provided under the emergency-calls-only system, the affected operator's core network is impaired, and only emergency calls are provided.

The connection architecture for the emergency-calls-only system is illustrated below (Figure 5).

Figure 4: Non-UE-detectable emergency call
[Excerpted from materials accompanying the Partial Report (December 17, 2024).]

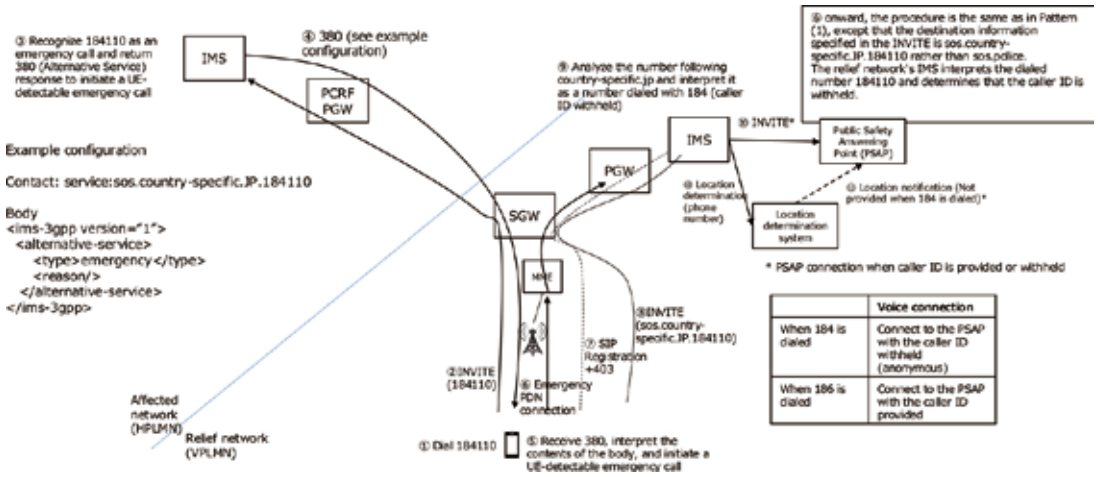


Figure 5: Connection architecture (Emergency-calls-only system)
[Excerpted from materials accompanying the Partial Report (December 17, 2024).]

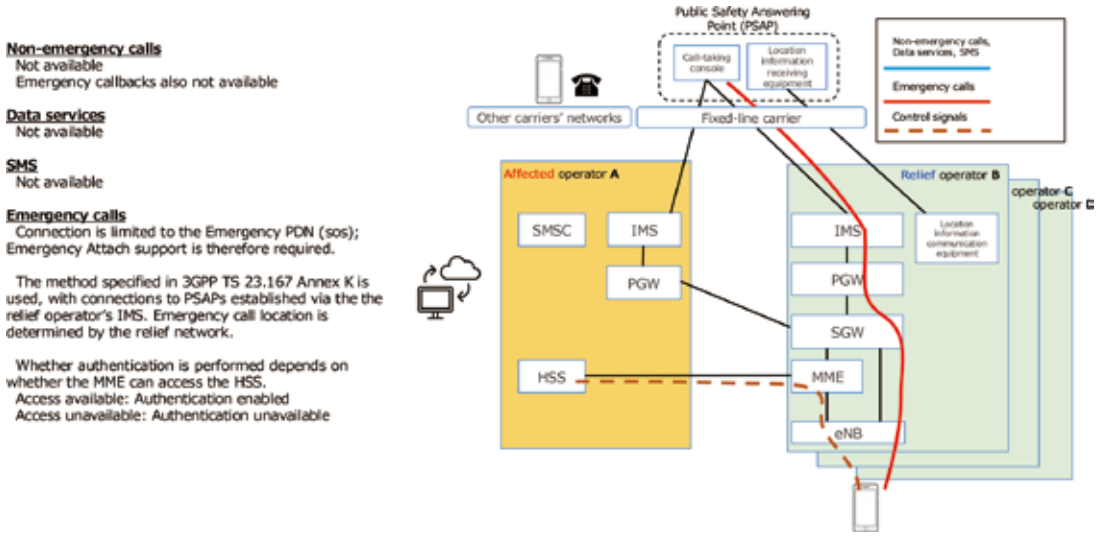
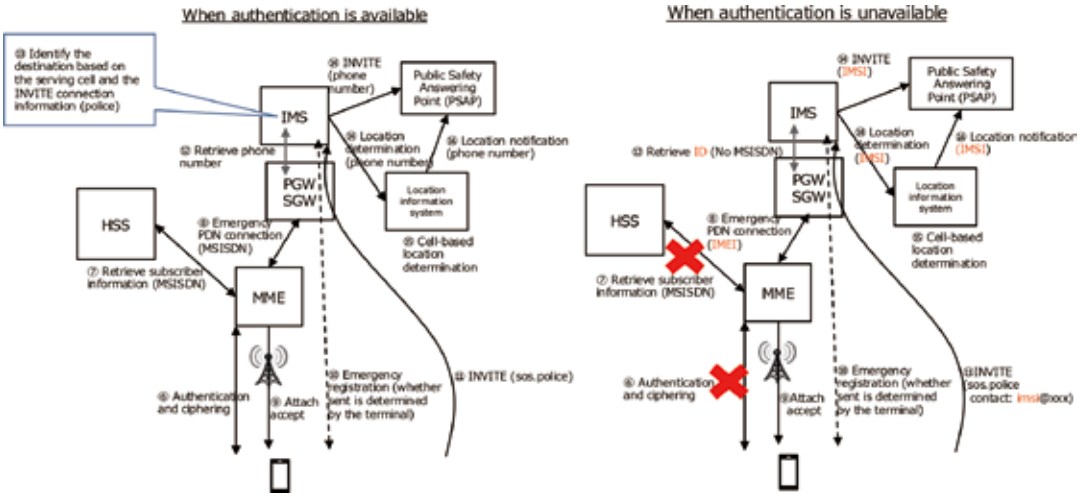


Figure 6: Emergency calls with and without authentication
[Excerpted from materials accompanying the Partial Report (December 17, 2024).]



When relief is provided under the emergency-calls-only system, a terminal cannot perform a Normal Attach to a PLMN for roaming. If a terminal that is not attached makes an emergency call, and imsEmergencySupport-r9 is enabled in the SIB1 broadcast by a base station within the designated area, the terminal performs an Emergency Attach to the PLMN of that base station and makes the emergency call. Once the Emergency Attach has been established, the procedure is the same as that for a UE-detectable emergency call under the full-roaming system: the call is connected to the PSAP through local breakout.

With "JAPAN Roaming™," authentication with the affected network's HSS may either be possible (authentication available) or impossible (authentication unavailable) (Figure 6). When authentication is available, the terminal's telephone number can be transmitted to the PSAP. When authentication is unavailable, the telephone number cannot be transmitted, so the International Mobile Subscriber Identity (IMSI) number is transmitted instead.

4. Trademarks, logo, flyer, and promotional video for "JAPAN Roaming™"

Changing topics slightly from the technical information presented above, this section introduces the trademark, logo, flyer, promotional video, and other materials related to "JAPAN Roaming™."

Figure 7: "JAPAN Roaming™" logo



The trademark and logo for "JAPAN Roaming™" are owned by the TCA so that they can be used commonly by relevant carriers and other parties. Both may be used by MNOs/MVNOs, terminal equipment manufacturers, media organizations, and other relevant third parties, subject to the terms of use provided on the TCA website. In particular, the logo can be used by contacting the TCA by email to obtain the logo usage guidelines and image files.

A flyer providing an overview of how to use "JAPAN Roaming™" is also available from the TCA website. The flyer may be reproduced and redistributed in accordance with the Flyer Usage Guide.

In addition, a promotional video introducing "JAPAN Roaming™" is available at the link below and may also be used.

- TCA website: https://www.tca.or.jp/information/japan-roaming.html (in Japanese)
- Promotional video for "JAPAN Roaming™": https://youtu.be/zsneKf80S_w (in Japanese)

5. Conclusion

This article has provided an overview of "JAPAN Roaming™," including its technical aspects. "JAPAN Roaming™" is a service provided during emergencies that differ from normal operating conditions, such as major disasters or serious failures of telecommunications facilities. In the event of a major disaster, it is possible that the relief operator may also experience an outage, depending on the scale and nature of the disruption. Even under such circumstances, it is extremely important to secure communications between carriers to the greatest extent possible and support people's daily lives and economic activities. On the basis of this shared understanding, the telecommunications carriers agreed on the common goal of working together to secure communications, which ultimately led to the launch of "JAPAN Roaming™."

This initiative is the result of sincere and in-depth discussions among the TCA's member telecommunications carriers, supported by collaboration with MIC and other relevant organizations, as well as various industry stakeholders. We would like to express our deepest respect for the dedication and efforts of everyone involved.

Space Infrastructure Built with Launch Vehicle and Satellite Vertical Integration: Launching and connecting satellites in-house



Muneaki Ogawa
R&D Satellite Department
Interstellar Technologies Inc.

1. The vertical integration revolution

Interstellar Technologies began business in 2013 in the town of Taiki in Hokkaido. With our MOMO observation launch vehicle, we have achieved the distinction of being the first private enterprise to independently reach space and are a leading enterprise in the field of private space transport. Our current mission is to "Provide space infrastructure used in society," and we are developing our ZERO launch vehicle, which will launch small satellites into orbit. We are also working on the "Our Stars" communications service using low Earth orbit satellite constellations. This is the first attempt in Japan at vertical integration involving both a launch vehicle business and a satellite communication business (Figure 1).

This vertical integration gives concrete form to our vision of "bringing reform to space industries." The greatest limitation when building satellite constellations is the ability to launch large numbers of satellites into orbit. In particular, formation flying, which is described below, assumes the use of very large numbers of satellites, so our capability to launch them is a very significant factor. The barriers to entry for launch systems are very high, requiring huge investments of time and funding for development, but once we have overcome them, they will form a base for expansion into various businesses. Considering that satellite launch time frames are under pressure globally and new launches often take several years, having our own launch vehicles is directly related to our ability to demonstrate our technologies quickly. With the ability to perform development, transport and operation in one effort, we believe we can both increase development speed and lower costs. Our ability to promote the business has also improved steadily, with sales of our most recent series F reaching 20.1 billion yen and expanding launch vehicle manufacturing in collaboration with Toyota Motor Corporation.

2. Weaving a "giant antenna" in space

Recently there are accelerating efforts world-wide to unify terrestrial networks and satellite networks, such as the now-completed standardization of 5G Non-terrestrial Networks (5G NTN) by the 3GPP. As such, our goal with the "Our Stars" service is to increase the speed and capacity of direct-to-device (D2D) communication, in which devices such as smartphones and IoT devices connect directly to the satellite, without requiring dedicated terrestrial antennas. We aim to deliver the equivalent communications service from space, to locations that are difficult to reach with terrestrial networks, such as in the mountains, at sea, or in the air.

The core of our efforts is our original "formation flying" technology. Various issues with existing satellite technology provide background for this. Devices are small and have limited

Figure 1: Business overview



transmitting power for D2D, so the satellite must have a large-aperture antenna and high gain to establish a communication link. However, the antenna of a single satellite is limited in size by both the launch vehicle and the fuselage. Increasing the aperture would increase the size and cost of the satellite and having an antenna that expands to a large size increases complexity. Formation flying resolves these issues with the concept of "distribution". By having thousands or tens of thousands of ultra-small satellites flying cooperatively, with their relative positions and orientations controlled accurately, they can be made to act as a single, very large array antenna with high gain (Figure 2). Individual satellites are physically separate from each other, connected wirelessly rather than with physical wires, so we call this arrangement an "unwired phased-array antenna."

To implement this concept, we are currently engaged with two national R&D projects as central to our research. The first is Ministry of Internal Affairs and Communications (MIC) contract research titled "R&D for expansion of radio resources." It has the goal of establishing new methods to use limited radio frequency resources more efficiently, and we are conducting joint research with the collaboration representative, Microwave Factory Co. Inc., five universities, and the National Institute of Information and Communication Technologies (NICT). The second project is a JAXA Space Strategy Fund project called "Highly accurate satellite formation flying technology." We are working in collaboration with five universities on control technology that uses electromagnets to fly large numbers of satellites in formation with centimeter accuracy.

Results from these two programs are expanding steadily. In the first one, experiments demonstrated a proof-of-concept, using a terrestrial array antenna composed of many simulated satellites. In the second one, experiments have successfully simulated orbits with a position control algorithm at a scale of thousands to tens-of-thousands of satellites and tested operating principles on the ground.

3. Radio frequency and international systems environment

Implementing D2D satellite communication will involve a wide range of issues including the architectures linking antennas, satellite buses and terrestrial systems and also operations and regulatory issues. Among these, important upstream issues that determine prerequisites for system design and feasibility include defining radio frequencies and how to secure and use them. Non-geosynchronous satellite constellations based on formation flying with many devices involve many leading-edge issues that the ITU is engaged with, including frequency sharing and regulation, use of orbits, and interference that satellite businesses could have on terrestrial businesses. There is ongoing international discussion on the issues of Power Flux Density and Equivalent Power Flux Density (EPFD), regulation of the number of expected satellites and space sustainability, all related to the rapid increase in non-geosynchronous satellites.

In particular, D2D communication, with devices connecting directly to satellites, is currently one of the most actively debated themes at the ITU-R. At the World Radiocommunication Conference 2027 (WRC-27), Topic 1.13 Satellite Direct Communication (DC-MSS-IMT) is positioned as a communication method to fill-in areas where terrestrial networks cannot reach and during disaster. Study is progressing on system definition and issues such as coexisting and sharing frequencies with existing business. Our objective of providing broadband D2D using formation flying is also positioned among these types of international trends and we are watching the trends closely.

The initiatives described here would not be possible without the cooperation of many related parties. We look forward to cultivating space infrastructure that is useful in society as we continue to exchange ideas on issues such as international collaboration and consolidating systems for radio frequency use with all of you. We would be honored to receive any guidance or cooperation you may offer in these endeavors.

Figure 2: Low earth orbit communications constellation using formation flying



Cover Art



The Pride of Tokyo's Twelve Months : October, Autumn Foliage at the Takinogawa River

Tsukioka Yoshitoshi
(1839-1892)

Source: National Diet Library, NDL Image Bank
(https://ndlsearch.ndl.go.jp/imagebank)

= A Serial Introduction Part 1 = Winners of ITU-AJ Encouragement Awards 2026

In May every year, The ITU Association of Japan (ITU-AJ) proudly presents ITU-AJ Encouragement Awards to people who have made outstanding contributions in the field of international standardization and have helped in the ongoing development of ICT.
These Awards are also an embodiment of our sincere desire to encourage further contributions from these individuals in the future.
If you happen to run into these winners at another meeting in the future, please say hello to them.
But first, as part of the introductory series of Award Winners, allow us to introduce some of those remarkable winners.

Shoki Inoue
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Fields of activity: 3GPP RAN3



An Open Architecture for Base Stations with Flexibility and Reliability

I am honored to receive the prestigious ITU Association of Japan Encouragement Award. I would like to express my gratitude to everyone at the ITU Association of Japan and those from whom I have received support thus far.

My primary focus has been on improving the resilience of base stations in mobile communication networks. As mobile networks become increasingly important as social infrastructure, it has become essential to ensure that they provide both flexibility and high reliability. Meanwhile, virtualization and disaggregation of network functions have been progressing. Under these circumstances, through discussions in 3GPP, I have been working on highlighting the necessity of mechanisms to minimize the impact of failures and to enable rapid recovery.

Through my experience in standardization activities, I have recognized that technical validity alone is not sufficient; it is equally important to explain the necessity of proposals and their applicable use cases clearly. Since participants in 3GPP come from different countries and companies with diverse perspectives, I have learned the importance of understanding each stakeholder's position and incorporating a wide range of opinions. Refining proposals through repeated discussions and shaping them into forms acceptable to many participants has been a valuable experience that has allowed me to appreciate both the difficulty and significance of consensus building. These experiences have become an important asset in understanding the essence of standardization beyond its technical aspects.

Currently, I am contributing to discussions in 3GPP RAN3 on High Layer Split as part of studies on 6G architecture. While 5G achieved flexible network configurations through CU/DU split, 6G is expected to advance the functional split at higher layers. This architectural evolution is expected to enable more flexible and advanced network architectures based on cloud-native technologies and AI integration. However, challenges such as increasing control complexity, ensuring reliability in distributed environments, and aligning rapidly evolving virtualization technologies with standardized specifications have become apparent. I am continuing these discussions by leveraging the knowledge gained from resilience-related work.

From now onwards, mobile-communication networks will continue to grow in importance not only as social infrastructure but also as a platform supporting a wide range of services and applications. I will continue contributing to standardization activities that aim to implement open networks that achieve both flexibility and reliability.

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Fields of activity: 3GPP RAN Working Group 2 (RAN2)



Standardization Activities in 3GPP RAN2 concerning Network Energy-saving Technologies

I am honored to receive the Japan ITU Association Encouragement Award. I would like to express my gratitude to everyone at the Japan ITU Association and all those who have supported me thus far.

I have been engaged in international-standardization activities within 3GPP RAN2 for a long time, and in recent years, I have focused on the standardization of network energy saving (NES) technology for 5G. NES reduces power consumption by making base-station transmissions on-demand or partially suspending them during periods of low communication traffic. Throughout the discussions about 3GPP Releases 18 and 19, I consistently submitted proposals and—particularly when conflicting views arose—led the deliberations as a Rapporteur in a manner that contributed to the resolution of concerns among the various companies and the achievement of consensus.

As for international standardization, the ability to coordinate diverse perspectives is just as essential as technical expertise, and the resulting outcomes play a vital role in underpinning global telecommunications infrastructure. Discussions about 6G are currently underway within 3GPP,

and NES remains a key technical challenge being discussed. I aim to continue addressing challenges—including those beyond NES—and to take a leading role in standardization activities. I are committed to contributing to the creation of a sustainable, advanced telecommunications society, and I hope to see more colleagues join me in tackling the challenges that we face in this field.

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Fields of activity: Science and Technology Studies



Bridging Global AI Governance and Practice: Advancing Transparency through International Collaboration

It is an honor to receive the ITU Association of Japan Encouragement Award. I would like to express my gratitude to everyone who has worked with me over the years—including colleagues from academia, government, industry, and international organizations. This recognition reflects our collective efforts rather than my own achievements alone.

My research focuses on AI ethics and governance. In particular, I am investigating how to build trustworthy AI through international cooperation and dialogue. In recent years, I have been contributing to the G7 Hiroshima AI Process, in which I am working to promote transparency and responsible AI governance. Beyond international discussions, I have sought to bridge global policy frameworks and practical implementation by conducting interviews with companies, organizing public events, and publishing handbooks that help stakeholders understand and apply the Hiroshima AI Process Reporting Framework.

I believe that effective AI governance requires more than establishing principles or regulations. It also depends on creating opportunities for governments, companies, researchers, educators, and citizens to understand these frameworks and participate in shaping them. Making governance accessible and actionable is just as important as designing the governance itself.

As AI technologies continue to evolve rapidly across borders, governance must also become increasingly collaborative. At the same time, AI is being utilized in diverse social, cultural, and industrial contexts; accordingly, global principles must be translated into practices that reflect local realities. I see this "bridging" role between international frameworks and real-world implementation as one of the most-important challenges to be faced in the coming years.

Looking ahead, I hope to continue contributing through not only research but also education, public engagement, and international collaboration. By connecting policy, industry, academia, and society, I aim to help build AI governance that is transparent, inclusive, and practical. Ultimately, I hope these efforts will contribute to a society in which everyone can benefit from AI while respecting shared values, human dignity, and cultural diversity.

Makio Kawamoto

Formerly with Mitsubishi Electric Corporation
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Standardization Activities targeting Harmonization of Spectrum for Railway Radiocommunication Systems

I am honored to receive the ITU Association of Japan Encouragement Award. I would like to express my gratitude to the ITU Association of Japan and to all those who have supported my work.

These activities aimed to promote the international harmonization of spectrum for railway radiocommunication systems. Since there were concerns that such harmonization efforts might affect railway radiocommunication systems currently used in Japan, the Railway Radiocommunication International Standardization Study Group, comprising railway operators and radio-equipment manufacturers, was established to formulate Japan's positions going into ITU-R meetings and related international meetings.

During these standardization activities, railway radiocommunication experts, including myself, played a leading role in developing a total of four reports in the ITU-R and AWG as well as one ITU-R Recommendation. The Recommendation adopts different approaches to frequency harmonization for each ITU Region. For Region 3, to which Japan belongs, an approach based on identifying frequency ranges under consideration or proposed for harmonization was adopted. By ensuring that all frequency bands currently used by railway radiocommunication systems in Japan were included in these frequency ranges, Japanese experts, including myself, achieved Japan's objectives.

I also addressed the exportability of Japan's railway radiocommunication infrastructure and technologies through these standardization activities. In each report, details of Japan's railway-radiocommunication systems are introduced and their unique features are highlighted. In addition, a representative from a railway operator presented the details of these systems at railway-radiocommunication workshops organized by the AWG.

A key lesson from this work was that Japanese railway radiocommunication systems do not always conform to international standards. Compliance with international standards is a key factor for successful exports of infrastructure, and I am concerned that this situation will remain an important challenge in the future. While my involvement in this activity is coming to a close, I hope that efforts toward international standardization of Japan's railway radiocommunication systems will continue to advance in the years ahead.

通巻百五十二号

The ITU Association of Japan

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