

Restoration Status for Damage Caused by the Great East Japan Earthquake and Future Responses

December 13, 2011

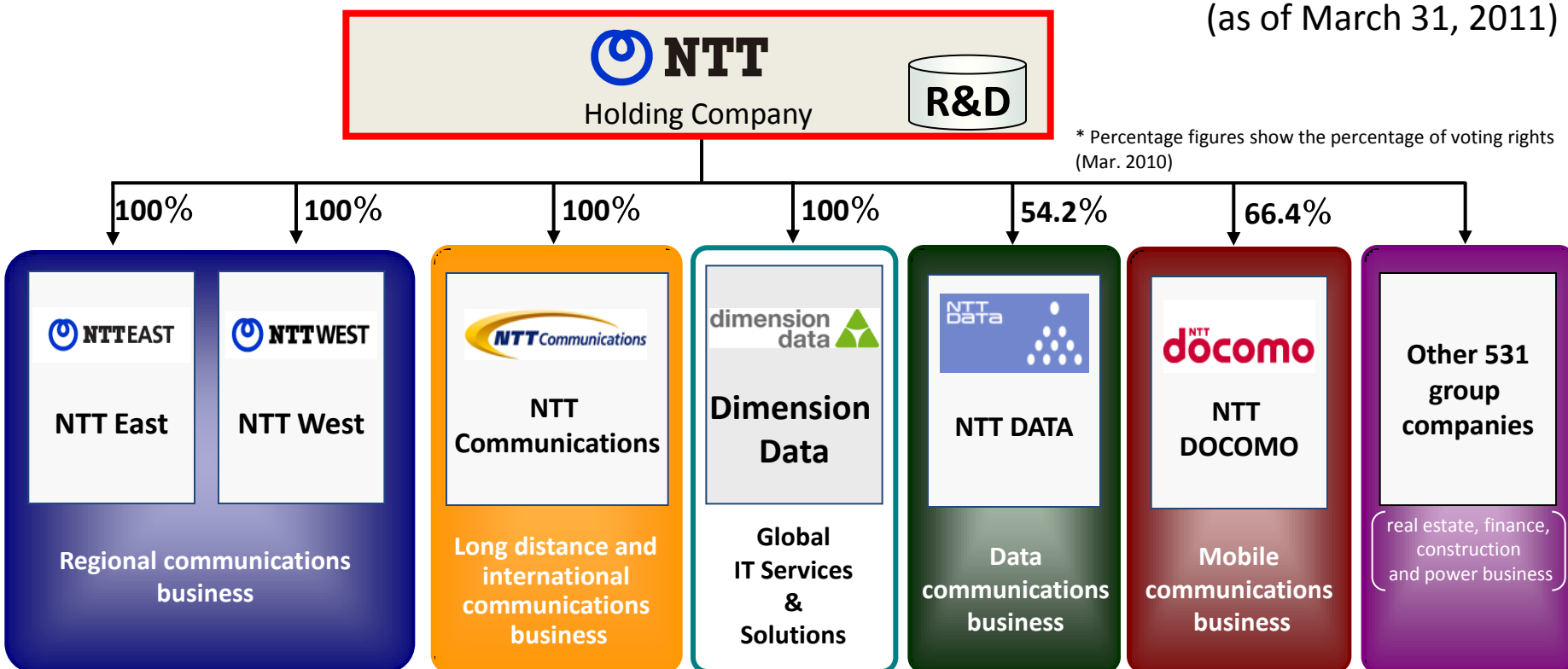
Nippon Telegraph and Telephone Corporation

Hirofumi Horikoshi

Corporate Overview

Name	Nippon Telegraph and Telephone Corporation	
Date of Establishment	April 1, 1985 (In accordance with the NTT Law)	
Head Office	Tokyo, Japan	
Consolidated Subsidiaries	536 companies	
Operating Revenues	\10.3 trillion*	
Employees	219,350*	* consolidated

(as of March 31, 2011)



- 1. Restoration Status**
- 2. Major Restoration Efforts**
- 3. Main Activities for Securing Means of Communication, Efforts in Providing Life Support to the Affected People**
- 4. Major Countermeasures against Future Disaster**

1. Restoration Status

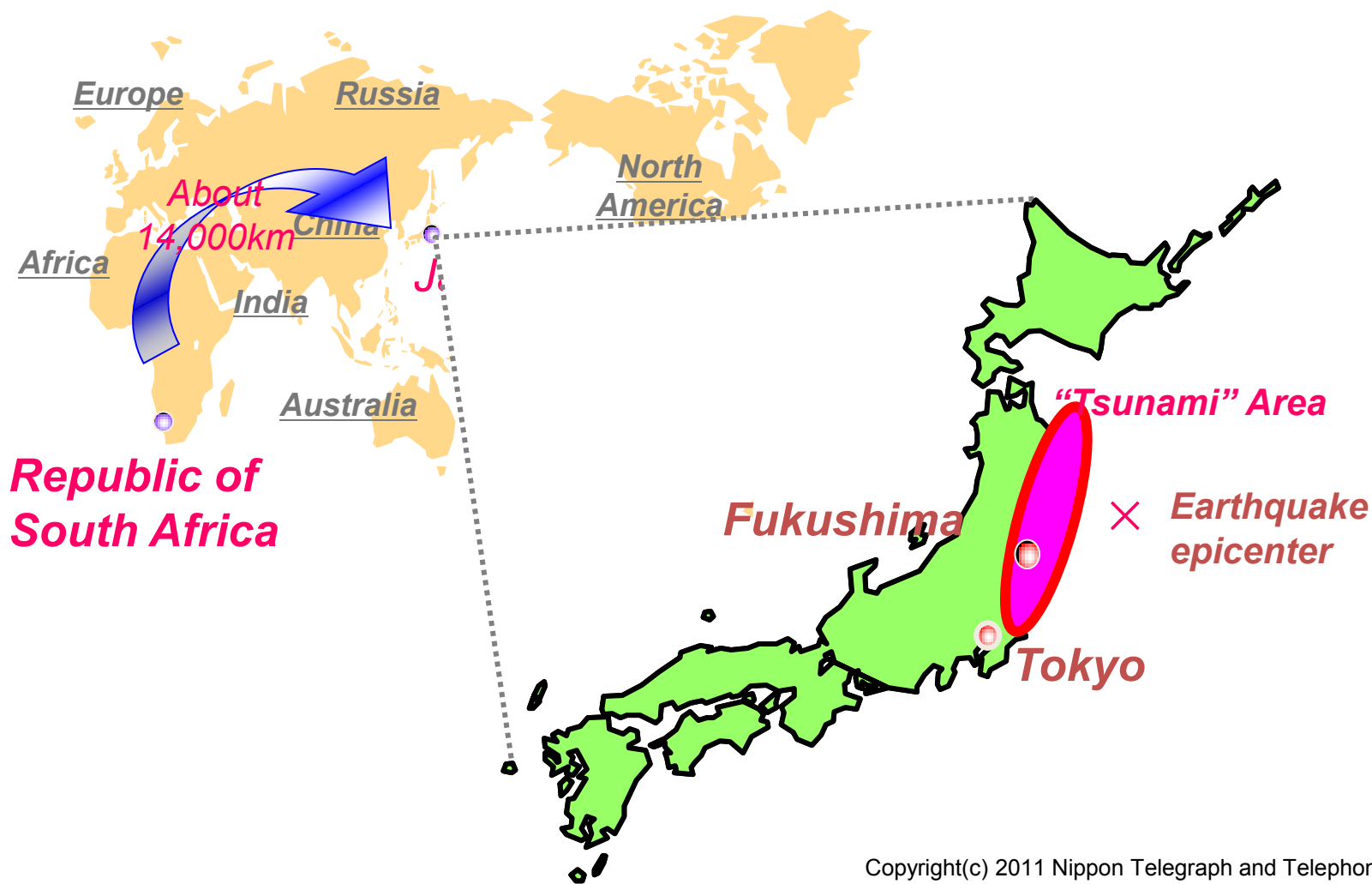
2. Major Restoration Efforts

3. Main Activities for Securing Means of Communication, Efforts in Providing Life Support to the Affected People

4. Major Countermeasures against Future Disaster

Occurrence of the Great East Japan Earthquake Disaster

At 2:46 p.m. on March 11, 2011, a great earthquake of magnitude 9.0 with its epicenter off Oshika Peninsula, Miyagi, hit East Japan, accompanied by a huge tsunami assaulting the coasts of the northeastern Pacific Ocean



Occurrence of the Great East Japan Earthquake Disaster



Fukushima Nuclear Power Plant



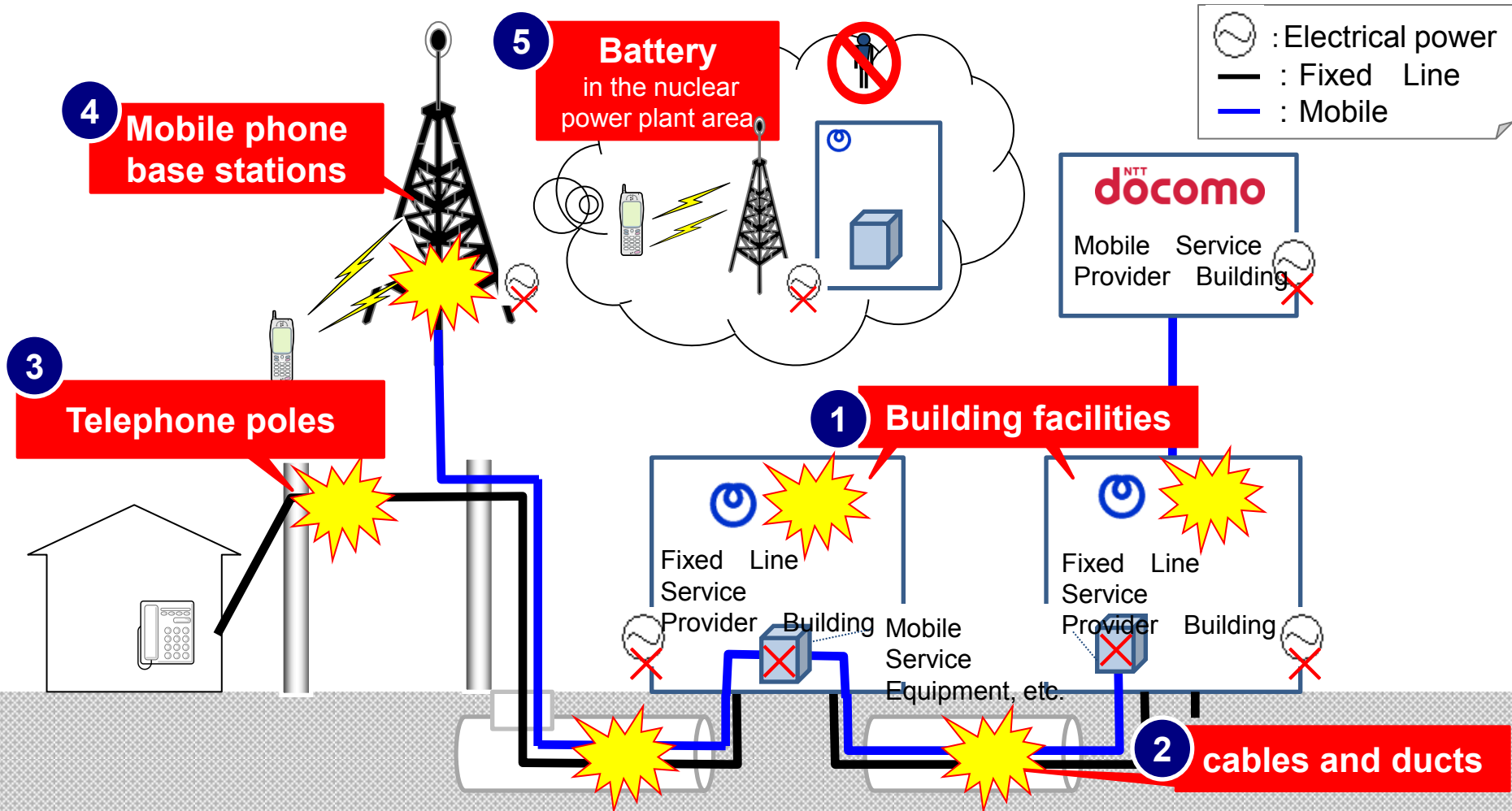
Example of Damage from the Tsunami



On the day of the disaster (left) and the night of the disaster)
Next day week after the disaster

Damage Condition of Communication Facilities

- Many exchange office buildings and facilities were affected by the large-scale earthquake and tsunami.
- Further damage was caused due to depletion of battery capacity associated with the prolonged disruption in commercial power supply.



① Building facilities

Before tsunami



Satellite photo



The building was found here

Original site of NTT Tokura Building

The building was carried 500 m away from its original site

Tokura Building afloat on the sea



Tsunami carried away Shichigahama Building



Tsunami carried Tokura Building to the sea

② Relay transmission lines (cables and ducts)



Kesen
Bridge

Conduits broken as the Kesen Bridge collapsed (Iwate)

③ Telephone poles



④ Mobile phone base stations



Damage to poles and a mobile phone base station (Miyagi)

Damage Status and Financial Impact

Damage status

March 31, FY2011

March 31, FY2012
(Estimation)

■ Damage to exchange office buildings



Demolished: **16 buildings**
Flooded: **12 buildings**

■ Damage to telephone poles



- Washed away/collapsed: approximately **28,000 poles** (coastal areas)

■ Transmission lines and switchboards washed away



- Transmission lines: **90 routes** disconnected (excluding the nuclear power plant area)
- Washed away/damaged aerial cables: approximately **2,700km** (coastal areas)

■ Damage to base stations



- Number of stations requiring restoration: **375 stations** (including 68 stations within a 30km radius of the nuclear power plant)

Approximately
260 million USD

(profit/loss)

Approximately
320 million USD
(CAPEX)

230 million USD

(profit/loss)

Approximately
80 million USD

(profit/loss)

Approximately

65 million USD
(CAPEX)

130 million USD

(profit/loss)

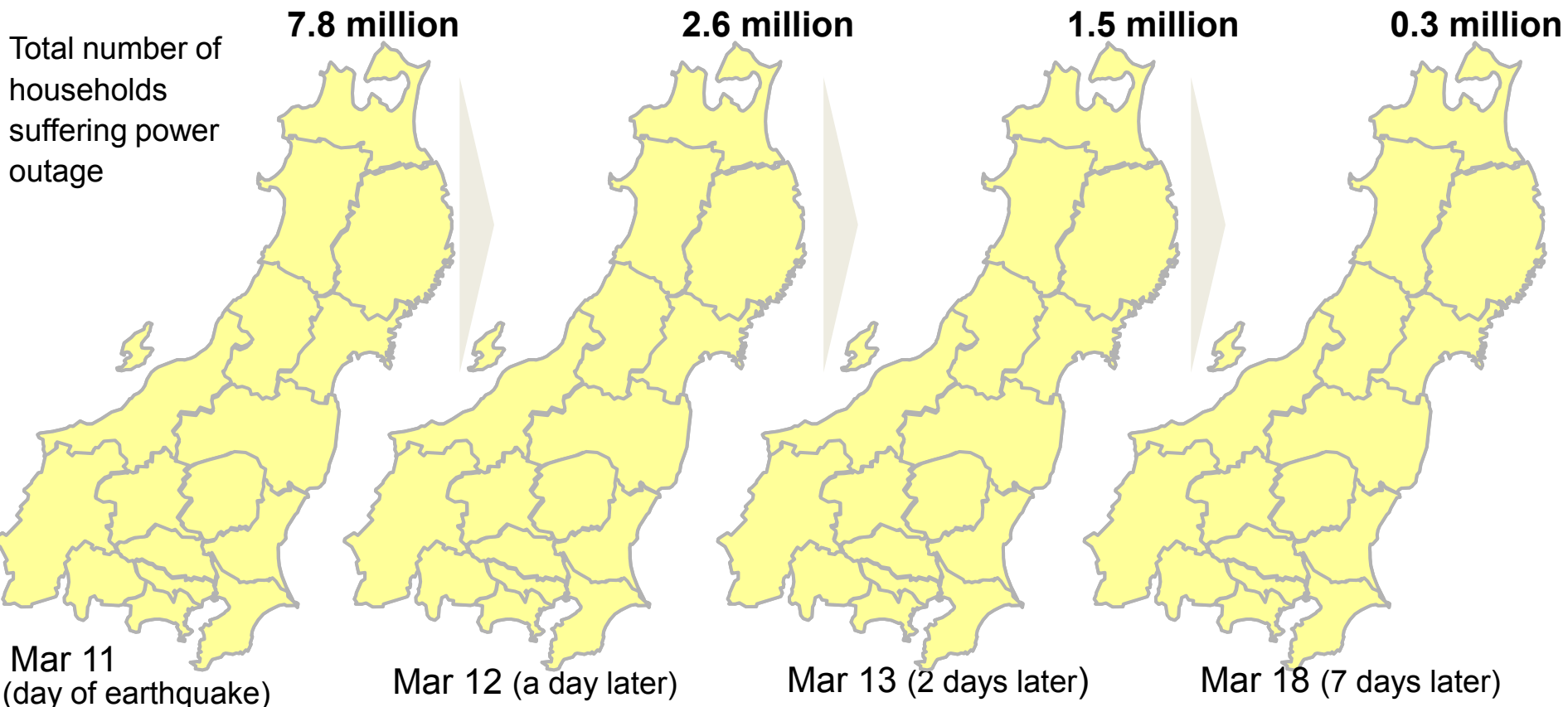
NTT East

NTT docomo

Occurrence of Widespread Power Outages

Widespread, prolonged power outages occurred in and around northeastern Japan due to damage to generation plants, substations, and power distribution facilities caused by the earthquake and tsunami.

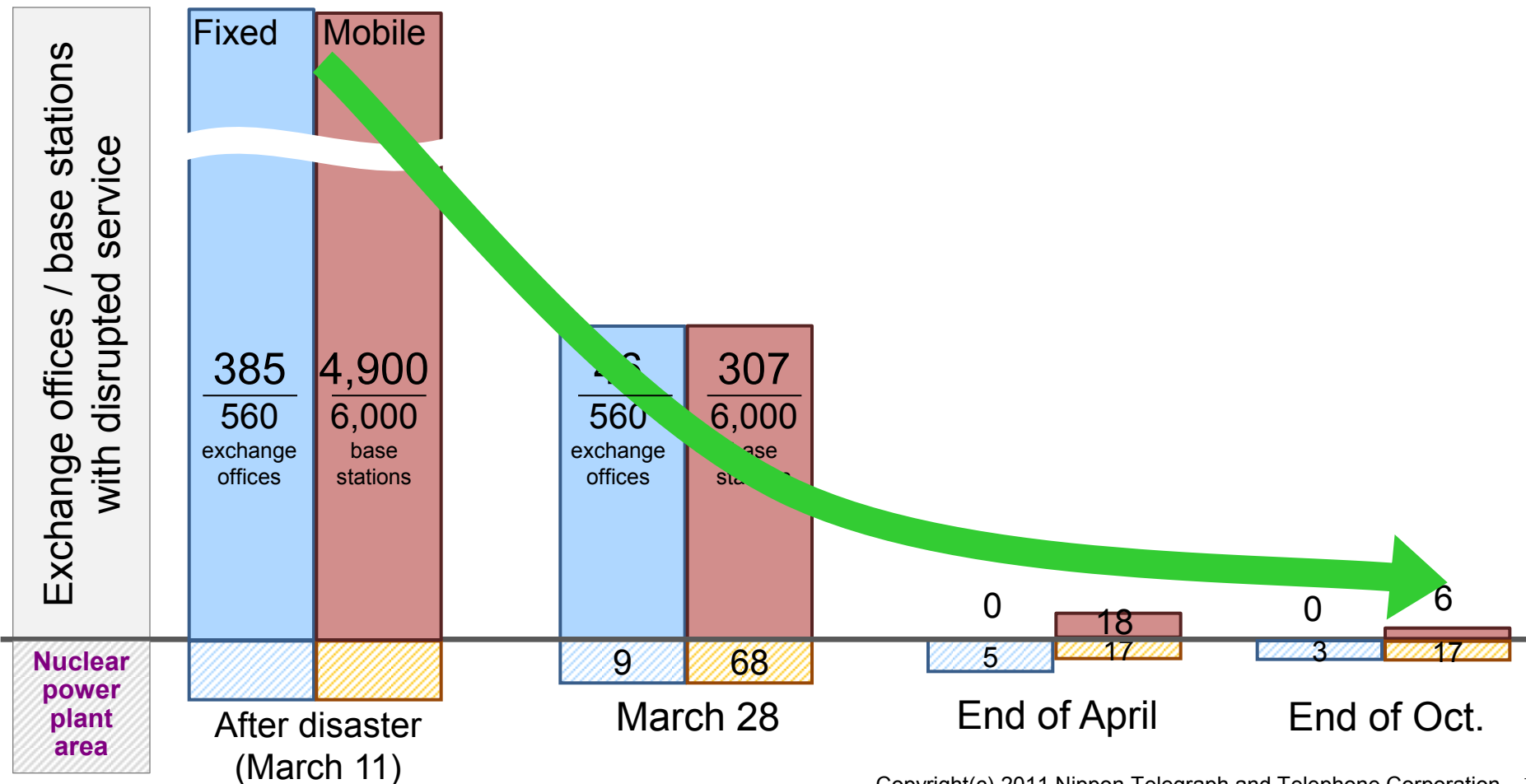
Power outage impact in terms of the number of households affected in prefecture



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Restoration Status

- By end of April, all exchange offices and base stations in currently inhabited areas had been largely restored
- We will restore the communication facilities in the nuclear plant area and currently difficult-to-live areas as roads and other infrastructures there are restored.



Restoration method

Detail of restoration

1 Restoring exchange offices

■ Install “Outdoor cabinet” in severely damaged buildings.

2 Securing transmission lines

■ Emergency restoration by connecting damaged sections and newly creating temporary aerial rerouting lines.

3 Access zone restoration

■ Install immediately metal and optical fiber cables using materials stocked for planned constructions, etc.

4 Restoring mobile base stations

■ Install stopgap optical fiber, use microwave transmission and satellite circuits.
■ Use large zone scheme, a method that covers areas normally covered by multiple stations with a single station.

5 Restoration in the nuclear power plant area

■ Restoration of the function at the Iwaki Tomioka Exchange Office, located approximately 10km from the plant, replacement of transmission line.
■ Coverage restoration by using high-performance antenna and deployment of satellite mobile base station vehicle.

Examples of Restoration Efforts

1 Restoration of exchange offices

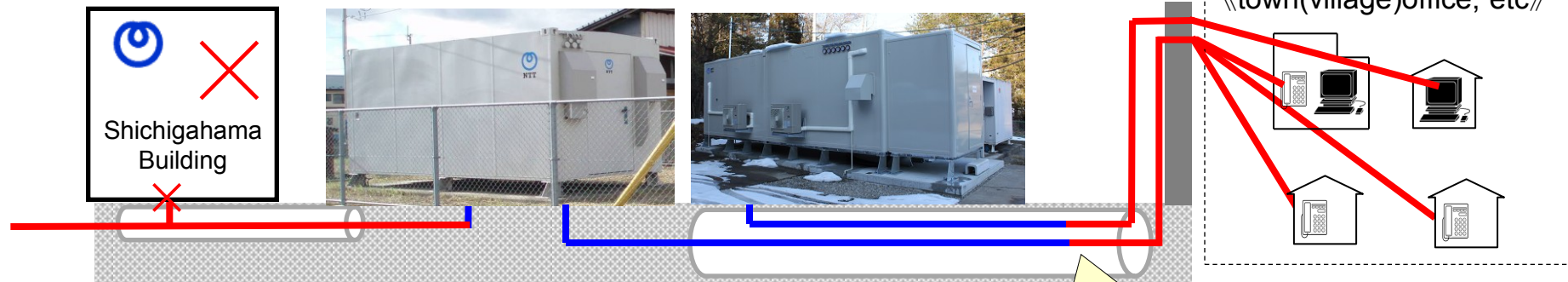
Since the whole Shichigahama Building had been lost to floods, Outdoor-use circuit switch was installed at the building's original site.

By suspending existing renewal and installation plans, equipment originally scheduled for a different use are to be diverted for use at the site.

**Outdoor cabinet
For narrow-band service
(PSTN, circuit line, ...etc.)**

**Outdoor cabinet
For broad-band service
(internet, VPN, ...etc.)**

《town(village)office, etc》



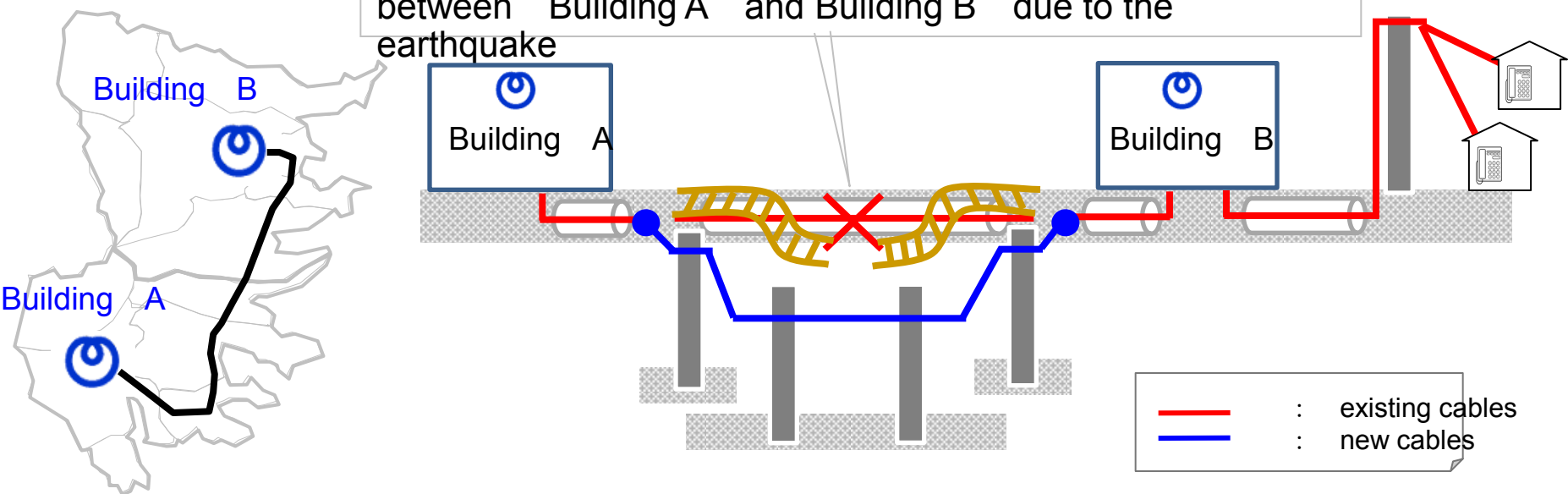
— : existing cables
— : new cables

New cables will be installed to connect with existing cabling

2 Restoration of transmission lines (from Building A to Building B, Iwate Pref.)

Establish backup relay routes or switch routes to achieve connectivity at disrupted points or to bypass damaged relay transmission lines. Therefore main relay transmission lines to be secured.

Disconnection of the relay transmission line connecting between Building A and Building B due to the earthquake

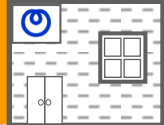
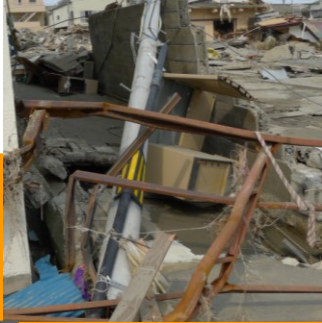


Examples of Restoration Efforts

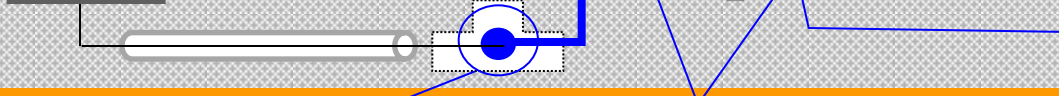
3 Restoration of access zone

Telephone poles and cables had extensive damages caused by tsunami. After the removal of debris, communication services were restored by installing telephone poles and laying out and connecting cables to residential areas.

Damaged telephone poles



Flooded area



[Step 3] Connections in manholes



[Step 4] Connections of aerial cables



[Step 1]

After the removal of debris, telephone poles were erected and tow cables were laid



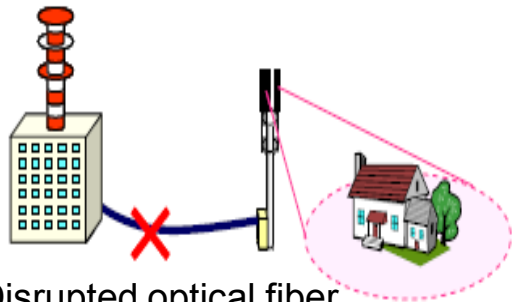
[Step 2] Installation of aerial cables



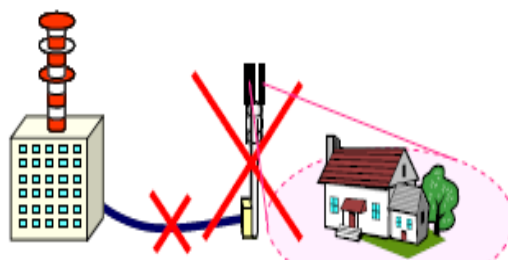
4 Restoration of mobile base stations

Most mobile base stations have been restored by using microwave transmission, satellite circuits and actively apply large zone scheme* in high-elevation base stations.

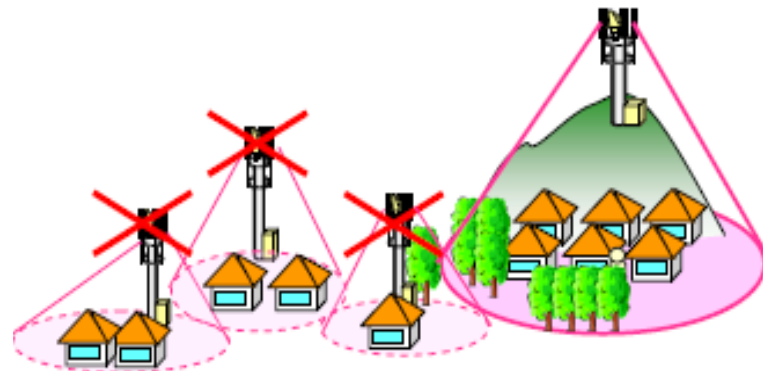
* a method that covers areas normally covered by multiple stations with a single station



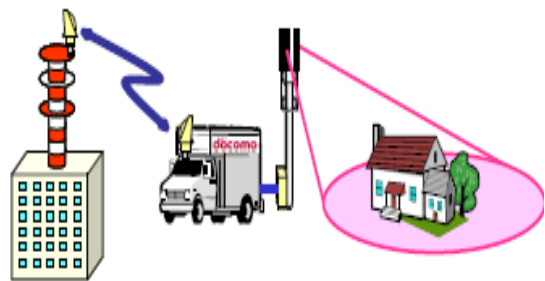
Disrupted optical fiber



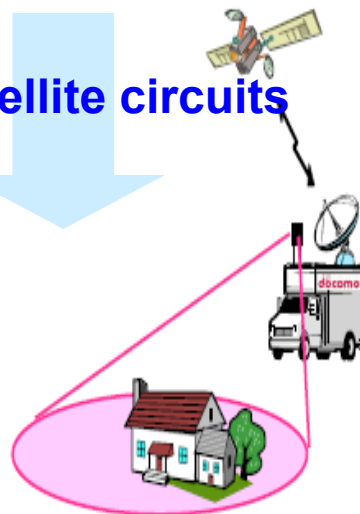
Disrupted optical fiber,
damage from tsunami



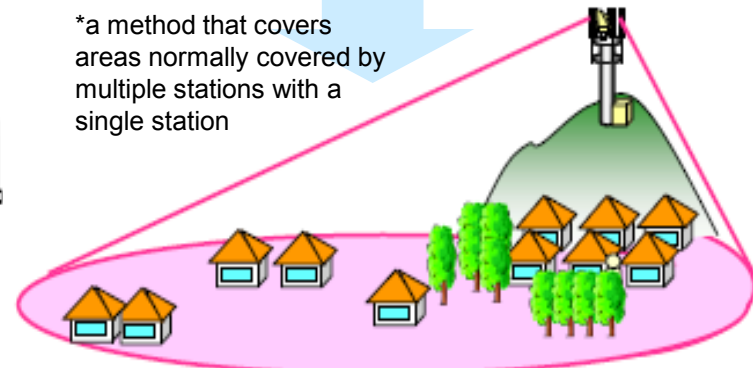
Microwave transmission



Satellite circuits



Large zone scheme*



*a method that covers
areas normally covered by
multiple stations with a
single station

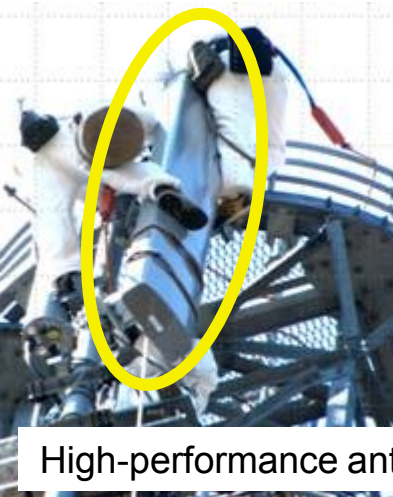
Examples of Restoration Efforts

5 Restoration in the nuclear power plant area

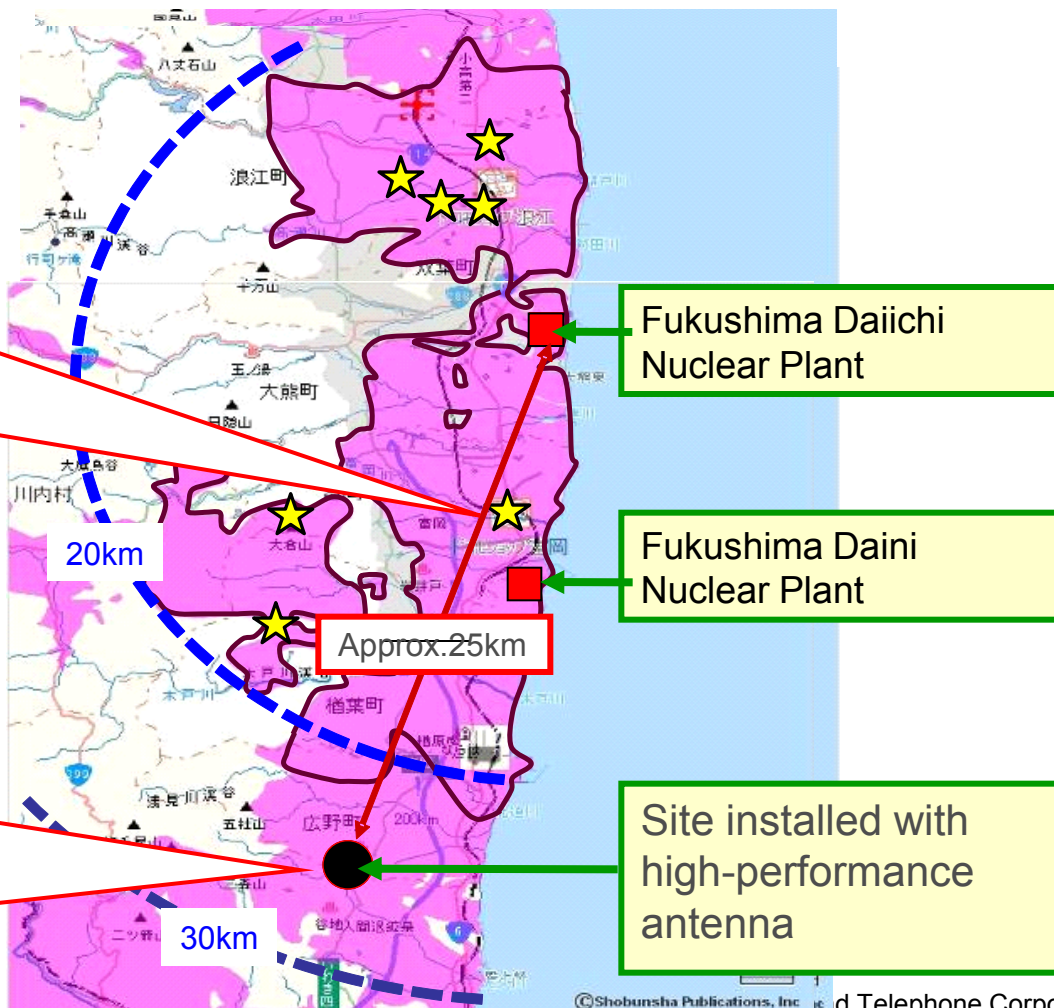
At our request, Tokyo Electric and Tohoku Electric Power Companies restored power supply to the building, and we conducted restoration work there. As a result, the capability of the 6 buildings was restored, and some links to mobile phone base stations were also restored.



Work in the Iwaki Tomioka Exchange Office



High-performance antenna



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Main Activities for Securing Means of Communication

- Installation of special public phones using portable satellite equipment (approx. **3,900** phones)



- Rental of free satellite mobile phones (approx. **900** units)

Portable satellite phone 01



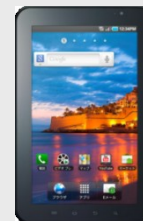
- Deployment of free Internet booths (approx. **410** locations)



- Rental of free mobile phones (approx. **2,100** units)



- Rental of tablet devices (approx. **670** units)



- Installation of free battery recharging station (approx. **410** stations)



Main Activities for Securing Means of Communication

Disaster emergency message dial



approx. 3.5 millions

Disaster emergency broadband message board



approx. 0.3 millions

Disaster message board



approx. 4.5 millions

Saving messages from people in damaged area

NTT East staff members deliver messages, on behalf of affected people, to their families, and if the family members are away from home, NTT East registers their messages on the Disaster Emergency Message Dial on their behalf.

NTT East staff



- Contact on the phone
- Register messages on the Disaster Emergency Message Dial
- Provide information to mass media
- Provide information on Web site

message



NTT East staff



Safety confirmation



Evacuation shelters

approx. 3,000 messages

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4. **Major Countermeasures against Future Disaster**

① Develop disaster-resistant networks and prompt recovery methods

- Distribute key functions across regions and implement multiple routes in preparation against wide-area disasters
- Improve power capacity to withstand widespread and long-term power outages

② Promptly reconnect local relief sites

- Increase the use of satellite and wireless communications

③ Secure means of information sharing after disasters

- Communication needs directly following a disaster, such as confirmation of safety (Strengthen means to meet countermeasures against congestion)
- Strengthen means to meet the diversification of customer needs, which are shifting from using voice communications to using email and the Internet

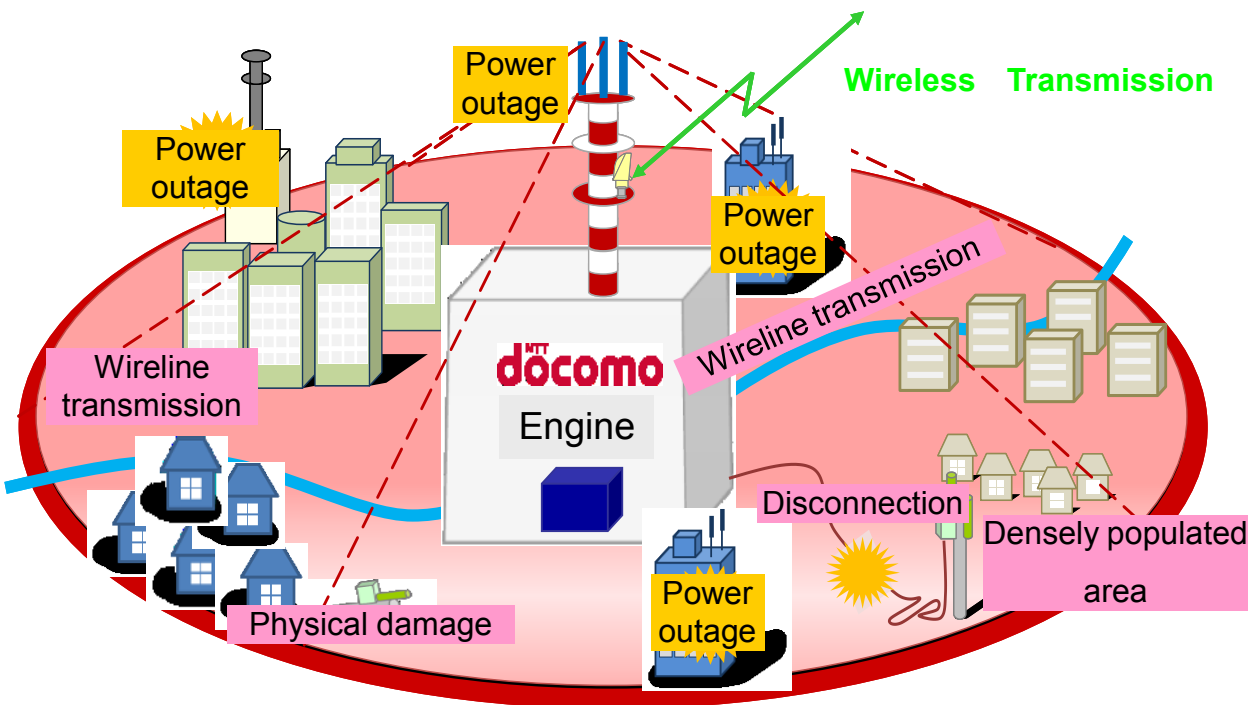
④ Provide services and solutions useful during a disaster or recovery phase

- Support of municipalities, schools, remote medical care, etc.

Where solutions cannot be provided by the NTT Group alone, we will collaborate with the central and regional governments.

Large-zone Base Stations

- Construct new large-zone base stations, in addition to normal base stations, to secure communications over densely populated areas efficiently in the event of a disaster resulting or power outage. (104 large-zone base stations, covering approx. 35% of the population)
- Ensure high reliability by adopting uninterruptible power supply systems and duplicate transmission routes



Large-Zone Antenna



Nagoya



Gifu

Completed at 28 Sep.

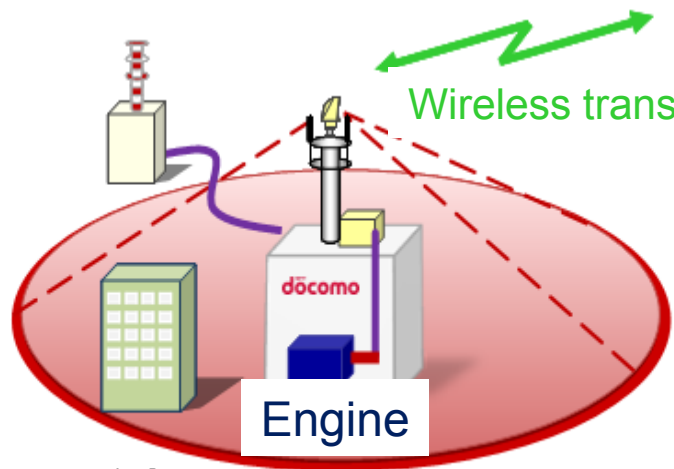
Plan to complete Dec. 2011

Measures against Power Outage

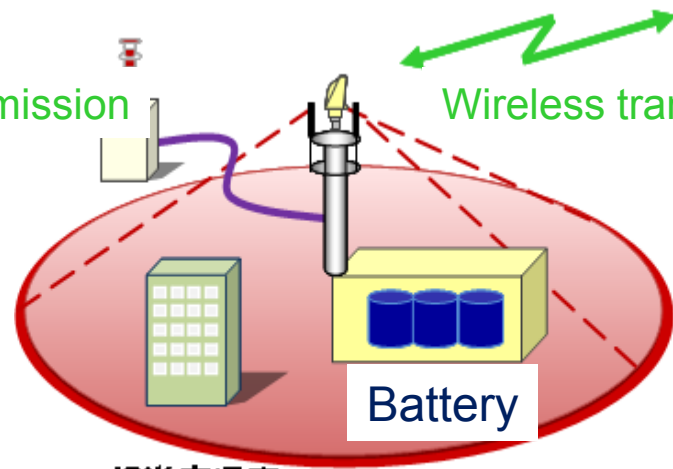
Promote use of uninterruptible power supply systems, and extend battery life to 24 hours in base stations to secure communications for prefectural/municipal offices, etc. (approx. 1,900 base stations, covering 65% of the population)

<Base stations in NTT docomo's buildings>
Engine-driven uninterruptible power supply (approx. 800 stations)

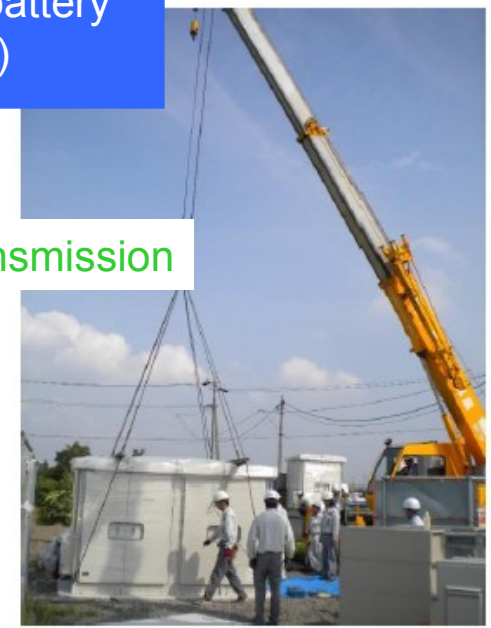
<Tower base stations>
24-hour power supply from battery (approx. 1,100 stations)



Prefectural/municipal government offices, etc.



Prefectural/municipal government offices, etc.



Deploy extend batteries from Tokay area.

Promote installation and use of satellite communication (telephone, the Internet) to ensure swift restoration of communication in regional disaster relief centers, such as evacuation centers

Reinforce current systems

- Increase number of satellite phones
- Increase number of transportable base stations that use satellite communication



Enhance current systems

- Increase mobility (enhance operational functions, reduce size)



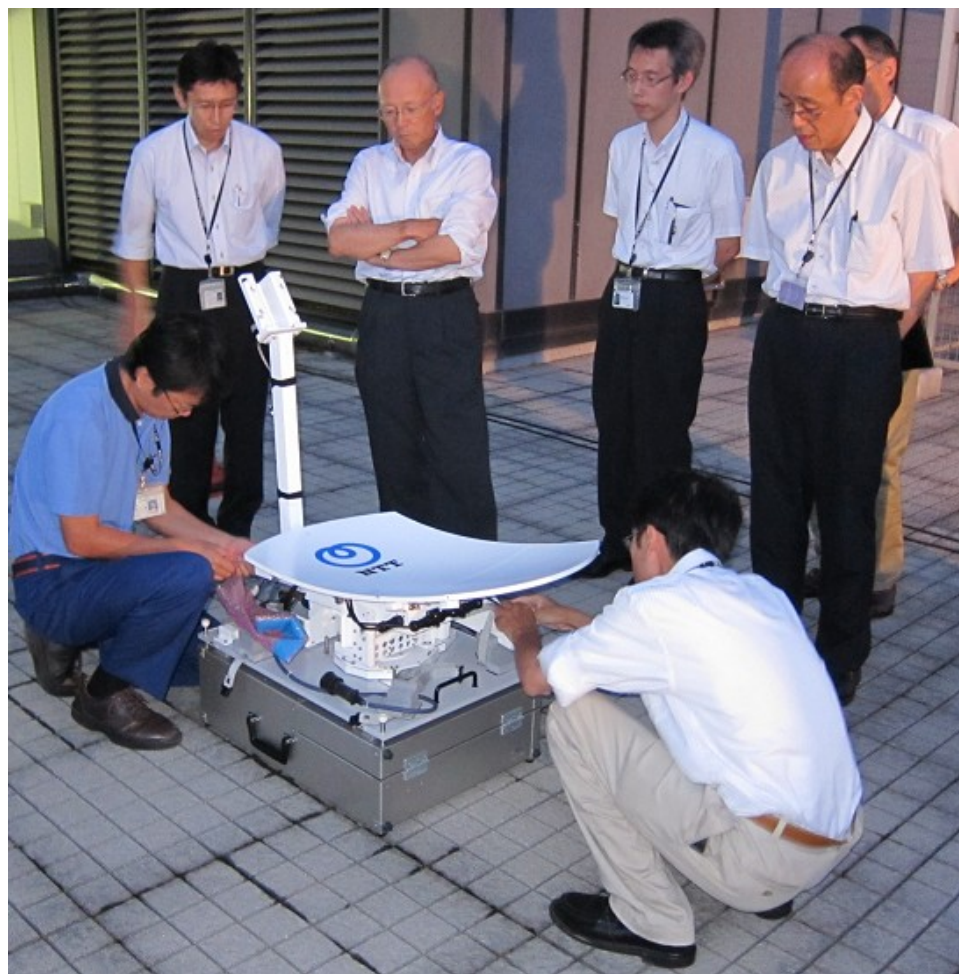
Introduce technical innovation

- Develop a new anti-disaster satellite system (supporting broadband access)
- Study future satellite systems

Both the public and private sectors need to work together in a study on the cost sharing of base stations for emergency communication, and a study on future satellite systems.

Compact Earth Station for Satellite Communication

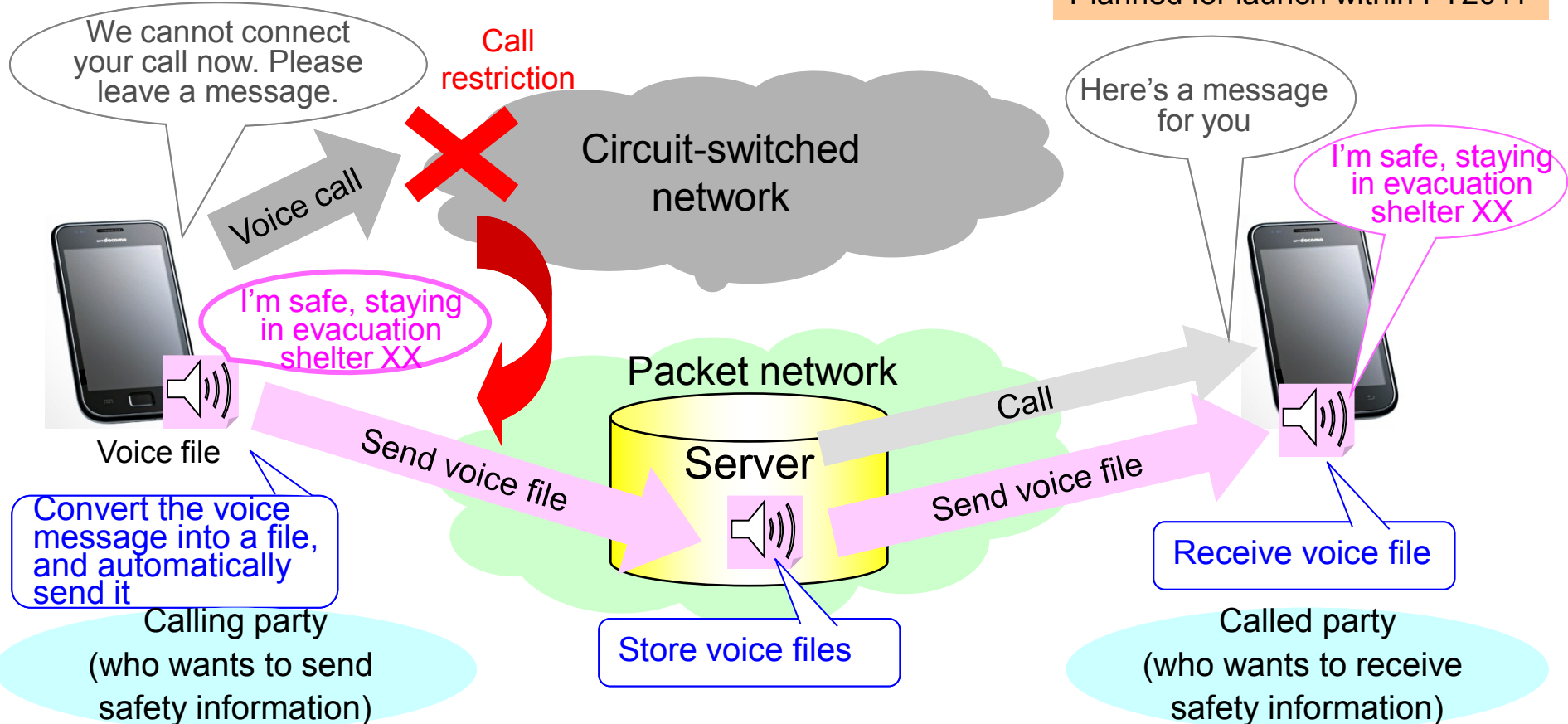
Under Development



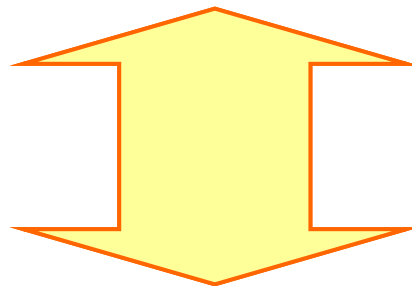
In the event of a disaster, massive call origination congests the circuit-switched network, making it difficult to get calls through. We are developing a service that converts a voice message into a file and sends it to the called party over a packet network.

Service overview

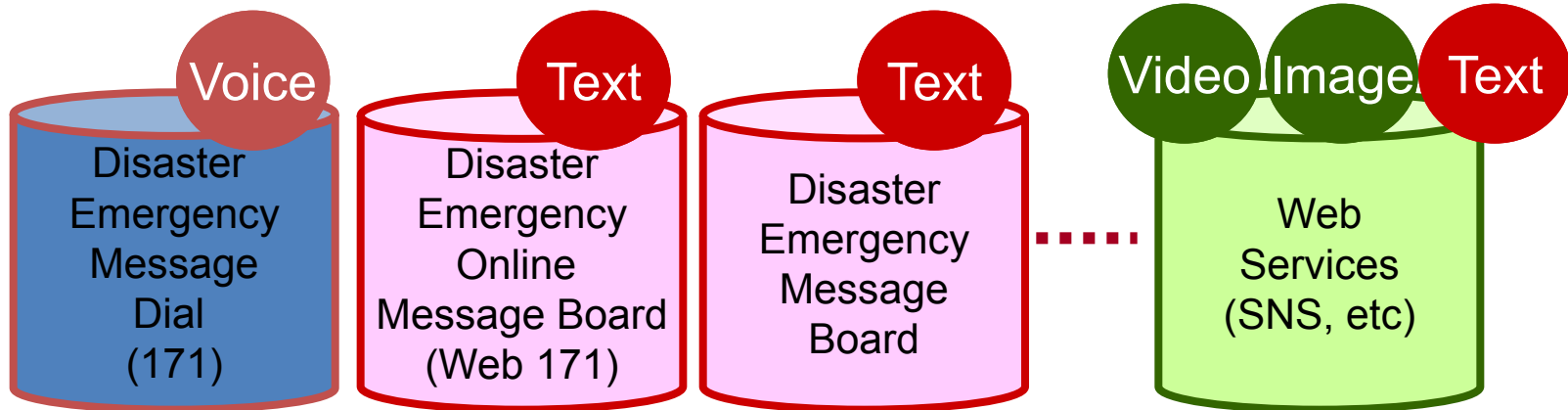
Planned for launch within FY2011



Multi-terminal



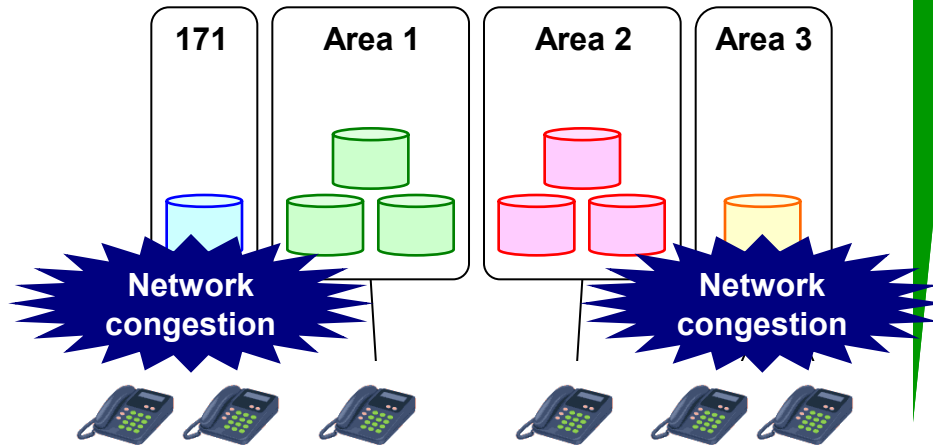
Cross-media
Wide range of sources



Implementation of virtual network technology into call control servers, which provide real-time and highly reliable services such as telephone, can handle rapid increase of traffic in case of emergency, because its network resources are allocated dynamically.

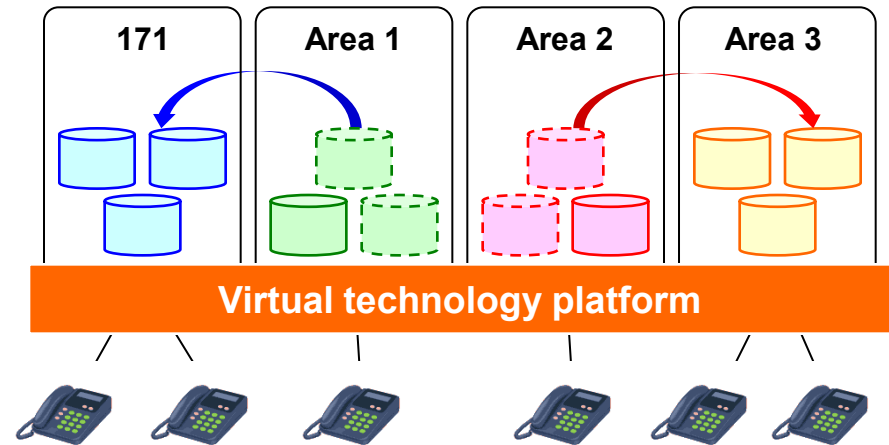
Existing network

Existing network can NOT handle rapid increase of traffic in emergency, because its network resources are allocated statically.



Virtual technology based network

Virtual technology based network can handle rapid increase of traffic in emergency, because its network resources are allocated dynamically.



Thank you

