



Recovering from the Great East Japan Earthquake: NTT East's Endeavors



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Cover photo: Sankei Shimbun



Ishinomaki City, Miyagi Prefecture

First of all, I would like to extend my greatest sympathies to all the victims of the Great East Japan Earthquake. We hope and pray for the earliest possible recovery from the disaster.

The disaster also inflicted unprecedented damage on the NTT East Group's communications equipment. In addition to the damage caused by the tsunami to exchange buildings, telephone poles and transmission lines, large-scale power outages resulted in unavoidable service interruptions. Please accept our apologies for any inconvenience caused.

The disaster served as a cruel reminder of the importance of our mission to provide services that keep people connected at all times in any circumstances. Telecommunications networks are vital lifelines, and we have devoted all of our resources to the early restoration of our communications equipment so as to enable as many people as possible to connect and remain connected to each other as soon as possible. With the help of employees from other NTT Group companies and telecommunications construction companies, as many as 6,500 personnel were involved in restoration at its peak, and as a result of their efforts, almost all of the exchange buildings in affected areas had been restored by the end of April 2011, just over six weeks after the disaster struck.

We also provided victims with communications from immediately after the disaster struck by equipping evacuation centers with emergency use public phones, Internet connections, and Wi-Fi services, as well as other assistance including making company housing available to local authorities and offering remote health consultations via videophones.

Currently, the Tohoku Future Network Design and Reconstruction Office that we established in May is supervising full restoration operations aimed at improving the reliability of our networks by relocating damaged buildings to higher ground and securing inland transmission routes. Moving forward, we will further rebuild our communications infrastructure in line with central and local government reconstruction plans, and use the lessons learned from this disaster to further improve the reliability of our communications networks nationwide.



November, 2011

A handwritten signature in black ink that reads "Tsutomu Ebe".

Tsutomu Ebe

President
NIPPON TELEGRAPH AND TELEPHONE
EAST CORPORATION



Rikuzen-takata City, Iwate Prefecture

1 The unprecedented disaster that struck Japan on March 11



Photo: Asahi Shimbun

The Great East Japan Earthquake struck at 2:46 p.m. on March 11, 2011, causing damage on an unprecedented scale mainly along Tohoku's Pacific coastline. The massive M9 earthquake shook the Tohoku and Kanto regions, followed by a huge tsunami of up to about 40 m that inundated the Pacific coastline of both regions.

Item	Great East Japan Earthquake	Great Hanshin-Awaji (Kobe) Earthquake
Date and time	2:46 p.m., March 11, 2011	5:46 a.m., January 17, 1995
Epicenter	Pacific Ocean, near to Tohoku's Sanriku coast	In the Akashi Channel north of Awaji Island
Magnitude	9.0	7.3
Death toll	15,835 ¹	6,434
Missing persons	3,664 ¹	3
Evacuees	approx. 470,000 max. ²	approx. 320,000 max.
Households affected by power outages (excluding planned outages)	approx. 8,400,000 max. ³	approx. 2,600,000 max.

1. National Police Agency (as of November 9, 2011)
 2. Cabinet Office White Paper on Disaster Management 2011
 3. Calculated from Ministry of Economy, Trade and Industry published data



A woman who has come to search for her son stands dumbstruck by the sight of the town flattened by the tsunami. (Minami-sanriku Town, Miyagi Prefecture)
 Photo: Asahi Shimbun



Photo: Jiji Press

The Disaster Management Center of Miyagi Prefecture's Minami-sanriku Town was totally destroyed by the tsunami.



Reinforced concrete telephone poles lay shattered along every road. (Onagawa Town, Miyagi Prefecture)



Photo: European Pressphoto Agency

A man stares in awe at his hometown, transformed by the tsunami into a sea of rubble. (Kesenuma City, Miyagi Prefecture)

2 How NTT East's networks were affected by the Great East Japan Earthquake



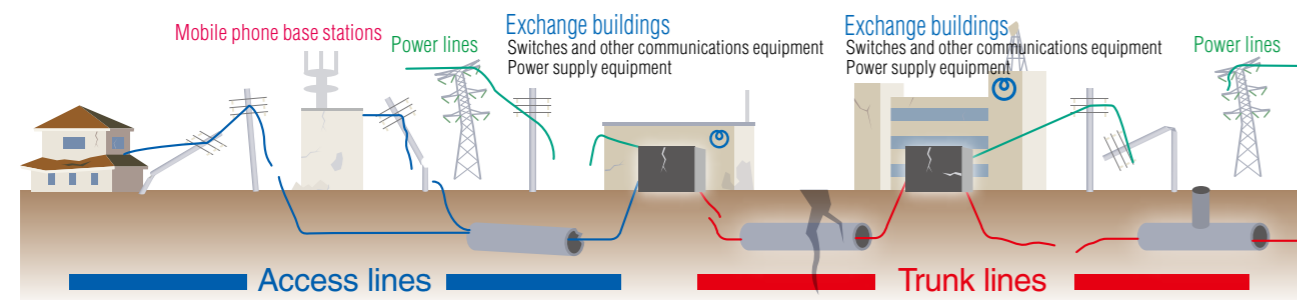
NTT East provides network infrastructure not only for fixed-line telephones, but also for public and private sector data communications, traffic between mobile phone base stations and various other data transmission. This infrastructure suffered unprecedented damage as a result of the Great East Japan Earthquake. The tsunami in particular caused enormous damage that far surpassed the impacts of the Great Hanshin-Awaji (Kobe) Earthquake of 1995.

The widespread and prolonged power outages prompted by the earthquake also affected 990 exchange buildings¹ at the peak of the crisis, incapacitating many of them. As a result, approximately 1.5 million lines in the Tohoku region and adjacent areas were affected.

1. Exchange buildings are buildings that house the communications equipment required to provide phone and Internet services to customers.

Item	Great East Japan Earthquake	Great Hanshin-Awaji (Kobe) Earthquake
Traffic at peak	approx. 9-fold	approx. 50-fold
Incapacitated buildings	385	—
Damaged lines	approx. 1.5 million	approx. 285,000
Time required to restore services	approx. 50 days (excluding nuclear power plant area and evacuated areas)	approx. 2 weeks (excluding totally destroyed buildings or houses)
Equipment damage	Trunk lines	approx. 90 routes (excluding nuclear power plant area)
	Exchange buildings	16 completely destroyed, 12 flooded ²
	Telephone poles	approx. 28,000 (coastal areas) ²
	Aerial cables	approx. 2,700 km (coastal areas) ²

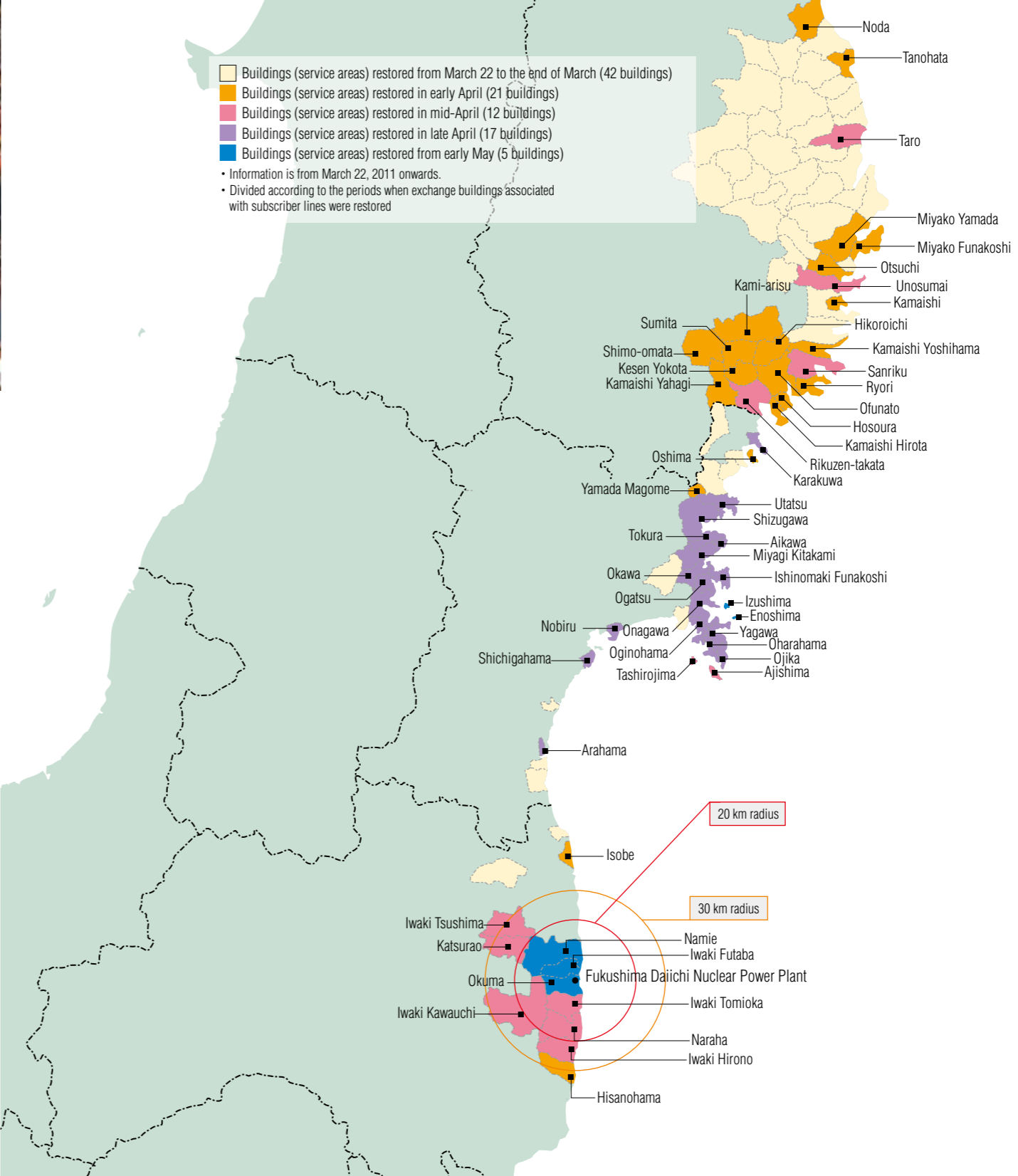
2. Changed from figures announced on March 30, 2011 as a result of field surveys



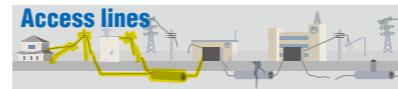
Restoration of functionality to exchange buildings in the three Tohoku prefectures of Iwate, Miyagi, and Fukushima

(based on available data as of March 22, 2011)

- Buildings (service areas) restored from March 22 to the end of March (42 buildings)
 - Buildings (service areas) restored in early April (21 buildings)
 - Buildings (service areas) restored in mid-April (12 buildings)
 - Buildings (service areas) restored in late April (17 buildings)
 - Buildings (service areas) restored from early May (5 buildings)
- Information is from March 22, 2011 onwards.
• Divided according to the periods when exchange buildings associated with subscriber lines were restored



2 ① Widespread damage to access lines



The access lines that connect the customer premises to NTT East exchange buildings suffered widespread damage. A great many telephone poles were swept away by the tsunami, while liquefaction and land subsidence caused others to lean or topple over. Underground ducts also suffered damage from submergence and mudslides caused by the tsunami. Many access lines were severed or impaired as a consequence of such damage.



Higashi-matsushima City, Miyagi Prefecture



Ishinomaki City, Miyagi Prefecture



Rikuzen-takata City, Iwate Prefecture



A public phone box leaning as a result of liquefaction (Urayasu City, Chiba Prefecture)



Manhole filled with water (Ofunato City, Iwate Prefecture)



Hachinohe City, Aomori Prefecture



A telephone pole leaning as a result of liquefaction (Itako City, Ibaraki Prefecture)

2 ② Sturdy exchange buildings destroyed in an instance by the tsunami



Exchange buildings that constitute the cornerstone of NTT East's communications networks are built to withstand earthquakes of the strongest seismic intensity, but the communications and power supply equipment of many buildings was inundated by the tsunami, and some buildings were completely swept away or destroyed.

The Shichigahama Building was carried about 500 m away. The photo on the right shows where it used to stand. (Shichigahama Town, Miyagi Prefecture)



Rikuzen-takata Building (Rikuzen-takata City, Iwate Prefecture)



Omachi Building (Kamaishi City, Iwate Prefecture)



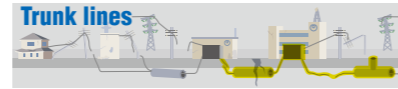
Ofunato Building (Ofunato City, Iwate Prefecture)



Shizugawa Building (Minami-sanriku Town, Miyagi Prefecture)



2.3 Approximately 90 trunk lines severed as a result of damage to bridges and railways.



Trunk lines that connect exchange buildings to each other also suffered unprecedented damage, some being severed when the bridge under which they ran collapsed, and others being swept away with the railway lines alongside which they were laid.



When the tsunami swept away the Kesen Bridge on National Route 45, the trunk lines laid along the underside of the bridge were also severed and carried away. (Rikuzen-takata City, Iwate Prefecture)



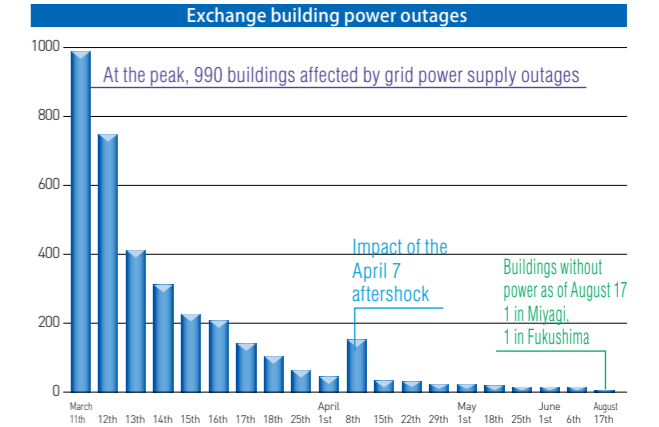
The Sanriku Railway line took a trunk line with it when it was swept away. (Ofunato City, Iwate Prefecture)

Isatomae Bridge trunk line (Minami-sanriku Town, Miyagi Prefecture)

2.4 Many exchange buildings incapacitated by widespread, prolonged power outages



The massive earthquake and tsunami caused widespread, prolonged power outages throughout the Tohoku and Kanto regions of Japan. NTT East's exchange buildings are equipped with large capacity batteries and on-premise generators to counter power outages, and the company also has power supply vehicles stationed throughout its coverage area. However, the power outages caused by the quake far exceeded our projections, affecting over 8 million households, and it was also extremely difficult to procure the fuel required to keep on-premise generators and power supply vehicles in operation. The resulting depletion of batteries and fuel for on-premise generators at many exchange buildings led to unavoidable suspension of services.



Grappling with the awesome consequences of the earthquake



Masayuki Kato
Sub Leader,
Information Control Group,
Headquarters Disaster
Countermeasures Office

It was almost impossible to get an accurate picture of what had happened on the ground immediately after the earthquake, but we could tell by the number of alarms indicating malfunctions that our equipment had suffered large-scale damage.

Within two or three days, we had a much clearer picture of the damage, and realized it was far more serious than just the kind of severed cables that we had experienced with previous earthquakes, involving as it did the incapacitation of whole exchange buildings.

It was plain to see that we would get nowhere with the kind of standard repair procedures and organization that we had used up to then. We knew that we were going to be in for a long haul, and needed to mobilize a great many people and resources and put together a new unit for building equipment from scratch.

Also, the quake caused widespread power outages in the Tohoku and Kanto regions on a scale that we had never before encountered, and so we needed to check battery capacity and performance of on-premise generators and at the same time dispatch power supply vehicles in order of priority.

We are currently working towards full restoration of services by reconstructing buildings that were swept away and installing more reliable equipment. Customers affected by the quake have moved out of evacuation centers and into temporary housing, and businesses too have built temporary offices and factories on their former locations and re-launched operations. We need to provide services as soon as possible to people starting to pick up their lives again in what is still a very tough environment.



Headquarters Disaster Countermeasures Office

Employee positions are as they were when the earthquake struck.

3 Responding to the greatest natural disaster that Japan has ever suffered

Early response:
Efforts to identify extent of damage and secure communications



Helicopter used to survey disaster damage



Aerial photographs of the cities of Rikuzen-takata (left) and Kesennuma (top right), and Kesennuma's city center (bottom right)



Support vehicle from the Kansai region



Support vehicles from West Japan about to be transported to the Tohoku region by ferry from the port of Tsuruga in Fukui Prefecture

Immediately after the Great East Japan Earthquake struck, NTT East established a Disaster Countermeasures Office and launched disaster response measures. We marshaled all of our Group's resources to identify the precise extent of damage and start recovery efforts while at the same time doing our utmost to provide means of communication to people eager to check on the well-being of evacuation center occupants and other family and friends cut off from the outside world in the disaster area.

We also endeavored to keep communications equipment going in the face of large-scale power outages, while also implementing stopgap measures to restore connections in our communications networks.



Headquarters Disaster Countermeasures Office



Iwate Branch Disaster Countermeasures Office

Disaster countermeasures offices were established in NTT East's head office and branch offices in Iwate, Miyagi, Fukushima, and other parts of East Japan to implement emergency response measures.



Fukushima Branch Disaster Countermeasures Office

Sleeping space for personnel who had gone to Miyagi to support recovery efforts



Miyagi Branch Disaster Countermeasures Office



NTT East personnel checking on damage used motorcycles for their ability to navigate through rubble.



Whiteboard used to record the ever-changing status of recovery efforts



NTT East supplied a total of 138.3 tons of food, beverages, blankets, and other necessities from Tokyo and other regions.



3 Securing communications for checking safety status

Disaster Emergency Message Dial (171) and Disaster Emergency Broadband Message Board (Web 171) service operation

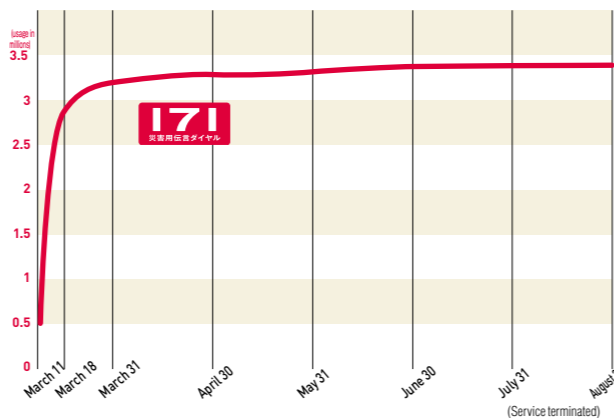
Because its networks were inundated by nine times as many phone calls as normal in the Tohoku and Kanto regions immediately after the earthquake, NTT East restricted network traffic by up to 90% at the peak to secure capacity for emergency calls and other critical communications.

To provide means for checking on the safety of people affected by the disaster under these circumstances, NTT East launched its Disaster Emergency Message Dial (171) and Disaster Emergency Broadband Message Board (Web 171) services.

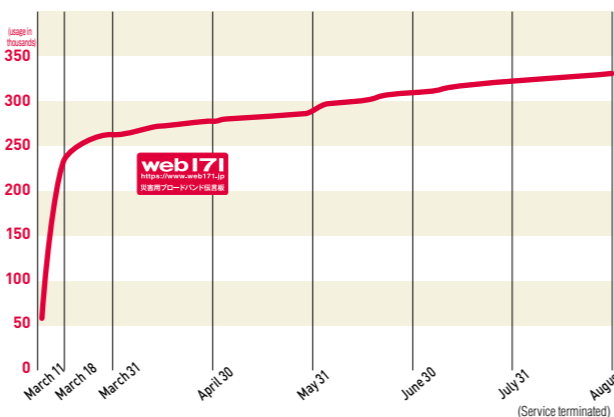
Until they were terminated on August 29, 2011, Disaster Emergency Message Dial (171) was used approximately 3.48 million times, and Disaster Emergency Broadband Message Board (Web 171) 330,000 times — about ten times the previous maximum usage, which was for the Niigata Chuetsu Earthquake.



Disaster Emergency Message Dial (171) cumulative usage



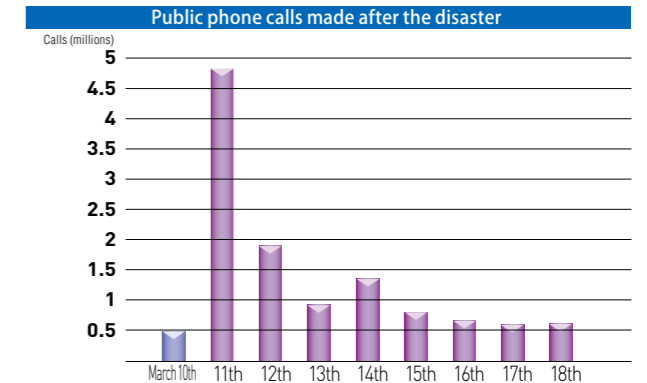
Disaster Emergency Broadband Message Board (Web 171) cumulative usage



First ever free provision of public phone calls

In Tokyo and its surroundings, all public transportation stopped on the day of the earthquake, and over 5 million people* were left stranded in the city, unable to get home. With mobile phone networks suffering congestion, means of communication were limited, and so in addition to its efforts to secure communications in the disaster area, the NTT Group provided free calls at approximately 122,000 public phones for the first time in its history.

*Source: Cabinet Office (announced on November 22, 2011)



Tokyo Station, Tokyo



Ikebukuro Station, Tokyo

Message handling

Certain measures launched by employees on their own initiative in disaster area locations were taken up in other locations too.

Message handling started when NTT Group construction employees engaged in restoring communications equipment and installing emergency use public phones were asked by people in the disaster area who had no phone connections to provide some means of informing other family members that they were alive and well. The employees offered to pass messages on as soon as they got back to their companies.



Form for customers to write messages

Installing emergency use public phones

We installed emergency use public phones in evacuation centers to provide occupants with a means of communication. As of November 9, 2011, we had installed 3,930 emergency use public phones in 1,202 locations. We also installed Internet access points with the cooperation of other companies*.

*Toshiba Corporation, NEC Corporation, Fujitsu Limited, BUFFALO INC., NTT Communications Corporation, and NTT Plala Inc.

	Emergency use public phones		Internet access points
	Number of locations	Number of lines	Number of locations
Total (aggregate)	1,202	3,930	450
Total for 3 Tohoku prefectures	744	2,817	203
Other prefectures	458	1,113	247
Number at peak time	777 - April 5	2,337 - March 30	273 - May 2



Carrying satellite mobile phones to isolated evacuation centers by helicopter with the help of the Japan Self-Defense Forces



Satellite mobile phone installed at a food distribution point (Rikuzen-takata City, Iwate Prefecture)



Internet access point (Saitama City, Saitama Prefecture)



Photo: Kyodo News

Checking on the safety of family members was uppermost in people's minds. (Otsuchi Town, Iwate Prefecture)



Long queues of people waiting to use emergency use public phones (Kamaishi City, Iwate Prefecture)



Portable satellite device connecting emergency use public phones at an evacuation center during a snowstorm (Iwaizumi Town, Iwate Prefecture)

I felt really proud of my job when I saw people checking on the safety of their relatives.



Yasushi Matsukawa
Branch chief,
Ishinomaki Sales Branch,
NTT East-Miyagi Corporation

Our Ishinomaki Sales Branch handles the third largest area in Miyagi Prefecture, with about 90,000 lines. The branch building is about 2 km upstream from the mouth of the Kyu-Kitakami River, and its first floor was swamped by the tsunami that rode up the river. At the time there were over 30 people — both employees and people from nearby who had taken shelter there — in the building, but luckily everyone was on the second floor and survived the ordeal. It took ages for the water to recede from the city, and so we were all stuck in the building for two whole days.

Most of our company vehicles and those of employees who had driven to work had been washed away, and so once the waters had receded, we went out to look for the few vehicles that could still run, and went around the evacuation centers in Ishinomaki,

Onagawa, Higashi-matsushima, and other places in our service area.

Using satellite mobile phones and portable satellite phones, we set about equipping schools and other public facilities that had become evacuation centers with emergency use public phones.

We set up rows of ten phones so that ten people could make calls at any one time. The moment their calls got through, some people were lost for words and their eyes filled with tears, while others cried their hearts out or hugged each other in relief. It was very emotional, and I felt fortunate to be involved in this kind of work.

One incident that left a very deep impression on my mind was the way a man who had been scolding us for not working faster came over to us after making his call to let us know that he had got through, and to thank us before heading back into the evacuation center.

Even though they were disaster victims themselves, our employees hitched lifts or walked for hours to get to work and start restoring communications for our customers. That kind of commitment made me feel proud of my job.



The disaster brought home to me the importance of our mission to connect people.



Noriyuki Furusato
Deputy manager,
Kamaishi Service Center,
NTT East-Iwate Corporation

Because NTT East's Iwate Kamaishi Service Center is located inland, we were lucky enough to escape any direct damage from the tsunami, but two of our major exchange buildings in the Kamaishi area — our Omachi Building and Unosumai Building — were hit by the tsunami, knocking out the region's communications networks.

As a result, the city of Kamaishi and its surroundings became totally cut off from the world, with no electricity, and both fixed-line and mobile phones rendered useless.

Using satellite mobile phones, we immediately set up emergency use public phones at the service center to enable people to check on the safety of relatives and friends. The following morning, we deployed a small parabola antenna with four phones, but as word spread, more and more people wanting to make calls

turned up at the center, and long queues soon filled the premises. At the peak, over 1,000 people were queuing, and there were still queues past midnight, with some people waiting up to five hours for their turn.

By late afternoon on the second day, we were beginning to run out of fuel for our emergency on-premise generator, and it was touch and go whether we would make it to the morning. We employees decided to keep communications going around the clock as long as the fuel held out, and we stayed up all night helping people to make contact with family and friends. Luckily, some group company employees had managed to get their hands on some fuel for us, enabling us to keep the public phones running for people desperate to make contact with loved ones.

I'll never forget the smiles on the faces of customers who had waited so long, and had finally got through after calling again and again, and the way elderly people thanked us when we redialed for them. I was also struck by the way disaster victims asked us to move women with small children to the front of the queue. Phones are designed to connect you to others, and you take them for granted in normal times, but the disaster brought home to me the importance of our mission to connect people.



Employee positions are as they were when the earthquake struck.

3² Protecting communications against large-scale power outages

Fuel supply hindered by fuel shortages and damaged roads

By causing oil storage depots in Miyagi, Chiba, and elsewhere to go up in flames and rendering the Tohoku Expressway and other transportation arteries impassable, the earthquake triggered serious fuel shortages from very soon after it struck. NTT East accordingly found it very difficult in the first few days after the quake to secure the fuel it needed to operate power supply vehicles and on-premise generators. (Later resolved by procuring fuel on the market and with the cooperation of central and local governments)

Over 100 power supply vehicles mobilized

As soon as the massive earthquake struck, power supply vehicles stationed in various locations around the country, including NTT West Group vehicles, headed to the disaster area to supply electricity to the most important exchange buildings.

Restoring grid power supply in the area covered by Tohoku Electric Power took a particularly long time, and 18 exchange buildings were still dependent on on-premise generators on May 13, 2011, over two months after the earthquake.



Power supply vehicle and fuel tanker keeping the Ishinomaki Kadonowaki Building running (Ishinomaki City, Miyagi Prefecture)



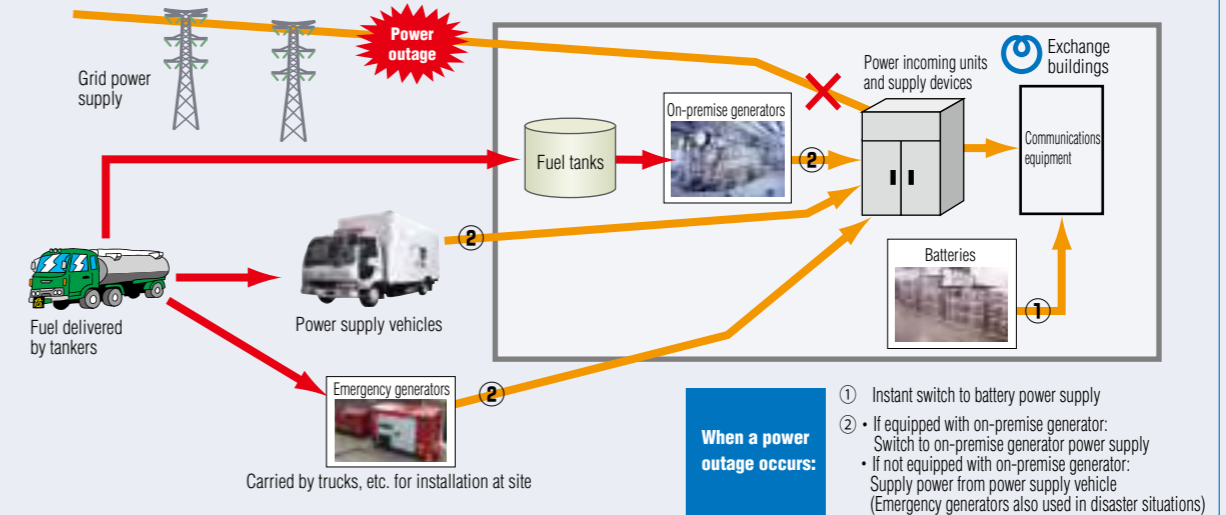
Emergency generator deployed at the Otsuchi Building (Otsuchi Town, Iwate Prefecture)



Power supply vehicle supplying electricity to the Miyako Building (Miyako City, Iwate Prefecture)

Countering power outages at NTT East exchange buildings

If power supply to communications equipment is interrupted, exchanges stop functioning and phone and Internet services can no longer be provided. NTT East takes the measures listed below to ensure that its exchange buildings can withstand long power outages.



Juggling scarce resources to restore connections



Tetsumi Yamaya
Chief officer,
Disaster Countermeasures
Office,
NTT East Miyagi Branch



Fuel tankers and power supply vehicles used to secure power

On the day of the earthquake, NTT East's Miyagi Branch Disaster Countermeasures Office had its hands full coping with power outages that affected the whole prefecture. Although it was still impossible to identify the extent of overall damage with communications down, we received a constant stream of news of power outages. We had issued instructions to secure power for exchange buildings knocked out by power outages by switching to batteries, on-premise generators, and power supply vehicles, but we were unable to cope with the sheer quantity of stoppages.

We faced some tough decisions. Our fuel stocks in Miyagi Prefecture were limited, and if we used them all up, we would be unable to keep emergency generators, on-premise generators, and power supply vehicles going. Sendai Refinery, Tohoku's only oil refinery, had gone up in flames, and we had not yet found any alternative fuel source. At the very least, we wanted to avoid total disruption of communications by keeping buildings that housed network backbone equipment going, and so we decided to save all

remaining fuel for powering those buildings.

However, we needed a daily 70,000 L of fuel — four large tank trucks' worth — just to keep on-premise generators at critical buildings going.

The tankers dispatched at our request by NTT East's Head Office Disaster Countermeasures Office actually arrived only a few hours before our remaining fuel was expected to run out, and so it really was touch and go whether we would be able to keep our systems going.

From that day on, we kept power supply vehicles and tankers stationed at critical buildings around the clock to guard against the frequent powerful aftershocks of seismic intensity 5 or higher and large-scale blackouts caused by power shortages.

Communications facilities other than the critical buildings ceased functioning one after another as their batteries or on-premise generator fuel ran out. All we could do was watch as they went off-line one by one, and it was really distressing.

Employee positions are as they were when the earthquake struck.

4 Responding to the greatest natural disaster that Japan has ever suffered

Stopgap measures:
Efforts for the early restoration of communications



The Great East Japan Earthquake inflicted unprecedented damage on NTT East's communications networks, and it was up to its equipment-related employees and those of affiliated companies who gathered from throughout the country to put it to rights.

Everyone worked furiously to restore equipment as quickly as possible, and as a result of implementing various stopgap measures, exchange buildings in almost every location were once again in operation by the end of April.

NTT East also fulfilled its role as a designated public institution under the Basic Act on Disaster Control Measures* by prioritizing restoration of the lines of local authorities, hospitals, and other critical institutions upon which the lives and safety of the public depend.

*Six telecommunications companies — five NTT Group companies (holding company NTT Corporation, NTT East, NTT West, NTT Communications, and NTT DOCOMO) and KDDI — are designated public institutions.

Restoration initiatives	
Restoration method	Restoration details
Securing transmission trunk lines	<ul style="list-style-type: none"> Reconnected damaged cables and implemented stopgap measures such as erecting provisional aerial bypass routes
Building restoration	<ul style="list-style-type: none"> Repairs to exchange buildings <ul style="list-style-type: none"> Cleared debris from buildings that could be re-used, then cleaned and provisionally repaired them Used container-like temporary exchanges to restore the functions of seriously damaged buildings
	<ul style="list-style-type: none"> Replacement of electrical equipment <ul style="list-style-type: none"> Temporarily installed new power equipment (power incoming units, rectifiers, batteries) Used power supply vehicles and emergency generators to provisionally restore power
	<ul style="list-style-type: none"> Repairs to communications equipment <ul style="list-style-type: none"> Diverted inventory and parts reserved for planned works to install new communications equipment
	<ul style="list-style-type: none"> Transfer to another exchange building <ul style="list-style-type: none"> Installed feeders from functioning exchanges to substitute for exchanges that were too seriously damaged to use
Area-wide restoration of access lines	<ul style="list-style-type: none"> Prioritized restoration of public infrastructure through restoring leased lines, etc. (Japan Self-Defense Forces, airports, railways, etc.) Diverted inventory and parts reserved for planned works to lay temporary metal and fiber optic cables

Marshaling group resources for restoration efforts

Damage was on such a scale that the NTT Group needed to marshal all of its resources to restore communications and provide people with means for checking on the safety of relatives and friends. At the peak of such efforts, 6,500 personnel were engaged in such restoration and assistance activities.



A support team from NTT West engaged in restoring access lines



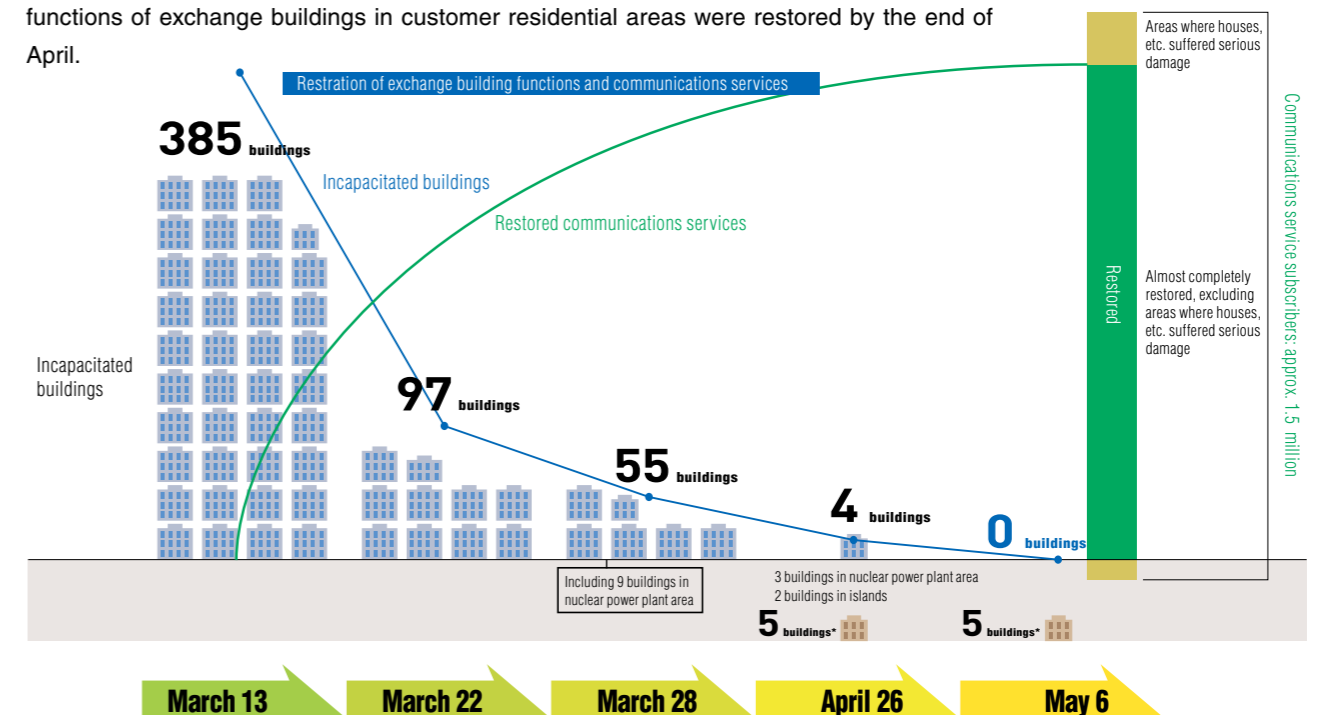
Brushing sand off a terminal board and connecting lines one by one



Connecting lines under lamp light inside an exchange building

Exchange building functions almost completely restored by end of April

The whole group worked as one on the restoration effort, and as a result, almost all the functions of exchange buildings in customer residential areas were restored by the end of April.



*Of the five buildings, functions of the two Miyagi Prefecture buildings (Izushima, Enoshima) were restored and services re-launched between July and September in line with return of the inhabitants to the islands. Functions of the three Fukushima Prefecture buildings were restored in September.

4 Restoring trunk lines

We endeavored to restore damaged trunk lines by reconnecting severed cables, building bypass routes, and switching routes.

Building bypass route by erecting telephone poles along railway

Iwate Prefecture Connecting the Ofunato Building and Kamaishi Kaminakashima Building (between Sanriku Station and Horei Station)

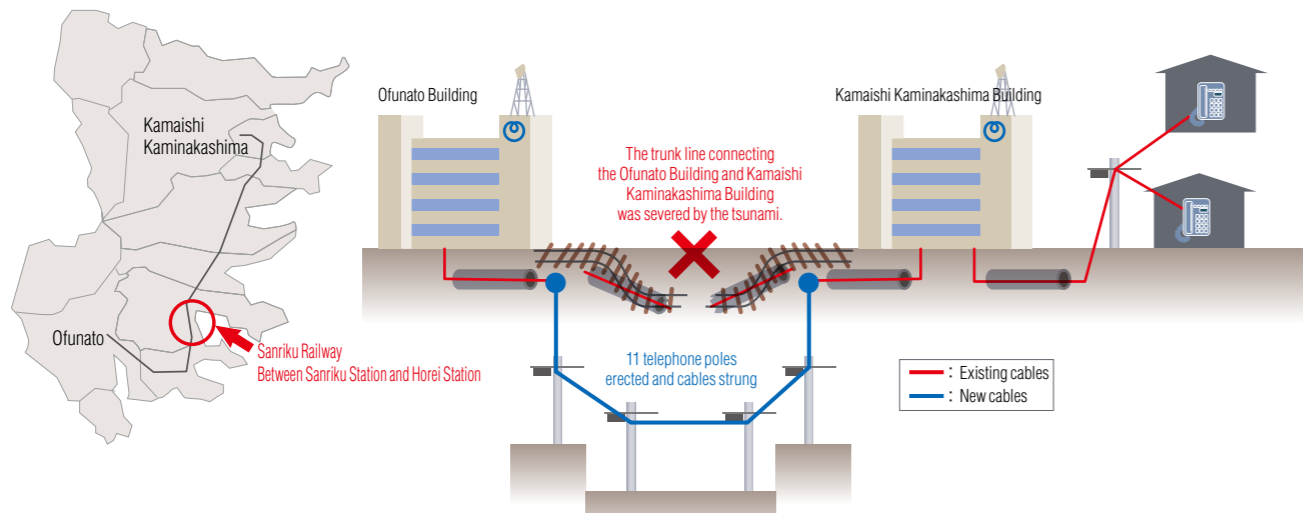
The Sanriku Railway line took a trunk line with it when it was swept away by the tsunami. We erected 11 telephone poles alongside the railway and strung cables to restore the trunk line.



New telephone poles erected near a railway



Connecting the cores of bypass cables to existing cables



Rerouting a trunk line upstream to string a cable across a river where it was narrower

Iwate Prefecture Connecting the Rikuzen-takata Building and Kesenuma Building (Kesen Bridge)

Kesen Bridge was swept away by the tsunami, taking a trunk line with it. We rerouted the line upstream to string a cable across the river where it was narrower.



4₂ Restoring exchange buildings

We restored tsunami-damaged exchange buildings by various methods according to the extent of damage, including replacement of power incoming units and communications equipment, installation of container-like temporary exchanges, and feeders from other exchange buildings.

Installation of new power incoming unit on third floor

Ishinomaki Kadowaki Building, Miyagi Prefecture

While communications equipment housed in the upper floors escaped inundation, power supply equipment on the ground floor was submerged by the tsunami. We accordingly installed a new power incoming unit on the third floor, and restored communications services by using power supply vehicles until grid power was restored.

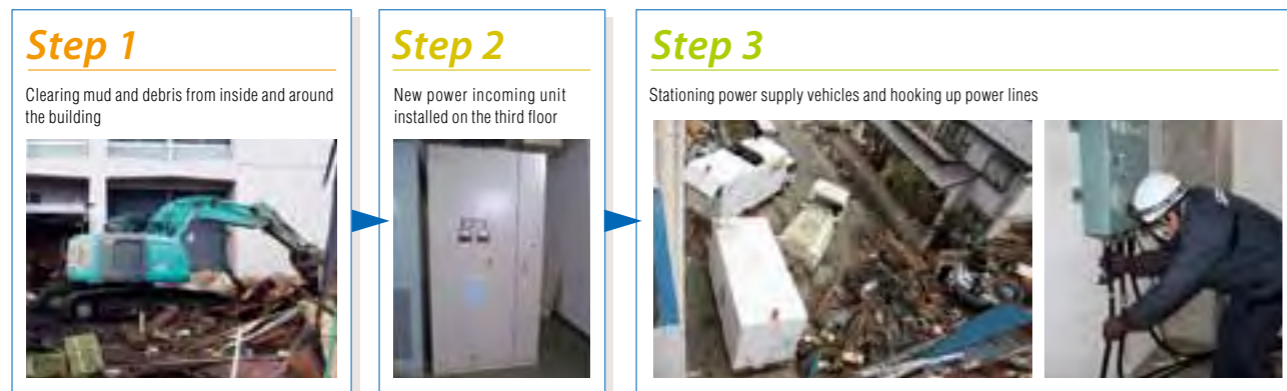


Removing mud and debris with the help of the Japan Self-Defense Forces



Seriously damaged ground floor power supply equipment

Upper floor equipment rooms that escaped flooding



Building repair and communications equipment replacement

Unosumai Building, Iwate Prefecture

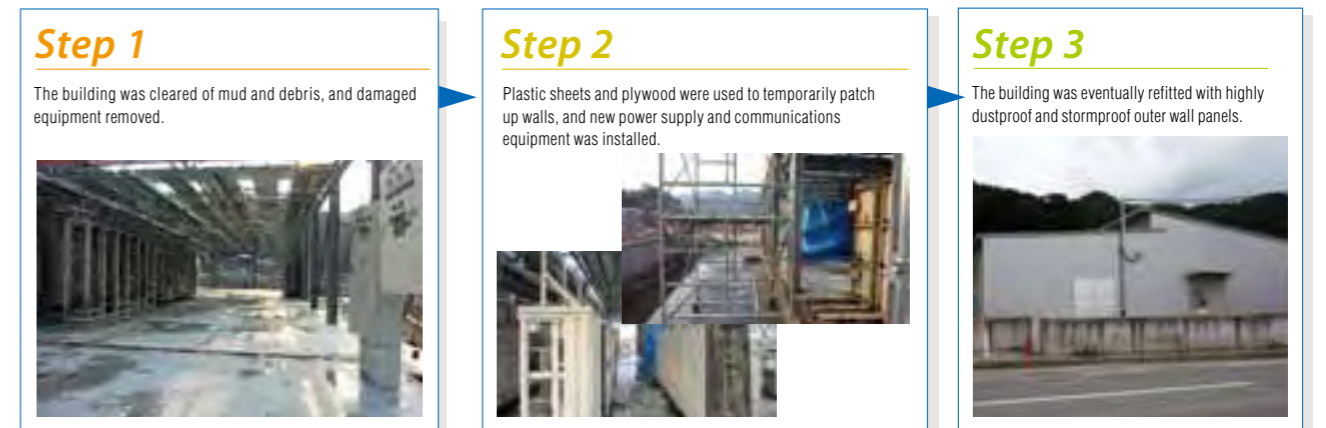
The tsunami wreaked havoc on this building, and both power supply and communications equipment was inundated. We re-used the building's frame and replaced walls with plastic sheets and plywood as stopgap measures, and restored communications services after installing new power supply and communications equipment.



The devastated building



The walls were destroyed, and the inside of the building was full of flotsam.



Installing container-like temporary exchanges to restore services

Shichigahama Building, Miyagi Prefecture

Since the Shichigahama Building was completely carried away by the tsunami, we restored services by replacing it with container-like temporary exchanges fitted with all necessary equipment and designed for outdoor installation.



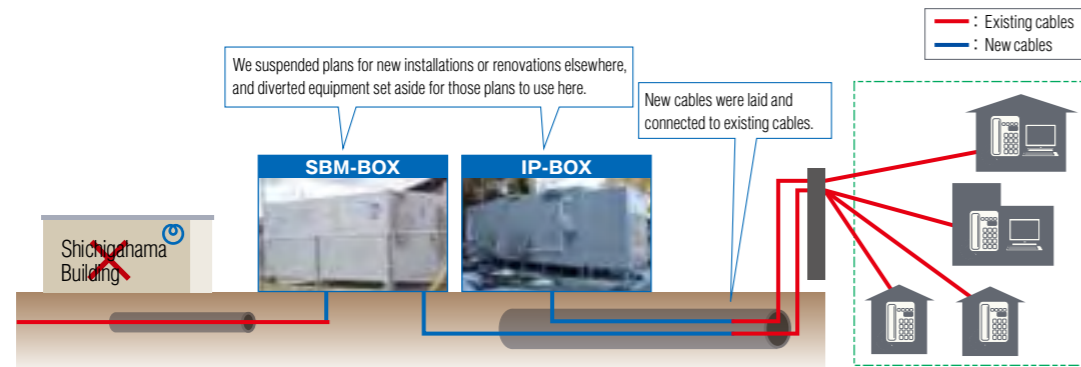
The site where the Shichigahama Building used to stand



The site was leveled, and foundation laid.



Container-like temporary exchanges slated for use elsewhere were requisitioned for installation on the site.



SBM: Subscriber Module, a device that accommodates PSTN lines, etc., for multiplexing and connecting to an NTT building through a fiber optic line

Restoring services by using feeders from other buildings

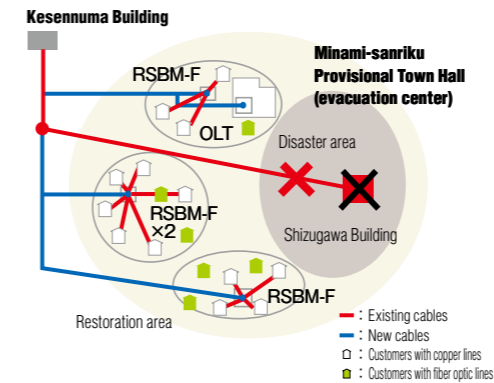
Shizugawa Building, Miyagi Prefecture

The tsunami caused extensive damage to the Shizugawa Building, and also submerged power supply and communications equipment. We restored services by extending communications equipment from other buildings.



Step 1

We extended communications equipment from our Kesennuma Building to substitute for the damaged Shizugawa Building and restore communications to parts of the town of Minami-sanriku that lay outside the disaster area.



1. Remote Subscriber Module-Feeder Point: device that accommodates copper lines for multiplexing and connecting to an NTT building through a fiber optic line
2. Optical Line Terminal: device for terminating fiber optic lines, temporarily installed in an evacuation center

Step 2 (Copper)

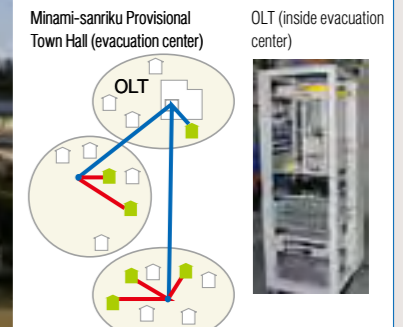
RSBM-F¹ powered by emergency generator



Restoring phone services by connecting subscriber cables in each area to RSBM-Fs

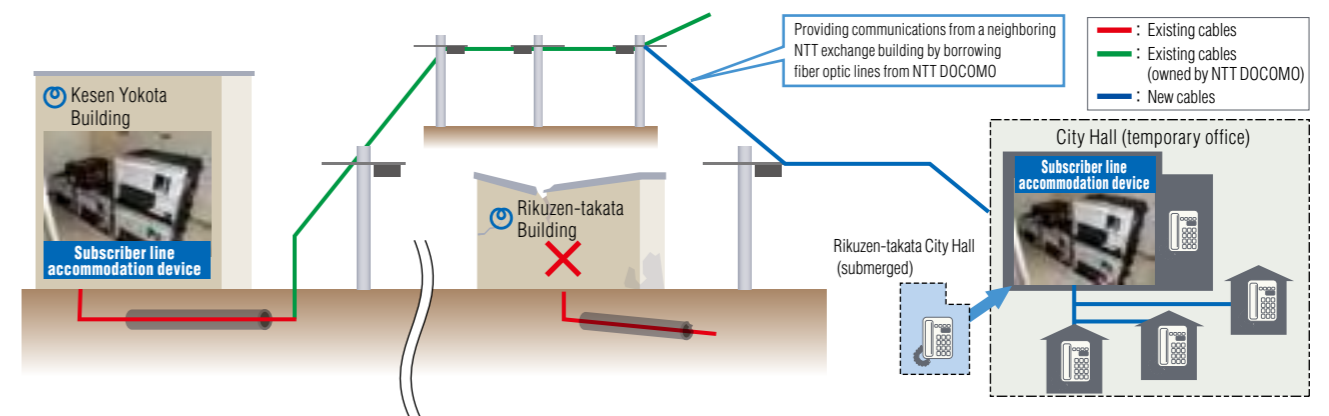
Step 2 (Fiber optic)

Area-wide restoration of fiber optic services by stringing fiber optic cables from OLT² to each area



Rikuzen-takata Building, Iwate Prefecture

The tsunami inundated the building, submerging both power supply and communications equipment. To restore communications services to key municipal offices as soon as possible, we extended communications equipment from other buildings. We later repaired the building and replaced its communications equipment so as to provide communications to other subscribers too.



4₃ Restoring access lines

The tsunami inflicted extensive damage on telephone poles, cable ducts and cables. After clearing away debris, we restored communications by erecting telephone poles, stringing cables to customer residential areas, and connecting access lines.

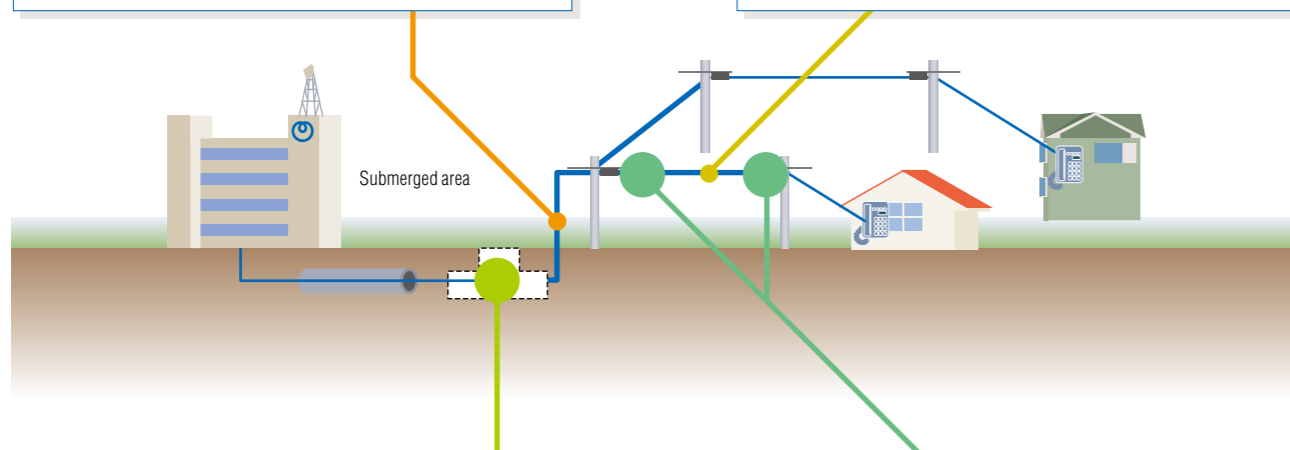
Step 1

Stringing a lead-up cable after clearing away debris and erecting telephone poles



Step 2

Stringing an aerial cable



Step 3

Connecting cables in a manhole



Step 4

Connecting aerial cables



4₄ Equipping temporary housing with new access lines

We erected telephone poles, strung cables, and connected them to new temporary housing to provide residents with communications.



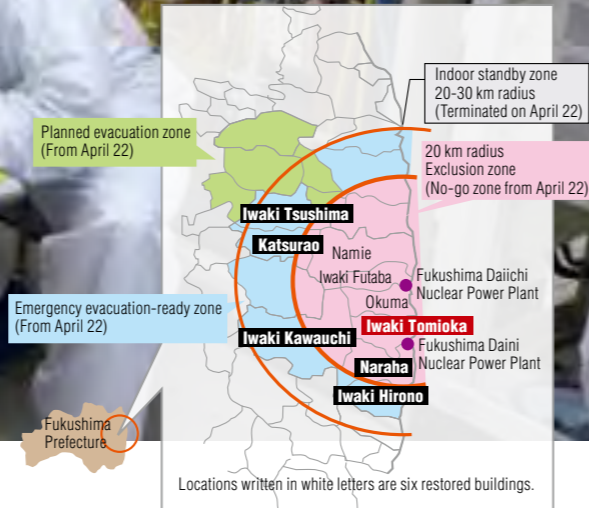
Rikuzen-takata Daiichi Junior High School, Iwate Prefecture



Kirikiri Junior High School, Iwate Prefecture

5 Fulfilling the NTT Group's mission

Restoring exchange buildings in the Fukushima nuclear power plant area



Located in a restricted area only 10 km from the Fukushima Daiichi nuclear power plant, NTT East's Iwaki Tomioka Building was incapacitated by the prolonged power outages caused by the earthquake. However, it is a core facility that controls five other buildings covering what was then the indoor standby zone lying between 20 and 30 km from the power plant, and so restoring the functions of the Iwaki Tomioka Building was essential to restoring mobile phone base station lines and fixed lines of people living in the zone. We accordingly enlisted the help of the power company to supply power to the building, and set about restoring the building's functions while taking precautions against radiation exposure.



Our employees gathered at J-VILLAGE, the Fukushima Daiichi accident cleanup operation base. The power company handed each of them a dosimeter, and gave them a lecture about radiation.



Our special precautions against radiation included protective suits, gloves, and a double layer of protective foot covers.



Our employees were allowed four hours to complete all necessary work. There were some difficult aspects, but the work went smoothly and we managed to restore functions in the given time.

Retrieving Okuma Town's servers

The Fukushima Daiichi nuclear power plant accident forced eight local authorities — Futaba, Namie, Kawauchi, Tomioka, Hirono, Katsurao, Okuma, and Naraha — to move their public offices out of the area.

NTT East helped the municipalities by providing their new temporary public offices with communications.

Servers and other important equipment required by the town of Okuma to maintain public office functions were left behind when the town was evacuated. We put together a team and headed with Okuma municipal employees to the town's public office within 5 km of the Fukushima Daiichi nuclear power plant, and retrieved about 90 servers, PCs, and other items of equipment that we then transported to the town's new temporary office.



This disaster made me newly aware of why we exist and our duty to connect people



Manabu Yoshimoto
Chief officer,
Disaster Countermeasures
Office,
NTT East Fukushima Branch

I had never imagined that a nuclear accident and radiation leaks could occur, and so when I first heard about the accident, the thought crossed my mind that we would have to stop what we were doing. I felt strongly that we needed to do whatever we could to get organized and stave off that eventuality as the Disaster Countermeasures Office. The question of what we could do for the people working at the front line was on my mind all the time.

Many evacuees had fled with only the barest necessities, and not knowing where others had gone, they were often plagued with the fear that they were on their own. I felt that if we were unable to connect such people to others, what was the point of us being there? I feel more keenly than ever now

that we have to do whatever it takes to connect people, to get their words across to the other people who mean most of them.

Surrounding towns and villages were unable to connect for over a month, and local government employees couldn't hide their exasperation, begging us to do something about the situation. I felt really sorry for our employees, since they were working flat out, and so when the Iwaki Tomioka Building was rehabilitated and communications restored, and people called to thank us, it was very rewarding.

What with radiation and other problems, the situation is not easy, but even if there are only one or two people involved, we have a duty to connect them.

I think it is also my duty to protect the safety and health of our employees engaged in restoration work out in the field.



Employee positions are as they were when the earthquake struck.

6 Working with and for the local community as a trusted partner Providing assistance to disaster victims



Telephone charge reduction and exemption

We waived basic monthly charges for the approximately 2 million customers who were unable to use their lines because of equipment damage, or who were effectively unable to make calls because they had been forced to evacuate, and other similar reasons.

We also extended payment due dates by up to three months if requested to do so by customers.

Initiatives for temporary housing, etc.

Line relocation charges waived and free phones provided to temporary housing occupants

We waived line relocation charges for people moving temporarily out of the disaster area as a result of the Great East Japan Earthquake.

We also provided free phones to occupants of temporary housing, etc., donating 30,000 phones to local authorities.



Provision of company housing to disaster victims

As part of our efforts to assist disaster victims, we made eight company housing blocks (411 apartments) and two plots of land available for temporary housing.

Free HIKARI iFRAME tablets for temporary housing

In July 2011, we started equipping temporary housing with Wi-Fi access and providing each household with a HIKARI iFRAME tablet PC that incorporates a Seven & i food delivery service application.

Yamamoto Town, Miyagi Prefecture: from July 2011
 Namie Town, Fukushima Prefecture: from September 2011

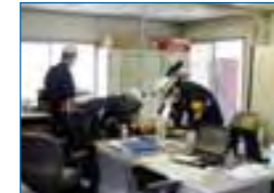


Supporting local authorities, and medical and educational facilities

Providing communications to local authorities

The public offices of many local authorities were swept away or submerged by the tsunami.

Since such local authorities play a central role in local community recovery and reconstruction, restoring their functions is a matter of utmost priority.



To support the recovery efforts of such local authorities, we provided telephones, Internet connections, PCs, LANs, multifunction printers, and other communications equipment required for them to function as they resumed operations.

Providing communications to damaged public medical facilities

Many major local hospitals were damaged by the earthquake and tsunami. We supported local community health care by providing communications at no charge to hospitals that had lost the communications capabilities that they required to operate.



Supporting remote health consultations

We enabled people affected by the disaster to seek physical and mental health support by providing a system that connects temporary housing to medical facilities in the greater Tokyo area by videophone to conduct remote health consultations.

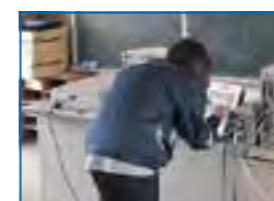
Sending medical professionals to the disaster area

We dispatched 56 medical professionals to attend to the needs of disaster area evacuation center occupants and others.

- 48 from NTT East Tohoku Hospital to disaster area evacuation centers
- 4 from NTT East Izu Hospital and NTT East Nagano Hospital to disaster area evacuation centers
- 4 from Medical and Health Administration Center to evacuation centers in Saitama Prefecture

Providing communications to educational facilities

We provided communications systems at no charge to the temporary staff rooms of public schools that had been swept away or otherwise severely damaged by the earthquake and tsunami so as to help such schools to resume operations.



Other assistance provided

Providing jobs in the disaster area, etc.

- We extended hiring for fiscal 2012 in both the disaster area and elsewhere from April 1 to June 1.
- NTT East Group companies (four prefecture-based companies, NTT-ME, TelWel East Japan, NTT Solco) hired approximately 280 people in the disaster area.
- We recruited additional new graduates for fiscal 2012 from among students whose job offers had been cancelled as a result of the disaster.



Preferential purchase of disaster area agricultural produce for company cafeterias

NTT East has been preferentially buying agricultural produce grown in Fukushima, Ibaraki, and Tochigi Prefectures and not subject to shipment restrictions for use at its company cafeterias.



Helping with live broadcasts of charity concerts

We used our FLET'S HIKARI fiber optic broadband service to help with high definition live broadcasts of charity concerts and sumo tournaments staged by other organizations in various locations to support recovery efforts.

Donations, etc.

- NTT East donated ¥100 million to the recovery efforts. (The NTT Group as a whole donated ¥1 billion.)
- FLET'S HIKARI Members Club invited its members to exchange points for donations from March 18 up to September 30. This resulted in 35,650 donations amounting to ¥51,216,500, all of which was passed on to the Japan Red Cross Society.
- NTT East is a sponsor of the Signal of Hope Fund established to support the early resumption of operations by Tohoku fishing ports.

NTT East Badminton Team brings cheer to the disaster area

NTT East Badminton Team players and other personnel visited 12 sports facilities in Iwate, Miyagi, and Fukushima Prefectures between May 29 and June 5, 2011 to provide training workshops to elementary, junior high, and high school students.

(5 locations in Iwate, 5 in Miyagi, 2 in Fukushima)

7 Working on full restoration

Improving the reliability of communications in the disaster area



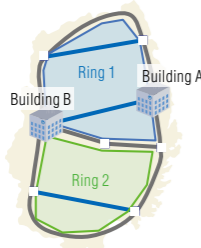
We have started working on full restoration of trunk lines and exchange buildings to improve the reliability of our provisionally restored communications network.

Trunk lines

We are subdividing trunk lines and establishing new inland routes in the tsunami damage area and nuclear power plant area.

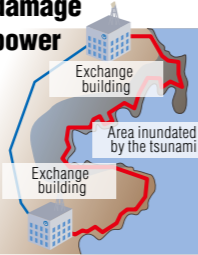
Strengthening trunk line backup system by subdividing network loops

We have long used a loop structure to secure two routes, but we are subdividing loops further by incorporating trunk lines within them to create a ladder-like structure.

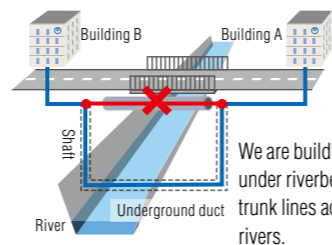


Creating new inland routes in the tsunami damage and nuclear power plant areas

We are diverting coastal trunk lines inland.



Laying new ducts under riverbeds in locations where cables strung along bridges were swept away or severed



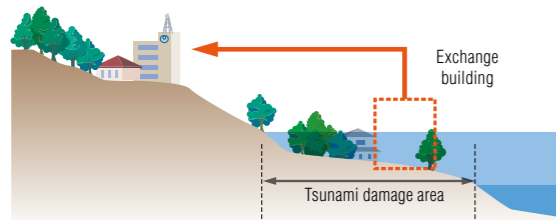
We are building ducts under riverbeds to lay trunk lines across rivers.

Exchange buildings

We are moving exchange buildings that were swept away or submerged by the tsunami to higher locations and taking flood defense measures.

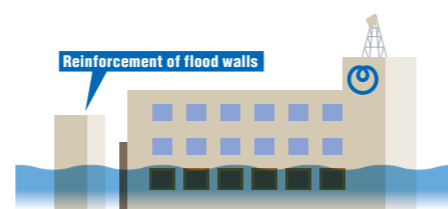
Relocation to higher ground

We are moving buildings that suffered extensive tsunami damage and those that are liable to flood due to land subsidence to higher ground or inland locations.



Flood defense measures

We are implementing flood defense measures such as reinforcing flood walls, and relocating power incoming units and generators on upper floors.



Rebuilding Tohoku

Hidefumi Matsuda
Engineering Promotion Manager,
Tohoku Future Network Design
and Reconstruction Office, NTT East



We are now working on the full restoration of communications equipment in the disaster area to regain the former reliability of our networks and build a disaster-resistant communications infrastructure.

We established seven field offices in Iwate, Miyagi, and Fukushima Prefectures, and brought together the company's most capable and experienced employees to carry out front

line restoration. Working in the disaster area is perilous, since aftershocks are still occurring, and so we are putting top priority on protecting the safety of all of our field workers as we endeavor to restore and reconstruct our networks in the coastal area as soon as possible.

By using restored facilities to simultaneously conduct stopgap restoration drills, we aim to offer communications services that people can rely on even during power outages and when disaster strikes. We will strive to contribute to the reconstruction of the region through leveraging ICT for safe and secure community development, disaster preparedness, healthcare, education, government, and many other areas of endeavor.

7 Working on full restoration
Improving the reliability of communications
in the disaster area

8 Preparing for future contingencies

Ensuring even greater safety and security



We will leverage lessons learned from the Great East Japan Earthquake to build even more reliable communications networks and fulfill our mission to connect people.

Building disaster-resistant communications equipment

We will carry out the following measures on trunk lines and exchange buildings in the East Japan area according to circumstances:

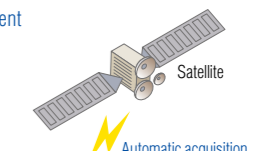
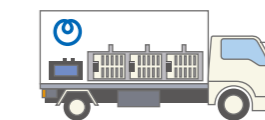
- Detours around areas vulnerable to disasters, and rebuilding of trunk lines in a way that will minimize disaster impacts
- Reinforcement of power supply equipment in exchange buildings
- Exchange building quakeproofing and floodproofing improvements

Ensuring rapid restoration of services

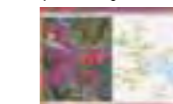
- Deployment of portable emergency switching equipment capable of handling FLET'S and other new services in addition to conventional fixed lines so as to enable flexible expansion and upgrading of alternative devices in the event that exchange buildings suffer disaster damage
- Development of portable earth stations capable of automatic satellite acquisition, and upgrade and increased distribution of wireless disaster countermeasure devices
- Utilization of geographical information systems (GIS) for ascertaining impacts in disaster situations and promptly providing customers with accurate information

Prompt operation of satellite devices

Portable emergency switching equipment



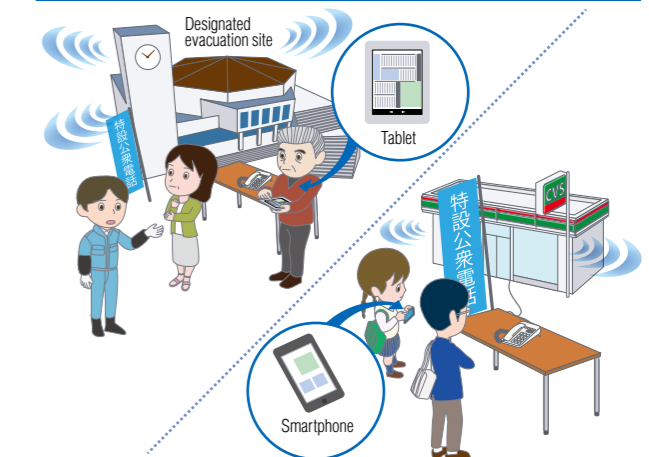
Utilization of geographical information:
Area submerged by the tsunami and telephone pole damage status



Assisting communication when disasters strike

- We will enable posting and checking of messages on our Disaster Emergency Broadband Message Board from various devices, and equip it with functions for pushed distribution of e-mail and voice notifications. We will also consider integration with other telecommunications carriers.
- We will work with convenience stores and other facilities equipped with fiber optic lines to enable Wi-Fi-based Internet access, and prepare the ground for operation of "information stations" in disaster situations through the prior deployment of emergency use public phone lines. We will also look into the establishment of such information stations at designated evacuation sites so as to enable the prompt provision of communications.

Information station concept



8 Preparing for future contingencies
Ensuring even greater safety and security

Restoration and reconstruction timeline

2011	Nationwide events in Japan	NTT East key actions
March 11	<ul style="list-style-type: none"> ● 2:46 p.m. Northern Miyagi Prefecture struck by an earthquake with a seismic intensity of 7. The quake's epicenter was off Miyagi's Sanriku coast. The M9 quake was the strongest ever recorded in Japan (and 4th strongest worldwide). ● Operation of many JR East lines including Shinkansen bullet trains suspended for the rest of the day ● Tohoku Expressway closed ● Water level drops in Fukushima Daiichi No.2 reactor. Fukushima Prefecture asks residents within a 2 km radius to evacuate. 	<ul style="list-style-type: none"> ● Disaster Countermeasures Office set up ● Networks inundated by calls to Tokyo, Ibaraki, Tochigi, Fukushima, Yamagata, Iwate, and Miyagi, forcing us to restrict traffic (maximum 90%) ● Disaster Emergency Broadband Message Board (Web 171) operation launched ● Disaster Emergency Message Dial (171) operation launched ● All public phones in the East Japan region made available for free usage ● Dispatch of power supply vehicles started ● Installation of emergency use public phones started 
March 12	<ul style="list-style-type: none"> ● Earthquake with a seismic intensity of upper 6 strikes northern Nagano Prefecture. ● Fukushima Daiichi nuclear power plant evacuation zone expanded to 20 km radius 	<ul style="list-style-type: none"> ● Phone call restrictions lifted ● Announcement of basic monthly charge waiver and other deductions and exemptions for disaster area lines
March 13	<ul style="list-style-type: none"> ● Tokyo Electric Power Company (TEPCO) announces planned blackouts. 	<ul style="list-style-type: none"> ● Communications services damage peaks, with approx. 1.5 million lines down
March 14	<ul style="list-style-type: none"> ● TEPCO Fukushima Daiichi No.3 reactor hydrogen explosion ● TEPCO launches planned blackouts in Ibaraki, Chiba, and two other prefectures. 	
March 15	<ul style="list-style-type: none"> ● Fukushima Daiichi No.2 reactor explosion ● Spread of Fukushima Daiichi No.2 reactor radiation leaks prompts issue of order for residents living within 20 to 30 km of the nuclear power plant to remain indoors. ● M6 earthquake with a seismic intensity of upper 6 strikes eastern Shizuoka Prefecture. 	
March 16	<ul style="list-style-type: none"> ● Delivery of relief supplies to Sendai Airport started 	<ul style="list-style-type: none"> ● Advice issued via media for subscribers to disable call blocking so as to receive calls from the disaster area
March 18	 <p>Photo: Asagumo News/PANA</p>	<ul style="list-style-type: none"> ● Provision of free public Wi-Fi access (FLET'S SPOT, etc.) started in Iwate, Miyagi, Yamagata, Fukushima, Ibaraki, and Nagano ● Exchange of FLET'S HIKARI Members Club points for Tohoku-Pacific Ocean Earthquake-related donations started ● Disaster Emergency Message Dial message recording expanded from the disaster area to nationwide. (Recording from mobile phones enabled)
March 20		<ul style="list-style-type: none"> ● Announcement of prolongation of recruiting activities in conjunction with the Tohoku-Pacific Ocean Earthquake.
March 21	<ul style="list-style-type: none"> ● Government bans shipment of spinach and kakina from Fukushima, Ibaraki, Tochigi, and Gunma Prefectures. 	
March 22		<ul style="list-style-type: none"> ● Announce that restoration of over half of the 97 buildings damaged in the Tohoku region will require considerable time. (Damaged lines: approx. 160,000)
March 25		<ul style="list-style-type: none"> ● Installation of free Internet access points in evacuation centers announced. (Complete installation at 113 locations by March 24) ● Add Aomori, Akita, Tochigi, Gunma, and Niigata to area where free public Wi-Fi access (FLET'S SPOT, etc.) is available. 
March 28	<ul style="list-style-type: none"> ● TEPCO's planned blackouts effectively terminated on this day 	
March 30		<ul style="list-style-type: none"> ● The NTT Group (NTT, NTT DOCOMO, NTT East, etc.) announces Tohoku-Pacific Ocean Earthquake-related damage, restoration status, and outlook. President announces that stopgap restoration will be completed by the end of April.

	Nationwide events in Japan	NTT East key actions
April 1	<ul style="list-style-type: none"> ● The March 11 earthquake is officially named the Great East Japan Earthquake by a Cabinet decision. 	
April 5		<ul style="list-style-type: none"> ● Announcement of blanket waiver of basic monthly charges in areas in which tsunami damage disabled phone and other services as determined by NTT East
April 7	<ul style="list-style-type: none"> ● Earthquake with a seismic intensity of upper 6 and epicenter off the coast of Miyagi Prefecture ● Tohoku Shinkansen bullet train line partially resumes operation. 	<ul style="list-style-type: none"> ● Announcement of free provision of phones for temporary housing, etc. (30,000 phones)
April 8	<ul style="list-style-type: none"> ● TEPCO announces termination of planned blackouts. 	<ul style="list-style-type: none"> ● Impact of Miyagi aftershocks on communications services announced. (Damaged lines: approx. 70,000)
April 10	<ul style="list-style-type: none"> ● Tohoku Expressway completely reopened 	
April 13	<ul style="list-style-type: none"> ● Sendai Airport reopened 	<ul style="list-style-type: none"> ● Restoration work carried out on the Iwaki Tomioka Building in the nuclear power plant area 
April 14		<ul style="list-style-type: none"> ● Provision of remote health consultations at evacuation centers, etc. using videophones announced. (Provided in the cities of Minami-soma from August, and Tono from September)
April 15		<ul style="list-style-type: none"> ● Announcement of free provision of school affairs support system to disaster area boards of education and schools to enable smooth and speedy information sharing and creation of school-related documents
April 21	<ul style="list-style-type: none"> ● 20 km no-go zone established around Fukushima Daiichi nuclear power plant 	
April 27		<ul style="list-style-type: none"> ● As it explained at the end of March, the NTT Group (NTT, NTT DOCOMO, NTT East, etc.) announces completion of stopgap restoration of buildings by the end of April excluding certain exceptional areas. Also announces restoration on April 13 of the Iwaki Tomioka Building in the nuclear power plant area. ● Use of agricultural produce from Fukushima, Ibaraki, and Tochigi in company cafeterias started 
May 6		<ul style="list-style-type: none"> ● Communications services (Analog [Kanyu Denwa], ISDN, FLET'S HIKARI) restored to all exchange buildings except 2 buildings on offshore islands in Miyagi Prefecture, and 3 buildings in the Fukushima nuclear power plant area
May 13		<ul style="list-style-type: none"> ● Announce full restoration schedule, disaster damages, and establishment of the Tohoku Future Network Design and Reconstruction Office in our results for the fiscal year ended March 31, 2011. ● Disaster area group companies (NTT East-Iwate, NTT East-Miyagi, NTT East-Fukushima, NTT East-Ibaraki, NTT-ME, TelWel East Japan) announce plans to hire approximately 150 new personnel. 
May 16		<ul style="list-style-type: none"> ● Establish the Tohoku Future Network Design and Reconstruction Office as an organization reporting directly to the president.
May 23		<ul style="list-style-type: none"> ● Plans for "Connecting to Tomorrow" events involving the players and staff of the NTT East Badminton Team announced. (Held from May 29 in Iwate, Miyagi, and Fukushima)
May 25	<ul style="list-style-type: none"> ● Partial lifting of ban on shipment and consumption of vegetables grown in Fukushima Prefecture 	
June 14		<ul style="list-style-type: none"> ● Disaster area group company (NTT Solco) announces plans to hire 95 people from the area.
July 6		<ul style="list-style-type: none"> ● Announcement of launch of collaboration with Seven & I Holdings to provide free HIKARI iFRAME tablet PCs to occupants of temporary housing (shopping support), and to equip Seven-Eleven stores with Wi-Fi access so that they can serve as information stations when disaster strikes
July 26		<ul style="list-style-type: none"> ● Izushima area in Miyagi Prefecture restored
August 29		<ul style="list-style-type: none"> ● Disaster Emergency Message Dial (171) service terminated
September 2	<ul style="list-style-type: none"> ● Yoshihiko Noda's cabinet inaugurated 	
September 14		<ul style="list-style-type: none"> ● Functions of three buildings in the Fukushima nuclear power plant area restored
September 26		<ul style="list-style-type: none"> ● Enoshima area in Miyagi Prefecture restored



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