Initiatives for Securing Communications during Disasters

Network Safety and Reliability Division
Telecommunications Business Department
Telecommunications Bureau
Ministry of Internal Affairs and Communications

1. Introduction

In recent years, natural disasters such as earthquakes, typhoons, heavy rains, floods, landsides, and volcanic eruptions have been occurring with increasing frequency in Japan, disrupting communication services through power outages, failures of communication equipment, severance of cables, etc. These include the earthquake that occurred in the Noto region of Ishikawa Prefecture on January 1, 2024 (referred to below as "Noto Peninsula earthquake") followed by heavy rains in the same area, large-scale damage from flooding in the Kyushu region, and in 2025, large-scale forest fires in Ofunato City, Iwate Prefecture.

At the time of a disaster, communications serve as a vital lifeline not only for residents to convey information but also for disaster response organizations to coordinate information. In addition, lifelines such as communications, power, and transport have an interdependent relationship in which problems in one lifeline can affect other lifelines. Here, a speedy response and restoration of communication services are essential to the speedy restoration of other lifelines.

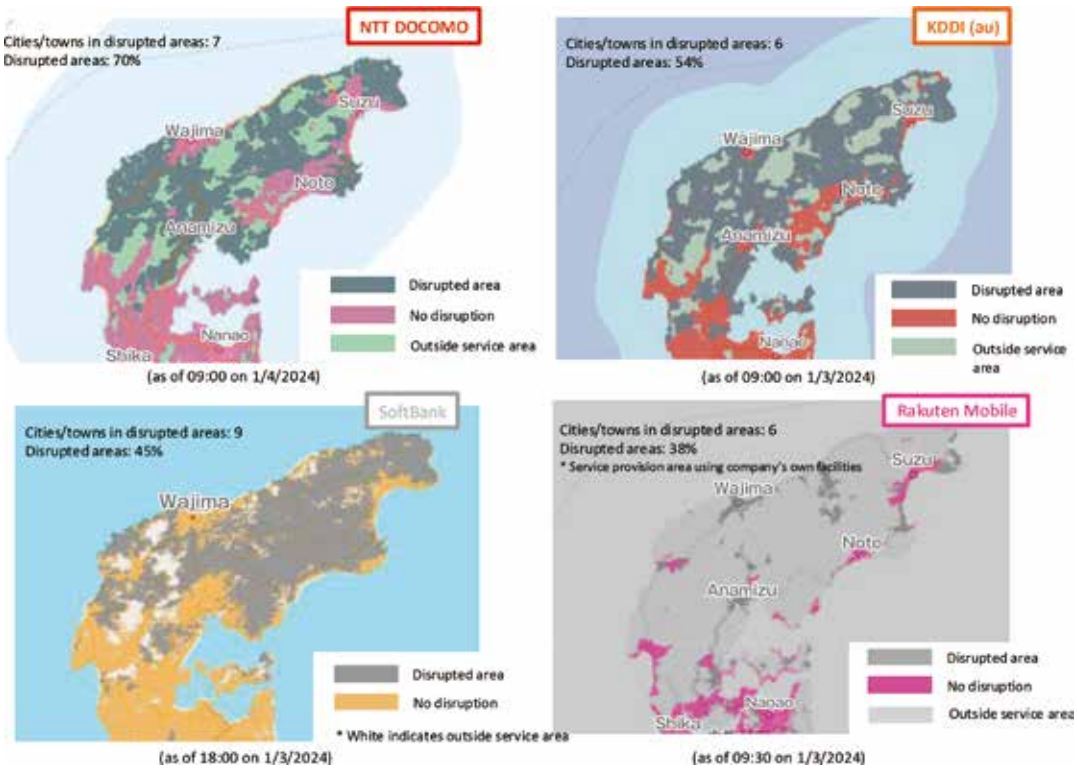
Based on the lessons learned from the Noto Peninsula earthquake, the Ministry of Internal Affairs and Communications (MIC) is strengthening its initiatives for securing communications with a focus on widespread damage from a large-scale disaster such as a Tokyo Metropolitan earthquake or Nankai Trough earthquake that is expected to occur sometime in the future.

This article first surveys the damage to communication services caused by the Noto Peninsula earthquake. It then introduces efforts made by MIC and telecommunication carriers to secure communications during this disaster and the strengthening of initiatives for securing communications in the future.

2. Overview of Damage to Communication Services in the Noto Peninsula Earthquake

In the Noto Peninsula earthquake, it was reported that a maximum of 839 base stations (799 in Ishikawa Prefecture) for mobile phones, etc. of NTT DOCOMO, KDDI, SoftBank, and Rakuten Mobile combined (Figure 1) stopped operating due

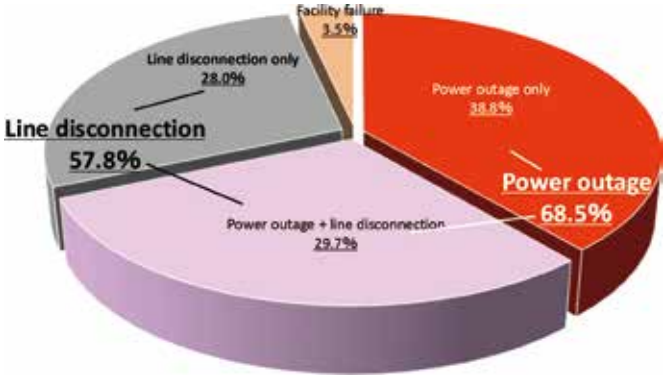
Figure 1: State of area disruption for mobile phones (during maximum area disruption)



to disconnected transmission lines caused by long-term power outages, landslides, and other issues occurring immediately after the disaster (as of January 3, 2024), as shown in Figure 2.

Amid a number of problems such as road closures due to landslide disasters, liquefaction, etc. and congestion on highways leading into affected areas, the above mobile phone companies brought in portable base stations, portable satellite antennas, portable generators, and other types of emergency restoration equipment. As a result, emergency restoration was completed for the most part by January 17, 2024 except for areas difficult to access because of landslides, etc. (remaining work was completed by the end of June of that year). In addition, steady progress was made in fully restoring base stations to their original functions in parallel with the above emergency restoration.

Figure 2: Causes of mobile-phone base station stoppage in the Noto Peninsula earthquake



In terms of fixed communications, a service-unavailable state occurred centered on cities and towns such as Wajima, Suzu, and Shika, in Ishikawa Prefecture. A number of communication buildings lost power because of the earthquake, and in addition, relay transmission lines and cables were damaged and large-scale service failures occurred due to landslides, etc. affecting a maximum of 20 communication buildings.

With the aim of reopening services, restoration of core facilities proceeded by supplying power to communication buildings using mobile power supply vehicles and portable generators, repairing damaged cables, installing new cables in disconnected-line intervals, and rerouting to undamaged relay transmission lines. In this restoration work, priority was given to emergency restoration of circuits connected to important hubs and circuits connected to base stations of the various mobile phone companies. Additionally, in the event of breaks in fixed telephone lines to city halls and town halls, communications were secured using a call forwarding service as an emergency response.

3. Efforts in Securing Communications in Noto Peninsula Earthquake

In the Noto Peninsula earthquake, telecommunication carriers made a variety of efforts to restore communication services. The following introduces some of these efforts.

(1) Deployment of mobile/vehicle-mounted base stations, mobile power supply vehicles, and portable generators

To deal with disconnections in transmission lines due to landslides and other calamities and prolonging of power outages that began immediately after the earthquake, mobile phone companies put into operation a maximum of about 100 mobile and vehicle-mounted base stations while the public and private sectors together deployed a maximum of about 200 mobile power supply vehicles and portable generators (Figure 3).

Figure 3: Vehicle-mounted base station and mobile power supply vehicle

(2) Use of mobile base stations

NTT DOCOMO and KDDI jointly deployed shipboard base stations for part of the coastal area of Wajima city difficult to access and restore by land routes. This means the installation of mobile-phone base station facilities on an ocean-going vessel, which was accomplished using the cable-laying vessel KIZUNA owned by the NTT DOCOMO Group. In addition, SoftBank deployed drone base stations capable of long-term flight by supplying power over a wire from ground power supply equipment. By mounting wireless relay equipment on these drones, radio signals could be delivered to terminals from the air thereby supplementing the communication area (Figure 4).

Figure 4: Shipboard base station and wire-powered drone base station

(3) Use of satellite communication services

In the Noto Peninsula earthquake, communication services became unusable in many areas due to disconnected transmission lines, power outages at base stations, etc. Under these conditions, Low Earth Orbit (LEO) satellite communication services were widely used for emergency restoration. KDDI, for example, worked to restore communications by replacing communication cables such as optical fibers (base-station backhaul circuits) severed by landslides, etc. with satellite circuits to serve as backhaul circuits.

In addition to KDDI, NTT DOCOMO and SoftBank provided LEO satellite communication services to evacuation centers and Disaster Medical Assistance Teams (DMAT) to enable Internet communications via Wi-Fi. In total, 660 units of LEO satellite communication services (KDDI, SoftBank, and NTT DOCOMO) were provided to evacuation centers and

elsewhere.

(4) Lending of communication equipment

The Noto Peninsula earthquake significantly affected telephone, Internet, and other communication services forcing the use of satellite mobile phones especially in hard-hit areas. The MIC lent out a maximum of 102 satellite mobile phones, which had been stockpiled as mobile communication devices for disaster response, to local governments and other entities free of charge. Telecommunication carriers likewise lent out mobile terminals and satellite communication equipment free of charge.

(5) Other efforts by telecommunication carriers

Telecommunication carriers were also involved in the following activities.

a) Roll out of disaster message services

During the disaster, NTT East, NTT West, NTT DOCOMO, KDDI, SoftBank, and Rakuten Mobile rolled out disaster message services.

b) Provision of free Internet connection services

From January 1, NTT DOCOMO, KDDI, SoftBank, Wire and Wireless, and Rakuten Mobile provided public wireless LAN free of charge in Ishikawa, Niigata, Toyama, and Fukui prefectures using "00000Japan" (Five Zero Japan) as a uniform Service Set Identifier (SSID).

4. Strengthening the Securing of Communications based on Response to Noto Peninsula Earthquake

At MIC, we have been working even in normal times on initiatives for securing communications in collaboration with telecommunication carriers and other related institutions. The following introduces the strengthening of initiatives in normal times for securing communications based on the response to the Noto Peninsula earthquake disaster.

(1) Establishing standards on measures that telecommunication carriers should adopt

At MIC, Standards for the Safety and Reliability of Information and Communication Networks (Ministry of Posts and Telecommunications (MPT) Notice No. 73 of 1987), which specify earthquake countermeasures, power-outage countermeasures, and fire prevention measures that telecommunication carriers should adopt, are regularly revised requesting, for example, the installation of backup power supplies and redundant transmission lines.

Specifically, as to base stations and communication buildings (referred to below as "base stations, etc.") that cover prefectural offices and city, town, and village offices that serve as hubs of disaster response activities, power-outage countermeasures that last for at least 24 hours are required, and power-outage countermeasures that last for at least 72 hours are recommended in the case of base stations, etc. that cover prefectural offices. Based on these safety and reliability standards, telecommunication carriers have implemented certain initiatives for making base stations, etc. more resilient.

On the other hand, as made clear by the Noto Peninsula earthquake, there are locations with limited access routes such as those on a peninsula. As a result, roads may become difficult to use due to disaster-related landslides or other problems thereby prolonging the disruption of commercial power supplies and breaks in transmission lines. It may also take time to mount an emergency restoration in such areas. Furthermore, while mobile phones and other devices have been used for collecting information in relation to disaster response activities by national government institutions, no rules have existed on power-outage countermeasures for base stations, etc. that cover the buildings of such national institutions. For this reason, revisions were made to the Standards for the Safety and Reliability of Information and Communication Networks in March 2025. These revisions recommended power-outage countermeasures for base stations, etc. that cover city, town, and village offices and the buildings of national government institutions in peninsula areas, as summarized in Table 1.

Table 1: Standards for the Safety and Reliability of Information and Communication Networks (excerpt)

"Standards for the Safety and Reliability of Information and Communication Networks" (Notice)

＊ Underlined items correspond to March 2025 revisions

Power-outage countermeasures

- Mobile phone base stations, etc. that cover prefectural offices, city, town, and village offices, and special ward offices
  → Power-outage countermeasures for at least 24 hours (obligatory)
- Mobile phone base stations, etc. that cover prefectural offices and city, town, and village offices on remote islands and peninsulas
  → Power-outage countermeasures for at least 72 hours (recommended)
- Mobile phone base stations, etc. that cover national institutions
  → Power-outage countermeasures for at least 72 hours (recommended)
- Mobile phone base stations, etc. that cover disaster base hospitals
  → Power-outage countermeasures for at least 24 hours (recommended)

In addition, the following measures are obligatory from the viewpoint of preparing for large-scale disasters.

- Formulation of plans for deploying emergency restoration equipment
- Study of methods for coordinating restoration activities including priorities in restoring damaged facilities

(2) Making mobile-phone base stations resilient in a disaster and strengthening functions of information-communication hubs

In addition to formulating standards as described in (1) above, there is a project at MIC for making mobile-phone base stations resilient to prevent them from stopping operation due to power outages or breaks in transmission lines at the time of a disaster. This would be accomplished through a variety of measures including the use of large-capacity storage batteries and power generators plus solar panels and satellites to maintain base-station functions.

Furthermore, in addition to the above initiative toward resilient base stations, there is a need for early deployment of equipment essential to emergency restoration in the event that the communication infrastructure is damaged in a disaster. The aim here is to secure communications of disaster-prevention hubs

such as prefectural offices, city, town, and village offices, and disaster base hospitals. To meet this need, there is also a project at MIC for strengthening the functions of information-communication hubs by accelerating the deployment of emergency restoration equipment and securing communications at disaster-prevention hubs such as city, town, and village offices and disaster base hospitals at the time of a disaster. To this end, subsidies have been established for some of the expenses incurred by mobile phone companies and fixed-communication carriers when purchasing emergency restoration equipment such as mobile power supply vehicles and portable base stations for deployment to government offices and elsewhere.

(3) Other initiatives for securing communications at MIC

In addition to initiatives (1) and (2) described above, MIC promotes collaboration among related parties essential to maintaining and restoring communications such as telecommunication carriers, power companies, fuel suppliers, road administrators, local governments, and MIC itself and conducts training annually to improve effectiveness.

Moreover, to ensure communications related to emergency restoration activities at a local government even if existing communication services have failed at the time of a disaster, MIC has established a system to enable wireless equipment such as satellite mobile phones to be quickly loaned out to local governments. Additionally, to ensure communications at evacuation centers, mobile power supply vehicles that can quickly secure power supplies will be deployed to the MIC Regional Bureau of Telecommunications in the affected area.

Additionally, to provide support for disaster response and secure means of information-communications, MIC launched the MIC-Telecom Emergency Assistance Members (MIC-TEAM) in June 2020 as a mobile communications support team (Figure 5). The MIC-TEAM provides support in the event of a large-scale disaster or its likelihood of occurrence. It is dispatched to affected local governments to assess the extent of damage to information-communication services, to coordinate collaboration with related government institutions, businesses, etc., and to provide support in the form of technical advice to local governments, lending of mobile power supply vehicles, etc. In 2024, MIC-TEAM was dispatched to local governments hit by natural disasters, such as the Noto Peninsula earthquake in January and the Noto Peninsula heavy rains in September.

At MIC, the goal is to enhance the effectiveness of the MIC-TEAM liaison dispatch system through joint training as mentioned above.

5. Conclusion

The Ministry of Internal Affairs and Communications conducts necessary investigations of the causes of disaster damage and response to that damage. In this article, we reported on the progress made in initiatives that make use of new technologies such as satellites and drones and initiatives that aim to further strengthen the communication environment and prevent breakdown of communications at the time of a disaster based on advances in public and private collaboration.

Additionally, we are working on an initiative that aims to implement "emergency inter-carrier roaming" by the end of FY2025 to enable mobile phone users to temporarily use another carrier's network at the time of an emergency such as a natural disaster or communications breakdown.

More recently, moreover, we have been working with related businesses on an initiative for implementing services that would enable calls to be made or e-mail to be sent/received by smartphone using satellites, unmanned aerial vehicles flying in the stratosphere, etc. Using new technologies in this way, initiatives are currently underway to enable mobile phone services to be used even if base stations have been damaged and terrestrial networks have stopped operating.

Going forward, it is extremely important to strengthen measures for securing communication services envisioning the occurrence of a large-scale disaster that can cause damage over a wide area such as a Nankai Trough earthquake or Tokyo Metropolitan earthquake. At MIC, we will continue in our efforts to collaborate with related institutions such as communication carriers and to contribute to the securing of communications.

Figure 5: MIC-TEAM overview