Status of Full-fledged Recovery following the Great East Japan Earthquake and Future Measures

March 1, 2012

Nippon Telegraph and Telephone East Corporation
(“NTT EAST”)

Efforts following the Great East Japan Earthquake

- NTT East is making efforts towards the full-fledged recovery of communication facilities in affected areas in order to improve reliability levels of damaged communication networks to above pre-earthquake levels.
- In addition, in order to accomplish our mission of maintaining and providing continuous services, NTT East will implement measures to further improve its service reliability

March 11,2011　The Great East Japan Earthquake

～ May 2011　Emergency restoration of services（relay transmission lines, exchange offices, access facilities, etc.）

1. Full-fledged recovery（affected areas）

Measures to restore service reliability to pre-earthquake levels

1. Relocation of damaged exchange offices to higher ground.
2. Relocation of relay transmission lines underground in bridge areas and below waterways for sections that were washed away.
3. Establish temporary relay transmission lines in the nuclear power plant areas and relocation of parent station of exchange offices.

2. Measures to improve reliability

Measures to further improve service reliability

1. Building disaster-resistant facilities
   - Countermeasures against blackouts and flooding at exchange offices.
   - Improving the disaster-resistance of relay transmission lines.
2. Rapid restoration of communications services
   - Increasing disaster countermeasure equipment.
   - Incorporating the effective efforts made in response to the Great East Japan Earthquake into disaster countermeasure programs.
3. Securing communications immediately after a disaster
   - Securing a means of communication during emergencies.
   - Contributing to regional residential services of local governments.

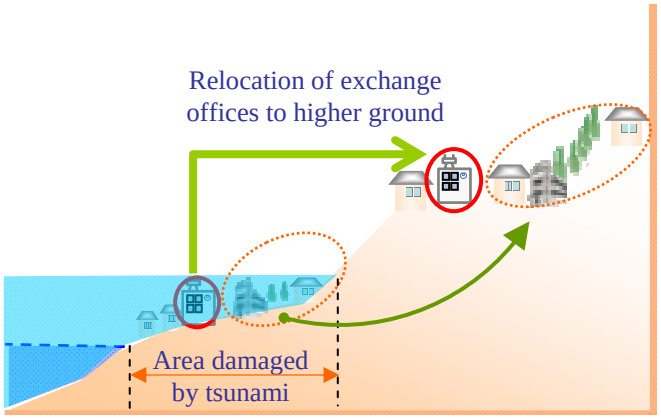
1-1. Relocation of Damaged Exchange Offices to Higher Ground

- As an emergency restoration measure for exchange offices heavily damaged by tsunami, temporary building repairs were made and boxes were installed.
- Exchange offices which were destroyed or washed away by tsunami, impacted by land subsidence or flooded by high waves, for which maintenance and preservation of telecommunications equipment are difficult, and those for which temporary boxes were installed because the switching stations were washed away, have been relocated to higher ground to improve reliability (19 buildings).

＜Example: Shichigahama Exchange Office in Miyagi Prefecture＞

Immediately after the earthquake

Emergency restoration



Full-fledged recovery

1-1. Relocation of Damaged Exchange Offices to Higher Ground

Iwate Prefecture	Otsuchi Exchange Office				
	Unosumai Exchange Office				
	Sanriku Exchange Office				
	Yamada Exchange Office				
	Taro Exchange Office				
Miyagi Prefecture	Shizukawa Exchange Office				
	Onagawa Exchange Office				
	Ogatsu Exchange Office				
	Tokura Exchange Office				
	Noda Exchange Office				
Iwate Prefecture					
Miyagi Prefecture	Shichigahama Exchange Office				
	Utatsu Exchange Office				
	Watanoha Exchange Office				
	Oshika Exchange Office				
	Karakuwa Exchange Office				

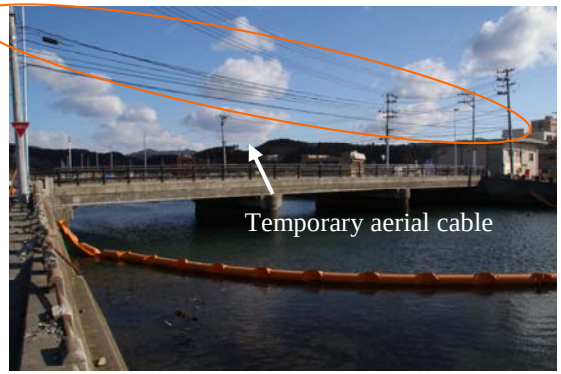
※The relocation of the Nobiru, Kitakami, Okawa and Rikuzentakata exchange offices is being planned in conjunction with town restoration plans.

1-2. Relocation of Relay Transmission Lines Underground in Bridge Areas and Below Waterways for Sections that were Washed Away

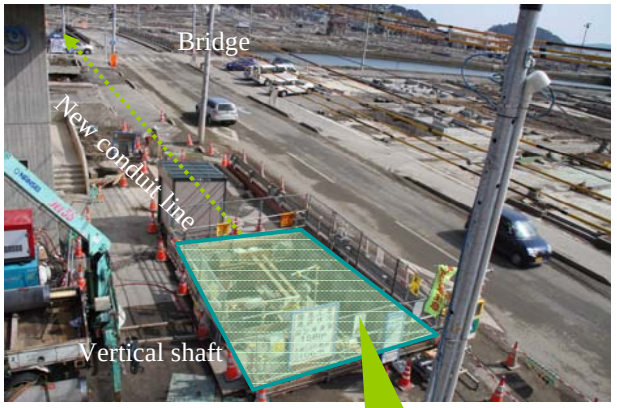
- As an emergency restoration measure for relay cables that were washed away by tsunami, a temporary aerial cable was laid.
- For full-fledged recovery of sections where bridges were washed away, conduit lines were newly constructed underground, below waterways, and relay cables were laid to improve reliability (9 areas).

Immediately after the earthquake

Emergency restoration



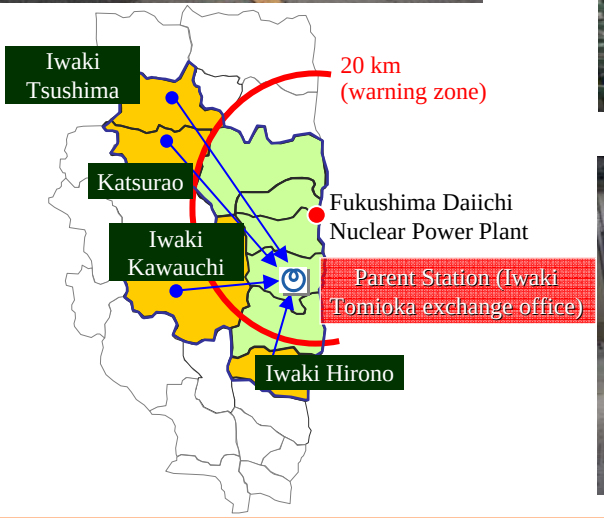
Full-fledged recovery



1-3. Establish Temporary Relay Transmission Lines in the Nuclear Power Plant Areas and Relocation of Parent Station of Exchange Offices

- As an emergency restoration measure in areas outside the warning zone of the nuclear power plant, damaged equipment was replaced and restored at the Iwaki Tomioka exchange office, which is located approximately 10 km away.
- The parent station function of four exchange offices outside the warning zone were relocated and inland temporary transmission relay lines were set up to improve reliability.

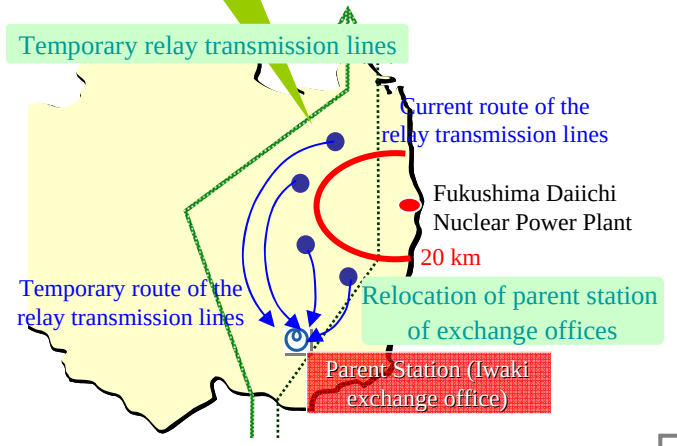
Immediately after the earthquake



Emergency restoration

[April 13, 2011]
Replaced damaged equipment at the Iwaki Tomioka exchange office in order to restore communications outside the warning zone.

Full-fledged recovery



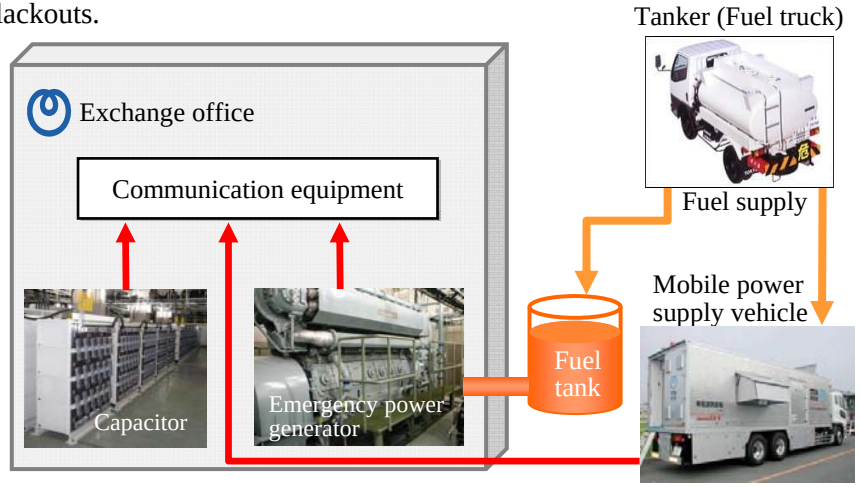
2-1. Countermeasures Against Blackouts and Flooding at Exchanges Offices

- In the past, in order to continue providing services, NTT East had implemented a backup power supply system in anticipation of blackouts and enhanced the durability of buildings. However, during the Great East Japan Earthquake, communication services were unable to be provided due to unexpectedly long and geographically wide blackouts and the large-scale tsunami.
- Going forward, in addition to existing measures, NTT East will strengthen countermeasures against blackouts and flooding, in anticipation for earthquakes with an epicenter in the Tokyo metropolitan area.

Existing measures

<Countermeasures against blackouts>

- Deploying large-capacity storage batteries and emergency power generators at every exchange office.
- In addition, deploying mobile power supply vehicles in anticipation of long blackouts.



<Countermeasures for exchange offices>

- Construction to avoid collapses or cave-ins that may result from severe earthquakes (magnitude 7 on Japanese scale).
- Countermeasures against flooding that take into consideration tsunami level forecasts by local governments and past floods and deluges.
- Construction of fire-resistant buildings, installation of fire detecting and extinguishing systems.

Future measures

<Strengthening countermeasures against long and geographically wide blackouts>

- Expansion of fuel tanks at exchange offices, and securing fuel storage vaults.
- Countermeasures against breakdown of emergency power generators (installation of backup power generators, power supply from neighboring exchange offices).
- Enhance operations by using mobile power supply vehicles and tankers.

<Improve countermeasures against flooding>

- Improve countermeasures against flooding in line with local government hazard maps.

Flood prevention panel

Flood prevention door

2-1. Improving the Disaster-resistance of Relay Transmission Lines

- NTT East had been improving relay transmission lines through two routes and by laying lines underground. Due to the widespread effect of the tsunami, however, both routes were disconnected simultaneously and communication services were unable to be provided due to the isolation of the exchange offices.
- Therefore, three routes will be secured in preparation for potential simultaneous disconnections of multiple lines and temporary routes that bypass active fault zones and tsunami areas will be built in order to lessen the risk of disaster, and to improve reliability.

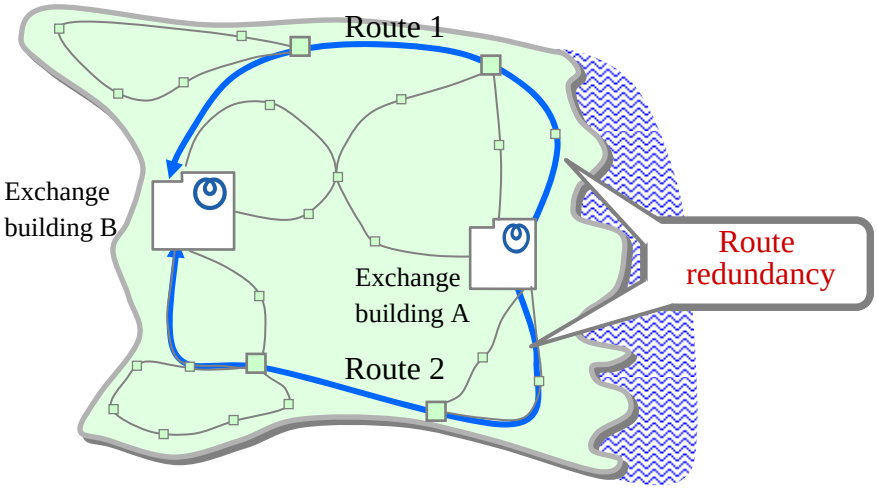
Existing measures

<Improvements in reliability with route redundancy>

- Building transmission lines in a ring shape to secure two routes, Route 1 and Route 2.

<Improvements in disaster resistance by laying transmission lines underground>

- Laying lines underground for important routes utilizing lessons learned from the Great Hanshin-Awaji Earthquake.



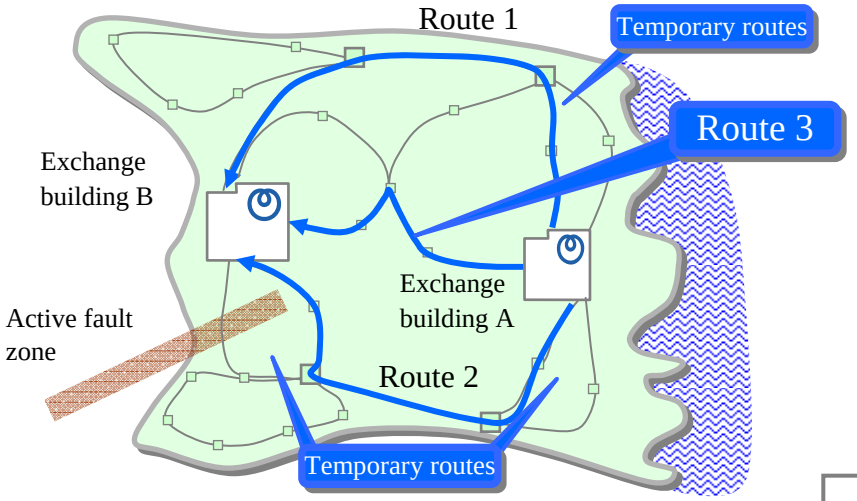
Future measures

<Further improvements in reliability by using Route 3>

- Establishing Route 3 for important routes that connect the main buildings of prefectures in order to minimize damages from hazards (to prevent the isolation of exchange offices in the event that both Route 1 and Route 2 are disconnected).

<Risk avoidance by establishing temporary routes>

- Avoiding risk factors in predicted tsunami areas and active fault zones.



2-2. Increasing Disaster Countermeasure Equipment

- In order to quickly restore services to areas where communications were cut off, various types of disaster countermeasure equipment have been deployed.
- Depending on each customer's usage situation, NTT East will enhance and increase the use of wireless and Wi-Fi compatible disaster countermeasure equipment and deploy portable accommodation units equipped with fixed-line telephones services and functions capable of restoring Internet access, to prepare for rapid restoration in case of emergency.

Disaster countermeasure equipment used for rapid restoration

No. of units used during the earthquake (at peak times)

<Restoration of isolated areas>

Satellite equipment and other disaster countermeasure equipment installed in all prefectural regions were utilized during this earthquake

- Portable satellite devices: 39
- Satellite mobile phones: 218

<Restoration of damaged exchange offices>

Boxes installed for phone service restoration and internet service restoration

<Countermeasures during a blackout>

- Mobile power supply vehicle: 101
- Portable accommodation units: 100

Future measures

<Restoration of isolated areas>

- Introducing new model portable satellite devices.
  - Provide fast and stable services
    - Downsizing of devices
    - Automatic satellite signal lock-on/tracking
    - Remote operation function

- Deploying portable Wi-Fi devices.
  - Provide Internet service to terminals with Wi-Fi capabilities
  - Build flexible access points
    - Optical fiber cables and other wiring are unnecessary
    - Can be installed in vehicles

<Restoration of damaged exchange offices>

- Deploying portable accommodation units.
  - Simultaneous support of both fixed-line telephone services and Internet services
  - Ability to flexibly install additional units depending on disaster situation

2-2. Incorporating the Effective Efforts Made in Response to the Great East Japan Earthquake into Disaster Countermeasure Programs

■ NTT East has prepared a disaster countermeasure manual in preparation for and in anticipation of disasters.

■ Based on the experiences from the Great East Japan Earthquake, to ensure that effective measures taken in response to the widespread disaster are implemented in future disasters, NTT East will incorporate such efforts into its disaster countermeasure programs and work to make such measures routine through training.

New measures to be implemented

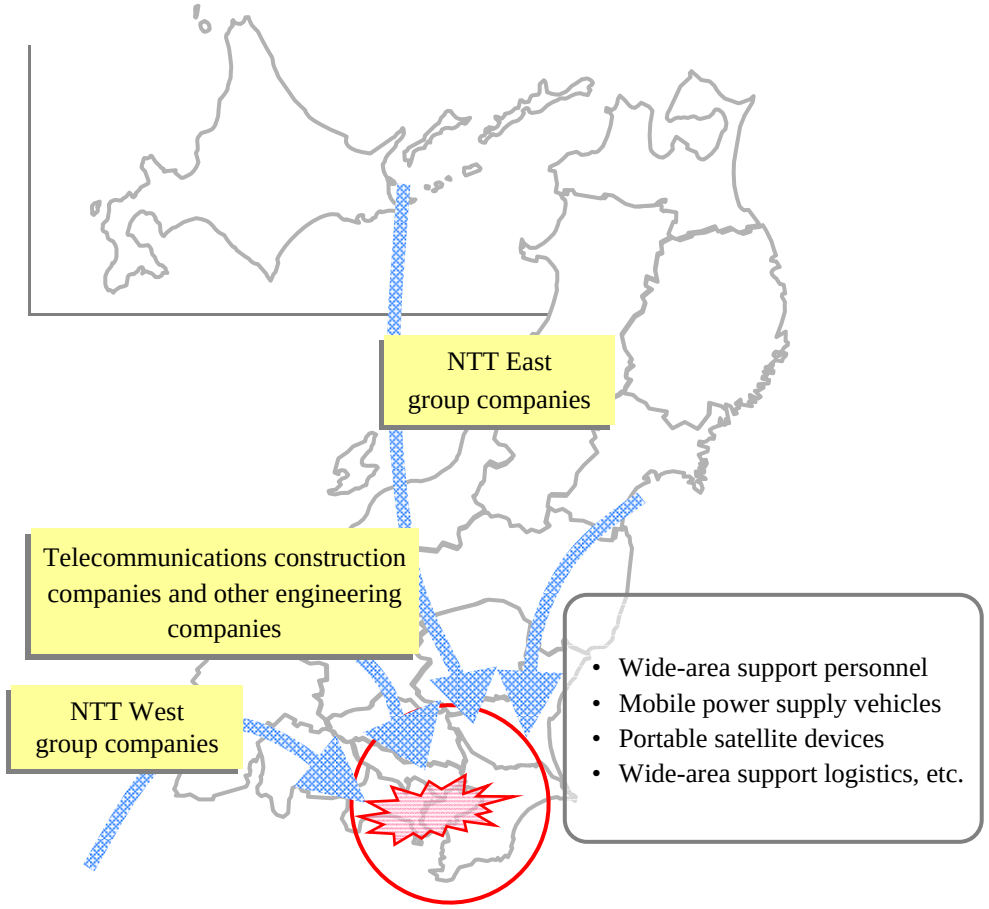
<Structure for geographically wide support>

- Automatic assembly in case of earthquakes of magnitude 6 or higher on the Japanese scale with an epicenter in the Tokyo metropolitan area
  → Select service areas for automatic assembly (disaster countermeasure equipment, wide-area support personnel, logistics)
- Advanced preparation of a dispersal pattern in order to provide continuous support from help desks in unaffected areas
- Establish rules and framework for wide-area support in affected areas

<Alternate base station during disaster>

- Maintenance of alternate base station in case the head office is affected by disaster
- Establish rules for assembly procedures and maintenance of satellite bases in anticipation of cases when head office employees have difficulty gathering at the NTT Disaster Countermeasures Headquarters
- Selection and preparation of wide-area support personnel for provisional bases for restoration and actual restoration bases

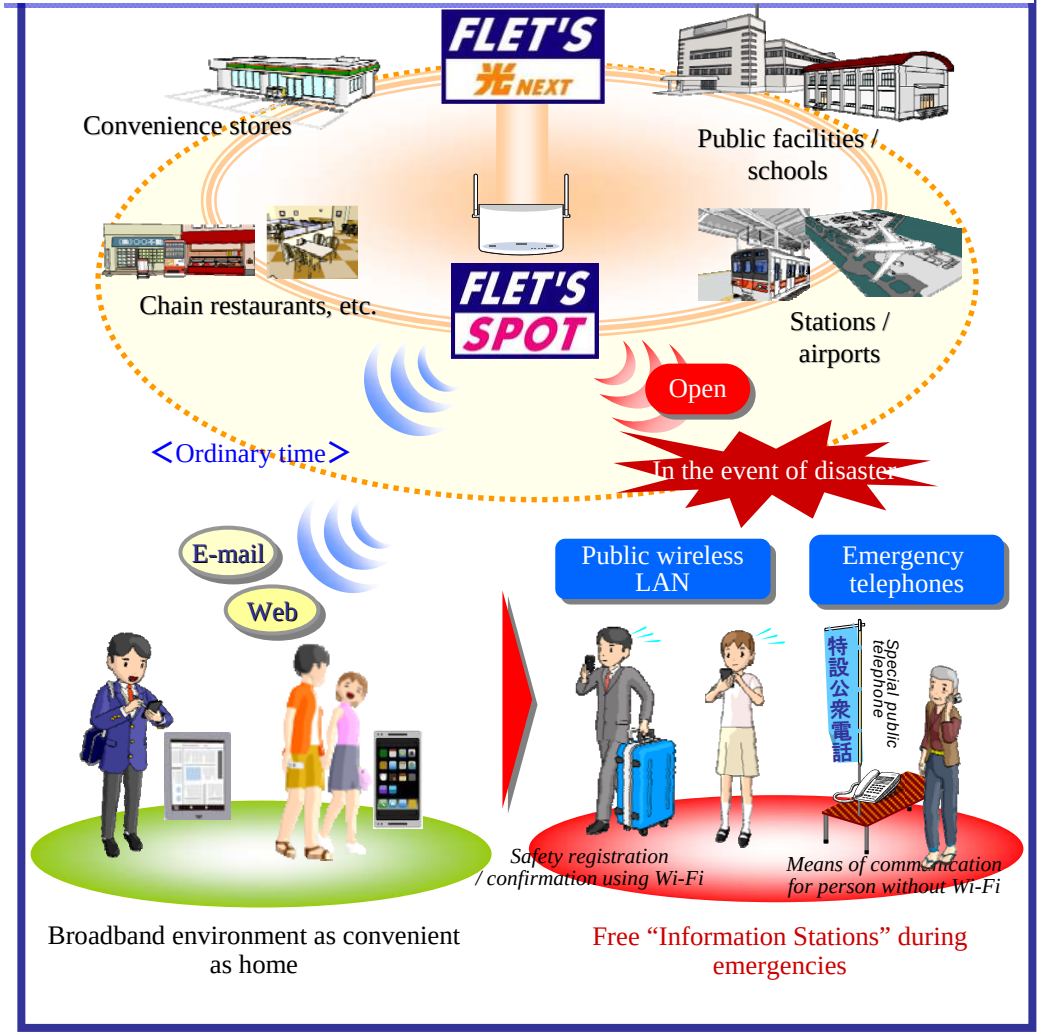
Structure for geographically wide support in case of earthquakes with an epicenter in the Tokyo metropolitan area



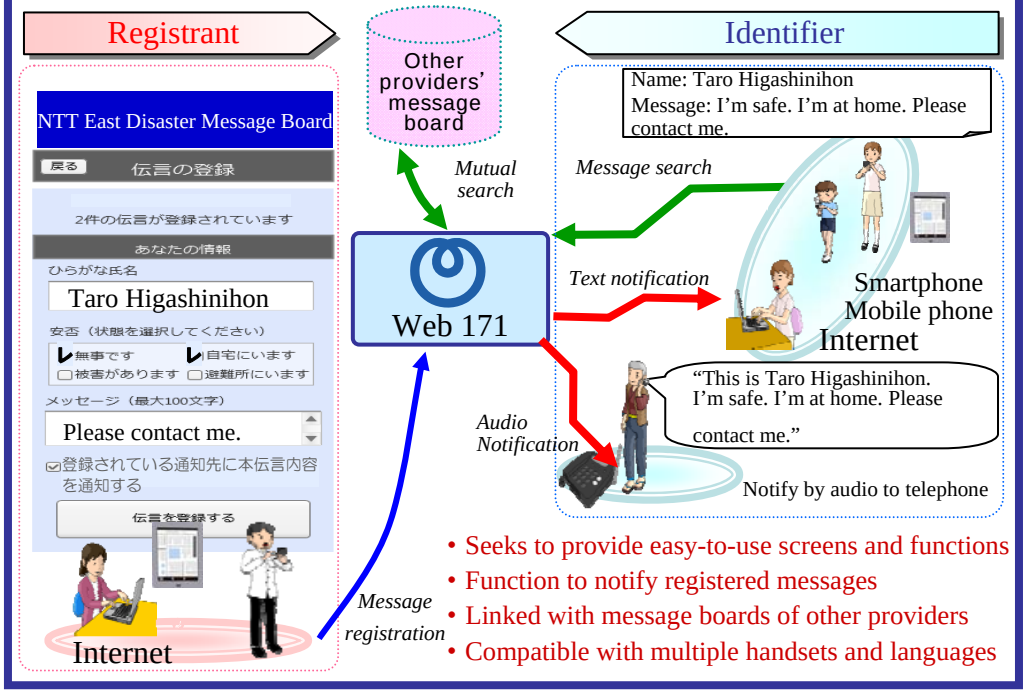
2-3. Securing a Means of Communication During Emergencies

- In order to provide a means of communication for safety confirmation, NTT East is working to promote the preparation of information stations equipped with emergency telephones and Internet. NTT East requests the cooperation of local governments and groups, as coordinated collaboration is necessary for the establishment of the information stations.
- Through the coordinated collaboration with other providers' message boards, and through the addition of functions that enable text and audio notifications of pre-registered messages, NTT East is working to improve the convenience of the Disaster Emergency Message Board services for emergencies.

Establishment of information stations in anticipation of large-scale disasters



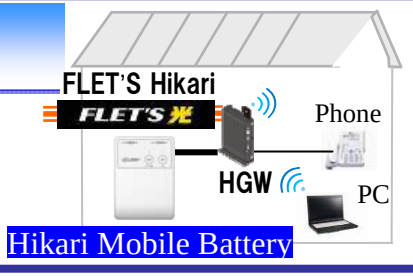
Advancement of Disaster Emergency Broadband Message Board (Web 171)



- Seeks to provide easy-to-use screens and functions
- Function to notify registered messages
- Linked with message boards of other providers
- Compatible with multiple handsets and languages

Hikari Denwa's countermeasures against blackouts

- Provide "Hikari Mobile Battery" that can supply power during blackouts (to launch on February 29, 2012)



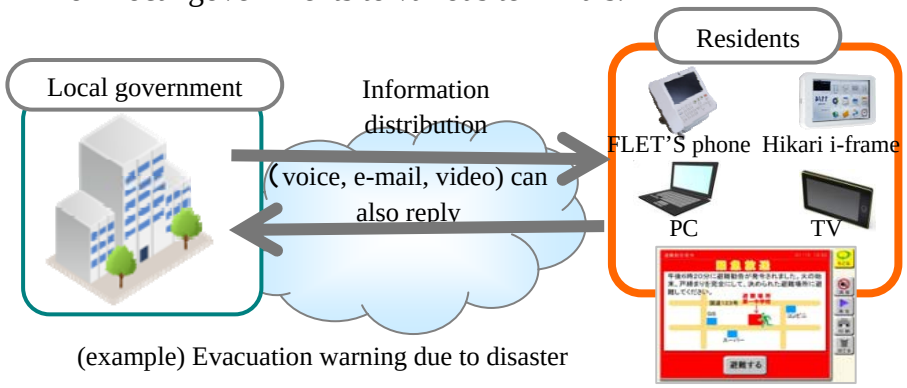
2-3. Local Government and Regional Residential Disaster Countermeasures

■ Since the earthquake, there has been an increased need for cloud services that provide continuous services for local governments. In addition to existing housing services, NTT East will collaborate with local governments to contribute to the development of highly reliable local government services, such as online backup services.

Existing Measures

<Distribution of local information>

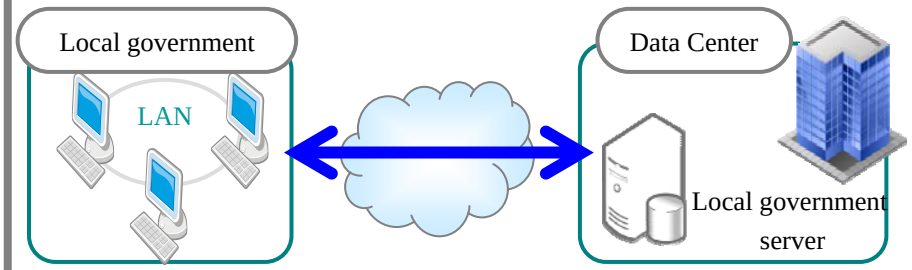
● Distribution of government, disaster and local information, etc. from local governments to various terminals.



(example) Evacuation warning due to disaster

<Utilization of data centers>

●Access from terminals in government buildings through a network by installing local government servers in data centers.



Future measures

<Further utilization of data centers>

● Able to provide continuous government services not only during ordinary times but also during disasters at local government buildings.

(Access to data center from bases, etc. after function transfer)

● By utilizing online backup services, local governments' important data is stored in remote data centers.

(Demonstration experiments are being conducted in Minamisanriku, Miyagi prefecture since February 1, 2012)