Maintaining Communications Capabilities during Major Natural Disasters and other Emergency Situations

Final Report

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Study Group on Maintaining Communications Capabilities during Major Natural Disasters and other Emergency Situations
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Chapter 1 Introduction

1. Telecommunications infrastructure as part of the fundamental groundwork of society

- Communications infrastructure including both landline and mobile communication networks, as exemplified by fixed-line and mobile phones, makes instant exchange of information possible even in remote areas, and constitutes a vital part of the social infrastructure underpinning the daily lives and economic activities of the Japanese people.

- In particular, with technological advances in recent years, the convenience and importance of the Internet and broadband have grown dramatically, and communications infrastructure has become ever more fundamental to society not only as a means of providing traditional telephone service, but also as a medium for delivery of all manner of information and services provided by government and businesses, etc.

- As of September 30, 2011, the number of fixed-line phone subscriptions stands at approximately 37 million,\(^1\) indicating that fixed-line phones continue to play a vital role as a means of voice communication. Meanwhile the number of mobile phone subscriptions (cellular and PHS) has reached 127.28 million, meaning there is approximately one mobile phone per Japanese citizen, and mobile phones have become the primary means of voice communication, essential to daily life. The number of broadband Internet subscribers is also increasing, with subscriptions topping 36.259 million, and speed and capacity of broadband connections on the increase. Accompanying this trend, the number of OAB-J IP telephone numbers in use has reached 19.42 million.

- In terms of broadband service, growth in the fixed telecommunications field has led the way, but in recent years the high-speed mobile broadband field has also exhibited rapid growth. In December 2011, LTE service offering transmission speeds comparable to FTTH was launched, and the mobile broadband environment can now be said to be on a par with that of the fixed telecommunications field.

- In this Internet-saturated environment, social media services,\(^2\) video streaming services, video sharing sites, cloud services and a wide variety of other services and applications have gained prominence, making major contributions to the convenience of users’ lifestyles and to improved efficiency and reliability of businesses’ economic activities.

- Not only does the telecommunications infrastructure play a fundamental role in everyday life as described above, during states of emergency such as major natural disasters, it also provides a means of confirming people’s

\(^1\) Total number of subscriptions for subscriber phones (NTT East / West subscriptions [including ISDN]), fixed-line phones (total of fixed-line, new-type fixed-line, and fixed-line ISDN), and CATV phones.

\(^2\) A media format in which a large number of individual users, etc. can mutually share content such as text, photos and video with others participating in the same online community. Twitter, Facebook and Mixi are examples.
safety status through emergency calls and emergency priority-line phones, and provides a necessary means of communication for the maintenance of basic administrative functions such as police and fire departments. The telecommunications infrastructure is essential to ensuring the safety and wellbeing of Japanese citizens and underpins Japan’s ability to function as a nation.

- To give a specific example, an earthquake striking the Tokyo region directly would lead to an estimated six million or more people being stranded and unable to return home, a situation which in turn would lead to massive traffic jams as people attempted to return home in vain, blocking rescue efforts, and also result in unforeseen accidents as stranded people attempt to return home on foot. To prevent this, it is essential to ensure viable means of communication in such circumstances so as to verify individuals’ safety, assemble stranded people in safe places, and facilitate safe return home on foot.

- As outlined above, the telecommunications infrastructure is indispensable for the lifestyles of Japanese people, the economic activities of businesses, and as a means of ensuring people’s safety and wellbeing and maintaining the functioning of the Japanese state. It is necessary to ensure that telecommunications networks remain viable even in the event of a large-scale natural disaster.

2. Notable turns of events during the Great East Japan Earthquake

(1) Network congestion

- In the aftermath of the March 11, 2011 earthquake, a massive spike in the number of phone calls caused network congestion, resulting in usage restrictions on up to 80% - 90% of fixed-line phones and 70% - 95% of mobile phones.

- In particular, while fixed-line telephone restrictions imposed by NTT East were lifted in a relatively short time, it is notable that mobile phone restrictions continued on and off for a period of several days. One factor behind this is the significant increase in the number of mobile phone users.

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3 NTT DoCoMo reported 50 to 60 times the normal volume of traffic.

4 In September 2011, the Ministry of Internal Affairs and Communications commissioned a survey on the status of telecommunications in the wake of the Great East Japan Earthquake (an online survey of 1,650 male and female Japanese aged 16 and over who attempted to make contact via telephone or text messaging, etc. with people in Tokyo and Kanagawa, Chiba, Saitama, Ibaraki, Aomori, Iwate, Miyagi, and Fukushima prefectures between the immediate aftermath of the Great East Japan Earthquake and March 14 or so, referred to hereinafter as the “Survey on the Status of Communications.” See http://www.soumu.go.jp/main_content/000136157.pdf). According to this survey, approximately 55% of respondents in four quake-hit prefectures (Iwate, Miyagi, Fukushima and Ibaraki) and approximately 41% of respondents in the Kanto region (Tokyo, Kanagawa, Saitama, Chiba, Ibaraki, Gunma, Tochigi) stated that they were unable to make phone contact at all.

5 The number of mobile phone subscriptions in Japan was 4.33 million at the time of the Great Hanshin-Awaji Earthquake (as of March 1995), while it was 118.23 million at the time of the Great East Japan Earthquake (as of February 2011).
compared with during previous great earthquakes, and the fact that many users made mobile phone calls as a means of verifying safety.

- On the other hand, packet communications such as text messages were not subject to restrictions, or in the case of NTT DoCoMo which did impose restrictions, these affected no more than 30% of users, meaning it was significantly easier to make contact via text messaging than via phone calls.6
- Some mobile phone carriers have implemented improvements that boost the viability of packet communications during disasters, etc., such as independent control of voice calls and packet communications. Each carrier put these improvements into effect on the occasion of the March 11 earthquake, contributing to a marked ease of communication via packet-based transmission such as text messages compared to voice calls which were subject to up to 95% restrictions.
- However, due to text message server congestion, text messages that were sent took more time to arrive than usual.7

(2) Damage to telecommunications infrastructure, etc.

- The massive March 11 earthquake triggered a large tsunami off the Pacific coast, which wreaked colossal damage across a wide swath of eastern Japan. The telecommunications infrastructure as well suffered unprecedented earthquake and tsunami damage across a wide area, including the collapse, submersion and washing away of equipment inside telecommunications office buildings, the severing and destruction of underground cables and ducts, the collapse of utility poles, the destruction of aerial cables, and the collapse and washing away of mobile phone base stations.
- The disaster also caused long-term electrical blackouts, meaning even facilities undamaged by the earthquake and tsunami which ought to have been capable of providing service became non-functional due to shortages of batteries or fuel for private electric generators, etc.8
- As to the specifics of quake damage, the NTT East fixed telecommunications network suffered from cessation of functioning in 385 buildings, 6,300 km of coastal aerial cables being washed away or damaged, and 90 severed transmission routes, as well as 65,000 utility poles washed away or broken in coastal areas. As a result, approximately 1.9 million subscriber lines (of which approximately 400,000 were operated by KDDI or Softbank Telecom) were affected.
- Meanwhile, transmission routes (entrance lines) between cellular and PHS base stations were operated by NTT East Japan, and the damage to these

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6 According to the Survey on the Status of Communications, approximately 29% of respondents in four quake-hit prefectures and approximately 17% of respondents in the Kanto region stated that they were completely unable to send or receive text messages.
7 According to the Survey on the Status of Communications, approximately 60% of respondents in four quake-hit prefectures and approximately 66% of respondents in the Kanto region stated that they felt text messages took either much longer, or somewhat longer, to send and receive than usual.
8 The cause of suspension of operations or service at 80% of NTT East telecommunications buildings and 85% of NTT DoCoMo stations was using up of power supply due to electrical blackouts.
routes and using up of batteries, etc. as electrical blackouts continued
resulted in a total of approximately 29,000 base stations shutting down.
• As described above, the damage inflicted on the telecommunications
infrastructure by the March 11 earthquake was greater in scale than that
caused by previous earthquakes,9 but swift restoration work by each
telecommunications carrier meant that recovery was complete by the end of
April with the exception of certain areas.
• In addition to the above, there were various measures taken such as the
re-routing to another headquarters of 119 emergency calls to the
Rikuzen-Takata Fire and Rescue Headquarters in the tsunami-devastated
area, the need for which had not been previously foreseen. This indicates a
key issue to be addressed in future so as to ensure the viability of
communications in the event of damage to critical sites.

(3) Use of the Internet

• With the development of telecommunications infrastructure and networks
over the past few years, a wide range of Internet-based services and
applications (social media services, video streaming services, video sharing
sites, cloud services, etc.) have become available, and on the occasion of
the March 11 disaster, the Internet was used in new ways to verify the safety
of individuals and to share information.10
• For example, social media services were used to verify the safety of
individuals immediately after the earthquake when it was difficult to make
contact via phone or text messages, and as persons registered to use the
services are able to post information in real time, they were used by
individuals and public institutions11 to disseminate and collect information
on the disaster, and were shown to be highly effective12.
• In addition, a wide variety of high-added-value Internet-based services were
made available, including searchable sites aggregating information such as

9 In the aftermath of the Great Hanshin-Awaji Earthquake of January 1995, over 300,000 fixed-line phones
went dead, and 145 base stations ceased to function. After the Niigata-Chuetsu Earthquake of October
2004, 4,450 landlines (NTT East Japan) went dead, and 189 base stations (NTT DoCoMo: 61 stations, au:
31 stations, Vodafone: 91 stations) ceased to function.
10 In the Mitsubishi Research Institute "Interim Summary of the Survey on Information and Communications
During Natural Disasters" (commissioned by the Ministry of Internal Affairs and Communications) (an
interview-format survey of 116 people [including municipal employees, with priority placed on those with a
reasonable level of ICT knowledge and those in leadership positions] who survived the disaster or
volunteered for relief efforts in Miyako City, Iwate Pref.; Sendai City, Kesennuma City, Ishinomaki City or
Natori City, Miyagi Pref.; and Minamisoma City, Fukushima Pref., referred to hereinafter as the "Survey on
Information and Communications", see http://www.soumu.go.jp/main_content/000140261.pdf), it is
noteworthy that in some of the areas affected by the disaster it was impossible to connect to the Internet
for long periods of time, as indicated by comments such as that of a man in his 20s who stated that "my
ADSL router lost power, and could not be used. It took two weeks to restore it." With this issue in mind,
Section 5.1 ("Maintaining the Viability of Internet Connections") outlines the status of efforts to maintain the
viability of Internet connections in the event of large-scale disasters, etc.
11 The number of Twitter accounts of administrative institutions amounted to 148 as of April 4 (27 more than
the number in March before the earthquake hit) (survey by the Ministry of Economy, Trade and Industry)
12 For example, the total number of logins to major social networking service Mixi for the month of March
2011 grew to 15.37 million (820,000 more than the preceding month), and the total number of postings
exceeded 700 million (approximately 100 million more than the preceding month).
lists of names of evacuees released by local governments, services that assemble and integrate a wide range of online information such as traffic updates and map data, and websites that match the items offered by volunteers and senders of relief supplies with the needs of disaster survivors.

- There were also instances of website and e-mail services for quake-hit municipalities, and evacuation area management tools, etc. being offered via cloud computing, highlighting the efficacy of cloud services in ensuring the viability of business operations and preservation of information.
- Besides these, other examples of Internet utilization include broadcasters providing disaster-related news content to video streaming services for streaming on the Internet, and individuals posting real-time video of the disaster-stricken area on video sharing sites.
- In contrast to the above-described examples of the Internet’s positive contributions, the March 11 earthquake exposed such issues as necessity to choose among massive amounts of disaster-related information flooding the Internet, and the digital divide that separates those with information literacy from those lacking it. Accordingly, it is desirable to share issues surrounding Internet use as well as to collect and share examples of the Internet’s effective utilization.

3. Holding of the Study Group

- The Study Group focused on and considered measures for maintaining communications capabilities, among various issues related to ICT during states of emergency, with a view to restoring and reconstructing the telecommunications infrastructure swiftly following earthquakes, and preparing for future large-scale disasters, taking into account the widespread congestion and disruption of the telecommunications infrastructure essential to disaster recovery efforts.13
- Specifically, the Study Group considered (1) means of alleviating congestion in emergency situation, (2) means of minimizing disruption to communications in the event of damage to base and/or relay stations, (3) implications of the recent disaster for future network infrastructure, and (4) implications of the recent disaster for future internet usage.
- This Final Report elaborates the Interim Report, compiling the discussions14 taking place at the first (April 8, 2011) through fifth (July 29, 2011) meetings

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13 Publications summarizing the full spectrum of issues related to ICT during disasters include the interim report of the Information and Communications Council on “Information and Communications Policy for Realization of a Knowledge- and Information-Based Society” (July 25, 2011).

14 The Study Group is comprised of the Network Infrastructure Working Group and the Internet Utilization Working Group.

- The Network Infrastructure Working Group discussed the issues of (1) Alleviating congestion in emergency situation, (2) Minimizing disruption to communications in the event of damage to base and/or relay stations, and (3) Implications of the recent disaster for future network infrastructure. (First (June 1) through ninth (November 21) meetings)
- The Internet Utilization Working Group discussed the issue of (4) Implications of the recent disaster for future internet usage. (First (June 1) through ninth (November 21) meetings)
of the Study Group, based on the discussions at the sixth (October 13, 2011) and seventh (November 28, 2011) meetings and the initiatives being implemented by various parties, with the final chapter consisting of the Action Plan outlining measures to be taken hereafter.

• This Final Report is expected to play an important role in formulating future initiatives aimed at preparing for future large-scale disasters comparable to the earthquake and tsunami of March 11.
Chapter 2 Alleviating congestion in emergency situation

Voice calls over the telephone network (including the mobile phone network) are easy for anyone to make, and enable real-time, two-way communication, making them an important means of verifying people’s safety and conveying information, etc. during disasters. However, after the March 11 earthquake, there was network congestion due to an enormous surge in the number of calls, resulting in usage restrictions on up to 80% - 90%\(^{15}\) of fixed-line phones and 70% - 95%\(^{16}\) of mobile phones and a situation in which it was extremely difficult to get through on the telephone.

Voice calls are a vital means of communication during states of emergency, and it is necessary to take measures against congestion\(^{17}\) so as to ensure to the greatest possible extent that calls can be made. These measures ought to include revision of the design capacity of switching equipment, increase in the number of base stations, and other efforts to upgrade the overall capacity of the telecommunications network including the access network.

It is also necessary to advance, in an integrated fashion, various measures which are not directly related to the viability of voice calls, such as initiatives to enhance and improve other means of communication and thereby mitigate the congestion of telephone networks; timely and appropriate provision of information to promote the use of these other means of communication; and research and development aimed at realization of networks less prone to congestion.

1. Ensuring voice call capability

(1) Revision of the design capacity of switching equipment and other measures to upgrade the overall capacity of the telecommunications network

- In the wake of the March 11 disaster, usage restrictions were imposed on up to 70% - 95% of telephone calls, a situation which resulted from traffic vastly exceeding the design capacity of switching equipment (50 to 60 times\(^{18}\) the normal volume of traffic, according to NTT DoCoMo.)
- Revision of the design capacity of switching equipment and call control servers so as to handle all traffic during massive spikes in usage during disasters is highly challenging from a cost perspective, but considering the importance of voice calls as a means of communication during states of

\(^{15}\) 90% for NTT East and KDDI, 85% for Softbank Telecom.

\(^{16}\) 90% for NTT DoCoMo, 95% for KDDI, 70% for Softbank Mobile. eMobile was not subject to restrictions.

\(^{17}\) In addition to efforts to prevent communications restrictions to the greatest possible extent, it is important congestion countermeasures include steps to enable the swift lifting of restrictions in the event that they are imposed.

\(^{18}\) Compared to the ratio of number of calls and call restriction rate at 13:00 with 15:00 just prior to the earthquake, it is estimated that in the Tohoku region, after the quake the number of outgoing calls multiplied by approximately 60 while the number of incoming calls multiplied by approximately 40, while in the 23 special wards of Tokyo traffic jumped to approximately 50 times the number of outgoing calls and approximately 20 times the number of incoming calls.
emergency, it is essential that each carrier take steps such as revising design capacity so as to maximize the capacity of networks.

- In this regard, some mobile phone carriers are taking steps to configure multiple switching equipment units together in groups connected by means of wireless control devices and mesh, in conjunction with the shift to IP networks. Other carriers are drawing up plans for distribution of traffic load through increased sophistication of data transmission accompanying the introduction of LTE. It is important that these and other efforts to boost the capacity of networks continue.

- Design capacity issues are being considered by the IP Network Facilities Committee, Telecommunications Technology Sub-Council, Information and Communications Council (hereinafter referred to as the “IP Network Facilities Committee”). The results of these considerations ought to be reflected in technological standards, etc. as soon as possible.

(2) Ensuring the stable viability of emergency priority calls

- During disasters and other states of emergency, emergency priority calls circumvent communications restrictions by allocating a signal to the outgoing call identifying it as important, ensuring it is given high priority in being handled. Along with emergency call, these are an essential means of communication during states of emergency.\(^{19}\)

- However, in the wake of the March 11 earthquake it was pointed out that it was difficult to make contact even using the emergency priority calls operated by many carriers.

- This may be because even if the outgoing call is given priority, the base station, etc. receiving the incoming signal may be damaged, or the person on the other end may be absent or in the midst of another call.

- Procedures used for handling outgoing calls from emergency priority calls differ depending on the carrier, and with mobile phone carriers there are cases in which resources between terminals and base stations are held in reserve and other cases in which they are not, leading to gaps in communication capacity.

- For this reason, in order to ensure stable usability of emergency priority calls while also minimizing restrictions on ordinary phones, it is necessary to formulate measures based on collection and analysis of data on final call ratios for emergency priority calls. However, some carriers are currently not acquiring or saving such data.

- This issue is currently being deliberated by the IP Network Facilities Committee, and the results of these considerations ought to be reflected in technological standards, etc. as soon as possible.

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\(^{19}\) The Regulations for Telecommunications Facilities for Telecommunications Business were revised in 2010, and for fixed-line phones with OAB-J numbers and mobile phones, requirements for emergency call and emergency priority calls were instituted. As of the end of FY2008, there were approximately 270,000 emergency priority calls (about 0.6% of total subscriptions) for fixed-line phones, and approximately 90,000 for mobile phones (about 0.08% of total subscriptions).
• The institutions, etc. eligible for priority handling should be subject to revision as needed. However, an increase in the number of eligible institutions may lead to expansion of the resources held in reserve for emergency priority calls and accompanying exacerbation of network congestion and increased restrictions on ordinary calls. It is necessary to weigh the matter carefully, taking into account carriers’ design capacity revisions, etc.

(3) Consideration of new service types aimed at boosting the viability of voice calls

1) Introduction of call length limits
   • Revisions of the design capacity of switching equipment are aimed at mitigating congestion by boosting the number of calls per time unit that switching equipment can process.
   • The volume of network traffic is set as “calls per time unit” × “average hold time,” meaning it is necessary to reduce the “average hold time” in order to combat congestion.
   • Here, call length limits would restrict calls during times of disaster to a certain length, and by reducing the “average hold time,” allow a greater number of people to make calls. As such they are seen as one effective countermeasure against congestion.
   • On the other hand, call length limits can cause calls to be cut off suddenly, exacerbating the caller’s distress. In order to introduce this system, it will be necessary to obtain a social consensus on the length of calls and user’s calling procedures.
   • As the cause of congestion is sometimes lies not in “average hold time” but in the “number of calls per time unit” that can be processed by switching equipment and call control servers, it may be necessary to revise the processing capacity of switching equipment, etc. so as to make call length limits an effective strategy.
   • The IP Network Facilities Committee should continue deliberating the matter of call length limits based on data on the recent post-quake congestion, etc.

2) Phone calls with reduced sound quality
   • Call length limits are aimed at reducing “average hold time.” In other words, they are intended to reduce the burden on transmission capacity and ensure that more calls can get through.
   • Another possible method of reducing the burden on transmission capacity is to provide calls with sound quality lowered to a certain extent.
   • Calls with somewhat lower sound quality are seen as one effective means of combating congestion, but there are issues to be addressed such as the degree of quality reduction allowable and means of publicizing the initiative among users.
   • The cause of congestion lies not only in transmission capacity but also in the processing capacity of switching equipment, etc., the relation to which must also be taken into consideration when introducing reduced
sound-quality calls.

- With reduced sound-quality calls, the flexible regulation of quality is not possible on the line switching network, and the introduction of the system faces technical hurdles, meaning it is more appropriate to consider its implementation on IP networks such as NGN or LTE.
- The IP Network Facilities Committee should continue deliberating the matter of reduced sound-quality calls based on the above considerations.

2. Expanding/improving means of communication other than voice calls

Voice calls over the telephone network are unavoidably subject to congestion when the number of outgoing calls increases dramatically during states of emergency, due to the processing capacity of switching equipment, etc.

On the other hand, in the aftermath of the March 11 earthquake, packet-based communications such as text messages were not subject to restrictions, or if they were (in the case of NTT DoCoMo), only subject to temporary restrictions of 30% at most, meaning it was easier than with voice calls.

To mitigate the congestion of voice traffic, it is effective to promote distribution of load from voice calls to other means such as text messaging, e-mail and Internet, and storage-type media for emergency situations. Steps must be taken to enhance and improve the infrastructure for these other media to be used during disasters.

(1) Boosting the sophistication of emergency message services

- Emergency message services currently consist of three types: emergency voicemail hotlines, Internet message boards, and mobile phone message boards.
- These three types of emergency message services are not linked to one another, meaning there is no means of searching for registered information across multiple media, presenting an obstacle to swift and accurate verification of individuals' safety status.

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20 On the NTT DoCoMo data communications network, outgoing and incoming text message traffic is estimated to have increased approximately 300% - 400% in the Tohoku region and 200% - 300% in the 23 wards of Tokyo following the earthquake.

21 NTT East's emergency voicemail hotline has been used approximately 3.33 million times, NTT East’s Internet message board approximately 2.3 million times, and mobile phone message boards (NTT DoCoMo, KDDI, Softbank Mobile, eAccess, Willcom) have 3.5 registered users and have been used 5.8 million times (as of May 31, 2011).

22 According to the "Survey on the Status of Communications," approximately 91% of all respondents did not use emergency message services, while approximately 21% of all respondents were not aware of such services.

23 Since March 2010, mobile phone emergency message boards have provided cross-carrier search allowing people to search for all information registered to any carrier, regardless of which carrier they themselves are using.
• In light of events during the March 11 disaster, operators of these services and others have pointed to the need for links between these services. These operators ought to take steps to link the various emergency message services so as to enable cross-service searches. Specifically, the following steps should be taken:

[1] Links between Internet-based and mobile phone-based emergency message boards

The Telecommunications Carriers Association (TCA) Safety and Reliability Commission is deliberating specific measures for linking of services aimed at enabling cross-service searches. The results of these deliberations should be acted on as swiftly as possible.

[2] Links between emergency message boards (Internet-based and mobile phone-based) and emergency voicemail services

There are challenges involved in creating links between emergency message boards and emergency voicemail services, such as the need for reciprocal conversion of voice data and text, but each carrier is taking steps to realize these links as well as those described in [1] above. These efforts should move forward to the greatest possible extent.

(2) Voice-based services not employing the telephone network

• As a countermeasure against congestion, NTT DoCoMo is planning to offer a service within FY2011 in which voice messages will be turned into files at a terminal and sent over the data transmission network. KDDI is planning to offer a similar service in spring 2012 or thereafter, and other mobile carriers are considering such services as well.
• If multiple carriers are offering services of this type, it will be more beneficial if users of different carriers can send and receive voice messages as data files to one another. Carriers should ensure that this is possible.
• This means it is essential for each carrier to work together with other carriers when developing these services. In October of this year, the TCA Safety and Reliability Commission formulated guidelines for enabling reciprocal links between different carriers (with guidelines released in November of this year), and technical specifications are also scheduled to be released, the first edition within this calendar year and the second edition within this fiscal year.
• It is desirable for the carriers to work toward provision of sound file transmission services, capable of transmission among different carriers, as early as possible.
• Also, in addition to these services, carriers should promote the use of IP phones (voluntary shift from telephone network to IP network (NGN, LTE etc..))\textsuperscript{24} wider use of mobile IP phones with 050 numbers), development of

\textsuperscript{24} IP phones transmit voice data in packet form over the IP network (data communications network), making them less subject to congestion. However, OAB–J IP phones may be subject to congestion due to the capacity of call control servers, and when IP phones are used to call landline or mobile phones over the telephone network, they may be affected by telephone network congestion.
wireless LAN, sending of SMS over the data transmission network during states of emergency, and otherwise enhance and improve the quality of voice-based services not employing the telephone network, so as to distribute the traffic load.

(3) Addressing delays in mobile phone text message transmission

- As mobile phone text messages were subject either to no restrictions or only minor restrictions during the March 11 earthquake, it can be said that it was easier for people to make contact via text messages during this period.
- However, if we turn our attention to the amount of time it took messages to arrive, while around 90% of NTT DoCoMo users’ text messages were delivered instantaneously (from the imode server to the receiver) a week before the earthquake, in the immediate aftermath of the quake only around 15% of messages were delivered instantaneously.
- This is because even if text messages were delivered from the sender to the text message server (imode server) as quickly as usual, congestion occurring in the server meant that it took longer than usual for the text messages to be delivered from the server to the receiver.
- To address this, NTT DoCoMo has upgraded the text message server so that delays will not occur even with a volume of traffic comparable to that which occurred during the Great East Japan Earthquake.
- Meanwhile, at KDDI and Softbank Mobile there was no problem in the text message servers themselves, but there were delays in transmission of text message receipt notifications which are sent over the voice call network.
- To address this, KDDI is scheduled to improve the system by employing an SIP protocol, not dependent on the existing text message transmission and receipt system, with the implementation of LTE in December 2012. Softbank Mobile is planning to make improvements in conjunction with the implementation of new technology and the timing of migration of voice-based service facilities.
- In the case of text messages, senders are not aware of when their message reaches the receiver, and severe delays threaten the effectiveness of text messages as a means of communication. The carriers are making ongoing efforts as described above to address the problem of delayed text message delivery.

25 In order to address the mobile phone network crunch arising from the prevalence of smartphones, etc. and offload to public wireless LAN, each carrier is working to expand the number of public wireless LAN access points. For example, the number of Softbank Mobile access points reached 100,000 in September of this year, with KDDI planning to achieve the same number by the end of FY2011. NTT DoCoMo is aiming to increase the number of points to around 30,000 within the first half of FY2012 or so, with plans to boost this number to around 100,000 in the future based on user needs.
26 Short Massage Service: sent to the phone numbers of mobile phones.
27 Since July 2011, NTT DoCoMo, KDDI, Softbank Mobile, and eAccess have launched SMS interconnection among different carriers.
28 Regarding sending of SMS, NTT DoCoMo has completed the shift from the voice call network to the data communications network during times of congestion. KDDI already employs the data communications network even during normal periods, with the exception of SMS sent from some old-model handsets.
(4) Simplified handsets for senior citizens

- While other communication methods that do not employ the telephone network are effective for combating congestion, procedures for using them may be complicated, and it may be difficult to promote their use among senior citizens who are not accustomed to them.29
- For this reason, each carrier is pursuing the development and distribution of simple and easy-to-use handsets enabling all people to use diverse means of communication, including non-voice-based methods to which they may not be accustomed. It is appropriate that such efforts continue.

3. Keeping users informed of available means of communication during emergency

As general users are not aware of which means of communication are effective in states of emergency, they tend to rely on the same methods they ordinarily use such as fixed-line or mobile phone voice calls and text messaging, leading to congestion.

In order to mitigate this congestion, it is necessary not only to enhance and improve communication methods for use in states of emergency, but also to distribute information and educate the public on which means of communication are effective and supply the appropriate information in a timely fashion during states of emergency.

(1) Effective information distribution via emergency notifications to mobile phones and broadcast media

- In light of the March 11 earthquake, important congestion countermeasures include widespread publicizing of the congestion conditions and requests to refrain from making non-urgent calls, as well as strongly encouraging people to make use of means of communication other than voice calls (such as text messages and emergency message services, etc.)
- Some carriers offer audio guidance to direct people to use emergency message boards during congested periods, and it is appropriate that others offer similar direction to makers of voice calls so as to mitigate congestion.
- At the same time, more effective way to mitigate congestion would be to provide necessary information not on an individual basis but to a large number of people at once, so as to direct them toward the most effective means of communication at that point in time, such as emergency message boards, etc.

29 According to the Survey on the Status of Communications, approximately 68% of people aged 29 or younger said they used text messages more often than phone calls, but among those aged 60 or over only approximately 36% used text messages more often.
30 For example, in addition to the development and provision of simple and user-friendly smartphones, consideration is being given to development of tablet-type remote controls allowing easy and convenient acquisition of information via cable TV.
• Methods of distributing the same information to large numbers of people at once could include emergency notification text messages to mobile phones and broadcast media such as TV and radio. These approaches ought to be pursued proactively.

• Regarding broadcast media such as TV and radio, some carriers are taking steps to provide broadcasters, etc. with emergency notifications on the state of congestion during states of emergency, and some carriers have a system in place to distribute information swiftly and widely via commercial messages, etc. It is desirable for each carrier to continue moving forward with similar efforts.

(2) Sharing and supplying of congestion and communications restrictions information through cooperation between the government and carriers

• During states of emergency, congestion and communications restrictions information differs depending on whether it refers to fixed-line or mobile communications and to voice calls or to data transmission, and depending on the carrier and on how much time has elapsed since the disaster struck.

• This means that for users seeking to verify individuals’ safety after disasters, it is useful to be able to keep track in an integrated fashion of the most effective means of communication in accordance with how much time has elapsed since the disaster.

• For this reason, it is appropriate to set up a venue for consideration primarily composed of telecommunications carriers and to consider unified rules (on the content and format of information, etc.) for provision of information on congestion and communications restrictions, so as to release information in a shareable and reusable manner for effective delivery of the information to the public.

(3) Education and distribution of information on communication methods during states of emergency in ordinary times

• During states of emergency, users have a tendency to rely on the means of communication that they are accustomed to and aware of, and there is a risk that in such situations, people will not make use of methods of communication as directed if these methods are not familiar to them.

• With this in mind, the following information ought to be widely distributed and requests made to the public during normal periods of time:
  - During states of emergency, voice call traffic is subject to severe congestion. Please keep calls short and do not make unnecessary calls.

31 In addition, J:COM is in the process of formulating specific procedures for information distribution employing two-way information services via community broadcast and cable TV.

32 The Survey on the Status of Communications reports that after the earthquake, 51% of people made an effort to avoid jamming phone lines by avoiding redialing and keeping calls short, while 49% gave no particular consideration.
- Specific procedures for using effective means of communication other than voice calls (and statement to the effect that use of these other methods will benefit everybody as it will mitigate congestion) etc.

- A Ministry of Internal Affairs and Communications (hereinafter referred to as the “MIC”) press release in August of this year and public announcements on government-run radio programs encouraged the proactive use of emergency message boards, and in November an audio CD for the visually impaired was released. Moving forward, these and similar publicity and education initiatives should continue.

- Telecommunications carriers have offered test versions of emergency message boards for use during disaster preparedness training conducted by municipal governments. Mitigation of congestion through diversification of communication methods used during states of emergency contributes to stability of service, and telecommunications carriers ought to continue with proactive efforts to inform and educate the public in this regard.

4. Designing robust networks to cope with congestion

- A massive surge in the number of phone calls made during a disaster is unavoidable, but in order to ensure the viability of voice calls to the greatest possible extent during future large-scale disasters, it is necessary to boost the capacity of telecommunications facilities, and for the government, etc. to pursue research and development towards a realization of a less congestion-prone network.

- For this reason, regarding services and areas where viable communications must be ensured even during congested periods, it is appropriate to take steps over the mid and long term to develop and demonstrate new technologies that emphasize congestion resistance, such as technology for flexible allocation of network processing resources, data storage technology, and technology for ensuring the viability of communications through all-out mobilization of all available communications networks including mobile networks, landline networks, data transmission networks and the Internet.

- With these points in mind, the MIC is focusing on the following research and development areas:
  [Third supplementary budget for FY2011]
  - R&D into strengthening the disaster tolerance of ICT networks (research and development of technology for reducing congestion of mobile phone traffic, etc. during states of emergency)

Research and development on technology aimed at ensuring the viability of mobile phone networks and other public networks even in states of emergency, through flexible modification of circuit capacity settings

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33 Refer to “During states of emergency, please use emergency message boards or text messages” (MIC press release, August 24, 2011).


34 NTT DoCoMo provided trial service primarily during Disaster Preparedness Week, and informed people of the service widely through distribution of messages, leading to a fourfold increase in the number of times the service was used compared to the same period the previous year.
[Budget for FY2012]
- R&D into core information delivery technologies for disasters (research and development on technology for rapid boosting of communications processing capacity of affected areas during states of emergency)
  Research and development on technologies for rapid deployment of mobile communications processing functions during explosive rises in traffic such as widespread verifications of individuals’ safety in affected areas during disasters, research and development on technology for supply of easily understandable information on communications traffic, and technology for all-out mobilization of leftover communications processing functions from other areas
  - The MIC is tasked with steadily pursuing these research and development initiatives, and seeing that their results are widely put into effect.
Chapter 3 Minimizing disruption to communications in the event of damage to base stations and/or relay stations

In cases like that of the March 11 earthquake where base stations, local stations and transmission routes have undergone major damage in disasters, in order to respond effectively to post-disaster emergency situations, verify the safety of individuals and facilitate information-gathering, it is essential to restore the telecommunications infrastructure swiftly, and to provide means of communication, emergency notifications and information on restoration status etc. that are appropriate to the length of time elapsed since the disaster and the needs of the affected areas and of evacuees,

This means it is necessary to take steps to ensure these measures can be taken swiftly after future large-scale disasters.

1. Emergency repairs to damaged telecommunications infrastructure

Because the telecommunications infrastructure is used for disaster relief activities, verification of individuals' safety status, and management of municipalities disaster relief headquarters, it is extremely important to ensure the viability of communication after disasters, and when telecommunications facilities have been damaged, it is vital to restore them as swiftly as possible.

(1) Emergency repairs to base stations and local stations

- During the March 11 earthquake, a total of about 29,00035 base stations for cell phones and PHS ceased functioning, and 385 NTT East telecommunications buildings stopped operating.
- Emergency repairs to base stations entails:
  - Expanding the zones of existing base stations and deploying mobile and compact base stations (femtocells).
  - NTT East has deployed outdoor line trunk accommodation units and shifted resources from other stations (laying in cable from other areas and out-rigging of network facilities).
- Telecommunications carriers have been sharing measures such as those described above as best practices, as well as deploying additional mobile base stations with superior immediacy and mobility, and providing information on emergency repairs (number of mobile power supply vehicles and mobile base stations, etc.), and it is essential that these efforts continue in the future.
- In terms of safety and reliability measures including the installation and deployment of equipment needed for emergency repairs, deliberations have

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35 6,720 NTT DoCoMo stations, 3,680 KDDI stations, 3,786 Softbank Mobile stations, 704 eMobile stations, and 13,760 Willcom stations.
been taking place in the IP Network Facilities Committee. The results of these considerations ought to be reflected in technological standards, etc. as soon as possible.

(2) Emergency repairs of transmission routes

- In the aftermath of the March 11 earthquake, 6,300 km of coastal elevated cables were washed away or damaged, 90 transmission routes were severed, and 65,000 utility poles washed away or broken in coastal areas. As a result, approximately 1.9 million subscriber lines (of which approximately 400,000 were operated by KDDI or Softbank Telecom) were affected and service was disrupted.
- As NTT East transmission routes are also used as entrance lines (transmission routes between mobile phone carriers’ base stations and switching equipment), when they are damaged in disasters, it will also lead to damage of mobile phone transmission routes and disruption of service.
- NTT East engaged in emergency repairs including clearing away of rubble, replacement of utility poles, and laying of cable. Meanwhile mobile phone carriers have been ensuring the viability of entrance lines through use of satellite circuits and fixed micro-lines, etc.
- Telecommunications carriers have been sharing measures such as those described above as best practices, and deploying mobile base station vehicles equipped with satellite entrances and transportable satellite base station kits, etc., as well as using satellite circuits\(^{36,37}\) effective for ensuring viability of transmission routes during disasters, and providing information on emergency restoration, and it is essential that these efforts continue in the future.
- In terms of safety and reliability measures including the installation and deployment of equipment needed for emergency repairs, deliberations have been taking place in the IP Network Facilities Committee. The results of these considerations ought to be reflected in technological standards, etc. as soon as possible.

(3) Network sharing and collaboration between carriers during states of emergency

- As mobile phone carriers are allocated small and limited spectrum and as a basic rule construct their own equipment with which to provide service, it has been seen as inappropriate for them to cover areas by roaming and using other carriers’ networks without constructing their own equipment.
- However, during large-scale disasters and other states of emergency when

\(^{36}\) According to SkyPerfecTV – JSAT, requests from mobile phone carriers, the Ministry of Defense and the National Police Agency, broadcasters, electric power companies, railways, etc. for additional frequency allocation from their satellites totaled approximately 500MHz of bandwidth (the usable bandwidth under normal circumstances is approximately 2,000MHz).

\(^{37}\) UQ Communications is considering the development of WiMAX base stations capable of using satellite transmissions for access lines.
telecommunications equipment has been damaged, there are a limited number of mobile base stations and their deployment takes time. As a result, some carriers have expressed the opinion that rules for an inter-carrier roaming system is necessary in order to restore communications swiftly under such circumstances.

- On another front, some are of the opinion that each carrier should work in ordinary times to construct networks that are highly resistant disasters and ensure that they can be restored as swiftly as possible if damaged. They also maintains that as networks that have been restored after disasters are only capable of processing a small volume of transmissions and that inter-carrier roaming is difficult to implement from a capacity standpoint.
- The efficacy of inter-carrier roaming during states of emergency cannot be denied from the viewpoint of benefit to the public and people in disaster-hit areas, but on the other hand there is opposition on the grounds that it cannot easily be put into practice. It remains to be seen whether the issues can be addressed through consultation among the carriers involved.
- Roaming limited to emergency calls (110, 119 etc.) is seen as an effective means of ensuring a bare minimum of communicative capability remains so as to protect the lives and wellbeing of citizens from danger, and has been implemented in nearly all EU nations. On the other hand, there are issues in that it must be possible for emergency institutions receiving calls to return the calls, etc. Thus it is advisable for a venue for deliberations centered on telecommunications operators to be set up swiftly, with an eye to resolving the issues towards a realization of an emergencies-only inter-carrier roaming system as soon as possible.

(4) Information sharing and partnerships between relevant administrative institutions and infrastructure organizations

- In the aftermath of the March 11 earthquake, even if the materials, fuel and personnel needed for emergency repair of damaged telecommunications could be procured, blocked roads and traffic restrictions meant that the means or routes for transporting them could not, and many telecommunications carriers felt that these presented serious obstacles to swift emergency repair.

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38 In the recommendation by the Information and Communications Council on "Development of an Environment for Promotion of Broadband Utilization" (December 20, 2011), it is stated that "regarding roaming during states of emergency such as natural disasters... it is not appropriate to make the system mandatory, but rather to see whether the issues can be addressed through consultation among the carriers involved."

39 According to Article 35.20.2 of the Regulations for Telecommunications Facilities for Telecommunications Business (Ordinance of the Ministry of Posts and Telecommunications No. 30 of 1985), mobile phone carriers are required to "have the capability to maintain the signal for a telephone conversation until there is a signal from the terminal facility that received the emergency call indicating that the call has ended, or else to return the call to a number transmitted to a law enforcement agency, etc.."

40 In the recommendation by the Information and Communications Council, it is stated that "it is advisable for a venue for deliberations on resolution of such issues as described in the Recommendation on interconnection rules to be set up swiftly, with an eye to a swift realization of roaming limited to 110, 119 and other emergency calls."
• Regarding the viability of transport means and routes, it is necessary for relevant administrative institutions at the national and local levels and infrastructure organizations to deepen their understanding of the importance of telecommunications infrastructure during states of emergency, and for these institutions and enterprises to share information and forge partnerships in ordinary times.

• Parties to be involved in information sharing and partnership may include the Cabinet Office, the MIC, the Ministry of Economy, Trade and Industry (Agency for Natural Resources and Energy), the Ministry of Land, Infrastructure, Transport and Tourism, the National Police Agency, the Fire and Disaster Management Agency, the Self-Defense Forces, and local governments. Information to be shared includes locations of evacuation areas, contact information and new locations of local governments and emergency institutions, status of roads, traffic restrictions, refueling areas, and necessary relief supplies. It is desirable for the national government and local governments to share this information swiftly and proactively.

• It is also desirable for the entire government to pursue discussions on disaster countermeasures including the development of arrangements ensuring means of transport for telecommunications operators on a priority basis.

• In addition, the following opinions seeking increased flexibility of administrative procedures have been heard from relevant telecommunications carriers:
  — For fuel shipping, it is necessary to have a licensed hazardous materials transport operator, but personnel shortages present an obstacle and exceptions should be made for fuel transport during states of emergency.
  — The emergency vehicle system, allowing vehicles to drive even on roads blocked to ordinary vehicles, is effective for speedy transport of supplies, but administrative procedures are time-consuming. The application procedures for issuing of emergency vehicle licenses should be shortened and made more flexible.
  — Documentation of permission to drive on blocked roads should be issued more quickly.

• The MIC should inform the Cabinet Office and ministries and agencies in charge of the rules involved of these requests, and with a revision of disaster preparedness-related laws expected, should work proactively to reflect these requests in the modifications of disaster response rules and plans.

2. Providing communications capability to disaster-affected regions and evacuation centers

(1) Securing and providing communications capability based on the length of time elapsed since disaster struck

• In the aftermath of the March 11 earthquake, each telecommunications
carrier took proactive measures to secure and provide means of communications in disaster-affected regions and evacuation centers, such as free distribution of mobile phone handsets, satellite phone units, and MCA wireless devices, installation of special toll-free public phones, free setup of Internet-enabled environments in evacuation centers, and free provision of public wireless LAN areas.

• Immediately after the quake, there was a strong need for voice-based communications such as satellite phones for verification of individuals’ safety status and for relief efforts, but after some time there was an increased need for Internet-enabled environments so that people in evacuation centers, etc. could obtain information, and to restore local government operations41.

• It is necessary to put a system in place for swift securing and provision of communication capability, taking into account the fact that the means of communication sought after change as time elapses.

• In this connection, the MIC has procured 300 mobile satellite phones through the first supplementary budget for FY2011, and distributed them free of charge to earthquake-hit municipalities, etc. Also, based on the experiences during Typhoon No. 12 which wreaked tremendous devastation particularly on the Kii Peninsula, the MIC has been expanding the number of storage facilities and deliberating and strategizing for the faster delivery of such satellite phones to municipalities that request them. In specific terms, this entails strengthening ties with governmental organizations that have strong transport capabilities even during states of emergency, as well as reinforcing ties between these organizations and the regional bureaus of telecommunications in the affected area at the time of dispatch, so as to enable the prompt delivery of satellite phones to those in need. If this is realized, it will be possible to meet the communications needs of disaster-hit municipalities with greater speed.

• Telecommunications carriers have been sharing measures such as those described above as best practices, as well as deploying satellite phones and providing special toll-free public phones and setting up Internet-enabled environments in evacuation centers. It is desirable that these efforts continue in the future.

• It has been noted that as the needs of people in affected areas could not be tracked in a timely and accurate fashion after the Great East Japan Earthquake, it was impossible to supply the appropriate means of communication swiftly even if such means were available. It is therefore necessary to put a system of information sharing and partnership between the national government and municipalities, etc. in order to match the demand in the affected areas with the supply from business enterprises in future disasters.

41 According to the Survey on Information and Communications, directly after the quake there was considerable use of broadcast-type media to obtain tsunami updates, etc., but since then there has been increased use and diversification of information sources including the Internet, word of mouth, and seeing in person, which are tools with which users can gather and disseminate regional information.
(2) Advance deployment of effective means of communication in evacuation centers, etc.

- During states of emergency, in order to ensure the timely securing of means of communication in the affected areas, it is necessary not only to supply the necessary means of communication post-disaster, but also to deploy the necessary communications equipment etc. in places likely to be used as evacuation areas and at other key points in advance.
- After the March 11 earthquake, public phones, wireless LAN, and satellite terminals proved to be effective means of communication.
- In particular, all public phone calls were designated as emergency priority calls, and played an important role as a means for stranded people unable to return home in the Tokyo region to make contact. With this in mind, the Information and Communications Council, Telecommunications Business Policy Committee is deliberating on the efficacy of public phones for communications during states of emergency, and relevant parties should take the necessary measures based on the results of these deliberations.
- Wireless LAN was also an effective tool in the wake of the disaster, playing an important role in delivering evacuation information and other regional information, and it is appropriate that the government develop and deploy wireless systems and other telecommunications networks that are highly resistant to disaster damage, in accordance with the characteristics of each region.
- In this regard, the MIC plans for “Development of an Environment for Realization of Innovative Community Development Employing ICT” as part of the draft budget for FY2012. This calls for community development deploying disaster-resistant wireless systems, and community development facilitating the swift and reliable receiving of evacuation information, etc. even under conditions where mobile phones cannot be used.
- Another potential measure is the conversion of classroom ICT environments at numerous schools, which serve as evacuation centers in case of disaster, to emergency response and evacuation-oriented ICT systems, which would require the work of changing settings, but which could prove effective for verification of individuals’ safety status and other information gathering.
- In this regard, since FY2010 the MIC has been implementing the Future School Promotion Project aimed at facilitating the effective use of ICT in the educational field. As a part of this project, the MIC intends to deliberate on the effective use of classroom ICT environments during states of emergency, and the issues surrounding realization of this repurposing concept, based on the lessons of the Great East Japan Earthquake.
- With regard to satellite phones, in addition to the abovementioned Ministry of Internal Affairs and Communications initiatives, the Cabinet Office has been implementing the Regional Disaster Preparedness Empowerment

42 The development and demonstration of optimum ICT systems for innovative community development, incorporating a combination of technologies that contribute to a safe, people-friendly and environmentally friendly community (sensor network technologies, cloud service technologies, wireless network technologies, etc.)
Support Project\textsuperscript{43} provided for in the FY2011 budget, etc., which provides subsidies to municipalities for the purchase of satellite phones.

- Besides these government efforts, telecommunications carriers have been taking steps such as the installation of special public phones and setup of Internet-enabled environments in evacuation centers and the advance installation of emergency phones in convenience stores.
- To reinforce the satellite communications network\textsuperscript{44}, under the FY2012 draft budget the MIC plans for “Research and Development for a Disaster-Resistant Satellite Communications Network” in which terrestrial stations do not specify satellites but can communicate with any satellite, so as to ensure the viability and smoothness of satellite communications that fulfill user needs. Satellite telecommunications operators, as well, have implemented measures such as upgrading of facilities at control centers that administer satellite circuits, and enhancement of backup equipment.
- As mentioned above, there is a need for continued work on integrated development of ICT environments at key disaster preparedness locations, promotion of deployment of satellite phones,\textsuperscript{45} swift distribution of satellite terminals by the government, and strengthening of the satellite communications network.
- Also, in locations seen as potential evacuation centers, it is important to secure power sources other than commercial electric power, to ensure the viability of communications even in case of electrical blackouts.
- In this regard, the Cabinet Office “Regional Disaster Preparedness Empowerment Support Project,” in addition to subsidizing the purchase of satellite phones themselves, provides support for municipalities purchasing emergency generators for charging of satellite phone batteries. It is desirable that such measures will help secure power sources for evacuation centers and other key locations.

3. Ensuring stability of power supplies

(1) Ensuring emergency generators (including ensuring fuel) suited to the type and size of telecommunications facilities

- Currently, electrical blackout countermeasures for telecommunications facilities (for telecommunications business) include requirements for the installation of backup generators or batteries (both backup generators and batteries in the case of switching equipment) (Regulations for Telecommunications Facilities for Telecommunications Business, Article 11).

\textsuperscript{43} The subsidy will be applied to 1/2 the purchase price, and a maximum of ¥17.5 million per municipality will be allocated from the national budget.

\textsuperscript{44} Regarding satellite telecommunications networks, the revisions of the Emergency Communications Council described later identify the securing of mobile satellite phones and satellite circuits as one “emergency communications route” connecting national, prefectural and municipal governments. It is important to deepen discussions of the further promotion of such existing technologies and effective means of utilizing satellites.

\textsuperscript{45} It is also essential to put in place technical standards for new mobile satellite phone services, with an eye to promoting deployment of this technology.
• The requirement for installation of the required batteries does not specify the number of hours they must be sustainable, but in the wake of the March 11 earthquake blackouts were widespread and lasted for long periods of time, and even telecommunications facilities undamaged in the quake were subject to power shortages and service disruptions as batteries and fuel for generators were used up.\textsuperscript{46}

• The aftermath of the March 11 earthquake highlighted the need for batteries, etc. that can last through long-term electrical blackouts, but it is not practical from a cost perspective, etc. to provide for batteries that can serve through very long-term blackouts as regards all telecommunications facilities.

• Building on the lessons of the quake, each telecommunications carrier is considering taking steps to prevent base station blackouts through installation of backup electrical generators and lengthening of battery life (NTT DoCoMo, KDDI, and Softbank Mobile plan to deploy batteries capable of powering mobile phone base stations for at least 24 hours, in about 2,000 locations throughout Japan). It is desirable that the carriers move forward with these efforts.

• At the MIC as well, the IP Network Facilities Committee is currently deliberating on safety and reliability measures including electrical blackout countermeasures. The results of these considerations ought to be reflected in technological standards, etc. as soon as possible.

• In the wake of the March 11 earthquake, there were problems with ensuring and shipping light and heavy oil, gasoline, and engine oil to fuel generators, etc., and in this regard there is a need for logistical improvements in preparation for future disasters.

• In this regard, it is desirable for private-sector partnerships including strengthening of collaboration between telecommunications carriers and oil companies, such as the conclusion of agreements on priority fuel shipments, etc.

• At the same time, in terms of partnership with administrative institutions regarding the ensuring and shipment of fuel, the following measures have been called for by telecommunications carriers:
  – Establishment of rules and systems for ensuring and shipment of fuel during states of emergency
  – National-level ensuring of fuel supplies and allocation to industries
  – Prioritized supply of fuel and preliminary announcement of refueling locations for vehicles involved in relief efforts, such as emergency vehicles authorized to drive on blocked roads.
  – Treatment of generator and motor equipment as emergency power sources under the Electricity Business Act
  – Improving the efficiency of information conveyance to relevant administrative institutions
  – Conclusion of supply agreements between municipalities and oil

\textsuperscript{46} 85\% of stations that stopped functioning for NTT DoCoMo, and 80\% of NTT East Japan telecommunications buildings where operations were suspended stopped functioning due to using up of fuel during blackouts.
industry associations

• The MIC should inform the Cabinet Office and ministries and agencies in charge of the rules involved of these requests, and with a revision of disaster preparedness-related laws expected, should work proactively to reflect these requests in the modifications of disaster response rules and plans.

• In light of the unavoidability of batteries and generator fuel supplies being used up in the event of long-term blackouts that were occurred during the March 11 disasters, the government intends to deploy 10 new mobile power supply vehicles,\(^{47}\) and telecommunications carriers as well are making efforts to boost the number of such vehicles. Such initiatives ought to be continued.

(2) Dissemination of information on the availability of fixed-line phones during electrical blackouts, and promotion of the use of battery powered fixed-line phones

• In some cases, telephone calls facilitated by remote power feeding,\(^{48}\) which had been possible during electrical blackouts with single-purpose metal-line phones, have become impossible due to the conversion to optical fiber.

• Currently, if emergency calls may not be able to be delivered due to electrical blackouts, telecommunications carriers are required to inform users of this fact at the time a contract is concluded (Guidelines on Consumer Protection Rules under the Telecommunications Business Law). However, it may not be possible for users to determine whether the terminal they have in their house, etc. is capable of being used with remote power feeding during an electrical blackout.\(^{49}\)

• For this reason, it is appropriate for telecommunications carriers and manufacturers to forge ties with relevant institutions and take swift steps to inform the public in an easily understandable manner how to determine whether the fixed-line telephones they purchase and install are capable of remote power feeding or not.

• Regarding phones for which calls cannot be made via remote power feeding, it is advisable to promote the use of battery-equipped terminals or terminals with backup power sources so that they can be used for a certain period of time even during blackouts.

• Information on phones that cannot be used during blackouts and on backup power sources that can be used during blackouts has already been disseminated to the public by the Communications and Information Network Association of Japan (CIAJ), TCA, and some telecommunications carriers.

\(^{47}\) Provided for in the first supplementary budget for FY2011.

\(^{48}\) Remote power feeding is a method by which telephones are supplied with power through the phone lines from the subscriber switching equipment at the telephone office. This method allows phone calls to be made even during electrical blackouts.

\(^{49}\) According to the Survey on the Status of Communications, as to whether or not respondents were aware that home fixed-line phones become unusable during blackouts, approximately 56% were aware of the fact before the earthquake, while approximately 14% found out only after the quake.
and manufacturers.

• Also, the CIAJ Working Group on Blackout Countermeasures, with the cooperation of the TCA and other relevant institutions, is implementing a survey on the power consumption and status of blackout countermeasures for various types of telecommunications terminals. It is advisable for relevant carriers to cooperate and take steps, with reference to this survey’s findings on blackout countermeasures.

(3) Steps by manufacturers, etc. to reduce the power consumption of facilities and terminals, development of more lightweight and longer-lived batteries etc.

• When large-scale disasters occur, blackouts can last for long periods of time, and batteries and generator fuel are unavoidably used up. Even under these circumstances, however, it is necessary to make every attempt to ensure batteries do not run out completely.

• For this reason, it is advisable for manufacturers, etc. to take steps to reduce the power consumption of telecommunications facilities and terminals and develop more lightweight and longer-lived batteries.

• NTT DoCoMo has stated its intention to launch a Green Base Station Vision in FY2012, which will utilize eco-friendly power generation and reduce peak electric power. Meanwhile KDDI is considering the promotion of three-way hybrid base stations incorporating power generated by solar panels, midnight-service power stored in storage cells, and regular commercial power, and eAccess is moving forward with demonstration experiments aimed at ensuring power supply using renewable solar power. Also, the abovementioned CIAJ Working Group on Blackout Countermeasures is deliberating ways of reducing the power consumption of facilities and terminals and developing more lightweight and longer-lived batteries.

• These efforts ought to be continued by the relevant parties.

4. Providing emergency information and disaster damage reports

(1) Effective use of emergency notification text messages on mobile phones

• During states of emergency, it is necessary to supply a wide variety of information in a timely and appropriate manner, such as emergency information (on earthquakes, tsunami, etc.), updates on the status of basic services (electricity, gas, water, etc.), and information for everyday living.

• With emergency notification text messages sent to mobile phones, the same content can be sent to large numbers of people, and users have expressed the desire for other kinds of information in this format in addition to emergency earthquake information.

• The effective use of emergency notification text messages could entail an increase in the number of service providers and a diversification of the contents provided.
• NTT DoCoMo is the only carrier currently offering emergency notification text messages other than for earthquake notifications, but KDDI and Softbank are also planning to introduce them in spring 2012, and it is evident there will be an increase in the number of providers.

• If multiple providers are offering emergency notification text messages, and municipalities need to receive separate notifications from each carrier, it will be burdensome during hectic states of emergency, and will interfere with timely provision of information to users.

• For this reason, it is appropriate for the parties concerned to cooperate, for instance through utilization of the Public Information Commons,\(^{50}\) so that the same information input once will be supplied to multiple carriers, are negotiating with the aim of sharing interfaces among carriers.

• In terms of the diversification of information to be provided, NTT DoCoMo plans to add tsunami and massive tsunami warnings released by the Meteorological Agency,\(^{51}\) and intends to add further categories in response to requests from municipalities (information on large-scale or sudden electrical blackouts, rescue activities, information for stranded people who cannot return home, distribution of relief supplies, and recovery or scheduled recovery status of electricity, water, etc.).\(^{52,53}\)

• Considering the efficacy of emergency notification text messages, it is appropriate for each telecommunications carrier to continue diversifying the contents of service based on the requests of municipalities, etc.

• The MIC plans for “ICT Promotion in the Disaster-Hit Regions” in the third supplementary budget for FY2011 and the draft budget for FY2012. This aims to establish a comprehensive and dependable system for conveyance of disaster information to local residents, through diverse media including mobile phone, community FM radio, emergency notification text messages, etc.

(2) Enhancement and improvement of restoration area maps

• In the wake of the March 11 earthquake, telecommunications carriers

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\(^{50}\) An information distribution framework (operated by the Foundation for Multimedia Communications) aimed at conveying information bearing on people's safety and security during states of emergency both swiftly and effectively. Highly urgent information as well can be distributed to a wide range of media after being registered just once to the Public Information Commons, making it both a speedy and accurate means of transmitting information.

\(^{51}\) It was already possible to disseminate tsunami advisories, tsunami warnings, and massive tsunami warnings in response to requests from municipalities. The tsunami warnings and massive tsunami warnings to be added by NTT DoCoMo differ in that they are automatically sent to the pertinent areas when they are released by the Meteorological Agency, regardless of whether there is a request from a municipality.

\(^{52}\) The previous categories of information that could be disseminated numbered 15: disaster preparation information, evacuation advisories, evacuation directives, caution zone information, tsunami advisories, tsunami warnings, massive tsunami warnings, volcanic eruption warnings, flood warnings, landslide warnings, Tokai earthquake forecasts, ballistic missile warnings, air raid warnings, guerrilla/special forces attack warnings, and large-scale terrorist attack warnings. The above categories based on requests from municipalities are considered as being included under “evacuation preparation information.”

\(^{53}\) In addition, in July of this year NTT DoCoMo eliminated fees for transmission of disaster/evacuation information through emergency notification text messages by the national government or municipalities.
released data on the Internet in the form of restoration area maps showing the status of damage to telecommunications facilities and restoration of interrupted services.

- The restoration area maps provided by NTT DoCoMo had approximately 200,000 visitors within the first 10 days, indicating the strong degree of need for such a service. With this in mind it is appropriate for each carrier to enhance and improve the quality of such services in preparation for future disasters, by reducing the amount of time needed to launch a map page after a disaster, diversifying the information provided, and boosting legibility and frequency of updates.

- Each telecommunications carrier is pursuing the development of frameworks for speedy launch of restoration area maps and other disaster-related content, and considering ways to enhance this content. These efforts ought to continue.

(3) Boosting the sophistication of services for verification of individuals’ safety (using location data from mobile phones, etc.)

- In the earthquake of March 11, more than 10,000 people went missing, highlighting the need for leveraging of the telecommunications infrastructure so as to boost the sophistication of means for verification of individuals’ safety.

- Mobile phones are prevalent to the point that there is nearly one handset for every Japanese citizen, and are usually carried with their owners at all times, meaning that if location information on the owner of the mobile phone and/or the maker of an outgoing call (derived from base station data, GPS data, etc. Referred to hereinafter as “location information”) is used, it is possible to ascertain the location of the mobile phone owner, allowing swift verification of safety status.

- For this reason mobile phone location information is thought to be an effective means of verifying individuals’ safety status, but on the other hand the location of a mobile phone holder is subject to concerns over secrecy of communications and personal information protection, meaning that it is necessary to respect users’ rights when employing this technology for verification of individuals’ safety.

- Thus when employing mobile phone location information for verification of individuals’ safety, it is necessary for telecommunications carriers, keeping an eye on the use of already implemented location information services, to consider the specifics of services, giving due respect to concerns over secrecy of communications, personal information and privacy. It is also necessary for the government to provide proactive support to each carrier for this endeavor.

- A certain telecommunication carrier is moving forward with efforts to disseminate information and educate users on the use of existing location information services during states of emergency, on the grounds that those location information services are potentially effective during these situations. This carrier is also endeavoring to employ mobile phone location
information, scrambled so that the users cannot be identified, to prepare population statistics which can be used for disaster preparedness plans, and is considering further use of these tools.

- The abovementioned reciprocal links between emergency message services provided by different carriers not only combat congestion, but also enable comprehensive cross-carrier searches, and are seen as effective means of accelerating the process of verifying individuals’ safety. With this in mind, its swift implementation is under consideration by the TCA Safety and Reliability Commission.

(4) Development of simplified devices for senior citizens and other means of providing information with consideration given to information literacy and accessibility

- Considering the fact that senior citizens and the disabled, etc. in affected regions or in evacuation centers may not be familiar with the use of prevalent telecommunications services and devices, it is appropriate to develop and provide simplified user-friendly devices so as to ensure that every person receives accurate information during states of emergency.
- During states of emergency, it is desirable for people to have access to diverse means of communication and to obtain the necessary information on their own. For this reason it is appropriate to disseminate information and educate people during times of normalcy, giving consideration to gaps in individuals’ information literacy and accessibility, and also to foster the advancement of information literacy.
- The MIC issued a press release in August of this year and made public announcements on government-run radio programs to reach the public, and in November an audio CD for the visually impaired was released.
- Related business enterprises are endeavoring to develop and provide user-friendly devices and to disseminate information and educate the public on emergency message services, and proactive efforts of this type ought to continue.
Chapter 4 Implications of the recent disaster for future network infrastructure

1. Improving the disaster resilience of networks

In the March 11 earthquake, the affected area covered a wide range, and damage exceeded previous expectations due to factors such as switching offices being washed away and damaged by the tsunami, and service outages caused by long power outages.

Similar large-scale disasters are likely to occur in the future, and it will be necessary to improve network disaster-resistance, taking into account the recent earthquake.

(1) Ensuring network safety and reliability

• In current Regulations for Telecommunications Facilities for Telecommunications Business, certain technical standards are set forth regarding ensuring network safety and reliability, such as earthquake-proof measures and anti-fire measures.
• However, in the March 11 earthquake, events occurred which exceeded previous expectations, such as a tsunami and long power outages, and thus there was tremendous damage to base stations, local stations and transmission lines.
• Telecommunications infrastructure is supposed to play an important role in disasters, and large-scale disasters are expected to occur in the future. Therefore it is necessary to improve network disaster-resistance in order to ensure stable provision of a means of communication.
• On this point, the various telecommunications carriers are taking account of the recent earthquake, and planning or reviewing efforts to improve network disaster-resistance, through approaches such as nationwide installation of large-zone base stations, and using multiple routes for transmission lines.
• In light of these trends among carriers, the IP Network Facilities Committee is currently considering the ways of ensuring network safety and reliability, including the above technical standards, and the results should be promptly incorporated into technical standards etc.

(2) Promoting introduction of local government common duct etc.

• In the recent earthquake, many aerial cables, utility poles and other equipment were damaged by the tsunami, and this caused disruption of communications services. Therefore, anti-tsunami measures are also a key issue for improving network disaster-resistance.
• On this point, buried transmission lines were damaged less by the tsunami than other transmission lines in the March 11 earthquake, and thus burial of transmission lines can be regarded as an effective anti-tsunami measure.
• In addition, in the recent earthquake, ground liquefaction occurred over a wide range, from the Kanto region to the Tohoku region, and fires made the damage of the Great Hanshin-Awaji Earthquake much worse. Burial of transmission lines can also be regarded as an effective way of countering these problems.

• Therefore, the introduction of local government common duct should be promoted in order to encourage burial of transmission lines, and strengthen network disaster-resistance.

• On this point, in promoting the elimination of utilities poles through efforts such as burying cables in the Ministry of Land, Infrastructure, Transport and Tourism's "Guidelines on Eliminating Utility Poles" (Feb. 2002), it is assumed that plans will be developed for locations where work is scheduled to be done and that the work will be done smoothly, through discussion adequately reflecting the views of constituent members in the regional block Utility Pole Elimination Councils comprised of relevant parties such as road administrators, cable administrators and members of local governments in Japan's 10 blocks. The MIC should encourage each of these councils.

(3) Infrastructure deployment to suit the recovery plan of the affected area

• In order to improve network disaster-resistance, it is necessary to make infrastructure such as telephone networks and mobile phone networks more redundant, and to provide diverse types of networks including satellite circuits and wireless LANs.

• Therefore, it is necessary to promote the development of facilities to ensure disaster-resistance telecommunications infrastructure in diverse forms to suit the recovery plan of the affected area.

• The recovery plans (including plan stages) for the affected areas of the Great East Japan Earthquake describe the construction of information and communications network which are resistant to disaster, in the prefectures of Iwate, Miyagi and Fukushima, and many of the municipalities in these prefectures.

• In order to deal with the issues facing the local governments affected by the Great East Japan Earthquake, the MIC is currently planning, in the third supplementary budget for FY2011 and the draft budget for FY2012, the ICT Promotion in the Disaster-Hit Regions – in which grants will be given for efforts by the pertinent local governments to efficiently and effectively solve these problems using ICT – and there is a need to promote the development of infrastructure for ICT use which is resistant to disasters, keeping in mind the response during the disaster in the affected areas.

(4) R&D to improve network disaster-resistance

• In light of the March 11 earthquake, it is necessary to conduct R&D to improve network disaster-resistance, so that continuous operation of the

54 Social Capital Improvement Grants from the Ministry of Land, Infrastructure, Transport and Tourism are available as one type of support for burying cables.
network can be ensured even if there is an earthquake, tsunami or other large-scale disaster, or an accompanying long power outage.

- More specifically, it is appropriate to make efforts in the following areas.
  - Technology should be developed so that transportable high-performance wireless stations and other equipment immediately configure a network if telecommunications infrastructure is damaged due to a disaster, and service is promptly secured in the affected area, local government buildings, evacuation shelters and hospitals etc.
  - In addition, systems should be developed to enable reliable transmission of emergency warnings (for tsunamis etc.) in affected areas using wireless systems such as mobile phones and wireless LANs, and these should be demonstrated in the affected area, paying attention to the potential for new disasters such as aftershocks and high waves.
  - Furthermore, power supply control systems should be developed to enable continuous operation of telecommunications infrastructure even if there is an interruption in commercial power sources due to the disaster.

- Based on the above, efforts are being made at the MIC to promote R&D in the following areas.
  [Third supplementary budget for 2011]
  - R&D to strengthen disaster-resistance of the information and communications network (R&D on technology to immediately and autonomously configure and network and secure communications, even if telecommunications infrastructure is damaged by an earthquake, aftershock, tsunami etc.)
  - R&D on wireless technology to enable use as a private communication network for municipalities, hospitals, neighborhood community associations and other key organizations, even if telecommunications infrastructure is damaged in the disaster due to collapse or submersion etc.
  - R&D on and demonstration of information and communications technology which can cope with wide-area disasters (R&D to construct a cloud foundation which can cope with wide-area disasters)
  - R&D to construct an inter-cloud linkage foundation, with high-reliability and greatly improved power conservation, which enables continuance of business processing by promptly evacuating important data from the cloud in the affected area to a safe cloud in a remote area when a wide-area disaster occurs
  - Construction of an information linkage system which is resistant to disasters
    Support for building a system which has a function for centrally managing and sharing disaster related information using ICT (information aggregation function), and a function for block distribution using various media of information to be provided from local governments to residents such as disaster-prevention warnings (information distribution function); and support for development of a multi-layered wireless network which is resistant to disasters and enables acquisition and distribution of
disaster-related information, without being affected by the situation of public telecommunications networks

- At the MIC, there is a need to steadily promote these R&D efforts, and to work to disseminate the results.

2. Setting up systems and structures for responding to disaster

In the March 11 earthquake, the various telecommunications carriers promptly made efforts to conduct emergency repair of telecommunications equipment and secure power sources and so on, but the damage exceeded previous expectations, and therefore, in light of the recent earthquake, there is a need to make efforts to develop a system which enables rapid-response to disasters.

(1) Verification/review of structure for responding to disasters at relevant telecommunications carriers

- At relevant telecommunications carriers, each company's disaster response structure (business continuity plan, disaster response manual etc.) should be verified, and if necessary reviewed, taking into account the congestion/damage situation in the recent earthquake, and the reasons why such problems occurred.

(2) Information sharing/conveyance structure between the national government, relevant enterprises and local governments

- During a disaster, properly aggregating, sharing and conveying information possessed by the national government, relevant enterprises and local governments is indispensable for responding to congestion and making prompt emergency repairs, and thus it is necessary to review from this perspective the way to information sharing and conveying between the national government, relevant enterprises and local governments. On this occasion, it will be necessary to review the Emergency Communications Council 55 whose purpose is to smoothly secure the communication necessary in an emergency.
- On this point, the Emergency Communications Council is to be reviewed as follows based on discussion by the Central Emergency Communications Council Board, which must be soundly implemented.

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55 Established in 1951 to ensure smooth operation of emergency communications necessary to enable lifesaving, disaster rescue and transportation communications, and to maintain order, when there is an emergency situation such as an earthquake, typhoon, flood, snow disaster or riot. Due to the 1965 amendment of the Radio Law (Law No. 131, 1950), the council, the MIC playing the central role, has become an organization which is active as a consultative body comprised of approx. 2,000 disaster-prevention related organization such as the national government, local governments, and telecommunications carriers. Primarily, it conducts periodic general inspection of equipment and operation structure for wireless stations to secure smooth communication in an emergency, in addition to examination of and training on emergency communication routes and structure assuming an interruption in communications during normal use.
1) Expansion of council composition etc.
Efforts must be made to secure communications to respond to emergencies at key infrastructure organizations by calling for active participation in the council by key infrastructure related organizations which are currently not participating in the council, such as railways, road traffic and fuel suppliers.

2) Strengthening and reviewing activity
[1] Development of an information sharing and conveyance structure
An information sharing and conveyance structure must be established, while using information sharing systems, to promptly promote information aggregation, contact coordination, and mutual help relating to the telecommunications infrastructure situation at local governments and key infrastructure organizations in the affected area, and to properly perform aggregation, sharing and conveyance of information on the congestion and damage situation of telecommunications infrastructure between telecommunications carriers, the national government, local governments and disaster-prevention related organizations.

[2] Mutual support based on information sharing etc.
An information sharing structure should be developed for mutual support in ordinary times, and to ensure, in case of a disaster, a support structure between constituent members such as the national government, nearby local governments, telecommunications carriers and private companies, using the above information sharing system.

[3] Review of emergency communication routes
Previously, the Emergency Communications Council has established emergency communication routes using private communication systems of nearby disaster-prevention related organizations etc. for communication between the national government, prefectures and municipalities, assuming a case where ordinary communication routes cannot be used, but since there may not be capacity available to play the role of an emergency communications route, the council should promote efforts to, as far as possible, flexibly verify and establish multiple routes, efforts to actively use local wireless networks employing comparatively simple wireless equipment, and efforts to secure certain communications routes which are resistant to disasters such as satellite mobile phones and satellite circuits.

The MIC shall consider standard specifications and guidelines, and promote information provision to the Emergency Communications Council, development and use of new disaster-prevention ICT such as public broadband mobile communication systems, as improvements of the emergency municipal radio system, such as securing an emergency power source, and providing resistance to earthquakes and inundation,
and to construction of a disaster-prevention information transmission system combining mobile mail and digital broadcasting,

- Also, in the Great East Japan Earthquake, fire-defense headquarters buildings stopped functioning due to damage caused by the tsunami, and measures were taken so that 119 calls in the jurisdiction of the fire-defense headquarters were rerouted to other fire-defense headquarters. In light of cases like this, it is necessary to encourage development of structure beforehand at fire-defense headquarters for measures such as rerouting of emergency warnings in case the fire-defense headquarters is damaged by the disaster.
Chapter 5  Implications of the recent disaster for future Internet usage

1. Maintaining the viability of Internet connections

The surge in call origination from users during the Great East Japan Earthquake caused severe congestion on telecommunication networks. At its peak, congestion brought about restriction of fixed telephone voice calls by as much as 80 to 90 percent and mobile telephone voice calls by as much as 70 to 95 percent. The Internet, on the other hand, was relatively stable on both fixed and mobile networks, aside from heavy traffic on certain government, power utility, and infrastructure-related websites that made those sites difficult to view.

Many novel uses of Internet information emerged during the March 11 earthquake disaster. As well as people confirming the safety of relatives and friends through real-time information sharing on social media sites, value-added information was provided by combining different types of information on the Internet, such as enabling single-point evacuation center searches or combining maps with other data to provide road passage information. Support tools that utilized cloud services were also provided to assist the operation of evacuation centers.

Consequently, because the Internet enables the efficient confirmation of people’s safety, requests for needed relief supplies, and sharing of information on road, railway, and other transport and infrastructure conditions, measures are needed to maintain the viability of Internet connections even in emergencies.

Of particular note are the expectations for mobile phone texting and instant messaging as an alternative to voice calls, which can easily become congested, as mobile phones are citizens’ most relied on means of communication.

(1) Safeguarding Internet access and functionality

1) Ensuring Internet connectivity by increasing line capacity etc.
   • In the March 11 earthquake disaster no major Internet usage outages surfaced outside the affected regions where physical damage occurred. Nevertheless, to ensure sufficient line capacity in anticipation of future large-scale disasters, telecommunications operators face the issue of boosting line capacity and taking other technical measures based on forecasts of future Internet traffic expansion.
   • On this point, some operators have embarked on increasing their line capacity by about 40 percent over pre-earthquake capacity and securing backup routes by adding multiple core network routes. They are also looking at enhancing transmission path redundancy based on scenarios of widespread physical damage. Telecommunications operators should continue to plan to add line capacity through the advancement of these types of initiatives.
   • Some mobile-phone email messages were delayed during the March 11 earthquake disaster because of capacity limitations at mail servers and other critical points. Because mobile-phone email is widely
anticipated to be an alternative to voice calls, which can easily become congested during emergencies, related operators should continue to move ahead with efforts in this area, as outlined in Section 2(3) of Chapter 2.

- Despite telecommunications operators’ best efforts to fortify and boost their line capacity, it is still very possible that sudden surges in streaming video access and other rich content will substantially interfere with all traffic. Even in the March 11 earthquake disaster, there were reports that public institutions waited for gaps between video news traffic spikes to circulate information. Therefore, measures to counter expected traffic congestion in such situations must be studied.
- More specifically, what needs to be deliberated are traffic limits to safeguard the connectivity of all communications in situations where heavy traffic occurs during a disaster. In the area of traffic controls, a telecom industry group (the Study Group on Operating Standards for Bandwidth Control (Bandwidth Control Study Group)) has formulated the Guideline on Operating Standards for Bandwidth Control, which sets out measures to prevent traffic congestion caused by heavy users occupying bandwidth. In view of the necessity of preserving the connectivity of holistic communications during disasters, the Bandwidth Control Study Group has also looked at various issues surrounding secrecy of communications and traffic shaping, such as sorting out the relationship between traffic controls and the protection of secrecy of communications as mandated by the MIC. The Bandwidth Control Study Group found that operators may implement traffic controls that temporarily and uniformly capped the bandwidth each user could use in the interest of preventing total network congestion during disasters. On the question of whether such bandwidth control represents a violation of secrecy of communications in relation to the obligation to protect the secrecy of communications, the Bandwidth Control Study Group decided to draw up guidelines on the operation of bandwidth control so that even if such control did violate secrecy of communications, the control would not be considered illegal on grounds that is a legitimate business action. The Bandwidth Control Study Group plans to revise its guideline during FY 2011.

2) Fortifying Internet connection services against damage in disasters
   - At present, telecommunications operators who install telecommunication circuit facilities are required to meet prescribed technical standards (Regulations for Telecommunications Facilities for

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56 Traffic shaping that gives priority to certain communications has been studied, but it was found to be technically infeasible at the present time because Internet traffic passes through the facilities of multiple carriers. Furthermore, even if such traffic shaping were technically possible, it was pointed out that it would be difficult for telecom carriers to reach a consensus on what types of communications should be awarded priority.
Telecommunications Business) regarding the safety and reliability of their networks, including taking seismic-resistance and fire-prevention measures at their telecommunication facilities used for telecommunication businesses.

- However, the equipment, such as servers and routers, Internet service providers (ISPs) use to provide their Internet connection services is not classed as telecommunication circuit facilities. Consequently, ISPs without circuit facilities are not obliged to conform with the technical standards on safety and reliability mentioned above.

- Internet connectivity should be maintained whenever possible given the importance the Internet played in the March 11 earthquake disaster. To this end, it is necessary to consider approaches to fortifying the disaster tolerance of ISPs (such as strengthening the seismic resistance of their telecommunication facilities and maintaining backup power generation facilities) in the interest of maintaining Internet access and functionality.

- Standards for Security and Reliability of Information and Communications Networks (Ministry of Posts and Telecommunications Notice No. 73 of 1987) provides basic and comprehensive guidelines on safety and reliability measures relating to all aspects of information and communications networks regardless of whether circuit facilities are installed or not. Based on the lessons learned in the March 11 earthquake disaster, the provisions of these standards need to be revisited.

- The IP Network Facilities Committee is moving ahead with examinations from this perspective of technical standards and other issues concerning telecommunication facilities used for telecommunication businesses. Based on the Committee’s eventual findings, the MIC should consider revising the Standards for Security and Reliability of Information and Communications Networks in the interest of strengthening the disaster tolerance of ISPs.

- Due to the length of the power outages during the March 11 earthquake disaster, telecommunications operators were forced to run their facilities using emergency power supplies. Furthermore, local ISPs had to travel to their customers’ sites to restore services and provide support. Because it proved difficult for them to procure the necessary fuel to carry out their operations, structure must be put in place to cope with fuel requirements in similar disasters.

- Specifically, as stated in sections 1(4) and 3(1) in Chapter 3, stronger private sector collaborations, such as telecommunications operators signing preferential fuel supply contracts with oil companies, are desirable. At the same time, the MIC should convey operators’ opinions on government collaborations in this regard to the Cabinet Office and the relevant ministries and agencies and then actively work to have these opinions implemented by, for example, incorporating them in rules and plans that deal with disaster measures.

3) Ensuring Internet use at evacuation centers
• During the March 11 earthquake disaster, evacuee registers at evacuation centers were created on paper because of a lack of computers and other resources. Information sharing (of such details as the state of evacuation center operations, evacuee registers, and types and quantities of needed supplies) between evacuation centers and local government disaster response headquarters was done by voice calls and on paper. This complicated the collection and reuse of information on evacuation centers.

• Various Internet-based resources were made available during the March 11 earthquake disaster, such as cloud-service-based tools to assist evacuation center operations and sites that matched provided goods with the goods required by evacuation centers. But these sites were not fully utilized because most evacuation centers did not have Internet access.

• To avoid these situations in the future, full-time Internet access environments must be set up at designated evacuation centers and other high-priority locations.

• With regard to this point, the MIC plans for the ICT Promotion in the Disaster-Hit Regions in the Third FY 2011 Supplementary Budget. With these projects, the MIC is aiming to establish highly disaster tolerant multi-layered wireless networks by building wireless LANs and other wireless environments.

• In tandem with this, the Future School Promotion Project has been running since FY 2010 to promote the effective use and application of ICT in the education sector. As part of this project, the MIC plans to verify how to effectively utilize, in times of disasters, the ICT environments set up in school buildings, which are frequently used as evacuation centers.

• Immediately after a disaster, the necessity of voice communications is paramount and it is vital to restore voice communications as fast as possible. Nevertheless, after a certain amount of time, Internet access is likely to become equally as important as voice because of the Internet’s utility. NTT East essentially worked to restore voice communications and Internet access with equal priority, although there were some differences in restoration times due to differing degrees of facility damage. In the future, Internet access and functionality should be restored wherever possible at the same time as restoration of voice connections to evacuation centers and other priority locations.

On the other hand, some observers have pointed out that because of the difficulty in ascertaining disaster area needs in a timely and appropriate fashion, it was not possible to immediately supply a given means of communication even if it was available. Therefore, structure must be established to share and coordinate information between the central government and the afflicted local governments to appropriately match the needs of disaster areas with the available provisions on the operators’ side.

• All forms of communication suffered damages to some extent in the
March 11 earthquake disaster, and no absolutely reliable communication means existed. As a result, telecommunications operators implemented emergency restoration measures that made use of mobile base stations and satellite circuits. Telecommunications operators are also increasing the number of mobile base stations and deploying portable satellite base station kits and kit-type portable base stations equipped with both satellite and mobile approach links. Advancing these efforts is an appropriate way to further diversify Internet access methods, including wireless LAN and satellite Internet, instead of relying on a single access method.

4) Fostering information literacy

- During the March 11 earthquake disaster, the Internet was not sufficiently utilized at evacuation centers even after Internet services were restored because center administrators and staff members (i.e., local government officials, members of volunteer organizations, etc.) either were not fully aware of the benefits of the matching sites on the Internet or were in the first place not well versed in the Internet itself.
- In this regard, there are many necessities: routine and ongoing training for local government officials that incorporates e-learning; organizing the necessary information literacy for evacuation center administrators and staff members (i.e., what needs to be done to take advantage of ICT); building support frameworks with local NPOs and local universities; constructing human networks between local governments for ICT officials; and advancing collaborations involving, for example, preparatory training exercises.
- The MIC has previously supported regional ICT development by, for instance, dispatching “regional ICT advisors” when requested by local communities. The MIC has decided in its FY 2012 Draft Budget to promote regional ICT development through, among other measures, the dispatch of “regional ICT managers” who provide mid-term assistance to local governments that are considering projects that use and apply ICT.
- Similarly, the Association for Promotion of Public Local Information and Communication (APPLIC) is involved in various activities — such as running municipal government CIO nurturing and training programs, holding the National APPLIC Seminar, and sending experts into the field — with the aim of training personnel who will have the comprehensive skill set to lead local government ICT development and regional ICT development. The Local Authorities Systems Development Center (LASDEC) is also engaged in various efforts — such as holding various educational seminars and ICT development assistance training, providing e-learning training using the Internet, and posting certain training materials on its Website — to support the development of municipal government officials who can spearhead ICT development efforts in administration and in the local community.
- To foster information literacy among local government officials and
evacuation center administrators in ordinary times, alongside the continued efforts outlined above by the national government and industry groups, there is also a need to collect and share best practices in fostering information literacy and to apply these collected best practices in support of local government efforts.

(2) Approaches to network construction underpinning the Internet

• The country’s Internet exchanges\(^\text{57}\) and data centers are clustered in the Tokyo region. As a result, it is necessary to study approaches to constructing disaster-tolerant networks for the Internet so that the Internet will continue to function even if a large-scale disaster were to strike the Tokyo region.

• A new venue has been set up, led by the Japan Internet Providers Association (JAIPA), for ISPs and IX firms to deliberate this issue. Current deliberations are looking at ways to guarantee network redundancy, such as distributing IXs and data centers over a wider geographical area. The findings of these studies should be put into practice as soon as possible.

• New approaches to network construction may also involve financial considerations. Even as telecommunications operators are moving ahead with initiatives to boost line capacity as mentioned earlier, also engaging in efforts to move IXs and data centers out of the Tokyo region may cause ISPs difficulty in securing the required capital for facility investments and business operations. Based on consideration and initiatives by related parties, and while monitoring the status of these consideration and initiatives, the government must consider necessary policies and support mechanisms that are grounded on changes in the current Internet landscape and the situations ISPs are in.

• On the technical side, P2P\(^\text{58}\) is an effective traffic-distribution technology. Because it is imperative to safeguard the connectivity of the entire Internet through traffic distribution should a disaster strike the Tokyo region, measures that make effective use of P2P should also be included in consideration.

2. Effective use of the Internet

The Internet was used to share many kinds of disaster-related information in the Great East Japan Earthquake. In addition to providing information to a very broad audience, social media was utilized to exchange information in real time, functioning as an alternative to voice calls. Value-added information was also provided by combining various data sets available on networks, such as

\(^{57}\) Traffic exchanges between ISPs and other entities take place directly between the ISPs and other entities as well as at points known as Internet exchanges (IXs) where ISPs interconnect their networks. The IXs used by most ISPs at the present time are operated by Japan Internet Exchange (JPIX), Japan Network Access Point (JPNAP), BBIX, and a few other companies. These major IXs are located in Tokyo and Osaka. Similarly, traffic exchanges done directly between ISPs are said to be concentrated in Tokyo.

\(^{58}\) P2P stands for peer to peer; it is a communication method that exchanges data directly between terminals on a network.
matching road passage information with map data.

(1) Information sharing over the Internet

- In the March 11 earthquake disaster, many services were provided over the Internet, such as single-point searches of evacuation center information, road passage information, railway operation information, and power consumption data. These services were very effective in circulating and sharing information.
- But although the Internet was effective for sharing many kinds of information, Yahoo Japan, Google, and other portal site operators providing disaster-related information still encountered the following issues.
  - Each evacuation center created its own register of evacuees and other information on people's safety. Furthermore, the information fields and formats each local government used were incompatible. Because of these differences, provision of single-point search services of evacuation center registers was delayed because files from each local government had to be imported separately and databases prepared after reformattting the data fields such as names and addresses.
  - Much of the information provided by administrative bodies was in PDF or similar siloed formats. To reuse this information for other purposes, such as single-point evacuation center search services, the provided information had to be manually converted, which caused further delays.
  - Because individual local governments were in charge of approving the release and scope of evacuation center information in their jurisdiction, portal site operators had to approach each administrative body separately to obtain information, a process that was inefficient and delayed the release of information on the Internet.
  - Portal site operators were able to enhance their disaster-related services with user-supplied information. However, the user-supplied information was fragmentary, and, thus, it was difficult to provide comprehensive information based solely on user-supplied information.
- As described above, information from administrative bodies was provided on an ad hoc basis, and the information posted by portal site operators based on this administrative information was also very varied. It is desirable, then, that portal site operators share their respective information to ensure that disaster-related information is provided quickly on Internet sites as widely as possible. In parallel with this, it is necessary to study information collection approaches by administrative bodies, such as sorting out the minimum required information items to be collected and provided.
- On this point, first, portal site operators should continue in their efforts to share information by using hyperlinks and other techniques. Additionally, administrative bodies and portal site operators should make prior agreements on how to respond to emergencies and disasters. To this end, the administrative bodies and portal site operators should work out procedures for sharing information in emergencies and conduct training exercises together.
• In the next place, concerning file format issues, notifications\(^{59}\) have already been issued on recommended file formats for information administrative bodies supply, and administrative bodies should definitely abide by the provisions of these notifications. However, finding the best way for administrative bodies to provide information remains an issue, including creating standard information items and formats for certain critical information such as information on people’s safety.

• In particular, with respect to the question of how local governments should provide information on disaster victims, it is necessary to determine the format the information should be provided in and the details included in the information while bearing in mind potential conflicts with the personal information protection ordinances of each local government.

• Naturally, the information administrative bodies are required to supply in times of disasters changes as situations develop and time elapses. Nevertheless, the highest priority would be given to information on people’s safety, information on damage to roads, waterworks, power infrastructure, and other lifelines, information on lifeline restoration, and transportation information.

• With respect to the formats administrative bodies supply information in, formats used in emergencies must match regular formats wherever possible, XML or other standardized tags must be added on the assumption that the information will be mechanically processed (for secondary use), and administrative bodies must conduct training exercises on the provision of information in emergencies.

• The treatment of personal information by local governments is another concern. Article 11\(^{60}\) of the Act Concerning Protection of Personal Information (Law No. 57 of 2003, Personal Information Protection Law) requires local governments to endeavor to institute measures necessary to guarantee the proper handling of personal information in their possession. Consequently, each local government bases its treatment of personal information on local ordinances.

• In the March 11 earthquake disaster, some afflicted local governments interpreted the situation as an exception\(^{61}\) to their personal information

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59 The notifications issued in the wake of the March earthquake disaster were File Formats of Important Information Released to Citizens (dated March 18, 2011, from LASDEC to local governments), Request for Cooperation Concerning the Provision of Information Related to Earthquake Damages (dated March 22, 2011, from the Cabinet Public Relations Secretary to government ministries), File Formats for Provision of Information Concerning the Great East Japan Earthquake (dated March 29, 2011, from the MIC to government ministries), and Data Formats for Provision of Information Concerning the Great East Japan Earthquake (dated March 30, 2011, from the METI to government ministries). These notifications informed administrative bodies about releasing information as HTML files and not just as PDF files and making use of open application program interfaces (APIs) in the interest of reducing data volumes and simplifying the reprocessing of information for other uses.

60 Article 11(1) of the Personal Information Protection Law stipulates that “the Administrative Organ shall endeavor to take necessary measures for ensuring the proper handling of Retained Personal Information which take into consideration the nature of the Retained Personal Information and the purpose of retaining the personal information.”

61 The local government’s personal information protection ordinance in this instance recognizes the provision of personal information to third parties in the following cases: (1) when the person in question has given consent or when the person in question is the direct recipient of the information; (2) when the provision is based on stipulations in other laws or ordinances; (3) when the information has already been
protection ordinances and provided portal site operators with information on evacuees (names, ages, partial addresses (limited to municipality and district), gender, and initial evacuation center).

- Other afflicted local governments, however, followed evacuation center procedures and released on their respective Websites the names of only those evacuees who gave their consent when filling out evacuee cards at evacuation centers. While this method can be praised for its rigor and accuracy, it still had problems with respect to speed. It has been suggested that examinations are needed to find a method that provides both accuracy and speed. It has also been suggested that broader efforts are needed on a prefectural level because smaller municipal governments had more trouble coping with these demands than larger municipal governments.

- As the treatment of personal information in personal information protection ordinances varies between local governments, local governments should proceed with studies of finding the right balance between the necessity of providing information on people’s safety and other critical information during large-scale disasters and other emergencies and the demands of personal information protection and, where necessary, local governments should revise their personal information protection ordinances (such as defining exception clauses concerning the treatment of personal information in emergencies).62

- Opinions have been expressed seeking clarification of the circumstances under which exceptions to the principle of personal consent in the Personal Information Protection Law could be applied63 so as to provide personal information to third parties during large-scale disasters and other emergencies.

- Thus, it can be said that the emergence during the March 11 earthquake disaster of Internet services that enable the sharing and searching of various disaster-related information has underscored the need for new examinations on the treatment of personal information during large-scale disasters.

- Consequently, as local governments move ahead with examinations of their treatment of personal information during large-scale disasters and other

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62 At the Survey on Information and Communications, surveyed people gave their experiences with government responses to information provision. (Man in his 40s) “Information on people’s safety (names in katakana and partial addresses) was released for a time on the administration’s Website, but it was taken down in the interest of protecting personal info rmation. The government decided instead to provide information only when requested after obtaining the person in question’s consent and then only provide the information to the requesting party.” (Man in his 50s) “I asked the city about the well-being of some of my relatives who don’t have mobile phones, but they refused to tell me because of personal information issues.”

63 Article 23(1)ii of the Personal Information Protection Law stipulates that information provision is allowed “when it found that disclosure of the information is necessary to protect a person's life, health, and property and it is difficult to obtain the consent of the Individual Concerned.”
emergencies, it is important, in support of local governments’ efforts, for related agencies and ministries to make advance examinations of their own and work toward further clarifying interpretations of the Personal Information Protection Law. On the local front as well, related local governments and related business groups should collaborate on these examinations.

(2) Use of social media services

- Social media services were effective means of confirming people’s well-being and sharing disaster-related information in areas that had Internet or mobile phone access. Social media services were particularly effective because they have the following characteristics:
  - enable to notify friends and others about your status in real time;
  - enable to announce your current location using a GPS-enabled device; and
  - with community functions, enable to exchange information on a common theme.
- Because of these characteristics, it is felt that administrative bodies can more effectively publicize and share information by posting information on social media services in a fashion that makes the best use of each service’s particular strengths. It is important, then, to consider proactive social media use by administrative bodies.
- Some of the local governments affected by the March 11 earthquake disaster had been using social media services prior to the earthquake and made full use of the services immediately after the earthquake. In view of this experience, it has been suggested that it is necessary to have multiple, diverse information dissemination means in preparation for emergencies and that recipients of information need to be routinely familiar with social media services.
- To get the full benefits of using social media services, business process manuals should be revised making social media use part of the normal business processes of administrative bodies at all times and the number of followers should be increased by regular social media postings.
- On the other hand, concerns over spoofing and other problems have been pointed out, since anyone can open a social media account. With this in mind, in April 2011 the National Information Security Center, the Cabinet Secretariat’s IT Policy Office, MIC, and METI issued the Guideline on Delivering Information Using Private-Sector Social Media for Central and Local Government Bodies.64
- In order to encourage administrative bodies to make use of social media services, it is necessary to collect and share examples of effective social media service utilization by the government and business groups while

64 The guideline made several recommendations for administrative bodies considering using social media to disseminate information to prevent spoofing, including obtaining authenticated accounts from social media services and posting the social media services and account names used by the administrative body on the administrative body’s own website.
keeping in mind the points made in the guideline above, such as obtaining authenticated poster status from service providers.

(3) Use of mirror sites\(^{65}\)

- There were numerous reports during the March 11 earthquake disaster of mirror sites being set up so that websites of local governments and power companies in the disaster region could be accessed since overwhelming traffic volumes had made the original websites impossible or impractical to use.
- On the other hand, there were reports of website owners refusing to agree to set up mirror sites even when their sites were flooded with access requests because of concerns about entrusting intellectual property and personal information to a third party.
- Websites are crucial to conveying correct information to wide audiences. As such, it is important to build websites that can continue to operate even in disasters. Thus, to avoid situations where information cannot be supplied due to excess traffic, it is necessary to study mirror site use by administrative bodies during disasters.
- More to the point, it is necessary to study beforehand various issues surrounding mirror site usage, such as the scope of information administrative bodies entrust to mirror sites (what information on the administrative body's website is mirrored on the mirror site), the physical location of mirror sites (whether to limit to Japan or allow foreign sites), and the duration the mirror sites are in operation. Moreover, it is felt that mirror sites can be launched quickly in the event of a disaster by concluding agreements with mirror site operators, by each prefecture conducting training exercises with mirror site operators, and by incorporating mirror site procedures in disaster-response plans.
- In order to encourage local governments to make use of mirror sites, it is necessary to collect and share examples of effective mirror site utilization by the government and business groups.

(4) Information gap considerations

- There are large gaps in information literacy, with some people fully knowledgeable about social media services and others who find using mobile-phone email difficult. As Internet use becomes even more widespread in society, there are fears that gaps will emerge in the information and assistance people receive due to differences in information literacy. Another concern is that in the March 11 earthquake disaster, mobile phones and other devices could not be used in some areas until power and other infrastructure were restored. Given these circumstances, information should be provided via multiple modalities in consideration of the variations in information literacy and accessibility.

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\(^{65}\) A mirror site is a website that contains the identical content of all or part of the original website. Mirror sites are set up to lower or distribute loads on a heavily trafficked website.
• During a disaster there is a pressing need for local information, such as details on victims and evacuation centers, which major media channels do not provide, and community FM radio was effective in this role in the March 11 earthquake disaster. This requires the construction of mechanisms that make it possible to provide community-based information over the Internet. One possibility is sending local information as email to mobile phones in conjunction with local governments.

• The MIC is tackling this issue with the ICT Promotion in the Disaster-Hit Regions which has been positioned in the Third FY 2011 Supplementary Budget and the FY 2012 Draft Budget. Under this project, the MIC has decided to establish disaster information delivery systems that ensure information needed by local residents reaches them en masse through multiple information communication modalities, such as mobile phones, community FM radio, and emergency email notices sent to mobile phones.

• To effectively provide information in consideration of information literacy gaps, it is necessary in ordinary times to invigorate local communities through the joint activities of NPOs and local governments and to train ICT leaders in these communities.

• The events of the March 11 earthquake disaster have underlined again the usefulness of ICT and the importance of communicating information from local communities. In this light, some local governments in the disaster-struck regions have decided to pursue plans that entrust to prefectural NPOs and other organizations the arrangement of ICT utilization support bases and the construction of ICT support frameworks through the discovery, training, and networking of ICT personnel. The aim of these plans is to further ICT utilization in ordinary times. These efforts should be moved steadily forward.

• It also must be remembered that the information residents want changes as time progresses. Immediately after the earthquake, the primary information sought is information on people’s safety, information on damage to roads, water services, power infrastructure, and other lifelines, information on lifeline restoration, and information on daily necessities such as gasoline and food. After a certain amount of time has passed, however, attention turns to administrative information related to the opening of municipal offices, disaster victim certificates, construction of temporary housing, and other matters.

• Given these conditions, the provision of information using multiple communication modalities should be moved forward with the disaster information delivery systems described above. As well, information should be provided with due consideration to the features of information-provision tools each local government has at its disposal, the degree to which residents normally use ICT, and the content of provided information.

(5) Effective use of the Internet

• A wide range of services were provided over the Internet during the March 11 earthquake disaster.
- real-time confirmation of people’s safety using social media services
- services that allowed single-point searches for evacuation centers by consolidating separately released evacuation center information
- provision of information on the usability of railways and other infrastructure
- provision of automotive traffic conditions that aggregated probe travel information (data such as car speeds and positions) collected by automakers
- sites that matched local needs with volunteers and donations of goods

• On the other hand, because these benefits of the Internet had not been recognized prior to the March 11 earthquake disaster, evacuation centers and other places in the disaster-struck regions did not have Internet access. As a result, examples of successful Internet use should be collected, publicized, and shared widely.
• In this regard, JAIPA has been collecting examples where the Internet has been used effectively through seminars and motivational meetings with stakeholders. As well as continuing these efforts, it is necessary to publicize these examples and share them widely.
• Even as the Internet has proven to be effective in times of disasters, several problems have emerged as well, such as the need to sift through the massive amount of information concerning the earthquake disaster that circulated on the Internet and the occurrence of information gaps because of information literacy differences. Consequently, when collecting and sharing examples of Internet use, issues with Internet use should also be related at the same time.
• To this point, the MIC has been working on compiling both cases of successful Internet use and issues with Internet use so that they can be shared together. In tandem with the prompt compilation and release of this collection of application cases, public awareness campaigns alongside e-Net Caravan66 and other initiatives are needed.

3. Application of cloud services

During the Great East Japan Earthquake, various cloud services were provided to assist administrative operations, such as:
- creation of websites and provision of email services for local governments affected by the earthquake; and
- services for local governments affected by the earthquake and for NPOs engaged in relief operations that assisted management of evacuees at evacuation centers, management of volunteers, and management of relief supplies.

Two trends were also identified, namely:

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66 Since April 2006, the MIC, MEXT, and ICT industry groups have been jointly holding classes across the country for guardians, educators, and young students to help children use the Internet safely and securely. (More than 4,400 classes had been held as of Oct. 31, 2011.)
- in cases where network systems linked with the prefecture had been built for resident data, backup data could be used to restore services promptly and continue administrative processes with little interruption; however,
- in other cases where hard disks had been damaged or records had been kept on paper, it took time and money to recover information on victims that had been washed away by the tsunami.

Therefore, in the interest of protecting the valuable information held by local governments and ensuring the continuity of administrative operations, it is desirable that the use of cloud services be expanded.  

(1) Active use of cloud services

- The MIC has set up the Local Government Cloud Promotion Headquarters, which has advanced the development of local government cloud services nationwide. In June 2011, the Local Government Cloud Promotion Headquarters’ expert panel finalized a recommendation on introducing cloud services to local government affairs after examining the benefits of introducing cloud services, any potential limitations due to application software customizations, the assurance of interoperability between cloud services (standardization of data formats, etc.), and other related issues. Based on this recommendation, the MIC is determined to help local governments migrate to cloud services by establishing mechanisms that allow local governments to freely select the cloud service provider they wish to use. In the interest of preventing the loss of resident information and strengthening the disaster tolerance of local governments, including the prompt recovery of administrative functions, efforts to further expand the local government cloud while ensuring its security and reliability must be continued.
- In the March 11 earthquake disaster, the information systems of local governments and businesses experienced tremendous destruction and losses. With cloud services, however, it would have been possible to quickly and inexpensively restore destroyed information systems. Furthermore, the use of cloud services can both ensure service continuity and generate new added value through the coordination of varied types of information resident in the cloud.
- The MIC has developed the Smart Cloud Strategy in May 2010, under which the MIC is pursuing policies to expand the use of cloud services, including the establishment of environments in which cloud services can be used safely and securely. And through dialogs with other countries on cloud policies, the MIC has been presenting case studies of use of cloud service in earthquake disasters and sharing other information internationally.
- Furthermore, seeking cloud advancements through the joint efforts of government, industry, and academia, the Japan Cloud Consortium (JCC),

67 In cases where it is difficult to migrate immediately to the cloud, it has been suggested that critical information be protected by storing it in multiple locations, such as setting up backup servers in nearby regions.
led by Keidanren, is spearheading private-sector studies of specific cloud service models for a number of fields including agriculture, health and medicine, and education. The health and medicine cloud WG is examining service models that will provide health maintenance and preventative care to seniors living alone and households of elderly people. Specifically, the WG is examining services that use tablets and sensors to monitor people and provide advice to prevent musculoskeletal deterioration. These solutions can be applied widely, including regions affected by disasters.

The health and medicine cloud WG is examining service models that will provide health maintenance and preventative care to seniors living alone and households of elderly people. Specifically, the WG is examining services that use tablets and sensors to monitor people and provide advice to prevent musculoskeletal deterioration. These solutions can be applied widely, including regions affected by disasters.

The education WG is examining advanced e-textbooks and teaching material formats as well as requirements for classroom ICT environments to pave the way for more positive use of cloud service in the education field. And since schools are often designated as evacuation centers or temporary government offices in the event of a disaster, the WG is looking at policies that will allow ICT environments in schools to be utilized effectively in the event of a large-scale disaster.

- Because cloud services are an effective tool for reconstruction efforts in disaster-struck areas, the public and private sectors must continue to work together in promoting and further expanding cloud services that can add value in areas such as business continuity and public services.

(2) Collaborations between cloud service providers

- It is imperative that local governments planning to use a given cloud service first have a clear understanding of the said cloud service’s disaster tolerance before migrating to it. To this end, cloud service providers should disclose information on the disaster tolerance and quality of their cloud services. To make such information disclosure meaningful, however, cloud service providers must consider how best to disclose this information, including defining common parameters that measure disaster tolerance performance. The government must also assist the efforts of cloud service providers.

- On this front, the ASP-SaaS-Cloud Consortium (ASPIC) is studying revisions to its guidelines on disclosing information concerning cloud service security and reliability. The government should assist ASPIC’s guideline revision efforts so that the revisions are completed as soon as possible.

- That cloud services are effective in ensuring administrative operation continuity and protecting information during disasters was proven during the recent earthquake disaster. It is still possible, however, that data centers will be damaged in a disaster, leading to fears that users will not be able to access services. Especially if cloud services are used as mission-critical public systems, the social cost of a cloud service provider suffering damages or losses would be enormous.

- To avoid such situations, R&D should look at improving the reliability and availability of cloud services; for example, enabling the dynamic and autonomous transfer of assets between multiple clouds should a cloud service suffer an outage.
• Under the Third FY 2011 Supplementary Budget, the MIC plans to initiate R&D and demonstration of information and communications technology that can adapt to large-scale disasters. The successful outcome of this R&D will lead to the implementation of inter-cloud linkage technology that, in the event of a large-scale disaster, will immediately move critical information from clouds in the disaster area to remote clouds in safe regions. In this way, the technology will not only provide robust reliability and availability to continue business processes but also conserve large amounts of electric power.
• Along with furthering this R&D work, the MIC must also endeavor that the R&D outcomes are well utilized by the greatest number of people.
• In order to develop and expand the R&D outcomes, the MIC must collaborate with many stakeholders, especially cloud service providers. The Global Inter-Cloud Technology Forum (GICTF), consisting mainly of cloud service providers, has been set up to address this issue and is working on standardizing interfaces between different cloud systems. It is key that the MIC continues initiatives to boost the reliability and availability of cloud services while taking advantage of frameworks like the GICTF.

4. Building collaborative frameworks among Telecommunications operators to prepare for disaster

During the Great East Japan Earthquake, several overseas lines were severed, causing traffic congestion on the remaining overseas lines. Although in fact ISPs exchanged information to avoid overloading these lines, had individual ISPs, working from only their own information, acted at odds to avoid congestion, traffic may have been concentrated on a few unloaded lines causing massive overloading.

To prevent such a situation from happening, it is necessary to form a collaborative framework for telecommunications operators to be used when disasters occur.

(1) Operator collaborations to secure communications in the event of a disaster

• Collaborative approaches between ISPs and other telecommunications operators should be considered to facilitate and improve entire Internet connectivity in the event of a disaster. This specifically involves creating, in ordinary times, contact points for collaborating and sharing information and establishing a liaison platform for sharing information between stakeholders in preparation for disasters and other emergency situations.
• Led by the JAIPA, a new venue has recently been set up for ISPs and IX firms to conduct studies along with a liaison platform. To ensure that the liaison platform will work effectively in disasters, it should be tested and revised through ongoing training practices in ordinary times.
• Compared to fixed telephones and mobile phones, the Internet did not experience major, long-term access problems. But with the expected additional rises in Internet traffic, it is possible that ISPs will not be able to
respond fast enough by only sharing information, however efficiently done, to wildly fluctuating demands during a disaster caused by excess loading on a specific communication service or by severed transit networks.

• In order to ensure more stable communication services, R&D must look at methods of immediately and efficiently redistributing communication resources between different communication services in response to changing communication service demands.

• Recognizing this need, the MIC has decided to conduct R&D on the following topics.

[Third supplementary budget for FY 2011]

- R&D into strengthening the disaster tolerance of ICT networks
  Research and development on technology that ensures communications even when mobile phone and other public networks are congested during a disaster by flexibly adjusting line capacities as necessary.

[Budget for FY 2012]

- R&D into core information delivery technologies for disasters
  Research and development on technology that rapidly engages portable information processing functions, technology that enables to provide information on the state of communication congestion in an intuitive fashion, and technology that mobilizes information processing functions with reserve capacity over a wide area when lines become enormously congested in a disaster zone due to traffic spikes as people try to confirm others' safety.

• Along with furthering this R&D work, the MIC must also ensure that the R&D outcomes are well utilized by the greatest number of people.

(2) Coordination of disaster message boards

• As stated in Section 2(1) in Chapter 2, stakeholders should work to link different disaster message boards to enable single-point searches of all services, such as voice-based disaster messages accessed by phone, Web-based disaster message boards, and mobile-phone-based disaster message boards.
Chapter 6  Action plan

This chapter draws on the content of Chapter 2 to Chapter 5, identifies the items for which efforts should be made by each actor going forward, and brings together these items as an action plan.

Each actor is expected, based on this action plan, to proceed promptly with further efforts to ensure communication during emergency situations such as large-scale disasters. Also, the MIC will need to carry out the necessary follow-up for a certain period.

1. Items for which efforts should be made primarily by the national government etc.

Relating to [Chapter 2: Alleviating congestion in emergency situation]

- Necessary design capacity of switching equipment and others is being considered by the IP Network Facilities Committee, and the results of these considerations should be promptly incorporated into technical standards etc.
- Measures for ensuring the stable viability of emergency priority calls is being considered by the IP Network Facilities Committee, and the results of that consideration should be promptly incorporated into technical standards etc.
- With regard to call length limits, there is a need to have social consensus on matters such as the calling times to be limited, and it may be necessary in some cases to review the processing capacity of switching equipment and others to ensure effective functioning, and thus this issue should continue to be examined by the IP Network Facilities Committee, based on the actual condition of congestion in the March 11 disaster.
- The degree of permissible quality is an issue for phone calls with reduced sound quality, and it is also necessary to consider the relationship with the processing capacity of switching equipment and others, and thus the IP Network Facilities Committee should continue to deliberate its implementation on IP networks such as NGN or LTE.
- Development and verification should be performed for new technology stressing congestion-resistance, such as technology enabling flexible allocation of network processing resources to services and areas where communication needs to be secured during congestion, and large-scale data storage technology and technology to secure communication using all usable telecommunication networks, including data communication networks and Internet networks.

Relating to [Chapter 3: Minimizing disruption to communications in the event of damage to base stations and/or relay stations]
Setup and deployment of equipment needed for emergency repairs is being considered by the IP Network Facilities Committee, and the results of that consideration should be promptly incorporated into technical standards etc.

The opinions of relevant telecommunications carriers, regarding securing means and routes for transport of the materials, fuel and personnel necessary for prompt emergency repair work, should be communicated to the relevant administrative agencies, such as the Cabinet Office and the agencies governing rules, and active efforts should be made to encourage them to incorporate those opinions into rules and plans relating to disaster response.

As regards prompt distribution of satellite phones to local governments, there should be a prompt response to needs of local governments for a means of communication during a disaster, by realizing prompt delivery to the affected area of satellite phones, through strengthened ties with relevant governmental organizations having strong transport capabilities even during a disaster.

Support should be provided for development of community where information and communications networks have been developed and deployed, including wireless systems which function effectively during an emergency and are important as a means of communicating local information including evacuation information.

Deliberation should be conducted regarding effective use methods during a disaster of the ICT environment installed in school facilities and related issues to be addressed.

Efforts should be made to promote the deployment of satellite phones and emergency generators by local governments, using subsidy programs etc.

Efforts shall be made in R&D to smoothly secure channels for satellite communications to meet needs when terrestrial communications have been damaged in a disaster.

The approach for securing emergency power sources is being considered by IP Network Facilities Committee, and the results of that consideration should be promptly incorporated into technical standards etc.

The opinions of relevant telecommunications carriers, regarding coordination with administrative agencies relating to securing and transporting fuel, should be communicated to the relevant administrative agencies, such as the Cabinet Office and agencies governing rules, and active efforts should be made to encourage them to incorporate those opinions into rules and plans relating to disaster response.

Relating to [Chapter 4: Implications of the recent disaster for future network infrastructure]
The ways of ensuring network safety and reliability are being considered by the IP Network Facilities Committee, and the results of these considerations should be promptly incorporated into technical standards etc.

Introduction of local government common duct should be promoted in order to encourage burial of transmission lines, which can be regarded as an effective anti-tsunami measure etc., by encouraging the regional block Utility Pole Elimination Councils.

Support should be provided for promotion of infrastructure deployment to provide diverse types of telecommunications infrastructure with disaster-resistance in line with recovery plans of the affected area.

Efforts should be made in R&D in the following areas.
- R&D for technology by which transportable high-performance wireless stations and other equipment immediately configure a network if telecommunications infrastructure is damaged due to a disaster, and service is promptly secured in the affected area, local government buildings, evacuation centers and hospitals etc.
- R&D for systems which enable reliable transmission of emergency warnings (for tsunamis etc.) in affected areas using wireless systems such as mobile phones and wireless LANs, and demonstration of them in the affected area, paying attention to the possibility of new disasters such as aftershocks and high waves
- R&D for power control systems which enable continuous operation of telecommunications infrastructure even if there is an interruption in commercial power sources due to the disaster

Development of structure beforehand should be encouraged at fire-defense headquarters for measures such as rerouting of emergency warnings in case the fire-defense headquarters is damaged by the disaster.

Relating to [Chapter 5: Implications of the recent disaster for future Internet usage]

Consideration should be conducted regarding a review of Information and Communications Network Safety and Reliability Standards, taking into account deliberation of technical standards for telecommunications facilities for telecommunications business by the IP Network Facilities Committee.

The opinions of relevant telecommunications operators, regarding coordination with administrative agencies relating to securing and transporting fuel, should be communicated to the relevant administrative agencies, such as the Cabinet Office and agencies governing rules, and active efforts should be made to encourage them to incorporate those opinions into rules and plans relating to disaster response.

Support should be provided for development of community where
information and communications networks have been developed and deployed, including wireless systems which function effectively during an emergency and are important as a means of communicating local information including evacuation information.

• Deliberation should be conducted regarding effective use methods during a disaster of the ICT environment installed in school facilities and related issues to be addressed.

• Consideration should be conducted regarding policies and required support measures for achieving smooth geographical distribution of Internet interconnection points etc.

• Consideration should be conducted regarding information items and types in the best approach to provision of information by local governments on persons affected by the disaster, while also taking into account the relationship with personal information protection ordinances of each local government.

• Measures based on the notifications should be surely taken regarding file formats for information to be provided by administrative agencies.

• The format of information provided by administrative agencies in ordinary times should, as far as possible, be the same in emergencies, and training should be conducted for providing information during an emergency.

• At each local government, a review should be conducted on the relationship between the need to provide important information, such as information on the safety of individuals during an emergency such as a large-scale disaster, and personal information protection requirements, and efforts should be made, if necessary, to amend individual information protection ordinances.

• A review should be conducted beforehand, in ordinary times, at each relevant ministry regarding handling of personal information in an emergency such as a large-scale disaster, and ministries should be encouraged to further clarify the interpretation of personal information protection laws.

• The use of social media services should be positioned as one part of the normal work of administrative agencies, and a review of work manuals should be conducted.

• An examination should be conducted beforehand regarding the scope of information when administrative agencies permit mirror sites, as well as the location, operation period and other details of the mirror sites.

• A multi-layer multi-media disaster-prevention information system should be established, with which information is transmitted reliably to local residents, and information should be provided by various means, by directing all means of communication and broadcasting to coordinate, such as mobile phones, community FM, and emergency notifications to mobile phones.

• Efforts should be made to find, develop and network personnel who can
effectively use ICT.

- Information should be provided in a way that takes into account the features of information provision tools, state of usage by residents, and the content of information to be provided.
- Support should be provided for migration to a local government cloud, based on the recommendation by the Local Government Cloud Promotion Headquarters Expert's Meeting.
- R&D should be conducted to improve the reliability of cloud services, such as resource transfer between multiple clouds.
- R&D should be conducted to efficiently and immediately transfer communications resources between different communications services in accordance with the demand for communications services.

2. Items for which efforts should be made through coordination and cooperation between the national government and telecommunications carriers etc.

Relating to [Chapter 2: Alleviating congestion in emergency situation]

- Crossover searching should be realized promptly between various disaster message services, based on the results of consideration at the TCA Safety and Reliability Commission.
- Based on guidelines formulated by the TCA Safety and Reliability Commission, efforts should be made to provide, at an early date, services which convert voice messages into files with a terminal and transmit those files with a data communications network, so that the message files can be transmitted and received between different providers.
- Efforts should be routinely made to inform and request the public that they do not make unnecessary, non-emergency calls during a disaster and make their calling time as short as possible, as well as to inform the public of the nature and specific use methods of effective means of communication other than voice calling.
- During a disaster, emergency notifications to mobile phones, TV, radio and other media should be used to effectively provide information on the congestion situation and guide people to means of communication other than voice calling.
- To ensure the congestion and communication restriction situation can be shared, and the shared information can be effectively provided to the public, a venue for consideration should be established, constituted primarily by telecommunications carriers, and uniform rules should be considered with regard to disclosing information in a form which enables secondary use.

Relating to [Chapter 3: Minimizing disruption to communications in the event...
of damage to base stations and/or relay stations]

- It should be watched whether issues relating to roaming between mobile carriers during an emergency can be addressed through consultation among the carriers involved, and a venue for discussion, primarily by telecommunications carriers, should be established promptly and deliberation should be conducted towards a realization of limited roaming for emergency calls (110 and 119), including during normal times.
- The necessary efforts should be made by relevant parties regarding public telephones, which are an important means of communication during disasters, taking into account the results of a consideration by the Telecommunications Business Policy Committee of the Information and Communications Council.
- Efforts should be made to inform and educate the public about the use of positioning services of mobile phones already in practical use as methods of confirming the safety of persons, based on the results of examining the use of the existing services. (At that time, the government should actively provide support to the relevant carriers.)
- Efforts should be made to inform and educate the public regarding effective means of communication, while taking into consideration that there are differences in information literacy and accessibility between individuals, so that the information that a person needs during a disaster can be obtained using various means of communication.

Relating to [Chapter 4: Implications of the recent disaster for future network infrastructure]

- A review should be conducted of the Emergency Communications Council (improvement of the council's composition, development of structure for information sharing and conveying, and a review of routes for emergency communications etc.) with regard to the structure for information sharing and conveyance between the national government, relevant enterprises, and local governments, in order to facilitate response to congestion and prompt response for emergency repair.

Relating to [Section 5: Implications of the recent disaster for future Internet usage]

- In order to secure connectivity of holistic communications when heavy traffic occurs during a disaster, the Guideline on Operating Standards for Bandwidth Control should be reviewed within FY2011 by the Bandwidth Control Study Group.
- Efforts should be made to: develop human resources for local government staff while also using e-learning, develop the information literacy necessary for persons involved in the operation of evacuation centers; build support frameworks with local NPOs and local universities; and foster information literacy of persons involved in the
operation of evacuation centers through prior training etc.

• In order to support the efforts of local governments, efforts should be made by the national government and business groups to gather and share best practices relating to fostering information literacy.

• Consideration should be given to measures for securing network redundancy (geographical distribution of Internet interconnection points and data centers) so that the Internet will function when there is a large-scale disaster in the Tokyo metropolitan area.

• Agreements should be concluded beforehand between administrative agencies and operators of portal sites regarding responses during an emergency or disaster, and training should be conducted after sharing specific procedures on providing information.

• Examples of effective use of social media by administrative agencies should be collected and shared.

• Agreements should be concluded, and training should be conducted between administrative agencies and mirror sites, and examples of effective use of mirror sites should be collected and shared by the government and business groups.

• Efforts should be made to activate local communities through cooperation with NPOs and local governments, and to develop ICT leaders in those communities.

• Examples of effective use of the Internet in the recent earthquake should be gathered and publicized.

• Efforts should be made, in cooperation between public sector and private sector, to promote the further dissemination of cloud services which improve business continuity and public services etc.

• Guidelines on disclosing information concerning cloud service security and reliability should be revised.

• A liaison platform should be developed to prepare for the occurrence of emergency situations, and continuous verification and review should be conducted through training.

• Crossover searching should be realized promptly between various disaster message services, based on the results of consideration at the TCA Safety and Reliability Commission.

3. Items for which efforts should be made primarily by telecommunications carriers etc.

Relating to [Chapter 2: Alleviating congestion in emergency situation]

• The designed capacity of exchanges etc. should be improved in order to upgrade the overall capacity of telecommunications network as far as possible.

• In order to distribute the traffic load, efforts should be made to promote
the use of IP telephones (i.e., promoting the voluntary migration from the PSTN to the IP network (NGN, LTE etc.) and promoting dissemination of mobile IP telephones (050 numbers)); develop wireless LANs; and transmit of SMS over data communications networks during an emergency.

- In order to prevent delays in mobile phone text message transmission, efforts should be made to upgrade the overall capacity of network, such as boosting the capacity of mail servers.
- Simple and easy-to-use terminals should be developed and provided so that anyone can use a variety of means of communication, including people who are unfamiliar with any means of communication besides voice calling.
- In order to mitigate congestion when it is occurring, efforts should be made to guide callers to emergency message boards using voice guidance.

Relating to [Chapter 3: Minimizing disruption to communications in the event of damage to base stations and/or relay stations]

- Efforts should be made to develop emergency repair response based on the response during the March 11 disaster, while sharing measures which were effective in the March disaster for repairing damaged communications equipment as best practices, including further equipping mobile base stations and using satellite channels.
- Efforts to secure means of communication in the affected area and at evacuation centers during the March 11 disaster (e.g., lending at no charge of mobile phone terminals and mobile satellite terminals, lending at no charge of MCA wireless equipment, installation of special public telephones, provision at no charge of Internet connection environments in evacuation centers, and opening at no charge of public wireless LAN areas) should be shared as best practices, and efforts should continue to be promoted such as installing special public telephones and Internet environments at evacuation centers, installing emergency telephones beforehand, and strengthening satellite communication networks.
- In order to secure stable power sources, efforts should be made to promote longer battery times, and base stations which continue to operate through power outages, and to increase the number of mobile power supply trucks.
- To secure fuel, efforts should be made to strengthen coordination such as concluding priority fueling agreements with petroleum companies.
- Efforts should be made such as informing users in an easy-to-understand way so they can confirm whether or not their fixed-line telephone terminals enable calling through remote power feeding, and promoting dissemination of terminals with built-in batteries and backup power supplies etc.
- Efforts should be made while referring to the measures for response
during a power outage compiled by the CIAJ’s Working Group on Blackout Countermeasures.

- Efforts should be made to conserve power with communications equipment and terminals, and to make batteries with lighter weight and longer service life.

- In order to effectively use emergency notification text messages to mobile phones, efforts should be made to achieve coordination between relevant parties (using the Public Commons etc.) and to diversify the provided content taking into account the needs of local governments.

- Efforts should be made to enhance and improve restoration area maps, such as shortening the time until startup after a disaster occurs, diversifying the provided information, and improving the legibility and the revision frequency.

- Efforts should be made to develop and provide simple, easy-to-use terminals so that anyone can accurately receive the information needed during an emergency.

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Relating to [Chapter 4: Implications of the recent disaster for future network infrastructure]

- Each company should verify its disaster response structure (business continuity plan, disaster response manual) and a review should be conducted if necessary.

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Relating to [Chapter 5: Implications of the recent disaster for future Internet usage]

- In order to secure the Internet line capacity expected to be needed in future large-scale disasters, efforts should be made such as boosting line capacity while taking into account the future increase in traffic.

- In order to prevent delays in mobile phone text message transmission, efforts should be made to upgrade the overall capacity of network, such as boosting the capacity of mail servers.

- To secure fuel, efforts should be made to strengthen coordination such as concluding priority fueling agreements with petroleum companies.

- In order to provide more means for accessing the Internet, efforts should be made such as increasing mobile base stations and satellite channels.

- Information sharing should be performed between operators of portal sites, so that information related to an earthquake is widely and promptly supplied on the Internet.