NTT Group
CSR Report 2013

NTT Group

Based on the content of the NTT Group CSR Report website that provides a comprehensive account of our CSR activities (available in Japanese only), we publish a printed report that we position as a digest edition (available in Japanese only), and this PDF version, CSR Report 2013.

For the theme of our Special Feature, we chose "Towards the Next Stage", the Medium-Term Management Strategy that we announced in November 2012, and arranged a talk between an outside guest and the NTT Group director in charge of CSR to explain the relationship between our management strategy and CSR in an easy-to-grasp form.

We also report on the progress made in implementing our most important initiatives, particularly our NTT Group CSR Priority Activities, in line with the four goals of the NTT Group CSR Charter.

We publish this report in both printed and Web versions according to the respective features of these media so as to better address the needs of our stakeholders.

Reporting scope

Period: April 1, 2012 to March 31, 2013
- Certain activities implemented after March 31, 2013 and outlook for the future are also included.

Organization: NTT and the NTT Group companies (827 companies)
- The figures given for the NTT Group in fiscal 2013 are tabulated from figures for NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO, NTT DATA and their group companies (827 companies). The scope of specific reports is noted in relevant areas.
- Organization names are current as of March 31, 2013. However, some organization names are from fiscal 2014.

Month published: December 2013
Previously published: December 2012
Next report: December 2014 (provisional)

Reference guidelines:
This report has been created with reference to the GRI (Global Reporting Initiative) Sustainability Reporting Guidelines Version 3.1 and the Ministry of the Environment's Environmental Reporting Guidelines FY2012 Version.

About the contents

- In this report, NTT refers to NIPPON TELEGRAPH AND TELEPHONE CORPORATION, NTT Group refers to NTT and its group companies, and NTT [name] refers to individual companies within the NTT Group. For the subsidiaries of major group companies other than NTT, the name of the major group company to which they belong is shown. (For example, NTT Resonant is shown as belonging to NTT Communications.)

- Should any errors be found in this report after publication, a report and table of errata will be provided on our website.

- The contents of this report refer not only to past events, but also cover future plans and forecasts at the time of publication. Such descriptions include assumptions and judgments based on information that was available at the time of printing. Please note that actual future activities and results may differ from those described herein.

- The names of services and products appearing in this report are the registered trademarks or trademarks of NTT and NTT Group companies.

About the report media

Focus on new and important initiatives

We edit the printed report with the aim of presenting the highlights of our CSR activities in a way that will be easily readable to a wide audience.

Importance to stakeholders

High

Printed report
(in Japanese only)

High

Importance to the NTT Group

Website
CSR website /
CSR Report website

Comprehensive presentation of diverse activities along with detailed data

We leverage the capacity and searchability of the Web as a medium to report on a wide range of activities in as much detail as possible.

CSR website (updated as occasion demands)

http://www.ntt.co.jp/csr_e/

We regularly update our CSR website to provide the latest information on NTT Group CSR activities in a timely fashion. The latest information can be seen in the Topics section on the top page of the site.

CSR Report 2013 website (updated once a year)

http://www.ntt.co.jp/csr_e/2013report/

**CSR Report 2013
(this PDF file)**

About the CSR website:

The CSR website has been designed according to NTT official homepage guidelines and evaluated by NTT CLARUTY employees with visual, hearing and other disabilities. NTT CLARUTY applied its accessibility checklist to the design of the website to help ensure that it is accessible to elderly users and people with disabilities.

CONTENTS

We are working as one team to fulfill our corporate social responsibility and contribute to the sustainable growth of society as a Value Partner.

Earning trust as a "Value Partner"

Together with the spread of smartphones, tablets and other devices, the wider bandwidth resulting from the deployment of optical fiber and LTE services is driving the growth of social media and cloud computing in the information and communication technology (ICT) market. With various businesses in addition to telecommunications carriers entering the market in conjunction with these developments, we are witnessing the rapid evolution of an increasing array of sophisticated services.

In the light of these changes, we released a new Medium-Term Management Strategy, "Towards the Next Stage", in November 2012. We aim to accelerate our global development by focusing in particular on cloud services, the most promising growth area. We will support our corporate clients in their efforts to transform their business models and our individual customers in creating diverse lifestyles by providing services designed to be "Suitable (for customers' needs)", "Simple (convenient)" and "Secure (safe)".

Through these initiatives, we aim to contribute to the sustainable growth of society by serving as a "Value Partner" that earns the trust of its stakeholders.

Leveraging ICT to address social issues

I believe that it is our mission and corporate social responsibility as the NTT Group to contribute to the resolution of social issues both within Japan and in the world at large through leveraging ICT.

The Great East Japan Earthquake of March 2011 made us more than ever aware of the role of telecommunications as a lifeline in the event of a disaster, and of the importance of enabling people to connect with each other in any contingency. Based on our experience of the disaster, we are improving the quake resistance and flood defenses of our communications buildings, reviewing trunk line routes, reinforcing power supply equipment, and building up our stock of disaster response equipment. We are also conducting advanced research and development aimed at creating even more disaster-resistant networks and services.

In 2010, we drew up THE GREEN VISION 2020 as our new vision for reducing global environmental impacts. Under this vision, all of our employees are working together on initiatives to create a low carbon society, implement closed loop recycling and conserve biodiversity.

We envisage the creation of eco-friendly smart communities (next-generation energy and social infrastructure) by leveraging ICT to help save energy, for example by driving the visualization of electricity consumption in the offices and homes of our customers.

I think that promoting initiatives built on cloud services as proposed in our Medium-Term Management Strategy is another area in which NTT Group can offer solutions to today's societal issues, including the resolution of Japan's infrastructure crisis, the provision of sufficient healthcare and nursing care for Japan's increasingly aging society, and better governmental services and education, to name just a few.

Regarding the infrastructure crisis, we can help to make aging tunnels, bridges, expressways and other infrastructure safer by developing systems that combine sensors, wired/wireless networks and big data processing technologies to monitor and manage such infrastructure. We are also making such technologies available to emerging economies facing the same infrastructure issues.

I feel that these initiatives could make a very meaningful contribution to the sustainable development of society.
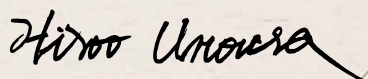
Together with our stakeholders

To implement common CSR initiatives across the Group based on our NTT Group CSR Charter, we drew up eight NTT Group CSR Priority Activities in fiscal 2009, and from fiscal 2012, started to set common groupwide quantitative indicators. With the completion of this process for all eight Priority Activities in fiscal 2013, we have further integrated CSR initiatives with the businesses of group companies, enhancing groupwide activities as a result.

We also established our Basic Policies on Human Rights in June 2012. We are opposed to any form of discrimination, and have been tackling a wide range of human rights issues. We now take a more active approach to respect for human rights in the light of growing worldwide awareness of their importance, and aim to meet the objectives of the core components of the ISO 26000 international standard for social responsibility with the group-wide implementation of our Basic Policies.

We will intensify our efforts to fulfill all aspects of our corporate social responsibility as a global ICT enterprise and Value Partner so as to contribute to the sustainable development of society.

We will continue to put priority on communication with our stakeholders moving forward, and we hope that you will help us improve by offering your candid views and suggestions.

Hiroo Unoura
President & CEO
NIPPON TELEGRAPH AND TELEPHONE CORPORATION

Overview of the NTT Group (as of March 31, 2013)

Name: NIPPON TELEGRAPH AND TELEPHONE CORPORATION (NTT)

Head office: 3-1, Otemachi 2-chome, Chiyoda-ku, Tokyo 100-8116, Japan

Date of establishment: April 1, 1985

Common stock: ¥937.95 billion

Number of employees: 2,907 (227,168 employees on a consolidated basis)

Number of consolidated subsidiaries: 827

Website: http://www.ntt.co.jp/csr_e/
(For additional information including details of management strategy: http://www.ntt.co.jp/about_e/)

Strengths

Fortune Global 500 **32nd**

Moody's **Aa2**

S&P **AA**

Business overview

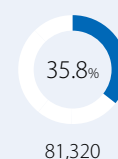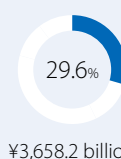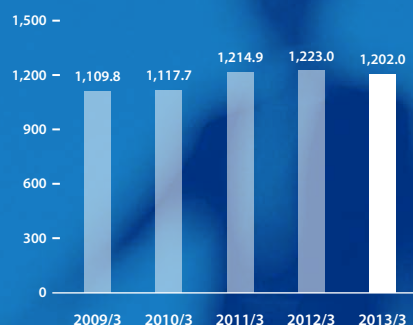|			Operating revenues[1]	Number of employees[2]
Regional communications business	Domestic intra-prefectural communications services and related ancillary services • Capital investments: ¥785.9 billion • R&D expenses: ¥118.5 billion • **Main companies: NTT East, NTT West** 　Also 78 other companies		29.6% ¥3,658.2 billion	35.8% 81,320
Long distance and international communications business	Domestic inter-prefectural communications services, international communications services, solutions and related services • Capital investments: ¥147.5 billion • R&D expenses: ¥15.6 billion • **Main companies: NTT Communications, Dimension Data** 　Also 268 other companies		13.4% ¥1,657.9 billion	14.7% 33,434
Mobile communications business	Mobile phone services and related services in Japan and overseas • Capital investments: ¥753.7 billion • R&D expenses: ¥111.3 billion • **Main companies: NTT DOCOMO** 　Also 180 other companies		36.2% ¥4,470.1 billion	10.5% 23,890
Data communications business	System integration and network system services in Japan and overseas • Capital investments: ¥122.1 billion • R&D expenses: ¥12.1 billion • **Main companies: NTT DATA** 　Also 216 other companies		10.6% ¥1,303.5 billion	27.0% 61,369
Other businesses	Real estate, finance, construction and electric power, system development and leading-edge technology development • Capital investments: ¥160.8 billion • R&D expenses: ¥132.7 billion • **Main companies: NTT FACILITIES, NTT COMWARE, NTT Urban Development** 　Also 76 other companies		10.2% ¥1,257.6 billion	12.0% 27,155
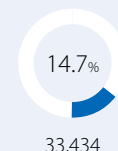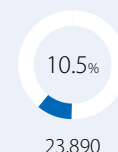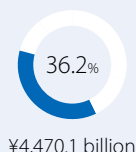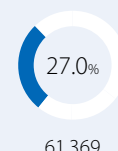
1. Percentage of the simple sum of all segments (including intersegment transactions)　2. Percentage of total NTT Group employees

Operating revenues

	2009/3	2010/3	2011/3	2012/3	2013/3
	10,416.3	10,181.4	10,305.0	10,507.4	10,700.7

Operating income

	2009/3	2010/3	2011/3	2012/3	2013/3
	1,109.8	1,117.7	1,214.9	1,223.0	1,202.0

Net income

	2009/3	2010/3	2011/3	2012/3	2013/3
	538.7	492.3	509.6	467.7	524.1

(in billions of yen)
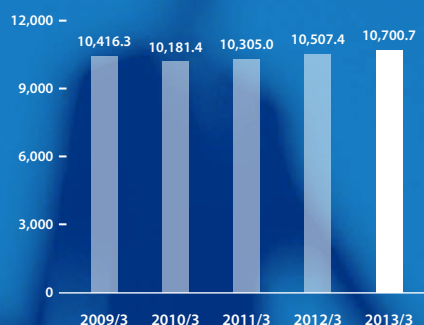
Main group companies

NTT EAST   NTT WEST

Regional communications business

NTT East and NTT West provide individual and corporate customers in NTT's East Japan and West Japan regions with a wide range of telecommunications services including fixed lines and Internet access for personal and business use. They aspire to provide stable, high quality universal services, while also pursuing fiber optic services and other solutions that contribute to local economic development.

NTT Communications

Long distance and international communications business

In addition to domestic long distance and international communications services, NTT Communications provides ICT solutions and services throughout the world, and is aiming to become a leading global ICT player.

dimension data

Long distance and international communications business

Dimension Data is a specialist IT services and solutions provider that helps clients throughout the world to plan, build, support and manage their IT infrastructures.

docomo

Mobile communications business

As a mobile communications operator, NTT DOCOMO aims to create a new communication culture through the provision of Xi (crossy), FOMA, international, satellite phone and other services.

NTT DaTa

Data communications business

In addition to its system integration business, NTT DATA is expanding its services and software business. It aims to become a true global business partner by building the structure required to provide coherent one-stop support in Japan and overseas to customers expanding their business globally.

NTT FACILITIES

Other businesses

NTT FACILITIES provides comprehensive engineering services that combine ICT, energy and construction, as well as one-stop planning, design, construction and maintenance of buildings and electrical equipment.

NTT COMWARE

Other businesses

NTT COMWARE supports system aspects of building communications infrastructure through its three core competencies of network technology, systems and applications, and support and maintenance services.

NTT 都市開発   NTT Urban Development Co.

Other businesses

NTT Urban Development focuses principally on the two areas of office space leasing and sales of its WELLITH brand of condominiums and other real estate, but is also involved in commercial facilities, rental housing, real estate solutions and other businesses.

Innovation that contributes to the resolution of social issues

Pursuing research and development of technology that benefits all of society

To help the NTT Group to achieve its mission of contributing to the creation of a prosperous society through providing communications services that meet everyone's needs, NTT R&D aims to develop cutting-edge technologies, products and services that contribute to the resolution of global social issues and the advancement of society, science and industry.

NTT R&D is endeavoring to help create a richer future by pursuing research and development of technology that benefits all of society. More specifically, we aim to help create a truly sustainable society through R&D in three areas, namely pliant ICT services that bring people closer together, autonomous ICT that has both the reliability and speed to connect people with each other promptly whenever they want to, and green ICT that combine environmental technology with ICT to help create new social systems.

NTT R&D initiatives

NTT R&D's approximately 2,500 researchers carry out a very broad range of research and development, from basic research to R&D that directly supports the business growth of group companies. NTT has three laboratory groups: the Information Network Laboratory Group, Service Innovation Laboratory Group, and Science and Core Technology Laboratory Group. The researchers belonging to these groups conduct research respectively on next-generation network (NGN) platform technologies, the innovative communication services that such networks enable, and world-class cutting edge basic research to develop optical and other new technologies.

As an organization that drives the growth of the NTT Group, NTT R&D creates competitive technologies and collaborates with universities, research institutes and other enterprises to spur ongoing innovation.

Comprehensive Commercialization Functions for generating business from research outcomes

In a field like ICT that is characterized by rapid change, it is important to achieve the right balance between medium- to long-term research and short-term R&D. NTT R&D formulates marketing and business plans, creates alliances and takes various other actions to bring the R&D outcomes of its laboratories to early fruition in the form of new business for NTT Group companies. Through its Comprehensive Commercialization Functions, NTT R&D actively drives the timely commercialization of research outcomes through seeking ways of combining its wide-ranging basic technologies with existing technologies and forging alliances both within the NTT Group and with other businesses and organizations outside the Group.

Existing technology and products

Identifying opportunities

Alliance strategy

Research

Research

Development of core technologies
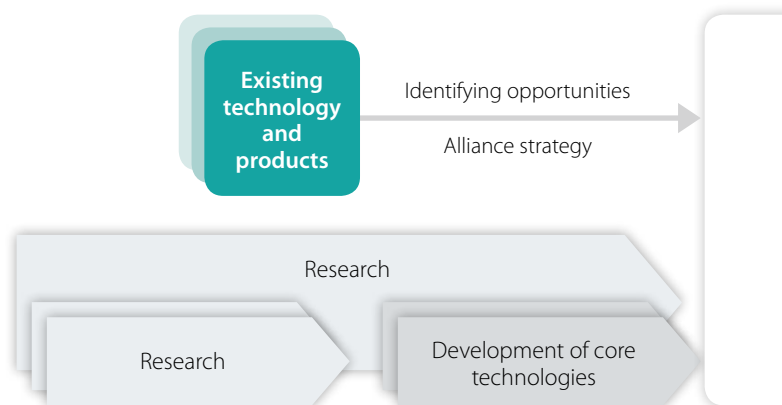
NTT R&D strengths

No.2 worldwide

25,603

Research paper citations per year (physics)

No.1 worldwide

World's fastest graph data analysis technology

No.1 worldwide

World's highest capacity petabit optical transmission

Approx. **2,500**

Number of patent applications per year

Approx. **2,500**

Number of researchers

No.1 worldwide

World's highest density optical fiber cable

Group company needs

Market trends

Comprehensive Commercialization Functions

Research and analysis of market trends

Marketing

Development planning and proposal

Market creation

Commercialization development

New business areas

Deployment (Group company business)

Welfare

Education

Healthcare

Financial services

Environment
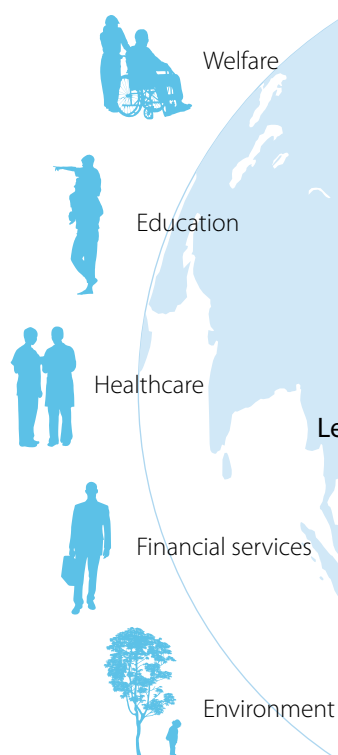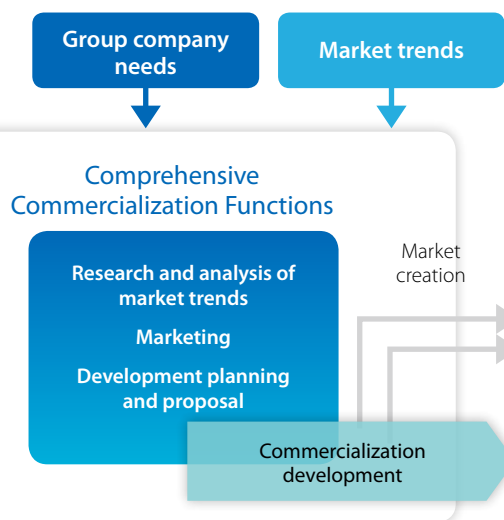
Creating a new future

Leveraging ICT to resolve social issues

From provider to Value Partner

Linking a wide range of services, connecting users and services

Leveraging our cutting edge broadband network, we will support our corporate clients in transforming their business models and our individual customers in creating diverse lifestyles. Through these endeavors, we aim to drive our evolution from a conventional provider to a "Value Partner" that will continue to be our customers' first choice.

Utilizing the world's most advanced broadband network to support corporate clients in transforming their business models and individual customers in creating diverse lifestyles

Enterprise services

Fiber-optic broadband

Mobile broadband

Personal services

To transform ourselves into a Value Partner, we will provide services designed to be "Suitable (for customers' needs)", "Simple (and convenient)" and "Secure (and safe)".

Suitable

Suitable for customers' needs

- Flexible combination of infrastructure, platforms and applications
- Appropriate service-matching support on behalf of customers

Simple

Simple and convenient

- Simple and user-friendly interface and user experience
- Meet customer demands at reasonable rates

Secure

Secure and safe

- Protect customers from security threats with leading technology and operations

I. "Global Cloud Services" as the cornerstone of NTT's business operations

Towards the New Stage, the NTT Group will enhance its cloud services and accelerate global development.

Enhancement of cloud services

As one of the world's largest data center operators (largest in Japan, and second largest globally) with the world's second-largest global IP backbone and a comprehensive range of ICT management services, applications and solutions, we possess all the strengths required to provide total cloud services. We will further leverage these strengths not only to enhance individual services, but also to transform and strengthen our overall service provision capabilities in a way that better enables us to swiftly address the various demands of our customers.

Acceleration of global development

To speed up our development of services in the highly competitive advanced technology market, we established NTT Innovation Institute, Inc. (NTT I³, pronounced NTT I Cube) in April 2013 in Silicon Valley, USA.

NTT I³ will support the growth of the NTT Group's global business from the perspective of developing innovative services and providing outstanding operation management by serving as a global hub for NTT Group R&D and the creation of new services through developing intellectual property focused on cloud-, mobile- and operation-related information security.

Particularly in the security field, the NTT Group will drive the rollout of secure and reliable services by focusing both on the development of a global security platform and on enhancement of capabilities for complying with the legal systems of different countries and other local requirements.

As we build up our R&D capabilities in North America in this way, we will formulate services developed at NTT I³ for global rollout.

NTT
INNOVATION
INSTITUTE,
INC.

II. Comprehensively strengthen network service competitiveness

We will further enhance the efficiency of our network assets through appropriate capital investment tailored to our customers' business models and market changes. We will also endeavor to further streamline our maintenance operations and reduce optical fiber network installation costs by expanding operations that do not require dispatch of field staff, and will continue our efforts to boost the efficiency of our operations in line with coming changes in the business climate.

The NTT Group's corporate social responsibility as a Value Partner

Contributing to sustainable society in an era of rapid change

Hiroki Watanabe
Senior Executive Vice President

How can the NTT Group help to address the many different issues facing present-day society in an age of rapid economic globalization and innovation in the telecommunications industry? NTT Senior Executive Vice President Hiroki Watanabe talks here with TV presenter Mari Watanabe about how the NTT Group can help to build a sustainable society through its business and the Medium-Term Management Strategy that it announced in November 2012, as well as other aspects of its CSR activities.

Groundbreaking services that leverage increasingly sophisticated and diversified telecommunications technologies

M. Watanabe: I think you'd be hard pushed to find someone in Japan today who has never heard of NTT, but I wouldn't be surprised if only very few knew the details of NTT's business activities, so could you brief me on them?

H. Watanabe: NTT was established in 1985 through the privatization of Nippon Telegraph and Telephone Public Corporation. Up until then, NTT was, as its old name suggests, a telephone company, but over the following 30 years, the telecommunications industry has changed dramatically with the arrival of mobile phones and the Internet.

M. Watanabe: Yes, when you think about it, there was usually just a single fixed line phone in each household at that time. Who could have imagined that someday we'd all be texting each other with mobile phones and shopping on the Internet with such ease?

H. Watanabe: In the 1990s and 2000s, the NTT Group rolled out optical fiber, 3G mobile and a whole range of other groundbreaking services to address the demand for increasingly diversified and sophisticated telecommunications. Since reorganization of the Group's domestic business structure, NTT itself has served as a holding company that oversees the Group's business, which is now concentrated around five major group companies — NTT East and NTT West handling domestic regional communications, NTT Communications handling long distance and international communications, NTT DATA handling data communications, and NTT DOCOMO handling mobile communications.

M. Watanabe: I hear that you're also involved in overseas business activities.

H. Watanabe: The Internet has enabled people to connect with each other worldwide in an instant, and as a result many different players are now offering a huge diversity of services over networks. If we were to focus only on domestic telecommunications carrier business, we couldn't hope to compete in the global telecommunications market. That's why the NTT Group has pursued an aggressively global strategy in recent years. We currently have sites in 72 countries throughout the world, and of the Group's 220,000-odd employees, approximately 45,000 are overseas employees. Our overseas sales too have grown to $12 billion, which is six times what they were five years ago.

Enhancing R&D assets in the cutting-edge North American market, and global rollout of cloud services

M. Watanabe: Telecommunications are bound to continue to evolve. What kind of approach will NTT be taking to drive its business moving forward?

H. Watanabe: In "Towards the Next Stage", the Medium-Term Management Strategy that we announced in November 2012, we set forth a strategy that positions Global Cloud Services at the core of our future business. As I mentioned earlier, telecommunications are expected to shift increasingly to cloud services as a means of addressing the demand for a diversity of convenient services at affordable prices. The NTT Group currently offers network services in over 160 countries and territories through its sites in 72 countries. We are one of the world's largest high-quality data center operators (largest in Japan, and second largest globally) and have the world's second-largest global IP backbone. We're now offering managed ICT services,

Mari Watanabe
TV presenter

applications and solutions throughout the world, and can provide all of these in combination with each other. We're in a unique position in a market populated by a great many global players, and we plan to make the most of our strengths to enhance our cloud services on a global scale moving forward.

M. Watanabe: What specific policies do you plan to pursue?

H. Watanabe: Firstly, we're beefing up our initiatives in North America, the leading market for cloud services. To that end, we established NTT Innovation Institute, Inc. (NTT I³) on the West Coast in April 2013 as a North American R&D base. We'll be working with our technology partners and other local companies there to accelerate our R&D in security, cloud utilization technologies and other areas.

M. Watanabe: With cloud services, you store and manage information assets that are of tremendous importance to customers in servers on your network, so making sure that such services are absolutely safe and secure becomes a critical issue, doesn't it?

H. Watanabe: Absolutely. In addition to conducting our own R&D aimed at building even stronger security, we're also planning to respond dynamically to market needs by acquiring and deploying the technology of overseas security companies. Also, say you develop a new cloud service in the healthcare, environment/energy or some other field, the North American market offers the advantage of enabling speedy rollout of such services owing to fewer regulations. That's why we're aiming to develop new cloud services in North America, and then roll them out globally to emerging countries too.

The importance of earning trust as a Value Partner in an increasingly borderless world

M. Watanabe: Hearing about your activities since privatization and your Medium-Term Management Strategy has reminded me of the invaluable role that the NTT Group has played in today's information society, so let me ask you once again about the ways in which the Group aims to contribute to society through ICT moving forward.

H. Watanabe: We used to position ourselves as a provider of network services and such like, but under our latest Medium-Term Management Strategy, we now aim to position ourselves as a trusted Value Partner that is always the first choice of our customers. As such a partner, we aim to support our corporate clients in transforming their business models and our individual customers in creating diverse lifestyles, while at the same time helping to address various social issues through providing Global Cloud Services.

M. Watanabe: What kind of initiatives are you pursuing where addressing social issues is concerned?

H. Watanabe: Well, in the area of healthcare and nursing care for example, we're working with medical facilities to field test remote medical consultation solutions for supporting home-based healthcare. Also, after the Great East Japan Earthquake, we mobilized over 10,000 of our personnel from throughout the Group to ensure the rapid restoration of our telecommunications infrastructure, and based on the lessons we learned from the disaster, we have since been reinforcing our communications buildings, mobile base stations, trunk lines and other components to build even more reliable networks. We're also working on expanding services for getting disaster information to the public as soon as possible, and on improving the usability of such services.

M. Watanabe: Information security, which we touched on earlier, is another important social issue, isn't it?

H. Watanabe: Yes, it is. Medical facilities, for example, need to process highly confidential treatment and other patient data for statistical purposes. We were the first worldwide to develop a practical implementation of confidential calculation technology that enables statistical processing of data scattered across multiple servers to protect it. This has led to significant improvements in assuring security.

M. Watanabe: I myself have been using NTT since it was just a telephone carrier, and I've always found its services to be totally trustworthy. I now appreciate even more that the reliability of NTT's services and the confidence they inspire are the result of the kind of solid technology you've just described, and the daily efforts of your many employees.

H. Watanabe: We will definitely continue in our efforts to earn the trust of the public as a Value Partner. Thank you very much for your time today.

NTT Group
CSR Charter

— Our Commitment —

As a leader of the information and telecommunications industry, the NTT Group is committed to providing reliable, high-quality services that contribute to the creation of a safe, secure and prosperous society through communications that serve people, communities, and the global environment.

Guided by the NTT Group CSR Charter, NTT is committed to promoting CSR activities across the Group that meet the expectations and interests of its stakeholders.

NTT drew up the NTT Group CSR Charter in June 2006 as a basic guideline for the more active implementation of CSR activities by Group companies. It revised the Charter in June 2011.

The NTT Group CSR Charter consists of a statement of our commitment to corporate social responsibility, and the four CSR goals that outline specific priority aspects of our CSR activities.

Safe and secure communication

Team NTT communication

Creation of a safe, secure and prosperous society through communications that serve people, communities, and the global environment

Communication between people and their communities

Communication between people and the global environment

Our CSR Goals

Communication between people and their communities	1. We shall strive to create a richer and more convenient communications environment, and utilize our technology to contribute to the resolution of the various issues faced by societies with aging and declining populations.	See p. 15
Communication between people and the global environment	2. We shall strive both to reduce our own environmental impacts and build environment-friendly forms of communications, and to provide information and communications services that help to reduce the impact of society as a whole on the global environment.	See p. 21
Safe and secure communication	3. While striving earnestly to ensure information security and resolve telecommunications-related social issues, we shall do our utmost to provide a safe and secure user environment and contribute to the creation and future development of communication culture. 4. Fully recognizing the role that telecommunications plays as critical infrastructure supporting society and protecting our livelihoods, we shall strive to offer secure and reliable telecommunications services fortified to withstand disasters and capable of connecting people irrespective of time, location, and other circumstances.	See p. 25
Team NTT communication	5. As Team NTT, we pledge to apply the highest ethical standards and awareness of human rights to our business duties, striving to fulfill our mission to society by working for the creation of pleasant workplaces, personal growth, and respect for diversity, and for the further development of a flourishing and vibrant community. • Team NTT comprises all NTT Group employees, including temporary employees, contract employees, employees of our corporate partners, and also former employees who endorse the NTT Group's CSR activities.	See p. 29

Integrating CSR activities with management strategy

In our NTT Group CSR Charter, we set ourselves four groupwide CSR goals. We are implementing activities in line with these CSR goals by incorporating CSR into our management strategy and integrating these CSR activities with our business.

We announced a new Medium-Term Management Strategy, "Towards the Next Stage", in November 2012. To reach the next stage in our evolution, we are committed to achieving the dual goals of establishing Global Cloud Services as the cornerstone of our business operations and comprehensively strengthening our network service competitiveness. These goals are closely connected to the CSR goals outlined in our CSR Charter.

To ensure that we continue to be our customers' first choice as a trusted Value Partner, we are committed to supporting our corporate clients in their efforts to transform their business models and our individual customers in creating diverse lifestyles, while at the same time helping to address various social issues through providing Global Cloud Services. These goals are closely tied to our CSR goal of enabling communication between people and their communities. Where cloud services are concerned, building rock-solid security and data centers is essential to the creation of a safe and secure usage environment, and is thus closely tied to our CSR goals of ensuring safe and secure communication and promoting communication between people and the global environment.

Comprehensively strengthening our network service competitiveness is also connected to these CSR goals insofar as it involves enhancing the efficiency of our network assets and simplifying and streamlining our operations.

Through integrating our CSR activities with our management strategy in this way, we aim to further contribute to the creation of a sustainable society as a global ICT business group.
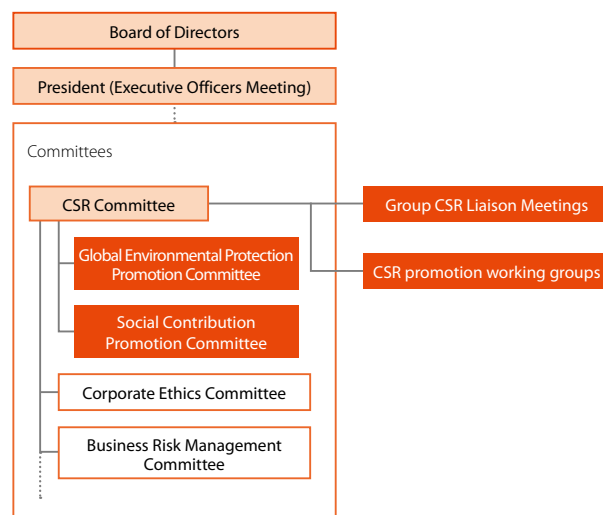
Managing PDCA cycles across the Group based on our CSR Priority Activities

NTT created a CSR Committee chaired by a Senior Executive Vice President in June 2005 to ensure the sustained and appropriate implementation of NTT Group CSR activities under two internal committees — the Global Environmental Protection Promotion Committee and Social Contribution Promotion Committee.

Based on the Guidelines for NTT Group CSR Activities that we drew up when we established our NTT Group CSR Priority Activities in fiscal 2009, we work with group companies to monitor progress on the implementation of Priority Activities with respect to PDCA cycles and further promote a sense of unity across the Group.

From fiscal 2011, we have been coordinating CSR activities with business planning management so as to enhance the effectiveness of PDCA management. We will continue to promote groupwide initiatives with the aim of further integrating CSR activities with business goals.
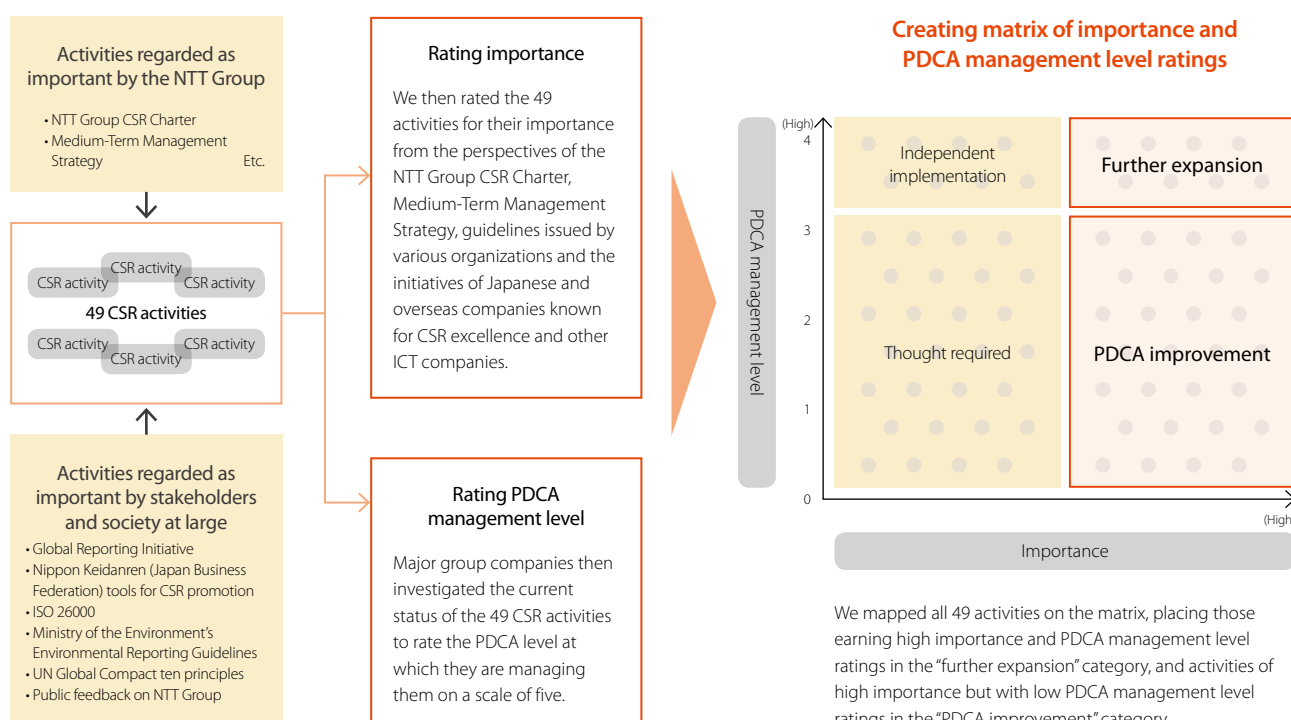
NTT Group CSR organization

- Board of Directors
- President (Executive Officers Meeting)
- Committees
  - CSR Committee
    - Global Environmental Protection Promotion Committee
    - Social Contribution Promotion Committee
  - Corporate Ethics Committee
  - Business Risk Management Committee
- Group CSR Liaison Meetings
- CSR promotion working groups

Deciding priority activities for each of the four goals set forth in the NTT Group CSR Charter

To drive the implementation of the NTT Group CSR Charter drawn up in June 2006 and take a more unified approach to addressing social issues both within Japan and overseas, we established our NTT Group CSR Priority Activities in November 2008 as activities to be pursued in common by group companies.

In deciding our CSR Priority Activities, we drew up a list of 49 CSR activities that we saw as important both to the NTT Group and to stakeholders and society at large (see diagram below). We then examined each activity to rate relative importance and PDCA management level to eventually narrow the list down to our eight CSR Priority Activities (see p.14).

Activities regarded as important by the NTT Group
- NTT Group CSR Charter
- Medium-Term Management Strategy   Etc.

49 CSR activities

Activities regarded as important by stakeholders and society at large
- Global Reporting Initiative
- Nippon Keidanren (Japan Business Federation) tools for CSR promotion
- ISO 26000
- Ministry of the Environment's Environmental Reporting Guidelines
- UN Global Compact ten principles
- Public feedback on NTT Group

Rating importance

We then rated the 49 activities for their importance from the perspectives of the NTT Group CSR Charter, Medium-Term Management Strategy, guidelines issued by various organizations and the initiatives of Japanese and overseas companies known for CSR excellence and other ICT companies.

Rating PDCA management level

Major group companies then investigated the current status of the 49 CSR activities to rate the PDCA level at which they are managing them on a scale of five.

Creating matrix of importance and PDCA management level ratings

We mapped all 49 activities on the matrix, placing those earning high importance and PDCA management level ratings in the "further expansion" category, and activities of high importance but with low PDCA management level ratings in the "PDCA improvement" category.

Coordinating CSR initiatives across the Group through Group CSR Liaison Meetings and working groups

We hold periodical Group CSR Liaison Meetings to coordinate CSR activities across the whole Group through discussing common issues, sharing information on successful initiatives and other means. In fiscal 2013, these meetings were devoted chiefly to reviewing the suitability of current Group CSR Priority Activities and completing the setting of quantitative indicators. We have also established issue- and theme-based working groups such as the Group CSR Priority Activities Review Committee and the Green with Team NTT Promotion Working Group (which examines employee participation-based environmental initiatives) to promote unity in CSR activities across the Group through groupwide projects.

Group CSR Liaison Meetings

Raising CSR awareness in society at large through Environmental/CSR Reporting Symposiums

The NTT Group holds yearly Environmental/CSR Reporting Symposiums with assistance from the Ministry of the Environment and Ministry of Economy, Trade and Industry. This symposium surveys and analyzes reports from the reader perspective and publishes its findings with the aim of raising awareness regarding CSR activities and reporting among the CSR handlers of participating companies. The 13th Symposium, which was held in December 2012 and drew a turnout of about 300 participants, featured a panel discussion on the subject "From Touting Safety to Building Trust: Promoting Initiatives and Disclosure Across the Whole Value Chain" and reported on the results of a questionnaire survey conducted both in Japan and overseas to compare attitudes regarding the same subject.

Environmental/CSR Reporting Symposium

Web Environmental/CSR Reporting Symposium (on the *Kankyo* goo site)
http://eco.goo.ne.jp/business/event/env_report/ (in Japanese only)

Completion of the setting of quantitative indicators for CSR Priority Activities

In fiscal 2010, group companies drew up CSR action plans for each of the eight Priority Activities so as to link them to their respective businesses and take CSR activities across the Group to a higher level. In fiscal 2012, we started to set common groupwide quantitative indicators, and completed the setting of quantitative indicators for all eight CSR Priority Activities in fiscal 2013.

CSR goals	CSR Priority Activities	Quantitative indicators (fiscal 2014)	Fiscal 2013 results
Communication between people and their communities	Helping to build a sustainable society through providing value to customers	Number of new products/services qualifying as contributing to sustainable society[1]	Continued implementation of CSR action plans[3] Example: Elimination of digital divides by working with communities to provide broadband services
Communication between people and the global environment	Creating a low carbon society	Reduction of CO_2 emissions[2]	CO_2 emissions reduced to 4.411 million tons
	Implementing closed loop recycling	Waste product reduction[2] Paper consumption reduction[2]	Final disposal rate for all waste materials reduced to 1.45%, continued achievement of zero emissions for decommissioned telecommunications equipment, total paper consumption reduced to 68,000 tons
	Conserving biodiversity	Common qualitative initiatives for ecosystem preservation and forest improvement activities[2]	Tree planting: Kesennuma Oshima Earthquake Recovery Support Activity - GTN Green Pearl Coastal Forest Regeneration Project, docomo Woods, etc.
Safe and secure communication	Ensuring information security	Number of employees receiving information security training	237,125
	Ensuring stable and reliable services as critical infrastructure	Service stability[1] Number of serious accidents[1]	Continued implementation of CSR action plans[3] Example: Providing high quality, stable communications services
Team NTT communication	Promoting respect for diversity and equal opportunity	Ratio (number) of women in managerial positions	3.5% (383)[4]
	Citizenship activities	Number of Operation Clean Environment (local community cleanup) participants Number of PET bottle caps collected (Ecocap Movement)	Operation Clean Environment (local community cleanup) participants: Approx. 119,000 participants PET bottle caps collected (Ecocap Movement): Approx. 33 million caps

1. From fiscal 2014
2. Initiatives leading up to fiscal 2021
3. Prepared by group companies for each CSR Priority Activity in line with the nature of their respective businesses
4. Number at section manager level or higher in NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO, NTT DATA, NTT FACILITIES, NTT COMWARE and NTT Urban Development as of the end of fiscal 2013

Communication between people and their communities

We will leverage ICT to help address social issues
and create a more prosperous and convenient society.

Helping to build a sustainable society through providing value to customers
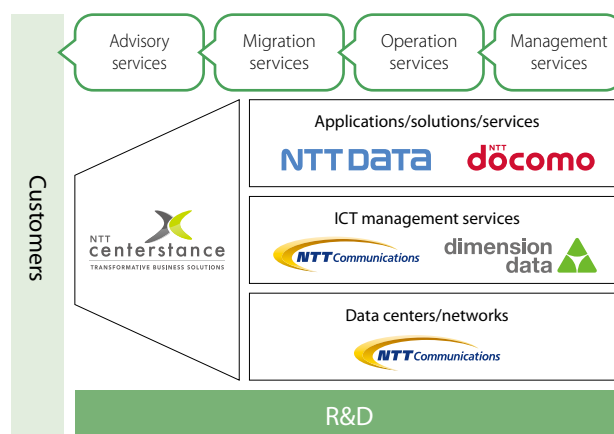
NTT Group

**Pooling the strengths of the NTT Group
to deliver safe and user-friendly Global Cloud Services**

Cloud computing — the use of software via the Internet — is generating keen interest in recent years. Particularly for companies planning to expand overseas, cloud computing is attractive not only because it enables them to build a global ICT platform, but also for the way it can be used to advantage as a global business continuity planning (BCP) and information security strategy. There are, however, many companies that harbor concerns about the security, quality and reliability of cloud services.

In this respect, the NTT Group operates over 240 data centers, and provides ICT services to over 10,000 companies in 160 countries and territories. In November 2012, we also acquired Centerstance, an American consulting company specializing in business transformation through process improvement and application of cloud technologies, to equip ourselves with a structure that enables the integrated, one-stop provision of a full lineup of services, from networks, data centers and other ICT infrastructure to ICT management services, applications and a diversity of cloud services.

We will support the efforts of our corporate customers to transform their business models by generating further synergy between NTT Communications, NTT DATA, Dimension Data, NTT Centerstance and other group companies so as to respond promptly to their various demands and serve as a one-stop facilitator for migration of their ICT systems to the cloud.

Organization for the provision of Global Cloud Services

	Advisory services	Migration services	Operation services	Management services
Customers				

Applications/solutions/services
NTT DATA   docomo

ICT management services
NTT Communications   dimension data

Data centers/networks
NTT Communications

NTT centerstance
TRANSFORMATIVE BUSINESS SOLUTIONS

R&D

NTT clouds, the umbrella brand name for NTT cloud services

The NTT Group has launched "NTT clouds" as an umbrella brand for the unified marketing of the various cloud services that its group companies offer to overseas businesses so as to establish a unique position for itself in the global market. Starting with North America, we plan to offer integrated cloud service solutions to our corporate customers, and aggressively promote the NTT Group brand in the global market.

NTT Group

NTT clouds

NTT clouds overview

CSR Priority Activities

Helping to build a sustainable society through providing value to customers

Having long led Japan's telecommunications industry, the NTT Group is well aware of the role and impact of ICT in present-day society, and is committed to delivering new convenience and prosperity by enabling everyone to benefit from ICT.

NTT

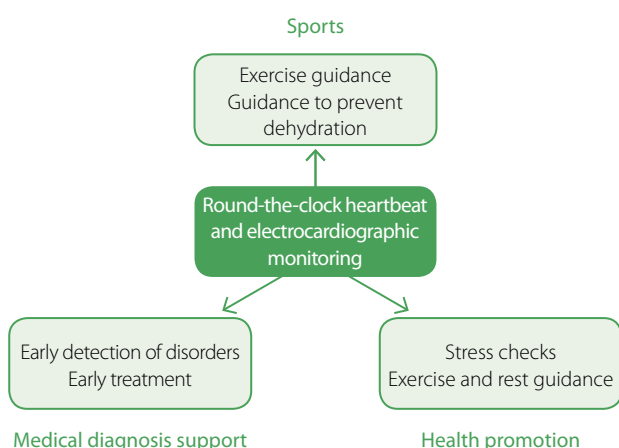### Creating a material that enables round-the-clock heartbeat and electrocardiographic monitoring when worn

Round-the-clock monitoring of heartbeat and electrocardiogram is attracting keen interest in recent years as a means of reducing the risk of heart attacks (sudden death) through early detection and treatment of cardiac disorders.

In 2011, NTT Basic Research Laboratories developed an easily wearable conductive material by coating the surface of silk or synthetic fiber with conductive polymer PEDOT-PSS*. Experiments on 10 able-bodied human volunteers wearing undershirts equipped with the material showed it to be capable of prolonged heartbeat and electrocardiogram measurement just by being worn.

The material promises to be useful not only for medical applications, but also for sports, fitness and various other scenarios.

* PEDOT-PSS: A conductive polymer that is also used in LCDs and antistatic coatings owing to its excellent conductivity and chemical stability in various environments
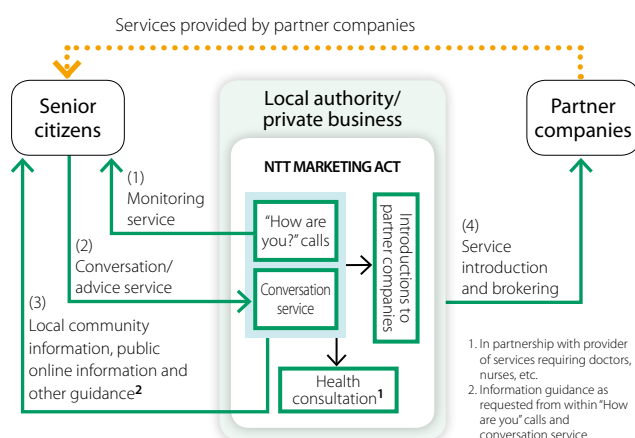
NTT WEST

Self-care support services for senior citizens

With more and more local authorities looking into ways of watching over the well-being of elderly people who are living alone, and businesses too wanting to expand their services for elderly people, demand is growing in recent years for call center and other telephone-based services for senior citizen monitoring and self-care support services.

NTT West accordingly partnered with call center experts NTT MARKETING ACT to launch self-care support services for senior citizens in October 2012.

It currently offers telephone-based monitoring, conversation/advice, assorted information guidance, and service introduction and brokering services to local authorities and private businesses.

Potential applications

Sports

Exercise guidance
Guidance to prevent dehydration

Round-the-clock heartbeat and electrocardiographic monitoring

Early detection of disorders
Early treatment

Stress checks
Exercise and rest guidance

Medical diagnosis support

Health promotion

Self-care support services for senior citizens

Services provided by partner companies

Senior citizens

Local authority/ private business

NTT MARKETING ACT

"How are you?" calls

Conversation service

Health consultation[1]

Introductions to partner companies

Partner companies

(1) Monitoring service

(2) Conversation/ advice service

(3) Local community information, public online information and other guidance[2]

(4) Service introduction and brokering

1. In partnership with provider of services requiring doctors, nurses, etc.
2. Information guidance as requested from within "How are you" calls and conversation service

Closeup

Shabette-Concier

NTT docomo

How high is Mount Fuji?

3,776 m

Function — Speak, and your smartphone will reply
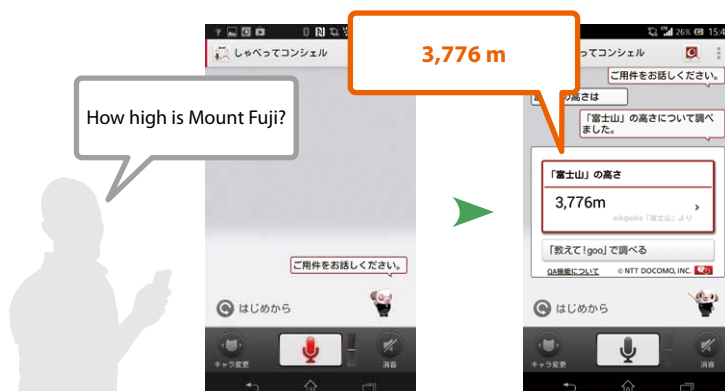
Launched by NTT DOCOMO in March 2012, Shabette-Concier is a voice-agent service for smartphones that discerns the meaning of questions or commands spoken by the user, and launches features or applications accordingly. A Knowledge Q&A feature that enables the phone to reply to user questions was added when a new version of the service was released in June 2012.

If, for example, the user asks, "What is the highest mountain in the world?", Shabette-Concier employs language processing technology to analyze the question, and respond with the answer "Everest" based on the results of searches of a cloud-based knowledge database or the Internet.
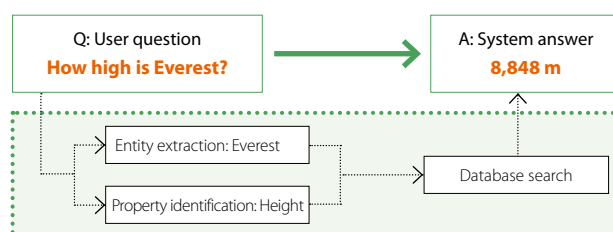
Technology — The inside story

Employing advanced language processing and machine learning technologies to display the best answers to questions

Knowledge Q&A uses original technologies developed by the NTT Group. If, for example, the user asks, "How high is Mount Fuji?", Knowledge Q&A analyzes the language structure to identify Mount Fuji as the entity in question and its height as the property that is being asked about. Even if the user frames the question differently, asking for example "How many meters high is Mount Fuji?", Knowledge Q&A uses machine learning based on various examples to determine that all such questions are asking the same thing. It then searches a cloud-based knowledge database for the words "Mount Fuji" and "height" to come up with the answer "3,776 m".

If it fails to find an answer using the database-type function, it uses its search-type function to search the whole Internet. First it analyzes the question to infer answer type (i.e. the type of answer required by the question, e.g. mountain name). Then it extracts keywords from the question to carry out an Internet search, extract, assess and rank candidate answers that match answer type, and present the top-ranking answer.
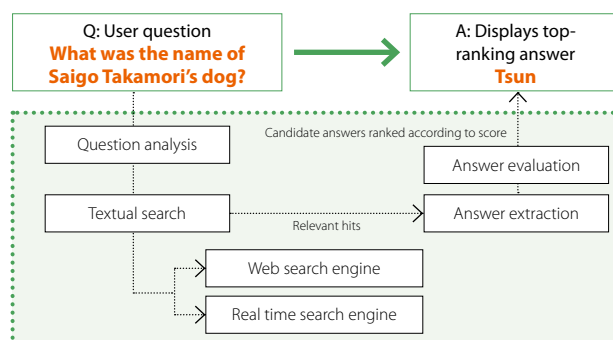
Database-type Q&A

Analyzes user's question, extracts the entity, identifies the required property, searches the knowledge database for the required property.

Q: User question **How high is Everest?**	→	A: System answer **8,848 m**

- Entity extraction: Everest
- Property identification: Height
- Database search

Search-type Q&A

Analyzes user's question to infer its intent, extracts answers from Internet search results, ranking and displaying those that best match the question's intent.

Q: User question **What was the name of Saigo Takamori's dog?**	→	A: Displays top-ranking answer **Tsun**

- Question analysis
- Textual search
- Candidate answers ranked according to score
- Answer evaluation
- Answer extraction
- Relevant hits
- Web search engine
- Real time search engine

Development

Basic research launched over ten years ago

Field testing launched with deployment on the *goo* website

The Web Answers service made available to the public wins a large following for its ability to handle questions regarding definitions, reputation and such like in addition to questions that could be answered with a single word.

| March 2012 | 2007 | 2004 | 2001 |

Shabette-Concier
launched

NTT DOCOMO i-concier
Hitsuji no Shitsuji-Kun
("Shitsuji the Sheep")

Extending Q&A system answering capabilities

Integration of NAZEQA system for responding to "Why?" questions, etc. so as to cater to questions requiring sentence-based answers rather than just single words

Research on Q&A systems begins

SAIQA, NTT's first Q&A system, incorporates machine learning early on, paving the way to later precision improvements.

◻ Developer perspectives

Developing language processing technologies to support the creation of new services by group companies

Ryuichiro Higashinaka
NTT Media Intelligence Laboratories

Ever since joining the company, I've been studying spoken dialog systems capable of conversing with humans. Since such systems have to be able to respond to user questions, I started researching Q&A systems.

The biggest headache in developing Shabette-Concier's Q&A function was figuring out a way of enabling it to respond to the many different kinds of questions posed by actual users. In the end, we used the logs generated by Web Answers when it was publicly available to identify the scope of questions that should be answered. The precision of answers was another major headache that required the creation of evaluation sets and repeated tuning.

We worked with an NTT DOCOMO team to implement the fruits of our research, and the process leading to service launch went very smoothly thanks to this close cooperation. I feel that the way we shared working service requirements and the current status of technology enabled the speedy development of the service.

I now want to develop a computer capable not only of answering questions, but also of making more normal conversation so that it can serve more as a partner to the user, and then I'd like to develop services based on the technology.

Uniting technology review, service development and service operation processes to drive speedy service improvements

Wataru Uchida
Service & Solution Development Department
NTT DOCOMO R&D Center

We really did work as a single team with NTT Laboratories on development leading up to the June 2012 launch of the Knowledge Q&A service. Using a prototype developed by the lab, we worked on enabling it to handle a large volume of users and on the user interface, and close communication between core members, including lab personnel, enabled us to cut development time considerably. We've stuck with the same structure even after service launch to work together on operation, analysis of usage, and examination of technology, user interface and other aspects to enhance performance, and we've been improving the service continuously.

We receive feedback from users not only on the precision of answers, but also on the subtle ways in which wrong answers are wrong, and I feel we're making good headway in creating a voice agent that will be able to reply to anything when asked.

As well as continuing our efforts to improve answer precision, we also plan to look into applying this Q&A technology to various other scenarios apart from Shabette-Concier.

Closeup

Miyagi Prefecture Ishinomaki-Kesennuma Healthcare Area Community Healthcare Integration System
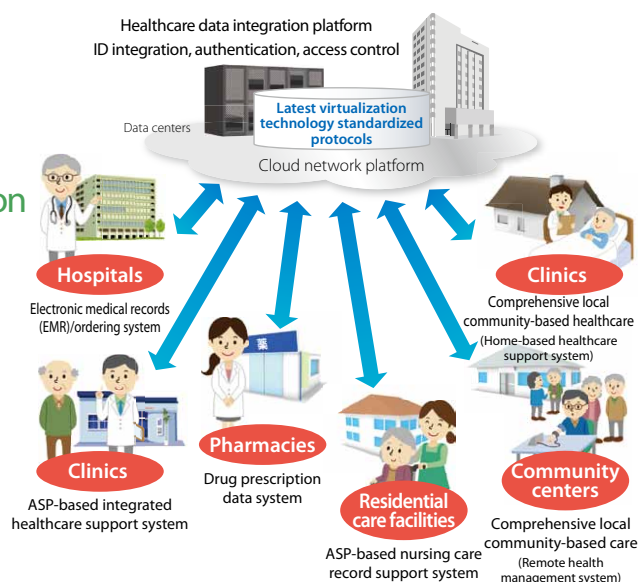
NTT EAST

Function

Seamless, disaster-resistant community healthcare integration

NTT East has worked with the Miyagi Medical and Welfare Information Network (MMWIN) and other NTT Group companies to build the Miyagi Prefecture Ishinomaki-Kesennuma Healthcare Area Community Healthcare Integration System. This system is aimed both at resolving issues related to the graying population and shortage of healthcare resources, and at ensuring the continuity of medical services even when disasters occur.

To enable the integration of data between healthcare facilities and provision of home-based healthcare, nursing care and self-care support, the system seamlessly integrates a combination of ten subsystems, including a healthcare data referencing system, an ASP-type healthcare data support system and a remote health management system.

The system also guards against the loss of medical records in the event of a disaster, thus ensuring healthcare continuity, by

Healthcare data integration platform
ID integration, authentication, access control

Data centers

Latest virtualization technology standardized protocols

Cloud network platform

Hospitals
Electronic medical records (EMR)/ordering system

Clinics
Comprehensive local community-based healthcare (Home-based healthcare support system)

Clinics
ASP-based integrated healthcare support system

Pharmacies
Drug prescription data system

Residential care facilities
ASP-based nursing care record support system

Community centers
Comprehensive local community-based care (Remote health management system)

enabling the digitization of medical, nursing care, drug prescription and personal health records using standardized formats for sharing between healthcare facilities, and backing up all data to a private cloud.

A healthcare data integration platform that uses technology developed at NTT laboratories enables the safe and seamless integration of these multiple systems.
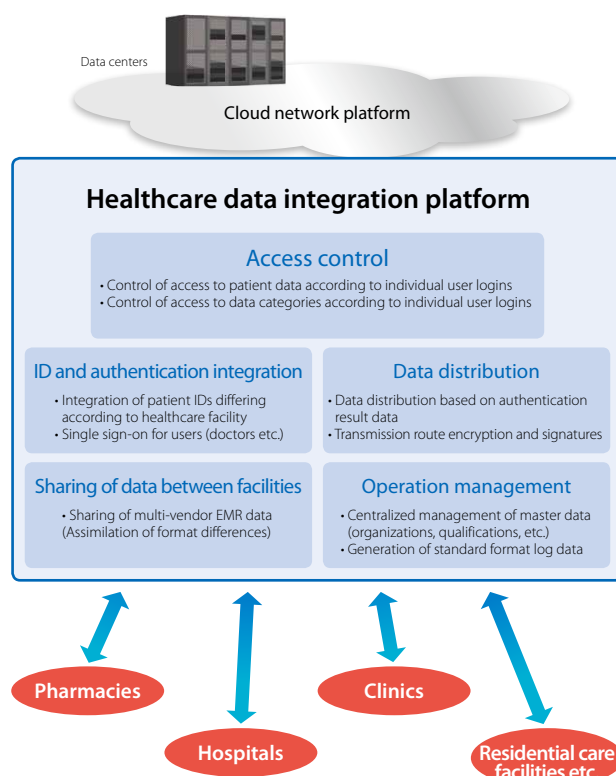
Technology

The inside story

Enabling the secure integration of healthcare data using original IT and standard technology

The healthcare data integration platform incorporates ID authentication integration, data distribution, access control and other functions required for the smooth integration of data between healthcare facilities (diagram on the right), thus enabling the secure handling of a wide variety of personal data including patient consents and access permissions according to healthcare facility or occupation (doctors, nurses, etc.).

Because rules for the disclosure of data can be configured separately according to type of data and the organizations of respective healthcare facilities, access to data can be rigorously controlled based on patient consent.

Using these functions to link with facilities using different access rules or ID authentication levels also enables the provision of comprehensive support for health management, medical treatment and nursing care.

Data centers

Cloud network platform

Healthcare data integration platform

Access control
• Control of access to patient data according to individual user logins
• Control of access to data categories according to individual user logins

ID and authentication integration
• Integration of patient IDs differing according to healthcare facility
• Single sign-on for users (doctors etc.)

Data distribution
• Data distribution based on authentication result data
• Transmission route encryption and signatures

Sharing of data between facilities
• Sharing of multi-vendor EMR data (Assimilation of format differences)

Operation management
• Centralized management of master data (organizations, qualifications, etc.)
• Generation of standard format log data

Pharmacies **Clinics**

Hospitals **Residential care facilities etc.**

Development

Leveraging ICT to enhance the quality of local community healthcare

Unified healthcare/personal health platform

Development of EHR-PHR integration system, one of the core components of the NTT Group's unified healthcare/personal health platform for the secure sharing and use of healthcare and personal health data

Participation in pilot project to develop a secure data integration platform for Japanese EHR systems

NTT Communications participates in Ministry of Internal Affairs and Communications health information utilization platform pilot study (conducted jointly with the Ministry of Health, Labour and Welfare and Ministry of Economy, Trade and Industry), applying its EHR platform.

July 2013	2012	2011	2008-2010	2008

Miyagi Prefecture Ishinomaki-Kesennuma Healthcare Area Community Healthcare Integration System launch

Demonstration of shared EHR usage by multiple local authorities

NTT East leads the field testing, with the cooperation of seven local authorities, of a data integration and utilization platform incorporating an EHR platform function.

System field tested in a hospital

NTT East links a Nagano Prefecture hospital with associated healthcare facilities to field test a community health integration system equipped with an EHR platform.

EHR platform development launched

The NTT Group launches development of an integrated platform for the secure sharing of medical and personal health data with the aim of creating EHR services tailored to Japan.

◻ Developer perspectives

Extending the utilization of healthcare/personal health information

Asami Miyajima
NTT Secure Platform Laboratories
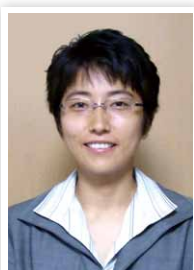
With its increasingly aging population, Japan faces major headaches in the healthcare sector, with insurers and hospitals facing collapse while country's healthcare bill continues to rise inexorably. NTT laboratories have been involved in EHR/PHR* development since 2008 in line with the government's strategy for promoting the utilization of ICT in healthcare.

Because medical and personal health records constitute extremely sensitive personal information, our EHR system incorporates key features for ensuring the secure and convenient sharing of such information, including ID integration, authentication integration, access control and access log management. More recently, we have developed a platform that integrates EHR with personal health records (PHR) for eventual utilization in comprehensive local community-based care programs that also incorporate nursing care and self-care assistance.

EHR/PHR systems are still very much an emerging field, and we're working closely with group companies to try out various concepts before taking our research to the pilot project stage and beyond to real world deployment.

* EHR: Electronic Health Record
  PHR: Personal Health Record

Contributing to local community-based healthcare through providing platforms for sharing healthcare data

Kouichi Imamura
Healthcare Team, Business Section,
Solution Engineering Division
Corporate Sales Promotion Headquarters
NTT EAST

This Miyagi Prefecture Ishinomaki-Kesennuma Healthcare Area initiative is part of our citizenship activities for supporting healthcare continuity in the Tohoku disaster area from the ICT perspective. We also positioned this as the field location for implementing NTT East's HIKARI Timeline local community healthcare integration solution as an NTT Laboratories' platform connection model, and right from the initial proposal stage planned this initiative as a development roadmap milestone.

The key features of the service are the data center for backing up healthcare data, and the viewer that serves as a platform for sharing and utilizing this data. By utilizing standard protocols for defining the formats for handling healthcare data, we created an open environment that enables integration with EMR and other healthcare data systems and the participation of various vendors.

We now plan to develop the model into a form that can be offered within NTT's cloud services for utilization by healthcare facilities throughout Japan.

Helping to build a sustainable society

Services to enrich everyday life

NTT

#### Sensor network for gathering information from objects in one's surroundings

Equipping consumer electrical appliances, clothing and other household items with wireless sensors would enable various types of information to be gathered. If all this information were transmitted to a server via a network to be integrated and analyzed, it could generate new and useful information, but for such systems to be feasible, the sensors would have to be extremely compact and maintenance-free (i.e. not require batteries).

NTT Microsystem Integration Laboratories (NTT MIL) is endeavoring to develop tiny battery-less sensors that could be embedded here and there throughout a living space to obtain various types of information. It has packaged test chips equipped with ultra-low power wireless circuits, nanowatt-level (10-9 watt) vibration detection circuits and such like into prototype devices, and is currently conducting proof-of-concept experiments on the technologies.

In fiscal 2013, it created one of the lowest power wireless circuits in the world, and using a millimeter-size energy harvester, succeeded in building a prototype wireless sensor that proved capable of transmitting signals over a distance of 10 m in a line-of-sight environment.

If it becomes possible to gather and analyze all sorts of information from objects in one's surroundings, this capability could be used for energy management, health management, monitoring of human vital signs, and various other applications. Sensor networks are a communications services platform that could give birth to a multi-trillion yen market in the future. NTT MIL will continue to pursue R&D in this field with the aim of creating a services platform capable of addressing new needs.

**Sensor network overview**

NTT
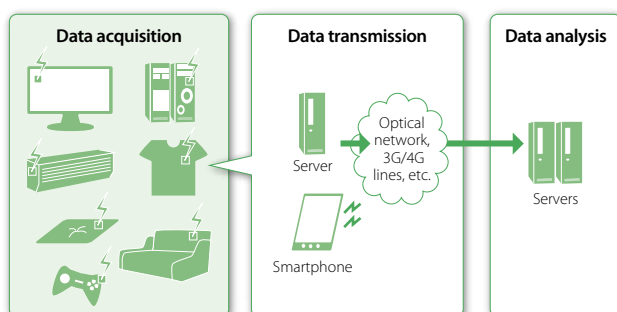
Yu bi Yomu software for "touch reading"

Conventional e-books and text display software are designed mainly to reproduce printed text on screen, but NTT Communication Science Laboratories (NTT CSL) is conducting research on *Yu bi Yomu*, a novel type of digital text display that makes use of the interactive capabilities of tablet device touchscreens.

Yu bi Yomu enables text that is initially displayed only very faintly on the screen to appear clearly when touched. By enabling the dynamic changes in text contrast according to finger movement to be recorded or sent to other devices, NTT CSL is aiming to create a rich form of text communication that enables the expression of feelings or personal attributes. It is currently conducting joint research with the Graduate School of Information and Science Technology, Osaka University and Hakodate Junior College to incorporate linguistics and interface technology findings.

NTT CSL will continue with this research with a view to applying the technology to electronic text such as e-mail and telegrams, text expression in novels and other works that stir the imagination, literary formats such as haiku and other poetry that lend themselves to being read out loud, and also to the field of educational support.

Using *Yu bi Yomu*
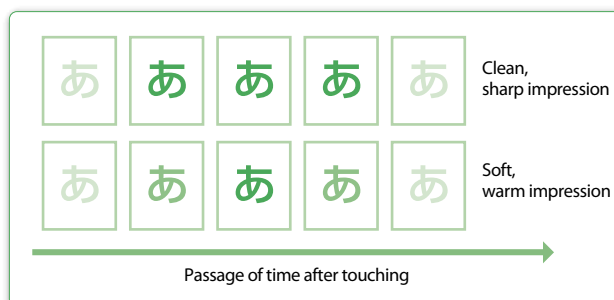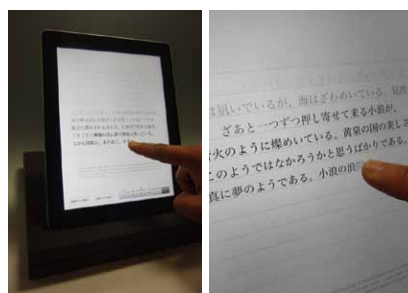
Changing time settings for the appearance of text results in different reading impressions.

Helping to build a sustainable society

▍Services to enrich everyday life

NTT EAST

▍Providing overseas tourists with better information

Tourism to Japan declined after the Great East Japan Earthquake, but thanks in part to government policies to promote tourism, the number of tourists visiting Japan each year is slowly but steadily rising once again. However, 36.7%[1] of foreign tourists to Japan say they have problems accessing information on tourism in Japan.

The town of Hiraizumi in Iwate Prefecture is home to Buddhist temples, gardens and archaeological sites that were selected in June 2011 for inclusion in UNESCO's World Heritage List, as a result of which it has attracted an increasing number of tourists. However, with only the most commonplace information available to both Japanese and overseas tourists, Hiraizumi's government felt an urgent need to provide visitors with information in a format that breathed life into the town's many attractions.

Hiraizumi Town accordingly teamed up with NTT East Iwate Branch to provide a Wi-Fi[2] service called "World Heritage Site Hiraizumi" from February 2013 that enables tourists to obtain information on their immediate surroundings using NTT East's HIKARI Station Wi-Fi service and mobile devices. Operated largely by people who cherish Hiraizumi's cultural heritage, the service delivers information both on renowned heritage sites such as Chusonji Temple and on the town's other attractions, together with directions etc. so as to make it easy for tourists to find their way around. The service takes advantage of the potential of Wi-Fi to provide information according to geographical position and other features enabled by ICT. NTT East is also exploring ways of extending the use of the HIKARI Station Wi-Fi service as communications infrastructure beyond provision of information for tourists, such as enabling its use as an Information Station that provides Wi-Fi access to the public in the event of a disaster.

1. Percentage of foreign visitors to Japan who responded that they found the lack of free public wireless LAN availability to be a problem. Source: Ministry of Land, Infrastructure, Transport and Tourism Japan Tourism Agency survey titled "Gripes expressed by foreign tourists about Japan's tourist hosting capabilities" (October 2011)

2. **Wi-Fi (Wireless Fidelity)**
A technology for wireless connection to a network

Poster publicizing a HIKARI Station service area

NTT docomo

▍Formulating common standards to enable international roaming for near field communication (NFC)

On February 25, 2013, NTT DOCOMO, China Mobile Communications and South Korea's KT announced their agreement on common standards for enabling international roaming for near field communication (NFC)*-compatible services and devices.

The three companies started to discuss roaming with respect to NFC services in tripartite committee meetings and other forums from January 2011, and started to formulate concrete specifications from April 2012. The common specifications conform with international NFC standards drawn up by international industry groups and standardization organizations such as the GSM Association (GSMA) and NFC Forum, and provide carriers, service providers, retailers and device vendors developing NFC-compatible devices with the information they need to enable roaming in NFC services in Asia.

Moving forward, the three parties will introduce the common specifications to industry and standardization organizations around the world to help promote standardization activities and enable the reciprocal use of NFC services worldwide.

* **Near field communication (NFC)**
A set of international standards for enabling wireless communications between devices in close proximity, usually no more than 10-15 cm. The transmission of data between two NFC-enabled devices merely by holding one device over the other is a typical usage example.

Common specifications for NFC services
Key contents
• Definition of NFC services
• Points to note when offering local (domestic etc.) NFC services (introduction of examples of commercial services available in Japan and Korea)
• Introduction of the vision and service rollout plan agreed to by the three companies with regard to global (Asia) NFC service roaming
• Points to note when deploying common NFC technology in devices or services

Common specifications for NFC-compatible devices
Key contents
• Requirements for all NFC-compatible devices (compatibility with reader/writers and noncontact smart tags, etc., noncontact communications protocol, power supply management, device and noncontact terminal operating conditions, etc.)

Helping to build a sustainable society

Services for supporting medical treatment and health management

NTT

Development of a disease activity data sharing system for rheumatoid arthritis patients

Rheumatoid arthritis is a chronic disease that can have a severely disabling effect on limb function. There are estimated to be over 600,000 people afflicted with this disease in Japan. Remarkable advances have been made in drug treatments for rheumatoid arthritis in recent years, and early detection followed by a regimen of powerful anti-rheumatic medication to alleviate the symptoms quickly is fast becoming the standard treatment strategy worldwide. It was against this backcloth that Kyoto University Hospital opened its Rheumatology Center in April 2011 as a facility for spanning various departments to provide integrated treatment. The Center aims both to treat patients and to analyze treatment progress and results in detail to contribute to the advance of rheumatoid arthritis treatment.

As one aspect of this endeavor, Kyoto University Hospital and NTT Service Evolution Laboratories (NTT SEL) have developed a disease activity data sharing system. This system includes the following features: (1) easy measurement, recording and assessment of data within daily life; (2) measurement of distance traveled and other body movement details when walking just by carrying a smartphone; (3) easy smartphone-based recording of everyday physical condition and assessment of disease activity; (4) real-time transmission of measurements etc. for sharing with healthcare professionals.

A total of 30 patients were lent smartphones to field test the system for approximately one year from February 2012. It was found that the recorded walking measurements and subjective evaluation data enabled doctors to predict disease progress, level of functional impairment and other aspects of a rheumatoid arthritis patient's condition. Kyoto University Hospital and NTT SEL subsequently examined how patients could be provided with feedback based on these predictions to assist in everyday self-care efforts. They plan to analyze the results of this field trial to seek further knowledge that might be useful in the treatment of rheumatoid arthritis.

**How the disease activity data sharing system works**

NTT Communications
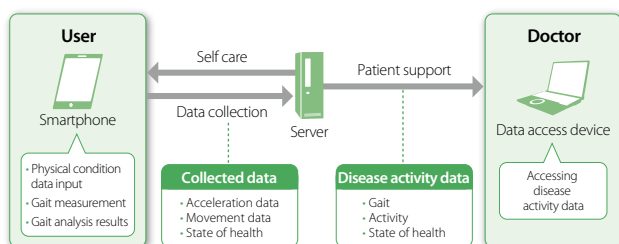
Provision of goo *Karada* Log Health Assist as a goo *Karada* Log service

NTT Communications launched the goo *Karada* Log Health Assist service in August 2012 on completion of a field trial of Health Enhancement Assist Service, a health support service that it had developed with NTT Resonant and foo.log Inc.

Designed for smartphones and PCs, goo *Karada* Log Health Assist includes the world's first tool for automatically estimating calories from photos of meals, plus estimation of distance covered and calories burned while walking each day by using smartphone GPS and accelerometer functions, virtual rival configuration, 5,000 recipes compiled by professionals, guidance on the use of 180 different exercise videos, and various other features. Automatically estimated calories, calories burned while walking and other recorded data can also be managed as part of approximately 200 goo *Karada* Log items.

Since this service was launched, users have responded that recording their meals has raised their awareness naturally and helped them to diet and maintain their health.

Overview of goo *Karada* Log Health Assist service
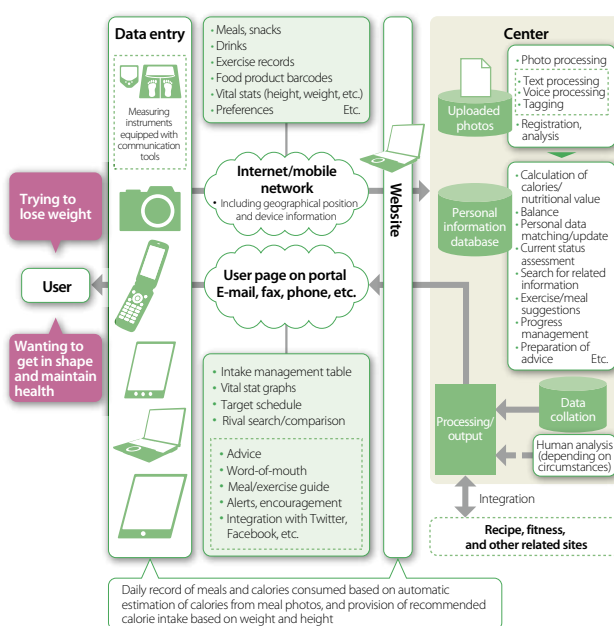
Helping to build a sustainable society

Services for supporting medical treatment and health management

NTT AT

Reducing patient burdens with the world's fastest wavelength swept light source

In 2004, NTT developed technology for manufacturing potassium tantalate niobate (KTN), an electro-optic crystal used in telecommunications. NTT Advanced Technology (NTT-AT) has since developed a wide range of uses for optical scanners that employ KTN. During this time, many laser technology experts advised NTT-AT that its technology could be applied to optical coherence tomography (OCT), and particularly to high-speed variable wavelength lasers. NTT-AT accordingly combined KTN crystal manufacturing technology with high-speed variable wavelength laser technology in fiscal 2013 to create a wavelength swept light source for OCT-related clinical applications.

OCT is currently widely used in ophthalmology to examine the fundus of the eye, and many clinics are now equipped with this technology. OCT is also being used by major hospitals to conduct coronary artery examinations, and R&D is being carried out to apply the technology to many other clinical fields, including dentistry, dermatology and the diagnosis of esophageal and colorectal cancer.

NTT-AT's wavelength swept light source boasts a high-speed sweep of 200 kHz, the world's fastest for such devices, significantly reducing the physical impact of OCT-based examination on patients. NTT-AT is pitching this product at medical device system makers, and has joined forces with Hamamatsu Photonics, a highly reputed medical device vendor with a global reach, to conduct sales activities.

NTT-AT will continue to conduct joint development with Hamamatsu Photonics to expand lineup and enable mass production with the aim of establishing and growing its presence in the medical device market.

Wavelength swept light source for OCT

Direction of light changes according to applied voltage.


KTN crystal
Controlled voltage
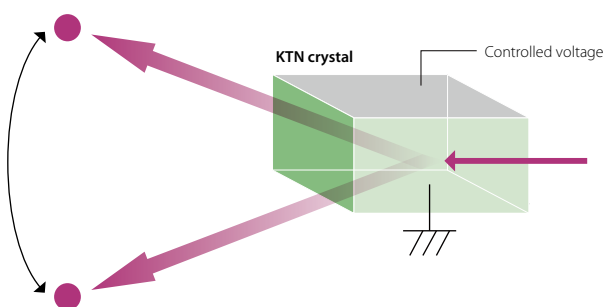
NTT IT

Public health checkup system for local authority health management sections

NTT IT has long provided health management systems. In June 2011, it launched sales of HM-neo, a new health management system with enhanced scalability that is now being used broadly by private business, health insurance unions, healthcare facilities, educational institutions, local authorities and other organizations. It started to develop a health management system specifically for local authorities after receiving requests from them for a product that could also support their public health checkups.

Currently public healthcare management is governed by different laws — for example, the Maternal and Child Health Act, Health Promotion Act, Act on Assurance of Medical Care for Elderly People, and Long-Term Care Insurance Act — and accompanying programs according to age group or applicable area, with different town hall sections handling different groups in line with these laws and programs. To help local authorities better cope with the resulting complexities in health management, NTT IT has developed a system for the unified management of the health and checkup status of each and every member of the public so as to streamline health management processes based on the different laws and eliminate wasted time and effort.

With this system, which was released on November 1, 2012, local authority health management handlers are now able to manage tasks such as mailing health checkup schedules, organizing health checkups, mailing checkup results, and conducting post-checkup health guidance much more smoothly. NTT IT will continue to expand system functions and drive adoption of the system by more and more local authorities.

Public health checkup system overview
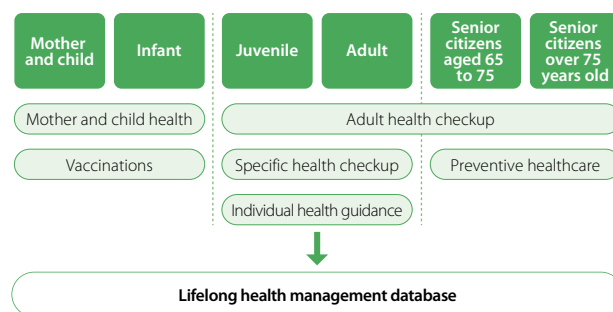
Helping to build a sustainable society

Educational services that provide added value

NTT

Field trial for Education Square x ICT project to connect schools with households

The NTT Group launched a three-year field trial for the Group's Education Square x ICT project in the first quarter of fiscal 2012 with the aim of leveraging ICT to develop new learning methods. The trial is being conducted in line with national public school education computerization initiatives and policies, with the cooperation of 12 elementary and junior high schools in five municipalities nationwide as well as education experts and education industry businesses.

In fiscal 2013, the field trial focused in particular on two specific themes. One of those was to promote the use of ICT in school by leveraging the knowledge and skills in ICT utilization gained by teachers participating in the trial up to then to make functional improvements and enhance support for the everyday use of ICT in classes. The other theme was the enhancement of home study through, for example, the award of points according to progress made in study conducted on a student's tablet, with those points being used in turn to raise characters or win trophies and such like. This kind of "gamification" was found to have a positive effect on home study.

Junior high school students were also provided with

repetitive learning opportunities that made use of the iKnow! vocabulary memorizing tool and EnglishCentral pronunciation practice tool to help them gain basic English language skills. They then used a videoconferencing system to improve their communication skills through chatting with students of the same age in schools in Australia.

The utilization of ICT in this way was shown to boost the students' interest, motivation, thinking and expressive abilities. Teachers too were enthusiastic, saying that simulation materials that required students to progress by trial and error helped improve their thinking skills, and that the use of electronic blackboards boosted students' motivation to give presentations.

Use of the function to connect tablets with electronic blackboards also enabled students to share and discuss their answers with each other, resulting in lively collaborative learning. Teachers commented that the opportunity to compare different opinions in this way promoted communication and broadened their students' minds.

New initiatives planned for fiscal 2014 include the provision of mechanisms for simple and flexible lesson support, and tablets designed for teachers. We put great value on the feedback provided by teachers participating in these trials, and are using it to improve the quality of our educational ICT solutions from the teacher perspective as we continue to explore means of promoting the utilization of ICT in education.

Education Square x ICT overview
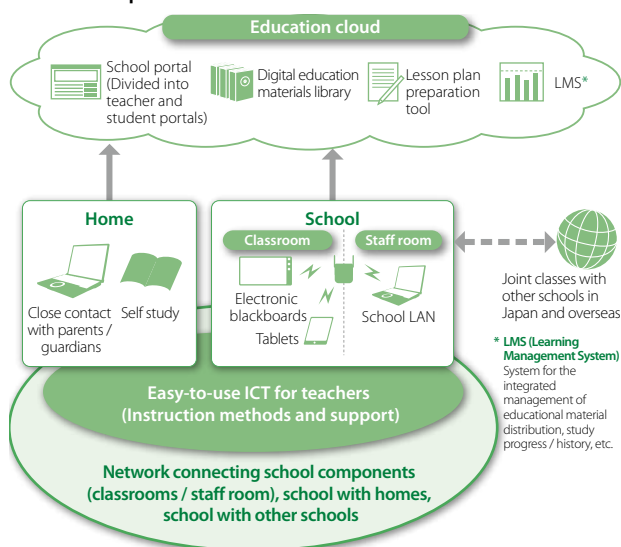
Boosting motivation to participate by enabling students to present their ideas on an electronic blackboard

Students can develop their understanding by repeatedly viewing digital educational materials at their own pace.

Digital educational materials can promote understanding by augmenting textbook explanations of experiments or scientific observations that children are unable to experience first-hand.

Helping to build a sustainable society

Educational services that provide added value ─

dimension data

Solution for connecting housebound children to their schools and classmates

Dimension Data Australia has developed Classroom Connection, a videoconferencing system composed of classroom and home units plus wireless speakers and microphone for enabling children unable to attend school to participate in classes from their homes.

Classroom Connection came into being after the daughter of a Dimension Data Australia employee told her father about a classmate unable to attend school due to illness and asked if he could help in any way. Her father used his own expertise in IT and enlisted the help of his company and partners to put together and provide a system for connecting the student to his classroom.

Classroom Connection was subsequently used to connect another housebound student to his classroom, enabling him to not only to catch up lost ground in his reading, but go on to achieve the highest reading level in his class. Dimension Data later used the same system to connect this student with his favorite judge from a famous Australian cookery program, the judge suddenly appearing live on screen to the amazement of both the boy and his classmates.

Looking ahead, Dimension Data hopes to expand usage of the solution to hospitals, connecting hospitalized children to their schools to participate in classes and interact with classmates almost as if they were at school.
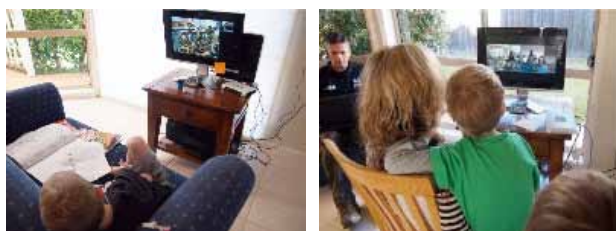
Using Classroom Connection to participate in classes from home

Services for supporting business growth ─
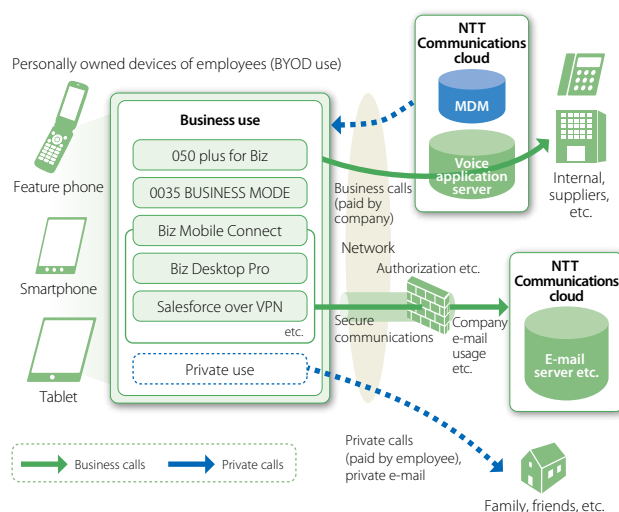
NTT Communications

Providing BYOD solutions to enable personally owned smartphones and tablets to be used for work

With the rapid spread of smartphones and tablets in recent years, more and more businesses are adopting the policy of "Bring your own device" (BYOD) for enabling employees to use their own smartphones, tablets and other such devices at work.

NTT Communications has endeavored to streamline work processes and provide its employees with a stimulating environment by deploying its own BYOD-compatible services, and has developed a store of BYOD-related expertise in areas such as the formulation of employee BYOD rules for ensuring information security.

It took this capability a step further on October 1, 2012 with the establishment of a BYOD Promotion Department to enhance and promote solutions for enabling its customers to utilize BYOD with greater convenience and safety. Moving forward, the BYOD Promotion Department aims to develop and offer further services that leverage BYOD to achieve dramatic reductions in mobile phone call charges and enable the inexpensive, secure and convenient use of an identical work environment as in the office by employees irrespective of where they are, while also guarding against such risks as the loss or theft of devices to provide an environment for the safe and convenient use of BYOD.

BYOD utilization as proposed by NTT Communications

Personally owned devices of employees (BYOD use)

Feature phone

Smartphone

Tablet

Business use
- 050 plus for Biz
- 0035 BUSINESS MODE
- Biz Mobile Connect
- Biz Desktop Pro
- Salesforce over VPN
  etc.

Private use

Business calls (paid by company)

Network

Authorization etc.

Secure communications

Company e-mail usage etc.

NTT Communications cloud
MDM
Voice application server

Internal, suppliers, etc.

NTT Communications cloud
E-mail server etc.

Private calls (paid by employee), private e-mail

Family, friends, etc.

→ Business calls → Private calls

Helping to build a sustainable society

Services for supporting business growth

NTT DaTa
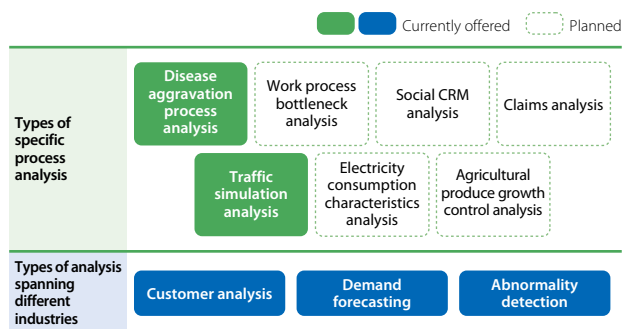
Making effective use of the data

The spread of broadband networks, smart consumer electronic appliances and increasingly sophisticated mobile devices has led to the generation of vast amounts of online digital data. This big data is being eyed as a valuable resource both for making everyday life safer and more convenient, and for enabling businesses across all industries to enhance their processes and create new services.

NTT DATA is actively developing solutions for leveraging big data to support the transformation of customer services and work processes. As part of these efforts, it revamped its big data analysis consulting service in November 2012. Most notably, it enhanced the service's quick diagnosis menu as a speedy and low-cost means of determining the efficacy of big data analysis.

In July 2013, it also set up a Big Data Business Promotion Office to coordinate between sections within its own organization and those of other group companies that are involved in big data. This new organization brings together 130 specialists to create a groupwide support structure.

NTT DATA plans to contribute to its customers' business and society at large by expanding its current industry-spanning big data analysis menu to provide an increasing number of analysis types focused on specific processes.

Big data analysis consulting service menu

			Currently offered	Planned
Types of specific process analysis	**Disease aggravation process analysis**	Work process bottleneck analysis	Social CRM analysis	Claims analysis
	Traffic simulation analysis	Electricity consumption characteristics analysis	Agricultural produce growth control analysis	
Types of analysis spanning different industries	**Customer analysis**	**Demand forecasting**	**Abnormality detection**	

NTT COMWARE

Acquiring attestation of operation controls for data centers supporting cloud services

NTT COMWARE has been offering SmartCloud Data Center since 2009 as a data center service that leverages green IT, and currently operates these data centers in six locations in Japan (Tokyo, Saitama, Osaka, Kyoto, Nagano and Hokkaido).

As of April 10, 2013, three of these data centers (Tokyo, Saitama, Kyoto) had earned ISAE 3402 (international standard)/SSAE 16 (US standard) Type II attestation for reporting description, design and operating effectiveness of a service organization's business procedures and internal controls.

Previously, data center users were required to include the data centers that they are using in audits to evaluate the efficacy of internal controls related to financial reporting. However because of the time and cost involved in conducting prolonged audits at data center operator sites, NTT COMWARE is actively helping to alleviate its customers' audit obligations by providing them with ISAE 3402/SSAE 16 reports attesting to the status of controls governing service operation.

It is hoped that these reports can also be used to meet the requirements of the U.S. Public Company Accounting Reform and Investor Protection Act (Sarbanes-Oxley Act) and Japan's Financial Instruments and Exchange Act for evaluating the internal controls of subcontractors, thus significantly reducing their audit obligations too. Furthermore, ISAE 3402/SSAE 16 also conform to international standards that include the US SAS 70 standard, and thus confer an even greater degree of accountability on data center users.

NTT COMWARE plans to acquire ISAE 3402/SSAE 16 attestation for its other data centers too so as to better address the BCP needs, security measures and audit obligations of its data center users.

Inside a data center

Helping to build a sustainable society

Services for supporting the everyday lives of elderly people and those with disabilities

NTT

Contributing to the creation of safe and secure local communities with remote monitoring services that utilize electricity consumption data
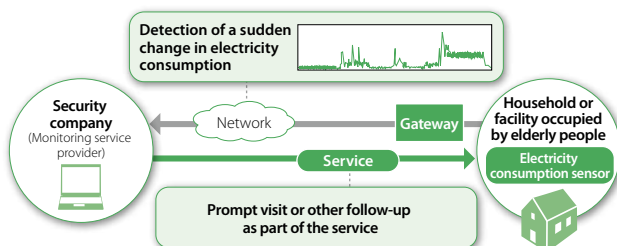
With Japan's low birthrate and increasingly aging population, the social isolation of elderly people living on their own has become a serious problem. To address this situation, the NTT Group is working on the implementation of remote monitoring services that leverage ICT to check on the presence of activity within a household by monitoring electricity consumption data.

We have developed an algorithm for identifying and separating human-instigated electricity consumption such as boiling a kettle of water or using a hair dryer from background electricity consumption by refrigerators, ICT devices, household appliances in standby mode and so forth to calculate reference values for precisely identifying conscious human utilization of appliances. Monitoring daily electricity consumption based on these reference values would enable us to detect if, for example, no conscious human utilization of appliances had occurred for some time, alerting us to the possibility that the resident concerned might be in need of assistance.

We conducted a trial of this remote monitoring service from January to March, 2011, using our reference values to monitor electricity consumption data of condominium apartments occupied by single elderly people. The trial showed that we were able to detect human activity from electricity consumption data with precision of over 90%.

However, applying this technology to remote monitoring services for elderly people requires an even greater level of precision so as to prevent the mistaken dispatch of personnel to households that, for example, appear to show no human activity only because the resident concerned is away from home. We are planning to further boost detection precision by collecting data from various perspectives, including conducting trials in different seasons when electricity consumption patterns also differ.

docomo

Mobile Phone Safety Program classes for elderly people to address the needs of an aging population

To address the needs of an aging population, NTT DOCOMO has since 2009 been dispatching instructors to local community associations and other organizations to hold Mobile Phone Safety Program classes for elderly people.

The classes cover various everyday issues and how to deal with them, including how to avoid becoming the victims of bank transfer fraud and other crimes targeting elderly people, how to block spam e-mail, how to avoid problems stemming from calls from unknown numbers, how to use mobile phone services for protecting people during disasters, what to do on misplacing a mobile phone and such like.

NTT DOCOMO also posts the educational materials used in its Mobile Phone Safety Program classes on its website so as to enable as many people as possible to learn about safe and secure mobile phone use.

Mobile Phone Safety Program class

Monitoring service overview

Helping to build a sustainable society

Services for supporting the everyday lives of elderly people and those with disabilities

NTT CLARUTY CORPORATION

E-books with text-to-speech functionality to help elderly people and those with disabilities to read

NTT CLARUTY is using the perspective of people with disabilities to incorporate universal design in e-books in such a way that they can be read more easily by people who find reading difficult.

It has launched a service that uses Virtual Narrator, a voice synthesis solution developed by NTT IT, to produce EPUB***** e-books with text-to-speech (TTS) functionality, enabling the reader to listen to a readout of the text while reading. TTS is a very convenient function for people with visual impairments, elderly people whose vision is weakening, and dyslexic people.

It also enables people to read through audio while, for example, traveling on commuter trains, jogging, cooking or nursing infants. As such, when NTT IT and NTT CLARUTY exhibited their system at the e-Book Expo Tokyo fair in July 2012, it attracted coverage by both NHK and commercial TV stations.

NTT CLARUTY developed a dedicated system in March 2013 to automate production processes so as to shorten work processes, and plans to further streamline production and make the service even easier to use.

* EPUB
An open e-book standard promoted by the International Digital Publishing Forum (IDPF), an American e-book standardization organization

The NTT IT/NTT CLARUTY stand at the e-Book Expo Tokyo fair

EPUB file

Initiatives to promote participation in society

Expanding work opportunities

NTT Group

Rehiring former employees eager to work again

Many former group employees who gave up their jobs because their spouse was transferred elsewhere and other similar reasons are eager to return to work at the NTT Group. To address such aspirations and also leverage valuable experience and skills gained while working for the Group, we have established a system for rehiring former employees.

This system is open to former employees who left after March 31, 2010, had worked continuously for over three years, and left their jobs as a result of marriage-related relocation or transfer/change of job of a spouse. Employees wishing to be rehired inform their immediate superiors on leaving their jobs in order to register under the system.

Registered former employees are contacted each year for six years after leaving our employment to ask about their desire to return to work. The decision to rehire those wishing to return to work is taken after they have gone through an interview, health checkup and other necessary procedures, and depends also on business and personnel circumstances.

NTT DATA

Helping to create jobs in the Great East Japan Earthquake disaster zone

With the passage of time since the Great East Japan Earthquake, people in the disaster zone are in increasing need of stable work. As part of its efforts to provide ongoing support for the recovery of areas hit by the disaster, the NTT DATA Group is supporting the creation of new jobs through the establishment of the NTT DATA Ishinomaki Business Process Outsourcing (BPO) Center in Ishinomaki City, Miyagi Prefecture.

The first step was taken in January 2012 by NTT DATA TOHOKU, which employed three Ishinomaki residents. The new employees were assigned to administrative tasks within the Group, such as working in claim management, which includes the issuing of invoices. In April 2012, NTT DATA Smart Sourcing hired 12 residents from Ishinomaki City and the surrounding area to launch a call center and undertake BPO work as a second step.

From September 1, 2012, NTT DATA Ishinomaki BPO Center also started to undertake contact desk tasks for NTT DATA's BizXaaS Office cloud service as a third step. BizXaaS Office is an office automation cloud service for companies with large workforces of 10,000 or more employees working both inside and outside company offices. Ishinomaki BPO Center is handling service application processing and invoicing tasks. In conjunction with this launch, NTT DATA Smart Sourcing hired an additional six residents from Ishinomaki City and the surrounding area.

The Group will continue active efforts to create new jobs, and aims to expand its workforce in the disaster zone to around 100 people in the next 1-2 years.

Involvement and cooperation in public policy

Maintenance of infrastructure and industrial development

NTT docomo

Expanding use of mobile spatial statistics for estimating area-specific populations from network operation data

NTT DOCOMO is seeking to contribute to society through the use of mobile spatial statistics. These statistics are demographic data derived from the operations of mobile phone networks. Counting the number of phones being used in each base station area according to specific customer attributes enables continuous estimation of population distribution per area, population composition according to gender, age group, residential area and other such items. Mobile spatial statistics are potentially useful to all sorts of initiatives in the public sector that make use of demographic data.

Joint research with universities has confirmed the usefulness of mobile spatial statistics in fields such as town planning and disaster preparedness planning, and in fiscal 2013 NTT DOCOMO conducted further research in the application of mobile spatial statistics to improve their reliability.

Particularly in the field of disaster preparedness planning, estimates made of the number of people in Saitama Prefecture likely to be stranded at workplaces and unable to return to their homes or forced to walk home in the event of a serious disaster led the prefectural government to rethink its measures for helping stranded people. Mobile spatial statistics were also used in fiscal 2013 in a survey conducted by Okinawa Prefecture on the number of tourists visiting Okinawa for a project aimed at nurturing repeat visitors.

Utilization of mobile spatial statistics
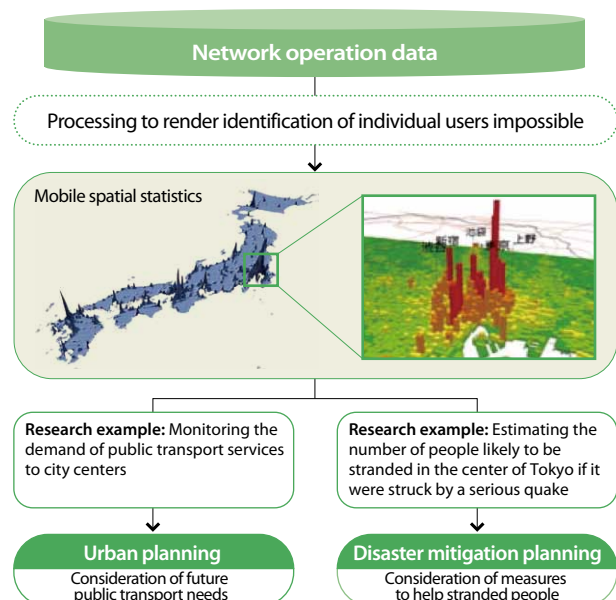
NTT Data

Building a social infrastructure data platform

NTT DATA teamed up with Tohoku University and the University of Aizu on a project to utilize a social infrastructure-related data platform to support the recovery of the Great East Japan Earthquake disaster zone.

Project members worked on the development of a Co-Creation Cloud[1] in which machines and humans complement each other to focus on the early restoration and reconstruction of social infrastructure that was severely damaged by the earthquake. NTT DATA combined its M2M[2] services and infrastructure management technologies such as its bridge monitoring system with MEMS sensor, image feature extraction and other research findings of both universities to build a platform for the efficient collection of data from inspection surveys of damaged roads, bridges, buildings and other infrastructure.

To put the big data collected in this way to effective use, NTT DATA also created the Co-Creation Cloud as a site that enables local communities, local authorities and engineers to cooperate in diagnosing and assessing the status of infrastructure.

The platform was tested and evaluated for a year from March 2012, using Fukushima Prefecture and other affected areas as its field area.

1. Co-Creation Cloud
A cloud site that serves as the base for the maintenance and management of an enormous volume of data collected using M2M services in collaboration with regional communities, municipal authorities and specialist engineers

2. M2M
A two-way communication service that uses mobile and fixed networks to enable information exchange between remote devices and IT systems without human intervention

Social infrastructure data platform
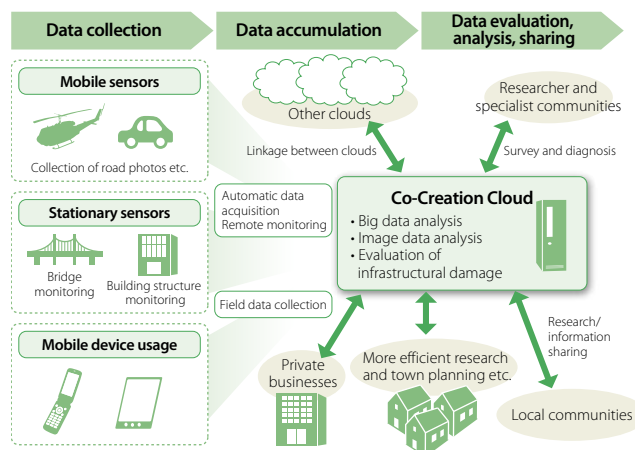
Involvement and cooperation in public policy

Maintenance of infrastructure and industrial development

NTT COMWARE

Utilizing the IEEE 1888 protocol to contribute to the creation of smart communities

NTT COMWARE is examining and testing technologies for household energy management and linkage of households and equipment to create smart communities.

In this context, IEEE 1888, a standardized protocol for the energy management of buildings and other facilities, is attracting attention for the way it could be applied to homes and smart communities. Stumbling blocks to the creation of smart communities include the complexity of managing the information from the many different types of devices and systems that would need to be connected to such a community, and the significant impact that changes in elements comprising the community could have on the overall system. In this respect, IEEE 1888 describes both the architecture for interconnectivity between devices and systems and the registry required to manage the information of those components. NTT COMWARE has developed such an IEEE 1888 registry function and demonstrated its ability to enable various devices installed in homes and other facilities to be integrated with other IEEE 1888 components.

Interconnectivity testing conducted under the University of Tokyo's Green University of Tokyo Project also confirmed that the gateway and registry developed by NTT COMWARE was able to communicate properly with devices and systems developed by other companies and universities.

Security, operational and other issues still need to be resolved before IEEE 1888 can be implemented on open networks, and various organizations are involved in various aspects of standardization and other related initiatives. NTT COMWARE is working on issues related to the implementation of its IEEE 1888 registry and on technologies for applying this registry to system management, access control and other functions.

IEEE 1888 registry utilization
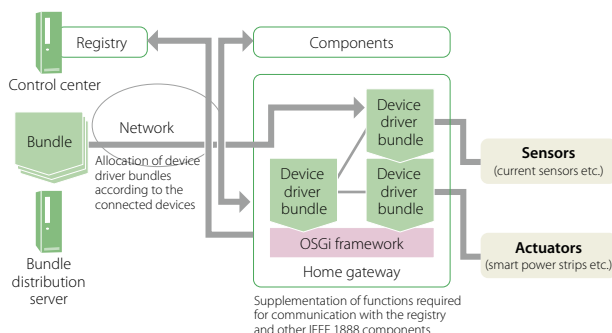

NTT AT

Provision of DiscussWeb, a legislature website management system

On October 1, 2012, NTT Advanced Technology (NTT-AT) released DiscussWeb, a content management system (CMS) developed specifically for legislatures to enable easy one-stop website management and updating without any specialist knowledge. DiscussWeb enables the speedy, low-cost creation of a website with tools for gathering opinions from residents, questionnaires, Twitter support and more. It can also be integrated easily with NTT-AT's Discuss series of systems for searching legislative session minutes to support the provision of a diversity of services for residents.

Feedback collected from both residents and councilors in a joint research project with the legislature of Nagareyama City in Chiba Prefecture conducted from May 2012 was used in the development of DiscussWeb, and Waseda University's Manifesto Research Institute also served in a supervisory capacity.

NTT-AT is currently deploying DiscussWeb to the approximately 600 municipal legislatures already using its legislative session minutes search systems, while also adding functions in line with the central government's Open Government Data Strategy.

DiscussWeb overview
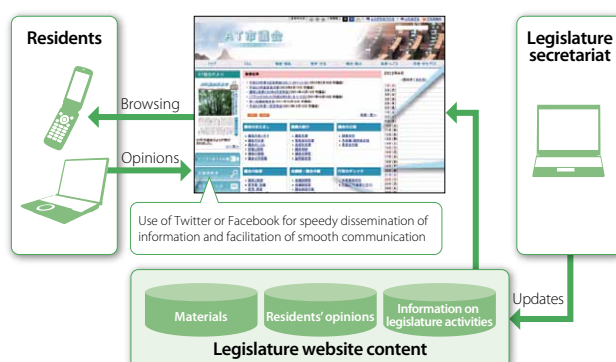
Communication between **people** and the **global environment**

We are committed to reducing both the environmental impacts of our own business activities and those of society as a whole through providing ICT services.

Creating a low carbon society

NTT Group

> **Building a sustainable Eco Model Town through energy management system (EMS) deployment**

The Tagonishi Eco Model Town Project on the outskirts of Sendai was launched in 2009 as the Tagonishi Land Readjustment Project, an initiative that brought government, academia and private industry together to probe sustainable urban development concepts. After the Great East Japan Earthquake, the project was positioned in the Sendai City Earthquake Disaster Reconstruction Plan as an Eco Model Town that is currently being developed with the help of subsidies from Sendai and the Ministry of Internal Affairs and Communications.

NTT FACILITIES and NTT East joined Kokusai Kogyo, the lead contractor for the Tagonishi Land Readjustment Project, to establish Sendai Green Community Association. This organization is equipping disaster reconstruction public housing and detached homes with energy management systems (EMS) to create a smart community that is both energy-efficient (and thus also economic) and resilient to disasters.
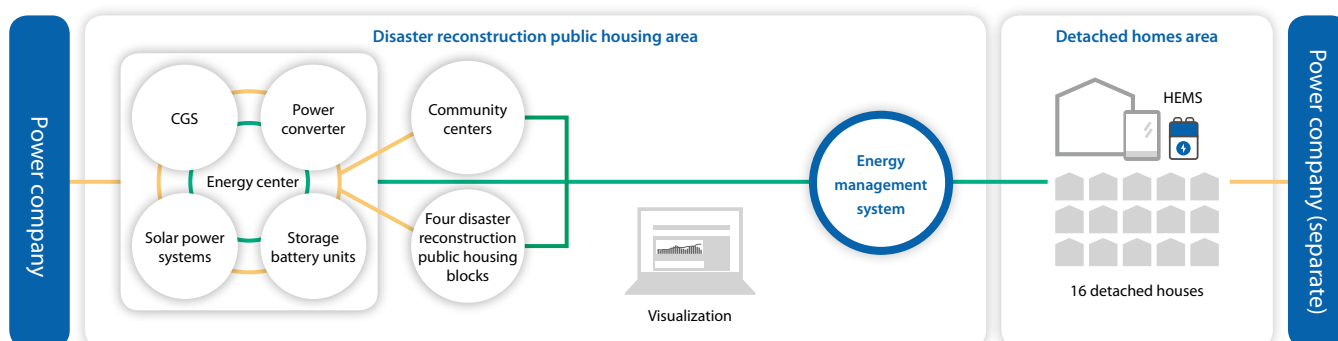
The NTT Group is going beyond reducing the energy consumption of houses and buildings to achieve optimal control of energy networks by engineering the visualization of energy consumption in the community as a whole.

More specifically, it is equipping each home in the community with ICT devices for the visualization of electricity consumption, while also fitting solar power systems, gas cogeneration systems*, storage battery units and other equipment. Two-way communication between each device and an EMS enables the efficient management of energy consumption. Detached homes in the community are being equipped with home energy management systems (HEMS) developed by NTT DOCOMO. Using five power sources, including solar power, storage battery units and electric vehicles, community residents will not only improve their energy self-sufficiency and contribute to the creation of a low carbon society, but will also be able to rely on these power sources in the event of a disaster.

* A system that burns gas to generate both electricity and heat

System overview

Legend: Electricity — Data

Power company

Disaster reconstruction public housing area
- CGS
- Power converter
- Energy center
- Solar power systems
- Storage battery units
- Community centers
- Four disaster reconstruction public housing blocks

Visualization

Energy management system

Detached homes area
- HEMS
- 16 detached houses

Power company (separate)

CSR Priority Activities

Creating a low carbon society	In addition to curbing our own CO_2 emissions particularly by reducing the electricity consumption of our communications buildings and data centers, we are also helping to reduce CO_2 emissions across society by providing and promoting ICT services that can greatly reduce energy consumption.
Implementing closed loop recycling	We put the 3Rs (reduce, reuse, recycle) into practice when decommissioning cables, telephone poles, switchboards and other communications equipment, collecting used mobile phones and disposing of waste generated in our offices. We also minimize our consumption of paper through the closed loop recycling of telephone directories and other means.
Conserving biodiversity	We pursue continuing initiatives within our business activities that are recognized as effective in conserving biodiversity, and also participate broadly with our stakeholders in activities to conserve biodiversity that are unconnected to our business.

Implementing closed loop recycling

NTT   **docomo**

Developing new recycling technologies and promoting the collection and recycling of mobile phones

Containing gold, silver, copper, palladium and other metals, mobile phones could be regarded as a valuable recycling resource in Japan with its paucity of mineral resources. NTT DOCOMO has accordingly collected and recycled used mobile phones since 1998. To further drive these efforts, NTT DOCOMO advertises the importance of phone recycling at its 2,390-plus docomo Shops throughout Japan, and through various events and other means. It is also working with NTT Energy and Environment Systems Laboratories to develop technologies for safer and more efficient recycling.

In fiscal 2012, the company introduced a new recycling process for pyrolyzing any plastic used in mobile phones to turn it into oil for use as a fuel, after which gold, silver and other metals are recovered from the residues of this process. This is the only process in the telecommunications industry to have been authorized by the Ministry of Environment as a wide-area

general and industrial waste disposal program*.

In fiscal 2013, NTT DOCOMO also developed a method that uses superheated steam to streamline the manual dismantling of used phones. This method involves treating the phones with superheated steam of over 100°C to soften the plastic outer casing, making it easier to remove. In addition to enabling phones to be dismantled rapidly without the use of any special tools, it has the advantage of allowing LCD modules and other parts with high reuse value to be recovered undamaged.

NTT DOCOMO aims to further refine its recycling and adopt various initiatives to promote the collection of used phones from customers.

* Wide-area authorization program: A special measure specified in Articles 9-9 and 15-4-3 of the Waste Management and Public Cleansing Act (#137, 1970) that relieves businesses that recycle their products effectively of the need to obtain local authority permissions related to waste disposal

Collected mobile phones

Superheated steam treatment unit

Treated mobile phone

Closeup

Conserving biodiversity

**Connecting wildlife with our daily lives**

Initiatives for changing our daily lives in ways that benefit wildlife

NTT FACILITIES

Supporting eco-friendly agriculture that uses no pesticides or fertilizers.

Agriculture that avoids the use of pesticides and fertilizers has less impact on the surrounding ecosystem, and can contribute significantly to the conservation of biodiversity.

NTT FACILITIES is working with Natural Harmony, a company that promotes pesticide- and fertilizer-free cultivation, to carry out experiments aimed at improving the efficiency of such natural cultivation and passing it on to future generations. The project team is using temperature, humidity, sunlight and other data critical to cultivation in combination with webcams to make effective use of water and enhance the productivity of pesticide- and fertilizer-free cultivation methods.
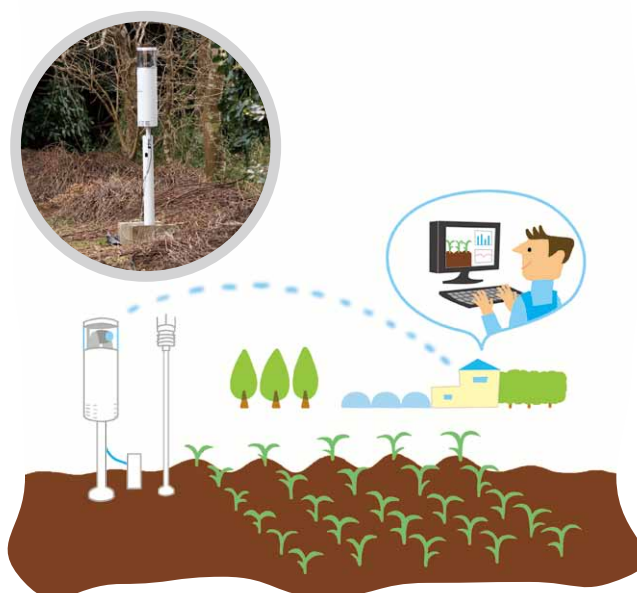
NTT WEST

Utilizing ICT to help investigate the best way to raise cattle in a natural environment.

NTT West is working with Kyushu University to field test the utilization of ICT in free-range cattle farming. The project team is investigating the effectiveness of network-enabled sensors and cameras in improving the efficiency of methods for raising cattle ranging over large areas of pastureland and reducing the workload of cattle farmers.

If the use of ICT opens the way toward free-range cattle farming, this would also benefit biodiversity by enabling the natural processing of manure and reducing dependence on cattle feed grown with pesticides and fertilizers.
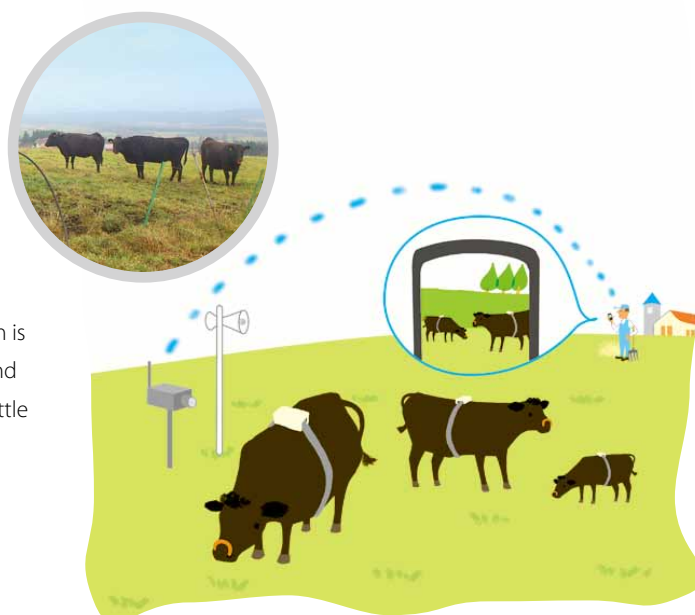
Connecting habitats and wildlife

Initiatives for protecting and connecting wildlife habitat

NTT WEST

Creating a greener Japan for future generations through its *Midori Ippai* Project.

NTT Group companies have long worked with local communities, NGOs and NPOs on citizenship activities for conserving biodiversity.

With the aim of taking those efforts a step further, NTT West launched its *Midori Ippai* (Greener World) Project in November 2012 with the aim of enlisting the participation of 10,000 employees. NTT West hopes to provide its many employees with the opportunity to appreciate the importance of biodiversity firsthand through their participation, and will continue to contribute to the conservation of biodiversity through initiatives that engage local communities.

Midori Nishino

Hikari Nishino, the concierge character for NTT West FLET'S official website, doubles as Midori Nishino to support the project as the mascot for NTT West Group's biodiversity conservation initiatives.

http://flets-w.com/nishinohikari/nishinomidori/ (in Japanese only)

NTT EAST

Building bridges for small animals to cross safety.

NTT East is leveraging its overhead cable stringing technology to help deploy animal pathways that bridge roads to connect habitat used by wildlife such as squirrels and the Japanese dormouse.
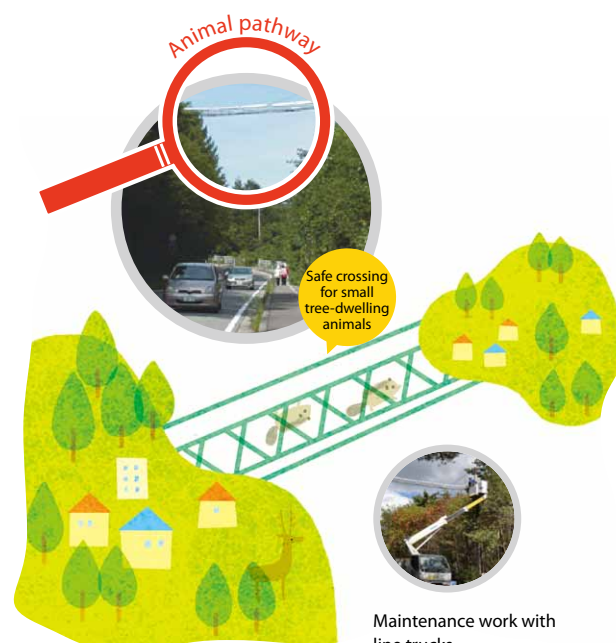
This initiative was recognized with a Minister of the Environment award in the 1st Contest for Corporate Activities on Biodiversity organized by the Keidanren Committee on Nature Conservation and others.

NTT East and other group companies will continue to probe ways of applying technology developed for business purposes to animal pathways and other initiatives that connect wildlife with habitats.

Animal pathway

Safe crossing for small tree-dwelling animals

Maintenance work with line trucks

Animal pathway to connect forest habitat divided by a road (photo: KEEP, Inc.)

Environmental management

Basic policies and management system

NTT Group

Establishing a shared NTT Group charter and vision

In 1999, the NTT Group drew up its NTT Group Global Environmental Charter to formally define basic principles and policies for protecting the environment. Based on the fundamental principle that our business activities need to be compatible with protecting the environment, this Environmental Charter emphasizes the importance of combating global warming and reducing waste and paper consumption, and established a set of targets for these priority activities to be achieved by fiscal 2011. In May 2006, we drew up the NTT Group Vision for Environmental Contribution, and based on the fundamental principle of contributing to reducing environmental impacts through providing ICT services, implemented various activities aimed at achieving our contribution targets for fiscal 2011 for reducing CO_2 emissions across society as a whole. In November 2010, having met all of the above fiscal 2011 targets, we added the conservation of biodiversity as a basic policy to our Global Environmental Charter and drew up THE GREEN VISION 2020 as our new vision for the environment up to fiscal 2021.

NTT Group

Formulation and operation of proprietary green guidelines

NTT Group operations have the following three key attributes: (1) procurement of a great many products; (2) in-house R&D facilities; (3) possession of many buildings. To promote the effective reduction of our environmental impacts, we have drafted green guidelines that address each of these three key attributes. NTT and its group companies apply these guidelines to their business activities.

In April 2013, we revised our Energy Efficiency Guidelines to issue the 4th edition. With this revision, we created comprehensive energy efficiency guidelines for reducing power consumption through the energy management of services and equipment as a whole.

The NTT Group's new vision for the environment up to fiscal 2021

THE GREEN VISION 2020

In November 2010, we formulated THE GREEN VISION 2020, our new NTT Group vision for the environment. Under this vision, we decided to focus our efforts on the three themes of creating a low carbon society, implementing closed loop recycling and conserving biodiversity, driving those efforts through the three approaches of "Green of ICT", "Green by ICT" and "Green with Team NTT". Particularly with regard to creating a low carbon society, we are focusing both on reducing CO_2 emissions from our own business activities and on contributing to the reduction of CO_2 emissions of society as a whole through promoting the increasing utilization of ICT services.

All employees of the NTT Group are working as one to contribute to the sustainable development of society through achieving the goals of our new vision for the environment.

Environmental management

Basic policies and management system

NTT Group

Environmental management

In fiscal 2006, the NTT Group established a CSR Committee charged with overseeing groupwide CSR activities, and brought the NTT Group Global Environmental Protection Promotion Committee, which drives group environmental protection activities, under the CSR Committee's jurisdiction. The Global Environmental Protection Promotion Committee oversees the Greenhouse Gases Reduction Subcommittee and Waste Disposal and Recycling Subcommittee, directs groupwide projects such as the Biodiversity Working Group that are implemented as occasion demands, formulates basic policies, manages targets and addresses any issues that emerge.

The NTT Group has also gathered group company environmental affairs managers together every year since fiscal 2002 for annual study sessions. The aim of the sessions is to share information on groupwide environmental protection promotion activities, and in particular information on the extent of understanding of the Group's vision for the environment, progress status of activities and outstanding issues. Group companies also use the sessions to introduce their environmental initiatives, latest field trials and other topics. Videoconferencing is used to enable managers in distant locations to sit in on these study sessions and put questions to participants through instant messaging.

In fiscal 2013, priority was put on raising awareness of the importance of biodiversity, with Naoki Adachi, CEO of Response Ability, Inc. being invited to give two talks in Tokyo and Osaka respectively on the subject of biodiversity in relation to the current activities of the NTT Group. These two events drew a combined audience of 272 employees.

Study session for environmental affairs managers

The NTT Group organization for promoting environmental protection
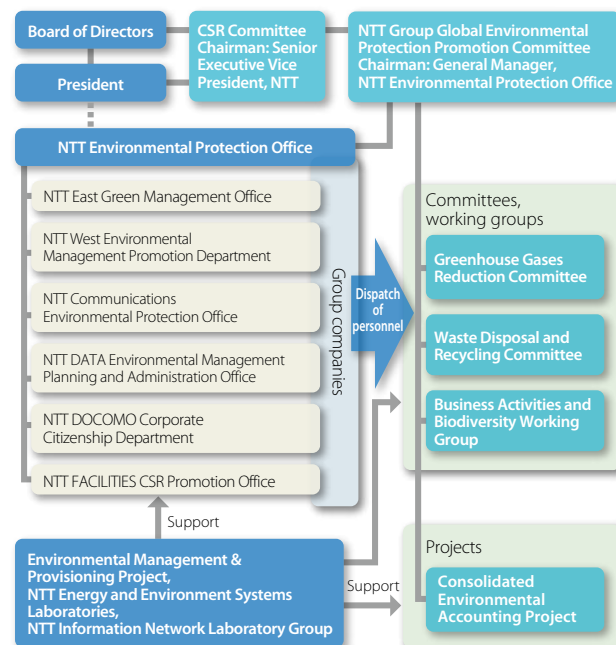
NTT Group

Compliance with environmental laws and regulations

The NTT Group complies with laws and regulations related to the environment, and works as one to reduce its impacts on the environment.

In conformity with the Law Concerning Special Measures Against PCB Waste, we pay meticulous attention to the proper storage and management of equipment using PCBs and PCB contaminated wastes, and use safe and appropriate methods for disposing of them.

We will continue in our efforts to dispose of remaining items without delay based on relevant laws and ordinances.

Environmental management

Environmental impacts overview

NTT Group

Environmental impacts overview

To minimize the environmental impacts of its business activities, the NTT Group endeavors to gather and analyze information on the resources and energy that it consumes, the processes involved in that consumption, and the resulting environmental impacts.
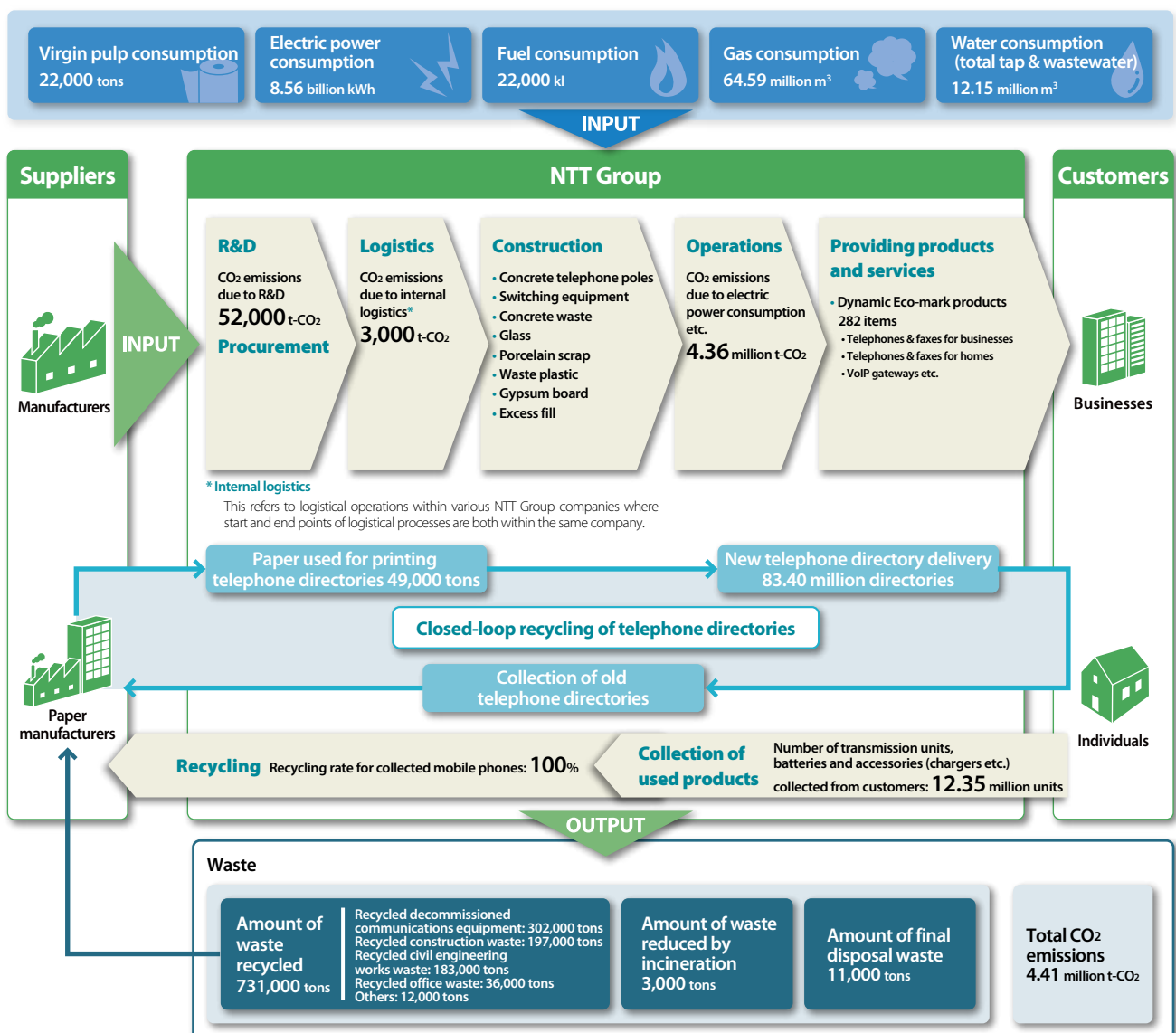
The NTT Group endeavors to reduce its environmental footprint by quantitatively monitoring the environmental impacts of all processes of its business activities on a continuous basis, and by setting itself concrete numerical targets under THE

GREEN VISION 2020 for reducing CO_2 emissions, waste and paper consumption.

Of the 4.41 million tons of CO_2 emissions generated by the NTT Group in fiscal 2013, 4.17 million tons (approximately 95%) were derived from business operation-related electricity consumption.

Of the 744,000 tons of waste generated, 731,000 tons (approximately 98%) were recycled, and the remainder was incinerated, resulting in a reduction of 3,000 tons to leave 11,000 tons of final disposal waste.

Each year, the NTT Group issues 83.4 million telephone directories throughout Japan, which translates into 49,000 tons of paper. Of those 49,000 tons, 11,000 tons are from virgin pulp.

Virgin pulp consumption 22,000 tons

Electric power consumption 8.56 billion kWh

Fuel consumption 22,000 kl

Gas consumption 64.59 million m³

Water consumption (total tap & wastewater) 12.15 million m³

INPUT

Suppliers | **NTT Group** | **Customers**

Manufacturers

INPUT

R&D
CO_2 emissions due to R&D
52,000 t-CO_2
Procurement

Logistics
CO_2 emissions due to internal logistics*
3,000 t-CO_2

Construction
- Concrete telephone poles
- Switching equipment
- Concrete waste
- Glass
- Porcelain scrap
- Waste plastic
- Gypsum board
- Excess fill

Operations
CO_2 emissions due to electric power consumption etc.
4.36 million t-CO_2

Providing products and services
- Dynamic Eco-mark products 282 items
  - Telephones & faxes for businesses
  - Telephones & faxes for homes
  - VoIP gateways etc.

Businesses

* Internal logistics
This refers to logistical operations within various NTT Group companies where start and end points of logistical processes are both within the same company.

Paper used for printing telephone directories 49,000 tons

New telephone directory delivery 83.40 million directories

Closed-loop recycling of telephone directories

Collection of old telephone directories

Paper manufacturers

Individuals

Recycling Recycling rate for collected mobile phones: **100**%

Collection of used products
Number of transmission units, batteries and accessories (chargers etc.) collected from customers: **12.35** million units

OUTPUT

Waste

Amount of waste recycled 731,000 tons

Recycled decommissioned communications equipment: 302,000 tons
Recycled construction waste: 197,000 tons
Recycled civil engineering works waste: 183,000 tons
Recycled office waste: 36,000 tons
Others: 12,000 tons

Amount of waste reduced by incineration 3,000 tons

Amount of final disposal waste 11,000 tons

Total CO_2 emissions 4.41 million t-CO_2

Environmental management

Environmental accounting

NTT Group

Environmental accounting

The NTT Group introduced environmental accounting in fiscal 2001 to boost the efficiency and effectiveness of its environmental conservation efforts by quantitatively determining both the costs and benefits of environmental conservation programs undertaken as part of its business activities. In fiscal 2013, environmental investment increased as a result of the active efforts of our group companies to minimize power consumption as a means of reducing their CO_2 emissions. Our implementation of Internet billing services has also generated positive economic effects of approximately ¥3.7 billion. Moving forward, we aim to implement even more efficient and effective environmental management through continued quantitative monitoring and analysis of our environmental activities.

1. Scope of data
The companies subject to consolidated environment accounting are NTT, NTT East, NTT West, NTT Communications, NTT DATA, NTT DOCOMO and their group companies (171 companies in total).

2. Applicable period
- Data for fiscal 2013 report is from April 1, 2012 to March 31, 2013.
- Data for fiscal 2012 report is from April 1, 2011 to March 31, 2012.

3. Accounting method
- Accounting is based on the NTT Group Environmental Accounting Guidelines. These guidelines comply fully with the Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment
- Environmental conservation costs are expressed in monetary units and benefits in monetary units and physical quantity.
- Environmental conservation costs are tabulated separately as environmental investments and environmental costs. From fiscal 2004, depreciation costs are included in environmental costs. Personnel costs are also included in environmental costs.
- Reductions in CO_2 emissions through energy conservation measures are calculated by subtracting actual emissions from projected emissions in the event that no such measures were taken.

Fiscal 2013 environmental accounting	Environmental investment (millions of yen)		Environmental costs (millions of yen)		Economic benefits (millions of yen)			Material benefits (thousands of tons)		
	Fiscal 2013	Fiscal 2012	Fiscal 2013	Fiscal 2012		Fiscal 2013	Fiscal 2012		Fiscal 2013	Fiscal 2012
(1) Business area costs	15,340	11,870	18,650	19,150						
· Pollution prevention costs	590	410	230	640						
· Global environmental conservation costs	14,440	11,370	4,810	4,410	Cost reductions through energy conservation	7,070	5,850	Reductions in CO_2 emissions through energy conservation measures	454	188
· Resource recycling costs	310	90	13,610	14,100	Revenues from sale of recyclable waste (decommissioned communications equipment etc.)	7,060	7,310	Recycled decommissioned communications equipment	302	276
					Waste disposal cost reductions through recycling	590	0	Recycled construction waste	197	307
					Cost reductions through reusing decommissioned communications equipment	19,900	7,940	Recycled civil engineering works waste	183	135
					Cost reductions through reusing communications devices	14,630	13,010	Recycled office waste	36	35
					Cost reductions through reusing office waste materials	10	10	Other recycled items	12	11
(2) Upstream / ownstream costs	120	110	7,270	6,440	Revenues from sale of recyclable waste (subscriber communications devices etc.)	430	230	Number of communications devices collected from customers (thousands)	12,348	12,320
					Cost reductions in postal expenses through computerization	8,800	5,120			
(3) Administrative costs	110	10	6,720	6,020						
(4) R&D costs	4,350	5,970	15,220	10,690						
(5) Citizenship activity costs	0	0	100	100						
(6) Environmental remediation costs	0	0	0	310						
Total	19,920	17,960	47,960	42,710		58,490	39,480			

Creating a low carbon society

Green of ICT

NTT Group

### Targets and results

One of the environmental themes of the NTT Group is the creation of a low carbon society, and we have set ourselves the target of curbing our emissions in Japan by at least 2 million $t-CO_2$ from the projected fiscal 2021 level so as to reduce total emissions by at least 15% (600,000 $t-CO_2$) from the fiscal 2009 level. In conjunction with emission coefficient adjustment, our CO_2 emissions for fiscal 2013 were 4.41 million $t-CO_2$, a year-on-year increase of about 620,000 $t-CO_2$.

CO_2 emissions from business operations

(thousands of tons-CO_2)
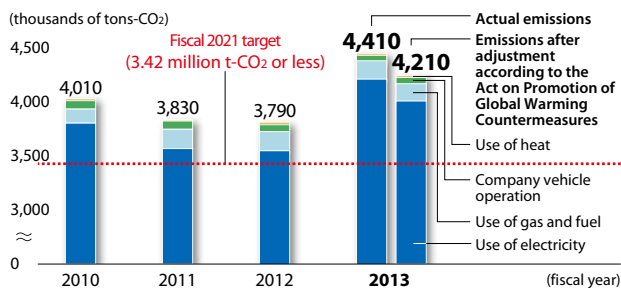
Fiscal year	2010	2011	2012	2013
Total CO_2 emissions (thousands of tons-CO_2)	4,010	3,830	3,790	4,410
Electric power (billion kWh)	8.72	8.71	8.66	8.56
Emission coefficient (kg/kWh)*	0.435	0.409	0.408	0.488
CO_2 attributable to electricity consumption (thousands of tons-CO_2)	3,790	3,560	3,530	4,170
CO_2 attributable to gas and fuel consumption (thousands of tons-CO_2)	129	177	177	164
CO_2 attributable to company vehicles (thousands of tons-CO_2)	77	76	66	59
CO_2 attributable to heating (thousands of tons-CO_2)	18	14	17	16

* Weighted average of emission coefficients announced annually by each power utility weighted according to the amount of each utility's power used by the NTT Group

NTT Group

Groupwide TPR campaign to reduce electricity consumption

Over 90% of the CO_2 emissions created by NTT Group business operations are attributable to office and communications equipment power consumption. The NTT Group accordingly created a groupwide energy conservation strategy called Total Power Revolution (TPR) in October 1997 to reduce its power consumption. By promoting efficient energy management at buildings owned by NTT and installing energy-efficient electrical power units, air conditioning systems and telecommunications equipment, we managed to continue to reduce power consumption across the NTT Group by approximately 930 million kWh from projected levels in fiscal 2013.

Creating a low carbon society

Green of ICT

NTT Group

Promoting Green NTT to expand solar power system deployment

The NTT Group has been implementing its Green NTT plan to promote the use of eco-friendly renewable energy since May 2008. The goal of this plan is to expand our use of solar power, which could be seen as a key symbol of the low carbon society, and we aimed to deploy a total of 5 MW of solar power systems over the whole Group by fiscal 2013.

In August 2008, we established NTT-Green LLP, a limited liability partnership charged with the task of driving the Green NTT plan. NTT-Green LLP is pushing ahead with the efficient installation of solar power systems in premises owned by group companies, and by investing and participating in NTT-Green LLP, group companies can contribute to the spread of renewable energy use. With the approval of a third party certification authority, NTT-Green LLP also issues Green Power Certificates to investing companies, according to the amount of power generated in line with the amount invested. This is the first environmental project undertaken by a business group LLP in Japan that combines the deployment of solar power systems with the issue of Green Power Certificates.

In fiscal 2013, five new solar power generation facilities were added to the Group's stock, and went into operation. The 13 facilities installed since fiscal 2010 generate a total of approx. 2.1 MW of power. These combined with systems deployed by individual companies brought the total number of NTT Group systems in operation nationwide to about 170 as of the end of fiscal 2013, with a total generating capacity of about 5.1 MW. This means that we achieved our target of deploying 5 MW by the end of fiscal 2013.

NTT

Developing technology for optimizing data center energy supply and demand

Air-conditioning equipment accounts for about 30% of data center electricity consumption. Making air-conditioning equipment more energy-efficient is accordingly a major aspect of reducing the environmental footprint of data centers.

NTT Energy and Environment Systems Laboratories (NTT EESL) is developing data center energy management systems (DEMS) for optimizing data center energy supply and demand by enabling centralized management and sophisticated cooperative control of server and other ICT equipment load and air conditioning equipment operation status.

In fiscal 2013, NTT EESL developed technologies for collecting temperature and power consumption data from sensors embedded in ICT devices in multi-vendor environments, and for optimizing ICT equipment load allocation and control of air conditioning operation parameters. These technologies, which are both aimed at enabling cooperative control of ICT devices and air conditioning equipment, were confirmed to enable reductions of up to 35% in air conditioning power consumption

NTT EESL is now planning to submit a proposal to the ITU-T* for drawing up a recommendation with the aim of driving the adoption of technology for collecting data in multi-vendor environments. It also plans to test and evaluate optimal control technologies in a test environment that simulates actual cloud environments.

* **ITU-T (International Telecommunication Union Telecommunication Standardization Sector)**
A department of the International Telecommunication Union (ITU), a United Nations agency that makes policy recommendations for developing international standards in telecommunications. Japan has participated in the ITU as a Council Member since 1959.

Data center energy optimization
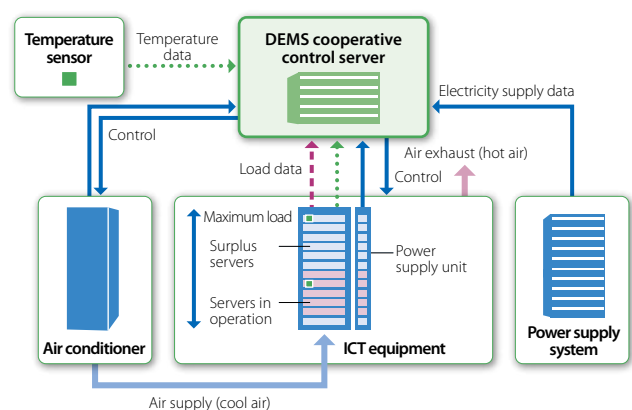
Creating a low carbon society

Green of ICT

NTT

Development of low-power LSI technology for next-generation high-speed, high-capacity communications systems

To cater to ever-increasing network traffic, we are conducting research on 10 Gbps Ethernet Passive Optical Network (10G-EPON) next-generation optical access systems that provide 10 times the speed of current mainstream 1 Gbps (GE-PON) systems.

NTT Microsystem Integration Laboratories (NTT MIL) has developed the world's first large-scale integrated (LSI) chipset for this next-generation optical access system by integrating all of the functions of optical line terminals (OLTs), the devices used on the exchange side, and optical network units (ONUs), the devices used on the subscriber side, respectively on single chips.

One of the key challenges in developing these LSIs was to curb power consumption while at the same time boosting transmission speeds by a factor of 10. NTT MIL succeeded in packaging a sleep control function that reduces power consumption without sacrificing usability by enabling most LSI operations to turn off automatically when network devices are not in use, and boot instantly when required.

In fiscal 2013, it researched LSI control methodologies and firmware for equipping this sleep control function with SIEPON* support, and teamed with NTT Access Network Service Systems Laboratories to conduct research on reducing device power consumption.

In addition to continued research on power saving technologies, NTT MIL's future plans include research on dependable ONUs that can run on batteries if and when disaster strikes.

* SIEPON
Service Interoperability in Ethernet Passive Optical Networks, a standard being developed by the Institute of Electrical and Electronics Engineers (IEEE) for ensuring GE-PON/10G-EPON system-level interoperability

NTT

Quality-adaptive power saving control technology for creating eco-friendly optical networks

As awareness of environmental issues grows, telecommunications carriers are under increasing pressure to reduce the electricity consumption of their optical networks.

The electricity consumed by the optical network units (ONUs) installed in customer homes is particularly critical, since their sheer number means that they account for a very large chunk — according to one estimate, over 50% — of the electricity consumed by a whole network. It is for this reason that NTT is focusing on reducing the amount of electricity consumed by ONUs through integration on single chips and reducing the number of parts they contain. In addition to such hardware design measures, the quality-adaptive power saving control technology being developed by NTT Access Network Service Systems Laboratories (ANSSL) is also attracting attention as a methodology-based solution.

This technology regulates the amount of electricity consumed according to the amount of traffic between the ONUs in each home and optical line terminals (OLTs) on the exchange side. For example, when a customer is not using the service, these devices now slip into a sleep mode, reducing electricity consumption to the bare minimum. The technology also adjusts transmission speeds between OLTs and ONUs according to subscriber-side usage status so as to save electricity.

In fiscal 2013, NTT ANSSL proposed a methodology for further communications device power saving through interaction between ONUs and the home gateways (HGW) linking ONUs to household communications devices. It also used a simulator and test machines to evaluate the power saving benefits from ONU-HGW interaction for the purpose of exploring commercialization.

NTT ANSSL will apply the findings from its methodology research to hardware design with the aim of generating synergy between the two approaches to achieve further power saving. In addition to mechanisms for saving power at the individual household level, it also plans to formulate power control mechanisms that employ low latency communication protocols to enable interaction across whole communities.

Creating a low carbon society

Green of ICT

NTT Group

Data centers that combine various NTT Group power saving technologies

With the spread of cloud computing and increasing demand for BCP solutions in the wake of the Great East Japan Earthquake, data centers are playing an increasingly major role, making the reduction of their power consumption an important issue. The NTT Group has accordingly put priority on power saving aspects of data center integration and operation, and its group companies have developed a wide range of technologies.

NTT Communications

Low environmental footprint data centers rated highly worldwide

NTT Communications has long been working on the integrated development of eco-friendly data centers both in Japan and overseas.

The Serangoon Data Center that it opened in Singapore in April 2012 has been built for energy efficiency, featuring improved insulation, air tightness, sunlight screening and other properties, as well as high-efficiency water-cooled air conditioning and a building energy management system (BEMS). In place of the conventional lead-acid battery-based UPS (uninterruptible power supply), it is equipped with a rotary UPS that combines UPS with a generator, thus reducing the use of materials that impact on the environment. The facility's all-round attention to the environment, including the utilization of natural light, rainwater, recycled water, recycled materials, LED lighting, green rooftop and surroundings, was recognized in June 2011 with the award of a top Platinum rating under the Singapore government's BCA Green Mark[1] scheme for rating the environmental performance of buildings. It also earned a Gold rating under the LEED green building rating system[2].

NTT Communications' use of Smart DASH[3], a system developed by Vigilent (California, USA) for the automatic control of air conditioners in accordance with changes in temperature and the environment, in its Sterling Data Center in Virginia and Lundy Data Center in California, USA, resulted in energy savings that earned it and Vigilent a joint 2012 Green Enterprise IT Award[4] in the Facility Product Deployment Category.

1. **BCA Green Mark**
   A scheme devised by the Building and Construction Authority (BCA), an agency belonging to Singapore's Ministry of National Development, for rating the environmental performance of building design

2. **LEED green building rating system**
   A system operated by the US Green Building Council, an environmental NPO, for rating green building performance. LEED stands for "Leadership in Energy & Environmental Design".

3. Smart DASH is a registered trademark of Vigilent Corporation (http://www.vigilent.com/).

4. **Green Enterprise IT Award**
   An award scheme organized by the Uptime Institute, an association that sets operating standards for data centers

Serangoon Data Center

Lundy Data Center

Creating a low carbon society

Green of ICT

NTT Data

XECHNO® Power + FRESH HVDC® energy-efficient power supply system

Data centers have traditionally used alternating current (AC) as opposed to direct current (DC) power supply systems that require the electricity fed to servers and other devices within the data center to undergo three AC/DC conversions, resulting in energy losses at each conversion.

The NTT DATA Group has succeeded in implementing an energy saving power supply system (HVDC[1] DC12V, product name: XECHNO Power + FRESH HVDC[2]) that reduces conversion energy losses by eliminating two of the three AC/DC conversions, resulting in power savings of 10-30% compared with conventional systems. This, combined with the simplification of devices to deliver more stable operation, has made the NTT DATA Group a leader in next-generation green data centers.

HVDC DC12V power transmission systems are also being eyed for next-generation smart grids for the way that they can be combined easily with renewable energy sources such as solar and wind power that produce direct current. Such is the potential of HVDC to save energy that the NTT DATA Group's initiatives are garnering worldwide attention, and were recognized with the Minister of Economy, Trade and Industry Award in the Green IT Promotion Council's Green IT Awards 2012.

1. **HVDC**
   High voltage direct current (HVDC) power transmission. HVDC DC12V is a system that transmits direct current power of over 300 V that is reduced to 12 V for supply to servers.

2. FRESH HVDC is a registered trademark of Japan Radio Co., Ltd. in Japan.

NTTFACILITIES

Next-generation modular data center systems that combine power saving HVDC and fresh air cooling technologies

Under the Green IT Project launched by the New Energy and Industrial Technology Development Organization (NEDO) in fiscal 2009, NTT FACILITIES has teamed with a number of other private enterprises to develop next-generation modular data center systems that incorporate a diversity of energy-saving technologies.

Modular data center systems are composed of container-like modules of about 3 m in width that are each equipped with power supply, air-conditioning and other equipment. The speed with which such systems can be deployed and assembled and their scalability in response to changing business needs is driving increasing demand for them.

NTT FACILITIES contributed HVDC power supply and fresh air cooling technologies as energy-saving measures. Having started to develop and commercialize HVDC systems in 2005, NTT

FACILITIES has been a front-runner in HVDC technology. Supplying ICT devices directly with DC power (DC 380 V) eliminates power losses from AC/DC conversion, thus boosting power supply efficiency. Fresh air cooling technology involves the use of fresh air intake units that enable servers to be cooled without using air conditioning by supplying a flow of fresh air at the temperature, humidity and volume required by the servers according to external atmospheric conditions.

Combining these two technologies enabled overall power consumption to be reduced by 30% compared with earlier modular data centers systems. Project members plan to operate one of these next-generation modular data center systems in the city of Tsukuba for over a year to assess its power saving capabilities under actual working conditions, as well as draw up operation guidelines and accumulate further know-how.

NTT COMWARE

Sales of fresh air-cooled data centers delivering world class power savings

In November 2012, NTT COMWARE started to offer fresh air-cooled data centers with a PUE[1] of less than 1.1, putting them at the top worldwide for energy efficiency[2].

NTT COMWARE's SmartCloud® data centers are equipped with carrier-grade disaster resistance, security, operational and other reliability qualities, and the company continues to make improvements and enhancements that deliver further cost and power saving benefits.

In addition to newly installed fresh air cooling technology, the adoption of airflow control technology for optimizing temperature and humidity within the data center and high-performance ICT devices that operate normally even at an inlet air temperature of 40°C has enabled cooling-related power consumption to be reduced dramatically.

The new system was field-tested for approximately one year from November 2011 and was shown to provide stable service with a PUE of under 1.1 even in the hottest and coldest seasons. This is equivalent to a CO_2 emissions reduction of 300 tons per 1,000 servers per year compared with NTT COMWARE's preceding generation of data centers.

NTT COMWARE will initially use the new fresh air-cooled data centers to run its own cloud services, but it will continue to work on improvements to its operational technologies with the aim of eventually offering services for housing customer ICT equipment.

1. **PUE (Power Usage Effectiveness)**
   A measure of how efficiently a computer data center uses its power. PUE is calculated by dividing the total power consumption of a data center by the power consumption of the computing equipment it houses. The closer PUE is to 1, the higher is the center's efficiency.

2. NTT COMWARE research based on figures published by data centers in Japan and overseas at the time of announcement

Creating a low carbon society

Green by ICT

NTT Group

Conducting field tests throughout Japan for the creation of smart communities

With interest in energy supply and demand running higher than ever since the Great East Japan Earthquake, the NTT Group is going beyond individual houses and buildings to focus on the application of visualization and optimal control technologies to whole communities, and its group companies and laboratories are teaming up to conduct field tests throughout Japan aimed at creating smart communities.

NTT Network Technology Laboratories (NTT NTL) is currently spearheading R&D on smart community platforms that utilize automated demand response (ADR)[1], a core technology in creating smart communities, to balance power supply and demand across a wide area.

ADR can be used to alert consumers when electricity is in short supply or the grid is suffering instability, and depending on alert details, to automatically control appliances or storage battery units and such like in consumer households.

In fiscal 2014, servers tested in a test room in fiscal 2013 — a management server for balancing household power supply and demand, data integration server for processing both demand-side and supply-side data, and automated demand response server — were deployed in company housing to verify their effectiveness in a real-world environment.

Packaging this ADR platform on the cloud also enabled the development of a service platform for providing power companies or demand response aggregators[2] with ADR services, thus eliminating the need for such entities to own their own equipment.

The NTT Group's ADR platform was the first in Japan to be certified for compliance with OpenADR 2.0, the international ADR standard, and was also chosen for ongoing joint field testing by the Ministry of Economy, Trade and Industry and Waseda University in cooperation with power companies and demand response aggregators.

We will endeavor to contribute to the creation of smart communities through utilizing the knowledge and expertise gained from these tests in implementing actual services.

1. **Automated demand response**
   Technology for balancing power supply and demand through automatically controlling devices in consumer households via messages sent from power companies or ADR aggregators when electricity is in short supply

2. **Demand response aggregator**
   A service provider contracted by a power company to use demand response to aggregate consumer household power consumption reductions (negawatts)

NTT EAST

Leveraging the FLET'S Miruene electricity consumption visualization service to support power saving in Hokkaido

Concern over power shortages across society have grown since the Great East Japan Earthquake, and Hokkaido with its cold snowy winters is particularly eager to reduce household electrical consumption for heating and other purposes. NTT East has teamed with the Hokkaido government to launch a municipality-based electricity conservation project in January 2013 that uses its FLET'S Miruene service for visualizing household power consumption.

As a first step, in February NTT East provided FLET'S Miruene to households in the city of Eniwa that wished to participate in the project. Participating households will aim to reduce their winter electricity consumption by 7% compared with the fiscal 2011 level through implementing power saving measures driven by electricity consumption visualization. The findings obtained from this trial will be shared with the Hokkaido government and municipal governments in Hokkaido to support efforts to encourage effective electricity conservation behavior.

Between March and September, NTT East also used Eniwa as a location to field test technology for estimating device electricity consumption that is being developed by NTT Energy and Environment Systems Laboratories. This technology analyzes data obtained from sensors installed on household electricity distribution boards to estimate electricity consumption separately for each household electrical appliance.

NTT East will also present FLET'S Miruene electricity consumption visualization case studies and usage concepts at Hokkaido government events and other venues to support Hokkaido's efforts to raise awareness and promote electricity conservation among its populace.

How FLET'S Miruene service works
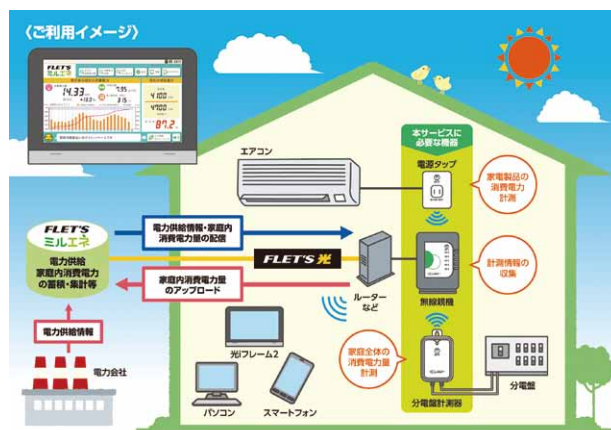
Creating a low carbon society

Green by ICT

Participating in the testing of a smart industrial estate for Southeast Asia

Southeast Asia continues to post rapid economic growth, but its power demands are rising steeply as a result, and chronic power shortages are hampering continued growth. The region also urgently needs to reduce CO_2 emissions through the stable supply of high-quality electricity and simultaneous deployment of renewable energy sources.

NTT Communications was accordingly commissioned by the New Energy and Industrial Technology Development Organization (NEDO) to participate in a smart community pilot study conducted in an industrial estate in Java, Indonesia.

The goal of this project is to promote the continued export of packaged infrastructure that leverages the superiority of advanced Japanese technology and products. The study involves deploying components such as a high-quality power supply system and factory energy management systems (FEMSs) and demand-side management (DSM) for optimizing energy supply and demand in factories in an industrial estate currently under development and expansion in Indonesia, and demonstrating the efficacy of deploying these smart community technologies and the economic viability of the business model.

NTT Communications' role is to build and test an ICT platform that combines cloud technologies with high-quality communications infrastructure in the form of an optical fiber network so as to enable the stable supply of power and optimal control of power supply and demand. The project was launched in July 2011. A preliminary study was completed in February 2012, and NTT Communications is currently building and starting to test the system in the field.

NTT Communications will use the knowledge and expertise gained from this study to work with its Indonesian subsidiary on the deployment of infrastructure for implementing smart community projects in Indonesia.

Suryacipta City of Industry, the industrial estate where the pilot study is being conducted

Source: Suryacipta City of Industry website
(http://www.suryacipta.com/about.html)

Implementing bicycle sharing as a low environmental footprint transport system

Systems for sharing bicycles to travel short distances are seen as a promising way of reducing CO_2 emissions and relieving traffic congestion.

NTT DOCOMO has been working on the implementation of such bicycle sharing as a transport system with a low environmental footprint. It conducted field tests from 2010 to improve the convenience of functions required to provide a bicycle sharing service, including bicycle reservation, lending and return, and payment of charges through the use of its communications networks and "Osaifu-Keitai" mobile phone wallet function. It used the findings gained from these tests to launch the operation of a bicycle sharing system together with the city of Yokohama in April 2011. It also improved the convenience and promoted the utilization of bicycle sharing services by developing a new system equipped with functions for installing bicycle ports in multiple locations, and working with a related company to develop a smartphone cycle app that can display distance traveled, speed, route, surrounding places of interest and other items.

NTT DOCOMO launched identical services in Tokyo's Koto Ward in November 2012, and the city of Sendai in March 2013. It continues to drive the evolution of its bicycle sharing system, enabling the use of transport service smart cards to pay bicycle usage charges in Koto Ward, and deploying a next-generation system in Sendai that enables initial investments to be curbed.

It is planning to expand the areas of availability of such services and add features, as well as developing a new system that uses bicycles with built-in GPS and mobile phones.

The bicycle sharing system deployed in Sendai

Creating a low carbon society

Green by ICT

NTT DaTa

Participation in a smart mobility pilot project in Austria

In recent years, an increasing amount of research is being carried out in the field of smart mobility, which seeks to resolve transportation problems such as GHG emissions and other environmental issues, traffic congestion and the issues of people underserved by transportation through the integration and total optimization of various means of transport with information infrastructure.

NTT DATA Österreich, an NTT DATA overseas subsidiary, is leveraging its expertise in this field to participate since 2011 in eMORAIL, a pilot project aimed at developing an integrated e-mobility* service in Austria.

eMORAIL aims to integrate e-vehicles, e-bikes and other e-mobility with public transport to enable travel from home to destination. Under the system, public railway information, reservation and ticket provision has been combined with e-mobility sharing functions to create a service that users can access through their smartphones. eMORAIL leverages public transport to reduce the environmental impacts of travel by enabling people to reach their destinations without using gasoline.

* E-mobility
Cars and other means of transport that are powered by electricity, and the mechanisms supporting such transport

E-mobility sharing

NTT DaTa

Bilateral Offset Credit Mechanism research project in Kenya

NTT DATA Institute of Management Consulting (NDIMC) conducted a research project in the Republic of Kenya under the Ministry of Economy, Trade and Industry's FY2013 Global Warming Mitigation Technology Promotion Project.

This project is aimed at the early establishment of a Bilateral Offset Credit Mechanism (BOCM) by which Japan transfers low carbon technologies and products to countries with which it forges bilateral or multilateral agreements to contribute to the reduction of their greenhouse gas emissions, with these contributions being fairly evaluated to generate credits for the offset of its own GHG emissions.

The project with Kenya is looking into the feasibility of utilizing low carbon technologies, products and systems developed by Japanese companies to build hybrid mini grids for rural electrification that combine diesel generators with solar and wind power generation. NDIMC has also been studying the possibilities for BOCM utilization with respect to the GHG emissions reductions generated by these mini grids, and has submitted policy proposals to the Kenyan government with the aim of accelerating BOCM utilization.

NDIMC has contributed to the BOCM negotiation process through strengthening ties with Japanese government representatives and companies hosting visits from Kenyan government representatives, and assisting with Japanese public/private sector policy proposal and introduction of Japanese technology and products in Nairobi, Kenya's capital. It will continue to work for the mitigation of global warming and creation of a low carbon society through promoting the utilization of low carbon technologies, products and services developed in Japan.

Kenyan government representatives, most of them from Kenya's Ministry of Energy and Ministry of Environment and Mineral Resources, visiting a renewable energy generation facility on an outlying Okinawan island during a study tour to Japan

Creating a low carbon society

Green by ICT

NTTFACILITIES

Participation in a smart grid demonstration project in Los Alamos, USA

Initiatives to build sustainable societies are being pursued globally, including projects being implemented in various countries to develop and standardize smart grids. The New Energy and Industrial Technology Development Organization (NEDO) is working with a number of overseas cities to implement projects aimed at demonstrating the efficacy of smart grid-related technologies developed in Japan and applying them overseas.

In America, it is working with the state of New Mexico and the US Department of Energy's Los Alamos National Laboratory to carry out a demonstration project in Los Alamos County and the city of Albuquerque. Full-scale pilot operations were launched in September 2012 after completion of the demonstration site in Los Alamos County.

These pilot operations are testing technologies for controlling large storage batteries used for power grids together with demand response to resolve issues related to weather-driven fluctuations in the power generated by solar power plants. Chosen by NEDO to participate in this project, NTT FACILITIES is leveraging evaluation expertise that it has gained as a solar power generation system integrator to test the power generation capabilities and deterioration of ten types of solar panels under local climatic conditions in New Mexico.

Demonstration project in Los Alamos County

NTTFACILITIES
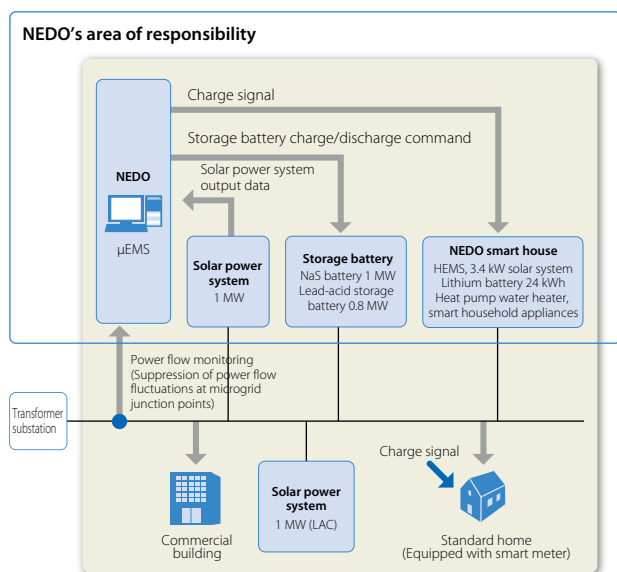
#### Attaching value to electricity conservation with negawatt aggregation

Since the Great East Japan Earthquake, the need to save energy across society as a whole has never been greater, particularly where the electricity consumed by household air-conditioning in summer and heating in winter is concerned.

NTT FACILITIES is seeking to address this issue by building a new "negawatt aggregation" business model. This model involves supporting electricity conservation (= negawatts) by households and aggregating these negawatts for provision to power companies in return for a financial incentive. Dividing this financial incentive among households rewards consumer electricity saving efforts and promotes electricity saving across society.

Pilot negawatt aggregation projects carried out in Tokyo Electric Power Company (TEPCO) and Hokkaido Electric Power Company supply areas in the summer and winter of 2012 demonstrated that at times when demand is high across a whole grid, customer electricity saving behavior can have a major impact. Discussions with power companies based on these findings have resulted in plans to implement year-round negawatt aggregation in TEPCO's supply area in fiscal 2014.

Negawatt aggregation has also been positioned as an important component of national energy policy, and NTT FACILITIES plans to leverage its position as a leader in the field to continue to drive electricity conservation behavior across society as a whole.

How negawatt aggregation works

Creating a low carbon society

Green by ICT

NTT FINANCE
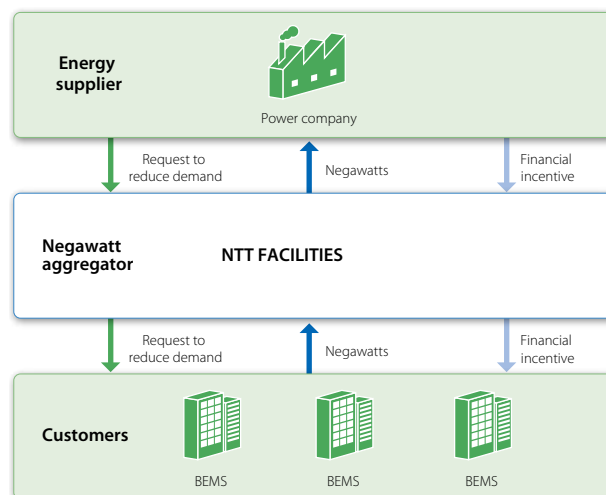
Providing financial support for mega solar projects

As interest in renewable energy sources grows, so-called mega solar farms (solar power generation plants with an output of at least 1 MW) are being built throughout Japan.

NTT FINANCE has teamed up with NTT FACILITIES to develop a scheme for driving mega solar business.

Under this scheme, NTT FACILITIES with its rich experience in solar power generation undertakes the construction of mega solar farms that NTT FINANCE acquires and then leases to power generation businesses for a set period. This scheme has the following advantages for power generation businesses: (1) meticulous, one-stop provision of services by the NTT Group for everything from design to construction and financial assistance; (2) dramatic cuts in initial investments for solar power generation equipment; (3) power supply during emergencies and effective use of idle land.

Local authorities in Fukuoka Prefecture, Nagano Prefecture and other prefectures are already using this scheme to operate mega solar farms.

Green with Team NTT

NTT Group

Greening the rooftops of buildings throughout Japan

Rooftop greening not only adds to the scenery, but also delivers a range of environmental benefits, including purifying air through absorbing CO_2 and releasing oxygen. Vegetation can also help to mitigate temperature increase and heat island effects through plant transpiration, and reduce air conditioning power consumption through its insulating effect, keeping temperatures down over the whole building.

Aware of these benefits, the NTT Group is actively greening the rooftops of group company office buildings, data centers, telecommunications buildings and other facilities with a diversity of plants including sweet potato, bitter gourd, cucumber, morning glory, loofah, bell pepper, pansy, rape, azalea, Japanese zelkova and lawn grass.

For example, at its Urbannet Mita Building in Tokyo's Minato Ward, NTT Urban Development is using an aero-hydroponic system***** to grow sweet potatoes and other plants for greening the building. It is also keeping bees to test the effectiveness of natural pollination by honeybees. In fiscal 2013 it started to grow strawberries, which require pollination by honeybees.

NTT West Kansai Regional Headquarters has also planted colorful flower beds at its five Kyoto buildings to match surrounding scenery, and grows bitter gourds that it harvests to serve at social events etc.

* Aero-hydroponic system
Liquid fertilizer is circulated through the cultivation unit.

Strawberry cultivation

Implementing closed loop recycling

Green of ICT

NTT Group

Targets and results

The NTT Group has made "Implementing closed loop recycling" one of its environmental themes, and set itself the targets of 2% or less as its final disposal rate for all waste materials, and the continued achievement of zero emissions* for decommissioned telecommunications equipment.

In fiscal 2013, our final disposal rate was 1.45% for all waste materials, and 0.02% for decommissioned communications equipment, which means that we achieved zero emissions for the ninth consecutive year.

Our target for reducing paper consumption was a reduction of 30% or more by fiscal 2021 compared with fiscal 2009 (to a total of 58,000 tons or less). Our total paper consumption for fiscal 2013 was 68,000 tons.

* Zero emissions
A concept proposed by the United Nations University that calls for reusing all waste materials and by-products from industrial activity as resource inputs for other types of production in order to eliminate waste on a lifecycle basis. The NTT Group considers a final disposal rate of 1% or less to satisfy zero emissions conditions.

Final disposal rate
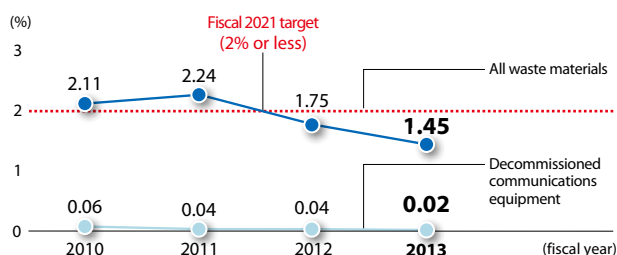
Total paper consumption
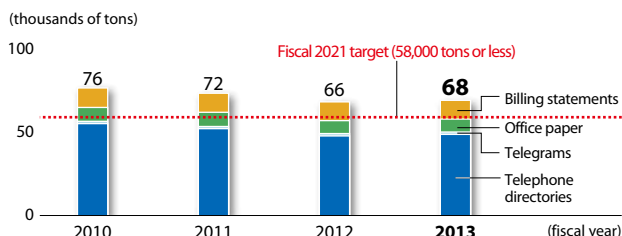
NTT Group

Reusing and recycling waste from communications equipment installation/decommissioning

The NTT Group owns a variety of communications equipment including telephone poles, switching equipment and communications cables. Such equipment needs to be decommissioned and disposed of when it reaches the end of its service life or is replaced during system upgrades for new services and so forth. We promote the reuse and recycling of such decommissioned communications equipment within the Group, and recycle whenever possible, for example recycling discarded concrete blocks as road building material.

NTT Group

Establishing closed-loop recycling by collecting and reusing telephone directories

The NTT Group uses large quantities of paper resources to manufacture telephone directories. We accordingly started in 1999 to implement the more effective use of those paper resources through closed-loop recycling that involved collecting old directories for processing into paper to be used to make new directories.

We are also endeavoring to reduce our paper consumption through double-side printing of office paper, e-billing and other measures.

Implementing closed loop recycling

Green of ICT

NTT

Researching how materials degrade to help extend the useful life of communications equipment

Extending the useful life of products and equipment is one aspect of creating a sustainable society, since the longer we can use each and every product or piece of equipment, the more we can reduce our consumption of resources to replace them.

NTT Energy and Environment Systems Laboratories (NTT EESL) is investigating the mechanisms by which materials degrade as an aspect of its research into extending the life of communications equipment from a materials science perspective. By elucidating how structural materials used in communications equipment degrade, it hopes to devise methods for preventing degradation and develop structural materials with longer useful lives.

Research has demonstrated that the introduction of hydrogen into high-strength steel can make it brittle. NTT EESL is currently investigating the way in which hydrogen infiltrates, and the amount of hydrogen required to cause embrittlement. Resolving these questions will hopefully lead to the development of technologies for manufacturing high-strength steel with a structure that prevents hydrogen infiltration or for otherwise maintaining the steel's strength for a longer period.

Green by ICT

NTT Group

Single billing and Internet billing services to reduce the amount of paper required for billing statements

NTT FINANCE is improving customer convenience and helping to reduce consumption of paper through its single billing service, which bundles monthly mobile phone, fixed line phone and Internet usage charge invoices into one bill.

In fiscal 2013, subscriptions to this service reached approximately 150,000, reducing paper consumption by approximately 18 tons per year. In fiscal 2014, we will aim to increase single billing service subscriptions to 1 million so as to reduce paper consumption by 120 tons per year.

We also reduce our consumption of paper by providing customers who pay by bank transfer with Internet billing services that enable them to check billing statements and other information through Internet, e-mail and mobile phones.

In fiscal 2013, subscriptions to this service reached approximately 20.13 million, reducing our paper consumption by approximately 16,000 tons per year.

Implementing closed loop recycling

Green by ICT

NTT

Research on techniques for analyzing telecommunications business resource utilization

Quantitatively monitoring and analyzing resource flow (input, accumulation, output), and using the information gained as basic data is an important aspect of reducing resource consumption and the waste generated by business activities. However, unlike manufacturing industries, which procure raw materials directly and can thus easily monitor resource input, non-manufacturing industries such as telecommunications, which procure ready-made equipment rather than raw materials, are unable to monitor resource input on a raw material basis.

NTT Energy and Environment Systems Laboratories (NTT EESL) has accordingly been studying resource utilization by telecommunications companies. NTT EESL is currently researching both top-down and bottom-up techniques for analyzing resource input, using various management data for the former, and data on resources contained in procured items for the latter. The results of its calculations for the top-down approach are featured in NTT East and NTT West's CSR reports.

In response to requests from NTT Group companies, NTT EESL began in fiscal 2013 to subdivide industries into more detailed categories with respect to the data used for calculating resource utilization, and also provided technical support for the disclosure of environmental information by improving the precision of calculation methods and providing its advice regarding how data should be presented in CSR reports and other literature.

NTT LOGISCO

Provision of a returnable transport item management system as an SaaS service

NTT LOGISCO has developed ECO-PRA[1], a management system for keeping track of returnable transport items (RTI) such as pallets, containers and drums, and started offering it in January 2011 as an SaaS[2] service.

ECO-PRA can help to improve RTI circulation and prevent uneven distribution and shipment delays by enabling the real-time sharing of information on individual RTI location, movement history, inventory, etc. between multiple logistics sites, and as such, supporting the practice of the 5Rs of Reduce, Reuse, Repair, Return and Recycle. Since ECO-PRA is offered as an SaaS service, it is low cost, quickly deployable and very scalable, enabling speedy and flexible response to expansion of usage area or business volume.

ECO-PRA was originally developed as a group environmental activity to manage plastic drums for telephone pole support cables, and by fiscal 2013 had been deployed in all logistics centers except Okinawa and island centers. It is currently being used to manage a total of 31,550 drums.

Going forward, NTT LOGISCO plans to make ECO-PRA even easier to use by engineering its integration with warehouse management systems and logistics information solutions that make use of smartphones and other mobile terminals.

1. ECO-PRA
Ecological and Economical Platform for RTI Application

2. SaaS
Software as a Service — the provision of software as a service over the Internet

Implementing closed loop recycling

Green with Team NTT

NTT Group

Groupwide focus on PET bottle cap collection

The NTT Group selected the collection of PET bottle plastic caps for the Ecocap Movement, an activity that group companies had previously carried out independently, as a Green with Team NTT priority policy that it has been implementing on a groupwide basis since fiscal 2011.

By recycling PET bottle caps, the Ecocap Movement reduces CO_2 emissions from waste incineration, and uses part of the income generated by recycling the caps to provide vaccinations for children in developing countries.

In fiscal 2013, we exceeded our target for the year of 30 million caps, collecting approximately 33 million caps that represent emissions reductions of 242 t-CO_2 and vaccinations for approximately 38,400 children.

Conserving biodiversity

Green of ICT

NTT

Addressing environmental risks

The key environmental impacts of the NTT Science and Core Technology Laboratory Group's main facility, the NTT Atsugi Research and Development Center, include the use of chemicals, generation of wastewater, gas emissions and waste products, and consumption of electricity by the air-conditioning systems of the clean rooms that it uses for research. NTT invests systematically in plant and equipment to prevent contamination from such impacts.

Since the Center's equipment for treating liquid wastes from experiments was approaching the end of its useful life, NTT renovated it in fiscal 2013 to prevent the accidental discharge of hazardous chemicals. It also made improvements to enable water discharged from the facility's groundwater tanks, air-conditioning chilled water tanks and other components to be treated as much as possible within the Center before being discharged so as to lighten the environmental load on public treatment facilities and minimize impacts on biodiversity in public waters. As a further means of conserving biodiversity, the Center's pond was equipped with a water purification unit that runs on solar power.

In addition to such equipment improvements, NTT SCTLG also conducts regular environmental surveys of air, rainwater/groundwater, odors, soil, noise and vibration, as well as round-the-clock monitoring of water quality and other items to assess environmental impacts. It also endeavors to prevent contamination by setting voluntary targets that are more rigorous than legally mandated targets. In fiscal 2013, it surveyed groundwater, rainwater, noise and vibration. For the noise and vibration survey, all results were within voluntary limits, but for groundwater the survey has been postponed owing to equipment malfunction. For rainwater, zinc contained in aggregate used in structural components has accumulated over the years and begun to leach out, as a result of which measured concentrations have exceeded mandated values, and so concentrations continue to be monitored. If mandated values continue to be exceeded, NTT SCTLG plans to treat discharges with zinc removal equipment. In fiscal 2014, it will conduct odor and soil surveys.

Also, when clean room air filters were replaced, radioactivity checks revealed the presence of radioactive cesium derived from the Fukushima Daiichi Nuclear Power Plant. Because the level of radioactivity exceeded the legal limit (8000 Bq/kg) for disposal, these filters are being kept within the facility in a condition that complies strictly with legal stipulations.

NTT Communications

Caring for the environment when laying submarine cables

NTT Communications has a basic policy for preventing marine pollution in relation to deploying submarine network infrastructure. In addition to observation of the MARPOL Convention and other environmental laws and regulations, it endeavors to minimize the impact of its cable laying on marine biota and fisheries.

For example, in areas where coral reefs are prevalent, it endeavors to protect them and the creatures that use them as a habitat by carrying out detailed assessments to develop plans for laying cable in a way that avoids the reefs. In the Inland Sea, where the majority of the marine area is designated as a national park, it works with the relevant government agencies and local authorities to develop careful plans before laying cables.

Before carrying out actual cable laying, it also carries out cleanups of the seabed along the planned route, taking any abandoned fishing nets, rope and wires collected during the cleanup operation back to the construction base to dispose of properly as industrial waste.

Also, when cable-laying ships raise their anchors, there is a risk or marine organisms being brought up and transplanted to other areas where they could disrupt the local ecosystem. To prevent this from happening, NTT Communications ensures that anchors and anchor pockets are cleaned meticulously.

Laying submarine cables to avoid coral reefs

Conserving biodiversity

Green by ICT

NTT Communications

Supporting environmental protection through the goo Green Label search portal

NTT Resonant, an NTT Communications Group company, provides services such as *Kankyo* goo, one of Japan's leading websites for environmental information, and goo Green Label, a search portal for funding environmental protection activities, on its goo portal site.

In addition to environment-related news from around the world, *Kankyo* goo carries hints for eco-friendly living and actively supports the efforts of private businesses, local authorities and NGOs to publicize their environmental initiatives and activities.

The site has also hosted the annual *Kankyo* goo Awards since fiscal 2001, selecting recipients on the basis not only of the content of their initiatives, but also on the information communicated, ingenuity, originality, anticipated benefits and so forth. In fiscal 2013, awards were presented in the categories of Climate Change Mitigation, Conservation of Biodiversity, Renewable Energy Promotion, and Disaster Zone and Victim Support. The award ceremony was designed to serve as an opportunity for generating communication across industries, welcoming as it did many different entities, including other entrants as well as the award-winning businesses and organizations, and featuring content such as a group discussion on how the portal could be further improved.

goo Green Label is designed so that a part of the revenue generated from use of the portal is donated to NPOs and NGOs engaged in activities to protect the environment. In fiscal 2013, it donated 5.5 million yen to the National Land Afforestation Promotion Organization, a public service organization that is supporting the recovery of the Great East Japan Earthquake disaster zone through reforestation activities. Since it was launched in August 2007, goo Green Label has donated a total of ¥48.5 million yen to 84 organizations. NTT Resonant will continue to provide easy means for users to support environmental protection activities and strive to further boost participant numbers.

Kankyo goo web page screenshot

Conserving biodiversity

Green with Team NTT

NTT Group

Green with Team NTT tree planting activities carried out nationwide

The NTT Group organizes employee participation-based hands-on environmental education activities as a priority policy under its Green with Team NTT initiative. We are carrying out a number of tree planting activities both in Japan and overseas to serve as opportunities for participating employees and their families to enjoy each other's company and think about environmental issues.

NTT

Launch of the Green Pearl Coastal Forest Regeneration Project to support Kesennuma Oshima's post-disaster reconstruction

NTT has combined Great East Japan Earthquake disaster zone reconstruction support with its tree planting activities to launch the Green with Team NTT Green Pearl Coastal Forest Regeneration Project in support of the post-disaster reconstruction of Kesennuma Oshima, an island in Miyagi Prefecture that suffered extensive damage from the earthquake and ensuing tsunamis and forest fires.

Kesennuma Oshima constitutes a natural bulwark in Kesennuma Bay that served to protect the city of Kesennuma from even worse damage when the Great East Japan Earthquake tsunamis hit the coast. The regeneration of Oshima's coastal forest will contribute to the local community from various perspectives, including environmental protection and restoration, conservation of biodiversity, disaster mitigation and disaster zone reconstruction.

A total of 116 members of "Team NTT", including retired employees as well as group company employees and their families, gathered from the Tokyo area and Tohoku region to participate in March 2013 in the first activity session. Under the supervision of the Japan Forest Biomass Network, an NPO cooperating in the project, the team planted 1,006 oak, cherry and other saplings on 6,600 m² of coastal hillside laid bare by the tsunamis in Sotohama on the island's northern tip.

Because these broadleaved trees put down deep roots, they will be more effective in mitigating future disasters than conifers. We will continue to manage the growth of these trees by

clearing brush and other activities in the hope that Oshima's disaster victims will take heart from the way the young trees spread their roots and grow into a forest that brings color to the changing seasons.

docomo

docomo Woods program

NTT DOCOMO is leveraging the Forestry Agency's Corporate Forest Program[1], National Land Afforestation Promotion Organization's Green Fund Program[2], and the Corporate Forestry Support Program[3] to implement forest improvement activities and create "docomo Woods" throughout Japan as part of its environmental protection activities.

The docomo Woods program aims to encourage a volunteer spirit and raise the environmental awareness of employees and their families by giving them the chance to enjoy nature while participating in brush clearing and other forest improvement activities. As of the end of March 2013, docomo Woods covered a total area of about 197 hectares (equivalent to 151 1.3-ha baseball fields) in 50 locations in all of Japan's 47 prefectures. NTT DOCOMO will continue this activity to contribute to the protection of the natural environment and conservation of biodiversity.

1. A program under which the Forestry Agency and companies nurture forests and share revenue from the sale of timber
2. A fundraising program for promoting forest conservation and improvement, greening activities, forest-related international cooperation, and other activities aimed at creating woods and forests
3. A program created in the main by Japan's prefectures and Prefectural Revegetation Promotion Committees to support private sector forest improvement initiatives

docomo Woods program activity

Tree planting

Conserving biodiversity

Green with Team NTT

NTT **NTT WEST**

Protecting the Japanese rosy bitterling

NTT West's Nara Branch has been cooperating with Kinki University Faculty of Agriculture's Japanese Rosy Bitterling Conservation and Satoyama Restoration Project since fiscal 2012 as one of its biodiversity conservation activities.

The Japanese rosy bitterling is an endangered species listed in the Ministry of the Environment's Red Data Book. It was found to be living in Nara Prefecture by Kinki University's Faculty of Agriculture in 2005, and the University has been breeding it under protection within its grounds since then.

NTT West Nara Group employees and their families participate about once a month in activities to help improve the environment around the pond in which the fish are being kept. These activities include elimination of introduced species, paddy planting, rice harvesting and crafting scarecrows.

In fiscal 2013, a total of 127 people participated in eight sessions from May to December. As part of efforts to maintain the breeding environment, the pond was drained in December to remove the sludge that had accumulated on the bottom. The sludge will be used as fertilizer for the paddy fields surrounding the pond next year.

NTT Communication Science Laboratories is working with Kinki University to conduct joint experiments that make use of a wireless sensor network to elucidate conditions for promoting the breeding of the Japanese rosy bitterling.

Japanese rosy bitterling

Environmental improvement activities around the pond

Sensor node

Deployed sensor node

Over 1,000 individuals have been bred at the University as a result of efforts to date. The species is now also being raised at schools within Nara Prefecture, and NTT West is looking into the possibilities of using ICT to link the participating schools and hold an environmental conference. It plans to continue to contribute to such grassroots environmental protection activities.

dimension data

Visiting an educational rehabilitation facility and studying contamination of streams in Malaysia's Cameron Highlands

A group of 40 Dimension Data Malaysia employees and their families visited the Cameron Highlands Educational Rehabilitation Informative Special Home (CHERISH) to spend time playing games with the autistic children enrolled at the facility and watching their performances. They also met with Dr. Liau, Vice President of Regional Environmental Awareness for Cameron Highlands (R.E.A.C.H.), who briefed them on contamination of streams in the Highlands that is threatening the habitats of invertebrates. The trip served to remind employees of the responsibility of all of humanity to care for the environment and of the importance of taking actions that make a difference to local communities.
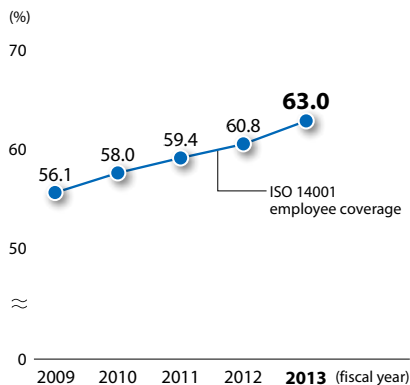

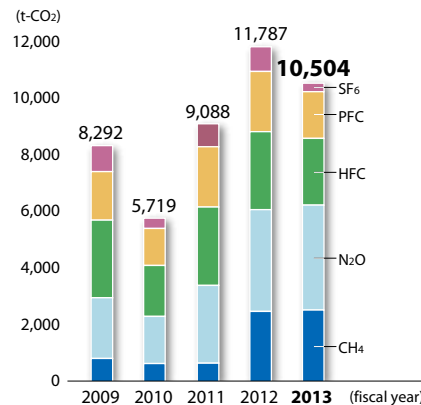Investigating stream fauna with children from CHERISH
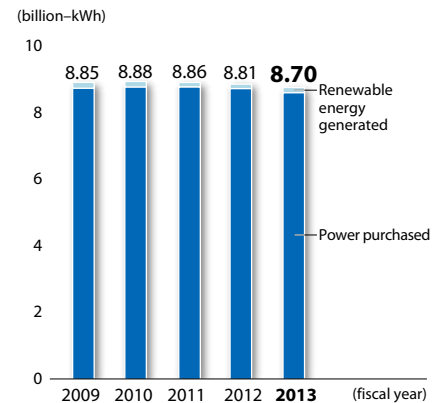
Environmental data

Environmental management

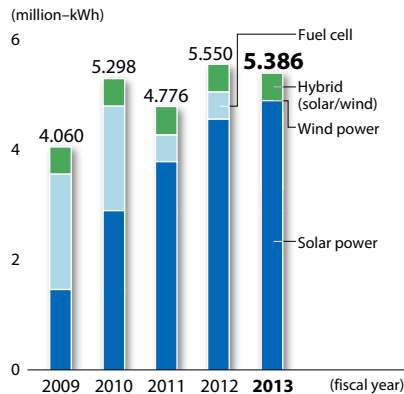### Current status of NTT Group's ISO 14001 certification acquisition

(%)

- 2009: 56.1
- 2010: 58.0
- 2011: 59.4
- 2012: 60.8
- 2013: **63.0**

ISO 14001 employee coverage

(fiscal year)

Creating a low carbon society

Greenhouse gas emissions other than CO_2 emissions (CO_2 emissions - equivalent)

(t-CO_2)

- 2009: 8,292
- 2010: 5,719
- 2011: 9,088
- 2012: 11,787
- 2013: **10,504**

Legend: SF_6, PFC, HFC, N_2O, CH_4

(fiscal year)

Electric power consumption

(billion–kWh)

- 2009: 8.85
- 2010: 8.88
- 2011: 8.86
- 2012: 8.81
- 2013: **8.70**

Renewable energy generated
Power purchased

(fiscal year)

Creating a low carbon society

Clean energy generation

(million–kWh)

- 2009: 4.060
- 2010: 5.298
- 2011: 4.776
- 2012: 5.550
- 2013: **5.386**

Fuel cell
Hybrid (solar/wind)
Wind power
Solar power

(fiscal year)

Number of clean energy generators

(units)

- 2009: 183
- 2010: 220
- 2011: 246
- 2012: 263
- 2013: **276**

Hybrid (solar/wind)
Fuel cell
Wind power
Solar power

(fiscal year)
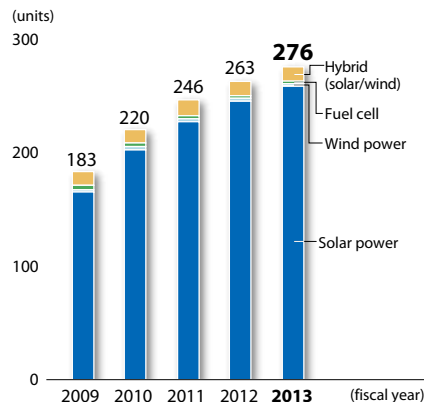
Number of low-emission company vehicles

(units)

- 2009: 553
- 2010: 704
- 2011: 924
- 2012: 1,168
- 2013: **1,437**

Natural gas vehicles
Electric vehicles
Hybrid vehicles

(fiscal year)
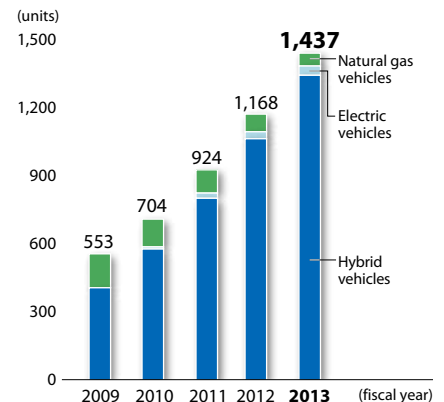
Creating a low carbon society

Fuel consumption by company vehicles

(kiloliters)

- 2009: 29,366
- 2010: 28,459
- 2011: 28,652
- 2012: 26,056
- 2013: **23,865**

Diesel consumption
Gasoline consumption

(fiscal year)
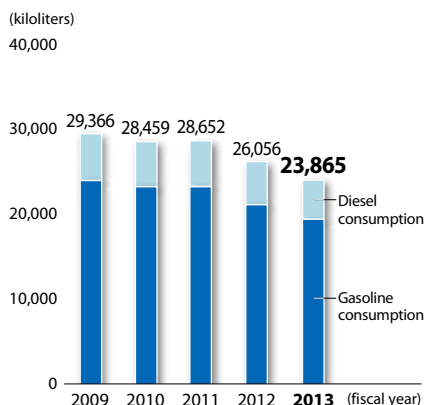
Implementing closed loop recycling

Waste output and final disposal waste

(thousands of tons) / (thousands of tons)

Waste output:
- 2009: 828
- 2010: 790
- 2011: 822
- 2012: 784
- 2013: **744**

Final disposal waste:
- 2009: 20
- 2010: 17
- 2011: 18
- 2012: 14
- 2013: **11**

Office waste
Civil engineering work
Construction work
Communications facilities

(fiscal year)

Medical waste

(tons)

- 2009: 1,886
- 2010: 1,847
- 2011: 1,540
- 2012: 1,603
- 2013: **1,157**

Noninfectious
Infectious

(fiscal year)
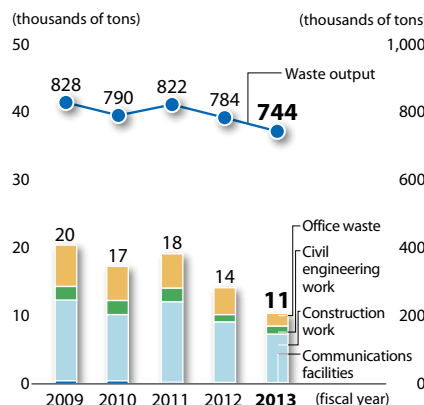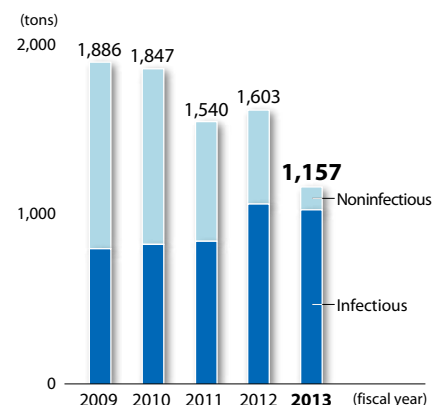
Environmental data

Implementing closed loop recycling

Virgin pulp consumption

(thousands of tons)

- Billing statements
- Office paper
- Telegrams
- Telephone directories

2009: 25
2010: 19
2011: 16
2012: 17
2013: 22

(fiscal year)
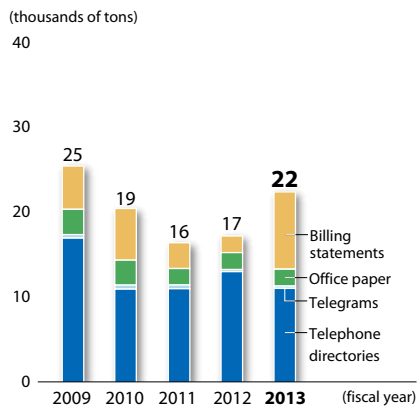
Paper consumption reductions from NTT Internet billing services

(thousands) / (tons)

Paper consumption reductions:
2009: 1,013
2010: 1,175
2011: 1,330
2012: 1,472
2013: **1,639**

Number of Internet billing service subscribers:
2009: 6,500
2010: 6,500
2011: 8,010
2012: 9,840
2013: **20,130**

(fiscal year)
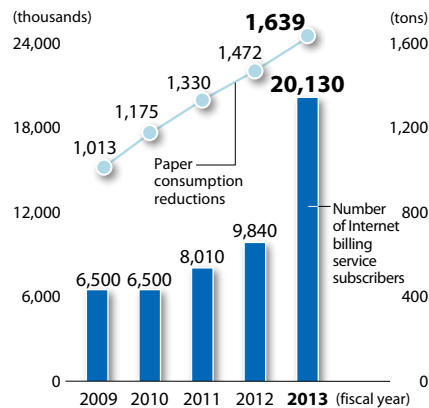
Number of recycling boxes installed and amount of confidential documents collected

(units) / (in thousands of tons)

Amount of confidential documents collected:
2009: 13.0
2010: 12.6
2011: 12.5
2012: 11.7
2013: **12.1**

Number of recycling boxes installed:
2009: 8,462
2010: 8,581
2011: 8,726
2012: 8,864
2013: **8,936**

(fiscal year)
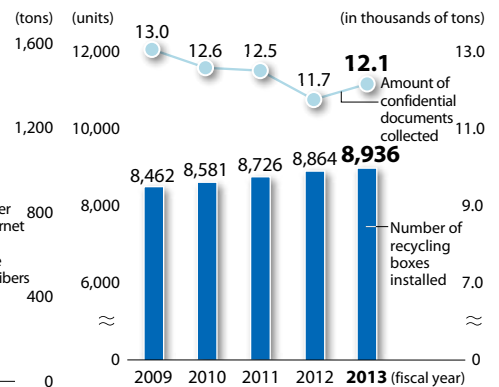
Conserving biodiversity

Participants in Operation Clean Environment

(persons)

2009: 61,899
2010: 85,661
2011: 92,204
2012: 118,195
2013: **118,730**

(fiscal year)
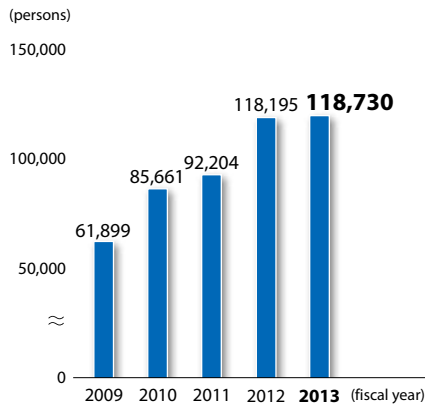
Other

Asbestos removed from NTT Group facilities

(tons)

- Bridges
- Buildings

2009: 264
2010: 512
2011: 93
2012: 34
2013: **21**

(fiscal year)
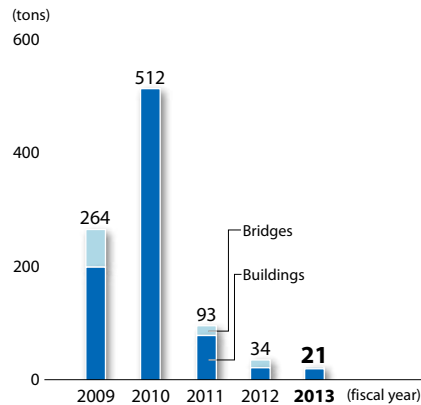
Amount of specified halon held for fire extinguishing equipment

(tons)

Amount held:
2009: 995
2010: 992
2011: 1,000
2012: 998
2013: **1,005**

(fiscal year)
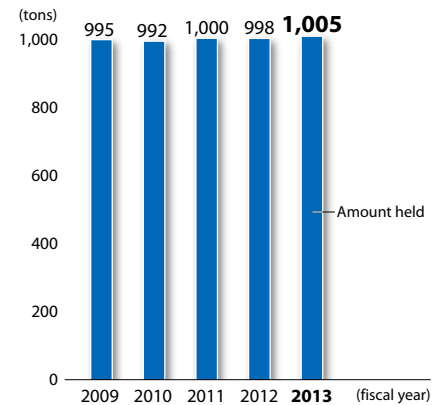
Other

Amount of specified chlorofluorocarbons used in air conditioning equipment

(tons)

- Stored amount
- Consumed amount

2009: 9.8
2010: 25.4
2011: 25.6
2012: 26.9
2013: **36.9**

(fiscal year)
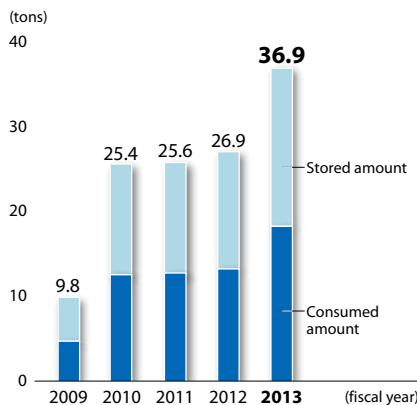
Number of centrifugal chillers (that use CFCs) and number of units removed

(units)

Number of remaining units:
2009: 45
2010: 45
2011: 45
2012: 45
2013: **45**

(fiscal year)
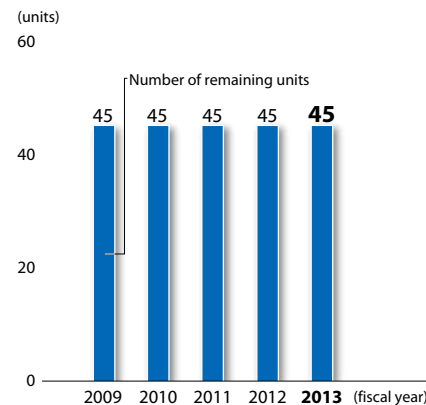
Safe and secure communication

We provide reliable and disaster-resistant ICT services while also protecting personal information and maintaining information system security.

Ensuring information security

NTT Group

Participating in the JASA Cloud Information Security Promotion Alliance to promote the use of safe and secure cloud services

The rapid spread of cloud services has made the building of robust security systems imperative. With cloud services certain to continue to grow, the Japan Information Security Audit Association (JASA)[1] created the JASA Cloud Information Security Promotion Alliance (JCISPA) in May 2013 as one of the world's first organizations for promoting the auditing of cloud service security to encourage the selection and use of secure, high-quality services. Eight NTT Group companies[2] are participating in JCISPA alongside 17 other Japanese cloud service providers and auditing businesses with the aim of contributing to the creation and development of an environment for the safe and secure use of cloud services.

JCISPA will formulate basic information security management requirements for cloud service providers, and plans to launch a Cloud Information Security Audit System in fiscal 2015 for conducting cloud information security audits designed to assess providers according to their compliance with the above requirements and provide users with clear reassurance of the security of cloud services. An international certification system will likely be launched in conjunction with the slated

2015 publication of the ISO/IEC 27017 international standard for cloud security. As such, JCISPA's proposed audit system will precede international standardization, and its findings will likely prove to be useful to standardization activities.

1. A Specified Nonprofit Corporation established to promote the adoption of the Information Security Audit System established by the Ministry of Economy, Trade and Industry
2. NTT East, NTT West, NTT Communications, NTT DATA, NTT COMWARE, NTT Software, NTT PC Communications and NTT

Press announcement of the launch of the JASA Cloud Information Security Promotion Alliance (JCISPA)

CSR Priority Activity

Ensuring information security

In addition to our efforts to provide safe cloud services by enhancing our security technologies, we will evaluate our security initiatives and publish evaluation results for the reassurance of our customers.

Ensuring stable and reliable services as critical infrastructure

We will endeavor to provide disaster-resistant ICT services that can be relied upon to stay connected as critical social infrastructure even in the event of a major disaster.

Ensuring stable and reliable services as critical infrastructure

NTT DaTa

Making the fruits of the Bridge Monitoring System available to the world as an effective disaster prevention measure

NTT DATA has applied the results of joint research conducted with Metropolitan Expressway Company Limited, Tokyo Institute of Technology and Yokohama National University as a development theme under the Japan Science and Technology Agency's Risk-Taking Fund for Technology Development to create the Bridge Monitoring System for supporting the detection of abnormalities in the event of disasters and at other times too. It is now implementing the system both in Japan and overseas.

The Bridge Monitoring System monitors the condition of bridges by using sensors installed at critical points on bridges to continuously gather and analyze data on heavy vehicle road usage, displacement, deformation, vibration and other factors in real time. In addition to the early detection of abnormalities and their real-time detection during disasters, the Bridge Monitoring System promises to be useful also in supporting the scheduling of inspections and repairs based on heavy vehicle traffic data. It

has already been deployed on major trunk roads in Japan, and has also been installed for the first time overseas on a bridge in Vietnam.

Technology for the real-time monitoring of bridges using the Bridge Monitoring System has won acclaim overseas, being selected in June 2012 from 500 entries from 25 countries worldwide as a 21st Century Achievement Award Finalist in the Computerworld Honors Program organized annually by IDG***** to pay recognition to both individuals and organizations who have used ICT to benefit society, business and education.

* International Data Group
  An American company that holds over 700 technology-related events in 97 countries each year

Vietnam's Cần Thơ Bridge

NTT Dream Kids Net Town fun events to learn about telecommunications

NTT Group

The NTT Group holds NTT Dream Kids Net Town summer vacation events for children every year. Staged jointly by NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO and NTT DATA, these events have attracted over 9,000 children up to 2012, their seventh year. They are designed to enable the children to learn about the fun and convenience of the Internet, smartphones and ICT services through actually experiencing them, while at the same time learning rules and manners for their safe and secure use.

NTT Group efforts to guard against major disasters

NTT Group roundtable discussion

The NTT Group is leveraging lessons learned from the Great East Japan Earthquake and the immense damage it caused to implement a range of measures aimed at building a more robust communications infrastructure. Professor Atsushi Tanaka of the University of Tokyo joins disaster countermeasure leaders of NTT Group companies here, two and a half years after the disaster, to look back on the Group's efforts to date and consider the approaches and initiatives of group companies to prepare for the predicted occurrence of an earthquake along the Nankai Trough off Japan's southern coastline or one centered on Tokyo.

The NTT Group's basic policy on disaster countermeasures

Disaster countermeasures 3 key themes

Disaster strikes

Securing critical communications

Securing 110, 119 and other emergency services and critical communications
Installing emergency use public phones and providing safety status checking services when disasters strike
Etc.

Countermeasures strengthened since the Great East Japan Earthquake

- Measures for securing critical communications
- Early resolution of communications blackouts
- Enhancements of disaster message services
- Further Information Station implementation

Improving communications network reliability

Building disaster-resistant facilities and transmission trunk line multi-routing
24/365 network monitoring and control
Etc.

Countermeasures strengthened since the Great East Japan Earthquake

- Enhanced disaster resistance (damage prediction, hazard map utilization)
- Stable provision of communications services (improving trunk line reliability etc.)

Prompt restoration of communications services

Early restoration of services by utilizing disaster countermeasure equipment, procurement of materials, equipment and manpower for restoration purposes
Etc.

Countermeasures strengthened since the Great East Japan Earthquake

- Building up stock of disaster response equipment
- Enhancement of organization for disaster countermeasure operations
- Exercises and practice for a major earthquake
- Training of crisis management personnel and utilization of knowledge and skills

Building disaster-resistant infrastructure

Yoshida (NTT): Even before the Great East Japan Earthquake, the NTT Group guarded against the occurrence of a major disaster by implementing a basic policy on disaster countermeasures that focused on the three themes of improving communications network reliability, securing critical communications, and promptly restoring communications services. Since 3/11, we've been enhancing these countermeasures based on the lessons learned from the disaster. As such, I'd first like to hear what Professor Tanaka has to say about our efforts to date and issues that we need to address.

Tanaka: Communications infrastructure underwent remarkable improvements after the Great Hanshin-Awaji (Kobe) Earthquake, enough that everyone was actually pretty confident of their ability to weather any contingency. 3/11, however, made a mockery of that confidence with the immense damage it caused. It certainly served to remind us all of the importance of telecommunications. You say that you're currently bolstering your disaster countermeasures based on the lessons learned from 3/11, so could you tell me about measures related to cables severed as a result of liquefaction and other ground disturbance?

Tsuji (NTT WEST): We've been implementing a three-year disaster mitigation plan since fiscal 2013 to build more disaster-resistant communications infrastructure, and this includes measures to counter the ground disturbance that you mention. In addition to trunk line multi-routing and shifting of trunk lines to more inland routes, we're also reinforcing trunk line cables passing through shallow layers of coastal regions. Even so, considerable distances are involved, and so we're tackling locations at highest risk first, while also examining and making preparations for responding in the event that cables are severed, such as setting bypass routes and arranging wireless communications as an alternative.

Taira (NTT COMMUNICATIONS): Where ground disturbance is concerned, the most critical locations are places where cables are strung along bridges and earth fills such as points where cable pipes and culverts cross. The 3/11 quake severed our trunk cables in two places, both of them as a result of ground disturbance-induced earth fill subsidence at such crossing points. We're accordingly using cable pipe renovation technologies to strengthen pipes in such locations.

Kubota (NTT EAST): At NTT East, we strung temporary aerial cables as a stopgap restoration measure for trunk line cables swept away by the tsunamis. For full restoration, we've taken measures such as burrowing beneath rivers to lay cable pipes, but it's difficult to do this at every location where we have cables strung along bridges. Doing so would involve huge investments and other difficulties such as the need to check the firmness of the ground and coordinate such measures with the local authorities who manage the bridges.

Tanaka: You all seem to be carrying out various measures, but even if you manage to shore up cables and other infrastructure, you still won't be able to restore services unless you have power supplies. What kind of measures are you considering to guard against prolonged power outages?

Yamashita (NTT DOCOMO): About 4,900 of our base stations in the Tohoku region stopped functioning after the 3/11 quake struck, but almost all of those were as a result of power outages. One measure that we've taken as a result is the deployment of

NTT Group roundtable discussion Participants

Atsushi Tanaka
Professor, University of Tokyo
Director of Center for Integrated Disaster Information Research, Interfacultly Initiative in Information Studies

Haruo Yoshida
Executive Manager, Disaster Prevention Planning Office
Technology Planning Department, NTT

Shin Kubota
Senior Manager, Disaster Countermeasures Office, Maintenance and Service Operation Department, Network Business Headquarters, NTT East

Hiroshi Tsuji
Director, Disaster Countermeasures Office, Service Management Department, Plant Headquarters, NTT West

Satoru Taira
Vice President, Crisis management Planning Office,
Customer Services Department, NTT Communications

Takeshi Yamashita
General Manager, Disaster Risk Management Office, Network Service Operation Department, NTT DOCOMO

104 large zone base stations nationwide. Each of these base stations can cover a very wide area, and we've equipped them with their own generators to guard against prolonged power outages. Even so, it's very difficult to cover all areas with these base stations, and so we've boosted the battery capacity of key conventional base stations and taken other such measures to counter power outages.

Tanaka: No matter how much you bolster your hardware, it's never going to be a complete answer, and so as Tsuji-san said just now, it's important to develop concrete plans in advance for responding to disasters.

Restoring communications services after the heavy rains suffered by northern Kyushu in July 2012

Walls and doors of communications buildings have been reinforced and made more airtight as a flood defense measure

A road section where a cable pipe/culvert crossing earth fill has subsided. A trunk line cable is buried beneath this section.

Involving customers in devising earthquake countermeasures

Tanaka: A crucial aspect of disaster countermeasures is the prevention of contingencies that should be avoided at all costs. In the NTT Group's case, the failure of critical communications is one such contingency. However, no matter what measures the NTT Group implements to maintain a robust communications infrastructure, there will be no point to it if users lose all means of communication. What are you doing in the way of boosting user awareness?

Tsuji: We see it as critical to maintain the communications of local authorities, since they comprise the core of local community disaster mitigation, and so since 3/11, we've intensified our marketing of disaster-related solutions for local authorities. While it is one of our businesses, we aim to work with our customers to help build a safe and secure society.

Taira: Because many of NTT Communications' customers are businesses, we've seen a huge increase in inquiries about business continuity planning (BCP) since 3/11. As a consequence, we've started carrying out disaster exercises together with our customers. We use the word "exercise" rather than "drill" because we want to provide a more realistic experience. For example, we don't inform participants in advance about the type of problem they will face or the timing of the exercise. If we did otherwise, it wouldn't be much help in improving customer disaster readiness.

Tanaka: I think that's a great idea. What about your initiatives for consumer customers? Immediately after 3/11, people were unable to connect through their mobile phones owing to congestion from all of the people calling to check on the safety of family and friends.

Yamashita: Dealing with network traffic congestion is an important issue, but when a disaster strikes, the first thing we want people to do is use our message board services for checking safety status. After the disaster, we also developed our Disaster Voice Messaging Service to address demand for a service that enables people to leave voice as well as text messages. When people post voice messages confirming their safety status, a notification is sent to the mobile phone of the person that the message is intended for. Since these services use packet rather than voice communications, making it easier to connect at the time of a disaster, I think it's important for us to further raise awareness of their existence.

Tanaka: In addition to encouraging the use of message boards for checking on safety status, I think that cooperation with other organizations outside the Group, and groupwide initiatives such as the way NTT East and West are seeking to ease congestion by deploying more emergency use public phones are also important. What kind of initiatives are being pursued in that direction?

Kubota: As a measure for people stranded in Tokyo and unable to get home owing to a disaster, we've worked with Seven & i Holdings to equip all 7-Eleven stores in Tokyo's 23 wards with Wi-Fi access and emergency use public phones, thus creating a structure for at least enabling people to get in touch with others if they find a convenience store. We think that this will also serve as a countermeasure to network congestion, and plan to expand it to other areas outside Tokyo.

The importance of cooperation when a large-scale disaster strikes

Tanaka: Research suggests that there's a high probability of a Nankai Trough earthquake or one centered on Tokyo in the near future. The former would affect a wide area, while the latter would be concentrated on one particular area, so they differ in nature, but I'd like to know about how you envisage their impacts and the countermeasures you are focusing on.

Yamashita: Because something like a Nankai Trough quake would affect such a wide area, we would need to set an order of priorities, and also examine how exactly we would tackle such wide area support. In the case of a direct hit on Tokyo, our buildings are designed to withstand such a quake, but even if we can assume that they will suffer no serious damage, we need to consider other perspectives such as ensuring continued power supply.

Kubota: Since recovering from a wide area disaster is not just a matter of restoring communications, I think it would be very helpful if group companies work not only with each other, but also with companies responsible for electricity, gas, water, railroads, roads and other lifelines to develop a clear picture of what they could do in such a contingency.

Yoshida: Cooperating with other organizations outside the Group is indeed critical. We telecommunications carriers are categorized along with the providers of other lifelines as "designated public institutions" under the Basic Act on Disaster Control Measures, and we're in fact already holding joint study sessions. We're also talking with other telecommunications carriers about cooperating through local authorities and so forth.

Burrowing below rivers to lay trunk line cables

A disaster exercise in progress

Deployment of large zone base stations

Advertising the 171 emergency service on water bottle labels

Tanaka: There's a limit to how much one company can do on its own, and so I see a need for society-wide initiatives such as, for example, telecommunications carriers getting together with each other or with other industries to share the resources they all need for maintaining business continuity. I'd like to see the NTT Group playing a lead role in forging such cooperation.

The right approach to disaster countermeasures

Tanaka: The words of one lifeline provider I once chatted with have stuck in my mind ever since — "the devil is in the detail". I take this to mean that the effectiveness of disaster countermeasures depends very much on taking a really long, hard look at the details well before anything happens. Could you tell me how you're all planning to implement disaster countermeasures from this perspective?

Kubota: At NTT East, we've focused on envisaging possible disasters and implementing measures to beef up our hardware, for example by deploying more disaster response equipment for avoiding communications blackouts and bolstering the disaster resistance of our communications network. However, actually operating and controlling such assets does indeed require meticulous and repeated examination of the details. That's why we're also paying close attention to soft aspects such as regular practice and the formulation of rules.

Yamashita: We too are implementing various measures based on detailed predictions of the kind of damage that would occur in the event of a Nankai Trough quake and so forth, but I think we need to continue to examine these measures relentlessly to ensure that they're the best we can do. It's no good just thinking on paper, so we aim to get a very solid grasp of the reality by going out and checking things out on the ground.

Tsuji: We are expected to have a very firm idea of what our customers need when disaster strikes and responding to those needs in a way that keeps abreast of changes over time and changing situations. We still tend to think of ourselves as a telephone company, but the communications infrastructure that we're responsible for now handles dedicated business lines, Internet and other types of traffic, and so we need to think about what we should put first.

Tanaka: Nothing is of course more important than human life, but it's a matter of deciding what, after safety status checking, needs to be done next, isn't it?

Tsuji: Yes. I myself experienced serious flooding two years ago when I was involved in an equipment project in Wakayama, and I remember being told by a local that he would've liked to see bank ATMs back in working order sooner. We need to think seriously about critical communications services up front, but we also need to pay constant attention after first impact to changing local damage status and customer needs as we go about restoring services.

Taira: As the provider of international communications, I feel that we bear a responsibility to ensure that Japan remains connected to the outside world. As such, we not only need to protect our interconnecting gateway switches (IGS) and other equipment for global communication from disaster damage, but I think it's also very important to go beyond reinforcing individual items of equipment to look at how to respond at the network level where all these dots are joined up. For example, if a gateway switching unit has been washed away by a tsunami, we could restore services faster by enabling network traffic to be diverted through another unit rather than trying to replace the ruined unit.

Tanaka: So in other words, your focus is on restoring services rather than equipment. That's a very valid approach. NTT is virtually a synonym for "communications", and it's your business to protect those communications services. Going without communications for three days is a pretty stressful experience to most people in the present age, and that includes me, so it's important to implement BCP from the viewpoint of society as a whole.

Yoshida: Communications are indeed an indispensable part of everyday life nowadays, and so we always need to bear in mind the impact of communications on society as we go about our business. As such, to prepare for when something serious happens, we need to consider how to address the demand for communications from various perspectives — the NTT Group as a whole, we and our customers as a whole, and also the way we cooperate with central and local governments, other carriers, and other companies responsible for manning our society's infrastructure. As you (Professor Tanaka) said just now, the devil is in the detail. Where disaster countermeasures are concerned, we can't afford to leave any loose ends untied. We need to examine and give thought to every little detail. We see it as our duty to protect Japan's communications, and we're committed to doing whatever is required to fulfill that duty.

Closeup

Supporting disaster area recovery and developing new disaster mitigation measures

Follow-up report | How the NTT Group and ICT can help

Even now, over two years after the Great East Japan Earthquake struck, a great many people affected by the disaster are still facing grim circumstances. In addition to the NTT Group's ongoing efforts to support disaster area restoration and reconstruction, group companies are leveraging the lessons learned from the disaster to implement a range of initiatives aimed at developing new disaster mitigation measures and helping to create a disaster-resistant society.

NTT Group

Enhancing safety status checking services

The NTT Group provides Disaster Emergency Message Dial (171), Disaster Message Board Service and Disaster Voice Messaging Service (both for smartphone and feature phone users), and Disaster Emergency Broadband Message Board (Web 171, for PC users) as means for people to check on the safety of family and friends in affected areas in the event of a major disaster that disrupts telephone connections.

We also joined Japan Broadcasting Corporation (NHK) in launching the J-anpi All-Japan Safety Confirmation Portal for Disaster website in October 2012. J-anpi enables the one-stop searching of all safety status information posted on the disaster message board services of the NTT Group and other telecommunications carriers and similar services provided by local authorities, news media, private enterprises and other organizations just by accessing the site from PCs, mobile phones and other devices and entering either a telephone number or name.

NTT docomo

Plan 1 Tablet-based support system for temporary housing liaison and support personnel

In December 2011, NTT DOCOMO established its TOHOKU Reconstruction Support Office to conduct various support activities based on the wishes of Tohoku region disaster victims. One such activity was providing support since October 2012 for the building and operation of a system for liaison and support officers in temporary housing estates for evacuees in the city of Kamaishi in Iwate Prefecture. DOCOMO handed out tablets to liaison officers responsible for checking on the well-being of evacuees living in approximately 3,200 temporary housing units in 66 locations in Kamaishi. Liaison officers are as a result able to enter visit details and requests from evacuees on their tablets as they make their rounds. This information is shared in real time with the liaison center and City Hall, thus enabling authorities to respond more promptly to the needs of the evacuees.

NTT Communications

Plan 2 Participating in the testing of a new disaster mitigation system for speedier, more extensive communication of disaster information

NTT PC Communications has further expanded its Project Tsumugi for supporting disaster area reconstruction efforts, working with the city of Ofunato in Iwate Prefecture to build a disaster mitigation communications platform that enables the multi-channel communication of information through both broadcasts and telecommunications. This initiative involved the building of a wireless network to enable communications throughout the city even when a major disaster has knocked out the services of telecommunications carriers in some areas, through the mass transmission of warnings to the mobile phones, radios and other devices of residents.

Delegating day-to-day operation of the new system to the Disaster Mitigation and Citizen Media Promotion Association (NPO), NTT PC Communications will continue to conduct research into both disaster-related and everyday usages for such information platforms.

NTT EAST NTT WEST

Free provision of emergency use public telephones in evacuation centers to prepare for major disasters

The Great East Japan Earthquake served as a powerful reminder of the importance of securing means of communication in the event of a disaster, and both NTT East and NTT West are steadily equipping facilities that will become evacuation centers in the event of a disaster with emergency use public telephones that enable temporary free use at such times.

By the end of March 2013, NTT East had installed approximately 11,000 such phones in 4,250 locations, and NTT West, approximately 6,000 phones in 2,534 locations. Both companies continue to work with local authorities and other organizations to make further progress with this initiative.

NTT Data

Plan 3
Building mechanisms for the prompt and reliable communication of disaster information based on multiple telecommunications and broadcasting channels

Local government disaster response wireless systems and other equipment suffered damage during the Great East Japan Earthquake that rendered them unable to reliably communicate disaster-related information to local residents. Learning from this experience, NTT DATA conducted joint field tests with the Miyagi Prefecture cities of Ishinomaki and Kesennuma and two other local authorities in the disaster area from November 2012 as part of research and development efforts commissioned by the Ministry of Internal Affairs and Communications with the aim of building more disaster-resistant telecommunications networks. The field tests succeeded in establishing the means for prompt and reliable communication of disaster-related information by integrating e-mail early warnings, One-Seg TV and other telecommunications and broadcasting channels.

NTT FACILITIES

Plan 4
Launch of field tests on the utilization of ICT in agriculture to spawn new industry in the disaster area

In December 2012, NTT FACILITIES installed fully artificially lit plant factories compact enough to fit in a 10 m² space into temporary housing units in the Iitate-mura district of Date City in Fukushima Prefecture. This was for the Agri-Community Creation Project, an initiative being implemented by NTT FACILITIES to help rehabilitate shattered communities and improve quality of life in the disaster area by bringing people together to grow safe vegetables and enjoy each other's company as they work.

NTT EAST

Plan 5
Building an electronic bulletin system to link evacuees with their town hall

Even now, over two years after the Great East Japan Earthquake, a great many people are still having to live as evacuees. The local administration of the town of Naraha in Fukushima Prefecture is seeking to maintain links with residents currently scattered throughout Japan as evacuees by utilizing Wi-Fi and 3G networks to distribute administrative information. NTT East worked with NTT DOCOMO to provide Naraha's government with the infrastructure for an electronic bulletin system for evacuees that went into operation in April 2013. NTT DOCOMO provided Naraha's administration with approximately 4,000 free tablets for evacuees to share, while NTT East equipped temporary housing throughout Fukushima Prefecture with wireless LAN. NTT East also equipped the tablets with questionnaire, safety status checking, and live camera integration functions in addition to the electronic bulletin system. Naraha's administration aims to maintain strong links with its evacuee population through this system.

Ensuring stable and reliable services as critical infrastructure

Managing and maintaining communications services

NTT Group

Maintaining a disaster-resistant communications infrastructure

Communications networks represent lifelines that are indispensable to the functioning of society, business activities and public safety. The NTT Group endeavors to build disaster-resistant communications infrastructure, and maintain and operate it in a way that ensures its proper functioning at all times.

We also strive to enable communications equipment housings, steel towers and other facilities to withstand contingencies such as earthquakes, storms, flooding, fire and power outages in accordance with predetermined design standards.

For example, NTT's communications buildings and pylons are designed to withstand earthquakes of a seismic intensity of 7 on Japan's *shindo* scale, and 60 m/sec winds experienced during the strongest typhoons. Our facilities are equipped with flood doors and other defenses according to location to prevent inundation of cable connections by tsunamis or floods. We also equip our communications equipment rooms with fire doors or shutters. Our communications buildings and wireless base stations are equipped with backup power sources to keep them running for extended periods in the event of sudden power outages, and power supply vehicles parked outside the buildings can also be hooked up to them to supply power. We use trunk line multi-routing to ensure that our communications services operate without interruption at all times.

NTT East, NTT West, NTT Communications and NTT DOCOMO monitor their communications networks on a 24/365 basis from their operation centers. In the event of a failure caused by a disaster or some other contingency, they work to restore service by switching to standby equipment and other means through remote operations.

Operation center

NTT

Developing a system for visualizing corrosion status to improve the reliability of outdoor communications equipment
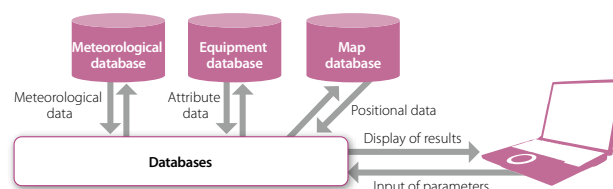
Steel pipe telephone poles, metal fittings and other outdoor structural components are indispensable to the provision of communications services. This exposure to the outdoor environment tends to corrode or otherwise degrade the metals that are a key component of these structures, and efficient maintenance to prevent such degradation is of vital importance.

Since the main cause of metal corrosion is exposure to sea salt particles, NTT Energy and Environment Systems Laboratories (NTT EESL) has been developing a Sea Salt Corrosion Risk Visualization System that enables map-based monitoring of sea salt damage risks over a very wide area.

Based on measurements taken throughout Japan, the Sea Salt Corrosion Risk Visualization System visualizes sea salt corrosion risks on maps using indicators such as sea salt particle quantity, corrosion speed, corrosion quantity and life expectancy. This is expected to facilitate the formulation of plans for maintaining vast quantities of equipment and replacing equipment in high-risk areas with components designed to withstand corrosion, as a result improving the reliability of our equipment and reducing our environmental footprint by extending its useful life.

NTT DOCOMO is considering using this system as reference data for reviewing the streamlining of its external equipment inspection cycles.

Sea Salt Corrosion Risk Visualization System

Meteorological database   Equipment database   Map database

Meteorological data   Attribute data   Positional data

Display of results

Databases

Input of parameters

Ensuring stable and reliable services as critical infrastructure

Managing and maintaining communications services

NTT EAST

Installing satellite communications equipment in the Kamikochi area to prevent communications blackouts

NTT East installed satellite communications equipment in the Kamikochi area of the city of Matsumoto in Nagano Prefecture as a means of preventing communications blackouts when disaster strikes. This equipment went into operation on October 10, 2012.

Telephone and other communications services in the Kamikochi area were knocked out in June 2011 when heavy rainfall caused mudslides. NTT East used commercial helicopter services to carry equipment and restore communications with the deployment of emergency use public phones, but it took over three days to completely restore communications. NTT East accordingly started to look into the deployment of more disaster-resistant means of communication in the Kamikochi area.

The standard way of guarding against disaster damage is network multi-routing so that even if one route is severed, communications can be maintained by diverting them through an alternative route. However, Kamikochi lies within a national park, which means that obligations to keep environmental impacts to a minimum need to be met. Carrying out installation works in the same way as in cities may well disturb the ecosystem.

As such, NTT East decided after research and discussion to use satellite communications, and even painted the antenna that it installed on the Kamikochi Telephone Exchange in a color that blended with the surroundings. In the event of a disaster, the newly installed equipment will enable communications via satellite from the telephones of the Ministry of the Environment's Kamikochi Information Center, which is located approximately 700 m from the telephone exchange. Leveraging the lessons learned from the Great East Japan Earthquake, NTT East also fitted batteries capable of providing power for about 100 hours in the event of a power outage.

NTT East will continue to build stronger communications networks to ensure communications in emergency situations, while at the same time taking care to minimize environmental impacts.

Kamikochi Telephone Exchange

Parabolic antenna

NTT Communications

Improving Internet environments in emerging economies

NTT Communications is working with local telecommunications carriers in emerging economies and elsewhere to provide users around the world with more ideal Internet environments.

In fiscal 2013, it reached agreement with Brunei International Gateway (BIG), a joint venture between Brunei's government and telecommunications carriers for building and operating the telecommunications infrastructure for connecting with global telecom networks, on collaboration to provide international Internet access to Brunei's Internet service providers (ISPs).

Several ISPs in Brunei and surrounding areas already connect separately to ISPs of neighboring countries to provide global Internet access services, and this is one of the factors hampering the improvement of Internet service quality and cost competitiveness in the region.

Under the agreement, NTT Communications will provide BIG with IPv4/IPv6 dual stack global access, and also help to develop the Internet environment in Brunei and surrounding areas to drive the growth of the region's Internet market.

This partnership follows earlier agreements reached with Vietnam in 2011 and Laos in February 2012 for the development of global Internet services. NTT Communications will continue to cooperate with organizations involved in ICT in emerging economies with the aim of contributing to the development of Internet infrastructure and promotion of ICT utilization throughout Asia.

Signing the agreement

Ensuring stable and reliable services as critical infrastructure

Disaster readiness

NTT Group

Communications network disaster preparedness based on three basic policies

1. Improving communications network reliability

The NTT Group is endeavoring to further enhance the reliability of its communications networks, and has learned many lessons from past disasters that it has applied to ensuring the continuity of communications services in the event of a disaster through such means as trunk line multi-routing and distributed location of important communications centers fitted with transit switches.

We also strive to secure and improve the ability of communications equipment housings, steel towers and other facilities to withstand disasters such as earthquakes, flooding and fire in accordance with predetermined design standards. For example, we are reinforcing the flood doors and blocking windows and other openings of our communications buildings, and moving some buildings to higher locations to guard against tsunamis and flooding in line with local government hazard maps. To guard against prolonged wide-area power outages, we are also increasing emergency fuel stocks for the backup power sources already installed in our communications buildings.

For mobile communications, we have deployed large zone base stations throughout Japan that are capable of covering wide areas in emergency situations so as to secure communications in high population areas. We have also fitted critical base stations throughout the country with generators or long-lasting batteries to guard against power outages.

2. Securing critical communications

When a disaster strikes, the telephone system of the affected area is inundated with calls, causing network congestion. Under such conditions, we suppress ordinary phone traffic to secure critical communications services necessary to conduct emergency rescue and restoration operations and maintain public order, and to keep emergency number services such as 110, 119 and 118***** going.

We also provide general customers with Disaster Emergency Message Dial (171), Disaster Message Board Service, Disaster Emergency Broadband Message Board (Web 171) and Disaster Voice Messaging Service as means of checking on the safety of relatives and friends in affected areas. In fiscal 2013, we joined NHK in launching the J-anpi All-Japan Safety Confirmation Portal for Disaster website for one-stop searching from PCs, mobile phones of all safety status information posted on the disaster message board services of telecommunications carriers and

similar services provided by news media, private enterprises and other organizations.

Furthermore, we make our public telephones available free of charge, provide emergency use public phones, lend out satellite mobile phones and install free phone charging points at evacuation centers and other locations in affected areas to secure means of communication for disaster victims.

* 118 (Emergency number for maritime accidents and incidents)
Calling 118 connects the caller to Japan Coast Guard to report accidents at sea, oil slicks, suspicious vessels and any other maritime contingency that requires help. The 118 service was launched in May 2000.

3. Prompt restoration of communications services

The NTT Group stations highly mobile disaster response equipment such as power supply vehicles, wireless IP communications vehicles (nicknamed "Wi-Fi Car"), portable satellite equipment, satellite entrance mobile base station vehicles and communications rescue vehicles at locations throughout the country to provide Internet and phone connections to evacuation centers whose lines have been severed and incapacitated critical facilities. If communications services have been disrupted by a disaster or other causes, this equipment is used to restore services as rapidly as possible. We are also working with convenience stores, local governments and other organizations to install Information Stations equipped with Wi-Fi hotspots and emergency telephone lines to be used as means of communication immediately after a disaster.

In the event of a major disaster, a Disaster Countermeasures Office and other emergency structures are also immediately set up to implement service restoration operations. Depending on the scale of the disaster, a wide area support network encompassing group and other affiliated companies around the country is also created to assist in disaster response.

Power supply vehicle

Portable satellite equipment

Satellite entrance mobile base station vehicles

Transportable emergency subscriber line accommodation units

Ensuring stable and reliable services as critical infrastructure

Disaster readiness

NTT Group

Practice for Disaster Countermeasures Office operation after a large-scale disaster in conjunction with government comprehensive disaster drills

NTT holds disaster drills on Japan's Disaster Prevention Day on September 1 to coincide with the government's annual comprehensive disaster drills held on the same day.

For fiscal 2013, we held the drills at our Otemachi Teishin Building and Musashino Research and Development Center to practice and examine the operation of an NTT Disaster Countermeasures Office in response to a serious disaster, using the example of an earthquake centered on Tokyo as a scenario. A total of 30 personnel, including new senior management executives and new Office members, participated in the drill. In addition to checking NTT Disaster Countermeasures Office functions that were strengthened and enhanced based on the lessons of the Great East Japan Earthquake, we also checked mechanisms for sharing information using a new videoconferencing system and disaster countermeasure message board for groupwide information sharing, and practiced setting up an alternative site for such an office and other items.

In fiscal 2014 too, we held drills on September 1 to coincide with the government's annual comprehensive disaster drills, in line with a scenario that envisaged a serious earthquake along the Nankai Trough off Japan's southern coastline.

NTT Corporation and group companies also participated in the government's annual comprehensive disaster simulation exercises for an earthquake centered on Tokyo. These exercises are designed to improve Emergency Response Office process implementation capabilities and examine the efficacy of emergency response measures with respect to cooperation with relevant regional authorities, designated public institutions and other organizations based on the government's Guidelines for Emergency Response Activities and other references.

NTT, NTT East and NTT DOCOMO from the NTT Group participated in these exercises alongside the Cabinet Office, Cabinet Secretariat, relevant ministries, regional authorities, other designated public institutions and volunteers. The main purpose of the fiscal 2013 exercises, which were held on January 10, 2013 at the Central Common

Practicing the operation of an Emergency Disaster Response Office

Government Offices in Tokyo's Kasumigaseki district, was to practice various operations. Participants were kept in the dark about the exercise scenario so as to create more realistic conditions for checking judgment and decision-making capabilities according to changing circumstances.

NTT will continue to hold drills to further develop its knowledge and skills in operating an NTT Disaster Countermeasures Office (including the operation of alternative sites), and to check and test its office operation system from the perspective of representing the response of the NTT Group as a whole.

NTT

Developing virtual network technologies to cope with surges in network traffic

Because network traffic tends to surge after a major disaster or other emergency, network resources allocated according to the needs of voice, video, Internet and various other services need to be reallocated to ensure that as many people as possible can use critical communications services. NTT Network Service Systems Laboratories (NTT NSSL) and NTT Network Innovation Laboratories are working on the development of network virtualization control technologies required to enable such resource reallocation.

In November 2011, NTT NSSL announced that it had developed the world's first technology for building high-quality virtual networks with control capabilities for selecting and switching between optimal paths according to user QoS requirements. In field trials, it succeeded in building a wide-area virtual network that encompassed the whole northern hemisphere. This technology holds promise as a means for helping to keep services going in disaster situations by automatically switching transmission paths to avoid damaged locations.

In April 2012, NTT NSSL also used research and education testbeds in Japan, USA and Europe to build a global virtual network capable of multipath transmission, and conducted experiments with NHK on Super Hi-Vision (SHV) video transmission between Japan and the UK. The experiments demonstrated the ability to quickly build virtual networks, and used multipath transmission and path switchover, both of which boost tolerance to network QoS fluctuation and failures, to identify issues related to the operation of virtual networks straddling multiple carrier networks.

We will continue to conduct R&D in virtual network operation, focusing on methods for selecting optimal paths according to various user requirements and path optimization for maximizing network traffic accommodation efficiency.

Ensuring stable and reliable services as critical infrastructure

Disaster readiness

NTT EAST **NTT** WEST

Publication of local community public telephone location maps

With the spread in recent years of mobile phones, use of public telephones has declined, but they still have a valuable role to play as a means of communication during disasters and other emergency situations, and as such, NTT East maintains about 58,000, and NTT West about 51,000 type 1 public telephones*.

NTT East and NTT West have since June 29, 2012 also published public telephone locations in the Public Telephone Information sections of their websites so as to enable customers to check on the location of public telephones in advance for their use as a means of communication in the event of a disaster or emergency.

NTT East and NTT West will endeavor to add functions to their public telephone location information web pages with the aim of providing more accurate information and improving customer convenience.

* Type 1 public telephone
Installed to serve as the minimum means of communication at a density of approximately one every 0.25 km^2 in urban areas and every 1 km^2 elsewhere according to installation standards based on laws and regulations

NTT East Public Telephone Information web page screenshot

NTT West Public Telephone Information web page screenshot

NTT docomo

Promoting expanded utilization of the Area Mail Disaster Information Service

NTT DOCOMO sends out mass "Area Mail" notifications of earthquake early warnings and tsunami warnings issued by the Japan Meteorological Agency to mobile phones in the applicable areas. Area Mail uses a global standard technology called Cell Broadcast (CB) that is not affected by traffic load and enables the simultaneous delivery of messages to all subscriber mobile phones in a specific area without using mobile e-mail addresses.

To enable local authorities to make use of the same Area Mail mechanism to communicate information when struck by a disaster, NTT DOCOMO also provides Area Mail: Disaster/Evacuation Information for sending mass notifications of disaster/evacuation information to all mobile phones in a specific area.

In July 2011, the Area Mail: Disaster/Evacuation Information service, which had up to then been provided to municipalities for 21,000 yen per month, was made free of charge as one of the disaster countermeasures adopted in the wake of the Great East Japan Earthquake. By the end of fiscal 2013, 1,450 local authorities throughout Japan were using this service.

In March 2013, NTT DOCOMO also launched sales of a Ubiquitous Module capable of receiving Area Mail notifications. This device can, for example, be embedded in electronic signage installed in public spaces and on coastlines so as to display earthquake early warnings or tsunami warnings issued by the Japan Meteorological Agency and disaster/evacuation information issued by central or regional authorities, and can also sound sirens. Embedding these modules in devices also enables those devices to be stopped or otherwise controlled by the modules when they receive an earthquake early warning, thereby limiting disaster damage.

Moving forward, NTT DOCOMO will strive to boost awareness of the Area Mail service, maintain and improve system stability and reliability and expand the number of Area Mail-compatible handsets to enable even more people to benefit from the safety and reassurance that it provides.

Ensuring stable and reliable services as critical infrastructure

Various means of checking on the safety of disaster victims

NTT Group

Expanding services for easy safety status checking and information gathering when disaster strikes
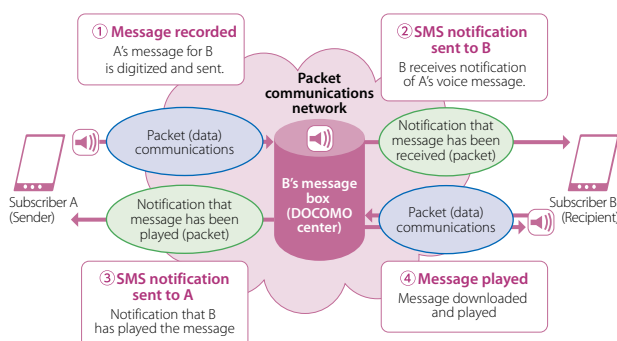
To enable people to check on the safety of relatives and friends in areas hit by a major disaster that has caused phone connection problems, the NTT Group provides Disaster Emergency Message Dial (171) for leaving voice messages by phone, Disaster Message Board Service for leaving text messages by mobile phone, and Disaster Emergency Broadband Message Board (Web 171) for leaving text messages via the Internet. When we launch these emergency services in the event of a disaster or other contingency, we promptly inform our customers through the mass media, website and other means.

In fiscal 2013, NTT further enhanced the functions of its Disaster Emergency Broadband Message Board (Web 171) service, releasing the updated version on August 30. It integrated Web 171 with its Disaster Message Board Service for mobile and PHS phones to enable company-wide one-stop search, and added functions for notifying designated subscribers by e-mail or voice when registering safety status information. Other improvements include support for English, Chinese and Korean, increase in the number of messages that can be registered, and longer message storage time.

NTT DOCOMO for its part has added voice guidance to its disaster message board application to facilitate registration and checking of safety status on its Disaster Message Board from smartphones, and launched a Disaster Voice Messaging Service for delivering digital voice messages at times when disasters have incapacitated voice communications. Reciprocal use of this service with those of other carriers was also enabled from April 1, 2013.

NTT DOCOMO has also enabled the checking of safety status information posted to the J-anpi All-Japan Safety Confirmation Portal for Disaster and Google Person Finder from its Disaster Message Board.

How the Disaster Voice Messaging Service works

① **Message recorded**
A's message for B is digitized and sent.

② **SMS notification sent to B**
B receives notification of A's voice message.

Packet communications network

Packet (data) communications

Notification that message has been received (packet)

Subscriber A (Sender)

Notification that message has been played (packet)

B's message box (DOCOMO center)

Packet (data) communications

Subscriber B (Recipient)

③ **SMS notification sent to A**
Notification that B has played the message

④ **Message played**
Message downloaded and played

Ensuring stable and reliable services as critical infrastructure

Supporting customer safety and security measures

NTT Communications

Leveraging ICT solutions to support business continuity when disasters strike

NTT Communications provides various ICT solutions for helping companies to draw up business continuity plans (BCP) and mitigate the risks to their business and employees posed by natural disasters such as earthquakes and typhoons, terror, pandemics and other contingencies.

One such solution is Safety Check/Mass Notification Service, a BizCITY SaaS application for collecting and collating the safety status of employees and their families in the event of disasters and other emergency situations, and for the mass issue of emergency instructions. Another is Earthquake Newsflash Distribution Service, which can also be integrated with elevator stoppage and other equipment control requirements. By providing solutions such as these, NTT Communications helps to support the business continuity of its customers by protecting the safety of employees and mitigating damage.

In fiscal 2013, NTT Communications enhanced the Safety Check/Mass Notification Service's system platform to boost its processing capabilities. Users of this service have increased by 1.2 times since fiscal 2012.

Another NTT Communications solution is Biz Desktop Pro, a desktop virtualization service for creating virtual desktops in the cloud that are exact copies of physical desktops within the company, and can be accessed remotely from anywhere at any time. A great many companies using this service confirmed after the Great East Japan Earthquake that it had enabled their employees to access their virtual desktops from home or elsewhere when power outages or other factors made commuting impossible, and that business continuity was maintained as a result. Interest in this service has grown steeply since the earthquake from the need to save electricity by having employees work from home, and users of this service in fiscal 2013 have increased by several times compared with fiscal 2012.

NTT Communications will continue to support business continuity in emergency situations through providing ICT solutions for protecting corporate information assets.

NTT docomo

Field testing of technologies for enabling priority transmission of voice communications or e-mail when a serious disaster occurs

In January 2013, NTT DOCOMO conducted joint field tests with Tohoku University, NEC, Hitachi Solutions East Japan and Fujitsu of technologies to prioritize the transmission of voice communications and e-mail as the most necessary means of communication for checking on the safety status of family and friends when a serious disaster occurs, causing network congestion.

Testbeds located in Yokosuka Research Park and a Tohoku University research facility were used to conduct the field tests. Technologies for maximizing connectivity for voice calls and e-mail, the highest priority means of communication, were tested in an environment enabling the use of voice, e-mail, video and other communications channels in which the kind of network congestion that occurred at the time of the Great East Japan Earthquake was simulated. Dynamically controlling communications processing resources was not feasible in the past, but the field tests demonstrated that the new technologies developed for this purpose were capable of boosting the processing capabilities of communications processing servers by over five times within about 30 minutes, thereby relieving voice communications network congestion.

The various parties involved in the testing launched R&D for the field tests in March 2012. The project was commissioned by the Ministry of Internal Affairs and Communications as "Research and development of dynamic control technology for mobile communication networks in times of large-scale disasters".

Based on the findings of the field tests, the parties will work on international standardization and continue to conduct R&D on technologies for delivering the level of reliability required for use by telecommunications carriers.

Ensuring stable and reliable services as critical infrastructure

Supporting customer safety and security measures

NTT DATA

Global provision of flight procedure design system to help create safer aviation infrastructure

The rapid growth of Southeast Asia's airline industry in conjunction with the region's economic growth and globalization has made the further improvement of air safety a pressing issue. Southeast Asian countries are consequently implementing various measures to improve air safety and create an aviation infrastructure that can gain the trust of international society.

One of the most important aspects of these efforts is improving air traffic control reliability, and in this respect, NTT DATA has developed PANADES® as a flight procedure design system.

These systems are pivotal to air traffic control, being used as they are to create the best possible flight procedures according to aircraft performance, topography in the vicinity of flight paths and airports, buildings, weather, air traffic congestion level and other factors. Ensuring safety is their most important concern, but flight procedure design systems can also help reduce flight duration, fuel consumption and CO_2 emissions through enabling the design of more efficient flight procedures.

NTT DATA has been involved in air traffic control systems since the 1970s, and leveraged this rich experience to develop PANADES as a flight procedure design system that conforms with International Civil Aviation Organization (ICAO) standards. A key strength of the system is its ability to automatically carry out a great many of the complicated calculations required to design flight procedures, thereby shortening the time required for design and boosting design quality. Moreover, because this automation enables the simulation of a greater number of flight procedures, PANADES helps to design safer and more efficient flight procedures.

Japan's aviation industry has accounted for the bulk of PANADES sales since NTT DATA launched the product in 2010, but starting with Thailand's AEROTHAI in July 2011, overseas orders through the Japan International Cooperation Agency have started to take off. Following Indonesia, the system also went into operation in Vietnam in July 2012.

NTT DATA aims to leverage this track record to win orders in Europe, Middle East, Africa and elsewhere in addition to Asia, and as a result to contribute to the improvement of air safety over a wider sphere.

NTT FACILITIES

Developing seismic resistance technologies for telecommunications equipment and nonstructural elements

NTT FACILITIES is endeavoring to ensure the seismic resistance of telecommunications equipment by conducting vibration experiments to assess the resistance of equipment located on building floors when shaken by earthquakes.

For these experiments, it is using DUAL FORCE, a 3D vibration experiment system that it started to use in 2010 with the aim of developing technologies for countering the kind of long period ground motions that are anticipated in the event of a serious earthquake along the Nankai Trough off Japan's southern coastline. In October 2011, NTT FACILITIES used other vibration experiment devices to conduct experiments on the impact of long period ground motion on its FIT Floor double floors and steel frames etc. for supporting telecommunications racks and other equipment, and on air conditioning equipment. These experiments showed that the tested equipment was unaffected by long period ground motions, demonstrating the effectiveness of existing material strength design methodology.

Damage caused by the tremors of the Great East Japan Earthquake included a large number of cases of suspended equipment dropping after being shaken loose. NTT FACILITIES has accordingly focused in particular on how tremors affect suspended equipment because of the risks that such equipment poses to people if it drops. Using DUAL FORCE, the company conducted experiments to reproduce the dropping of full-scale air conditioners to investigate the factors causing them to drop. Because these experiments showed that prolonged ground motions were a factor, NTT FACILITIES developed technologies for making such suspended equipment more resistant to earthquakes.

Moving forward, NTT FACILITIES plans to focus on the development of structural health monitoring* technologies for earthquakes, and applications for its newly developed suspended equipment quake-proofing technologies.

* Structural health monitoring
The use of sensors to detect damage and precisely diagnose the structural health of buildings

Using DUAL FORCE to conduct experiments

Ensuring stable and reliable services as critical infrastructure

Supporting customer safety and security measures

NTT IT

Providing MagicConnect BCP Anshin Service to enable business continuity when commuting to work is difficult while keeping costs down in normal times

MagicConnect is a remote access service provided by NTT IT to enable employees to connect to company PCs and servers over the Internet and carry out work-related tasks on their office desktops. In December 2012, NTT IT launched a new MagicConnect BCP Anshin Service for remote access tailored to business continuity when a disaster or other contingency has made commuting to work difficult.

Because MagicConnect BCP Anshin Service usage charges are levied only when the service is used, customers can curb maintenance costs in normal times while enabling employees to use their office computer desktops from home when commuting to work is not feasible.

The only costs paid by the customer if the service is not used are initial costs plus account management charges in the first year, and only account management charges from the second year. This represents a considerable cut in costs compared with the previous service.

Since the new service was launched, NTT IT has received a great many inquiries from customers who up until then had hesitated to deploy MagicConnect for cost reasons, and subscribers to the new service are steadily increasing.

NTT AT

Expanding sales of materials for countering snowfall, icing and signal attenuation of weather radar domes and other outdoor structures

NTT Advanced Technology (NTT-AT) provides HIREC as a super water repellent material for alleviating weather station radar dome or antenna signal attenuation as a result of rainfall or snowfall.

The water film that forms on the surface of antennas or weather radar domes when rain or snow falls can cause signal attenuation, but coating such surfaces with HIREC, a super water-repellent coating material, inhibits water film formation and thereby alleviates signal attenuation.

HIREC is helping to broaden the scope of radar-based weather observations through its use as a signal attenuation countermeasure to coat all of the 9 GHz frequency band weather radar domes newly deployed by the Ministry of Land, Infrastructure, Transport and Tourism to monitor localized intense rainstorms in built-up areas. It is also being used to coat weather radar domes that have reached their due date for recoating.

Other applications as a snowfall, icing and signal attenuation countermeasure include steel power pylons, communications and broadcast satellite dishes, TV station receiver antennas, bridges and tunnels, and in fiscal 2013, HIREC was also newly used to coat road sign canopies, water storage tanks and other steel structures.

Because of the high demand from ordinary consumers for such a product, NTT-AT started to offer a HIREC-S coating kit in October 2011 for home satellite dishes through its group company NTT-AT Creative.

In fiscal 2013, it also launched overseas sales of HIREC as a communications antenna signal attenuation countermeasure, and the product has so far been adopted on a trial basis in Switzerland, France and Germany.

Comparison of HIREC-coated (blue) and uncoated (red) broadcasting satellite dish signal strength during rainfall
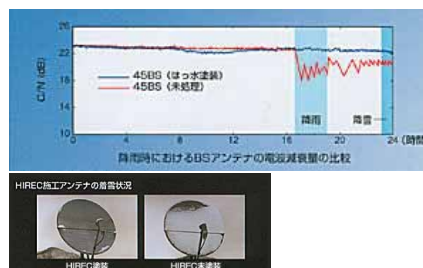
Snow adhesion on HIREC-coated (left) and uncoated (right) satellite dishes

Ensuring information security

Developing technology for maintaining and improving information security ──────────

NTT

World's first testing of secure computing technology for processing medical statistics while protecting patient privacy

In February 2012, NTT Secure Platform Laboratories (NTT SPL) and the Japan Adult Leukemia Study Group (JALSG)** became the first worldwide to successfully field-test secure computing technology aimed at enabling the safe and secure utilization of clinical research data and other confidential data in a wider range of applications.

The new technology encrypts data in a way that makes it unreadable but enables it to be analyzed. Successful testing of the technology opens the way to its use for the statistical analysis of clinical research data in encrypted form. Tests also showed that the technology can deliver fast enough performance for practical implementation.

Clinical research data held by individual medical facilities could be usefully applied more broadly, but because it needs to be handled cautiously to protect patient privacy, demand is growing for technology that enables secure statistical analysis of such data for medical purposes.

NTT SPL has accordingly been studying data encryption to come up with secure computing technologies for enabling safe and efficient statistical analysis of data, and had developed candidate software by 2010. In September 2011, it launched joint research with JALSG on the application of secure computing technology to the statistical analysis of JALSG's clinical research data.

Secure computing technology was already known to be safe in theory, but its practical implementation was hampered by processing speed issues. The joint research assessed the performance of NTT SPL's technology using standard PCs on JALSG's database of 800 items for approximately 1,000 cases, and found it to be fast enough for practical purposes.

Based on these findings, NTT SPL now plans to develop a commercial system capable of handling databases of 100,000–1 million items for small- to medium-scale medical purposes, while also conducting research to further boost the performance of its secure computing technology to enable it to handle medium- to large-scale databases in the range of 10 million items.

* Japan Adult Leukemia Study Group (JALSG)
A multi-institutional cooperative study group established originally in 1987 in Hamamatsu, Shizuoka Prefecture to conduct clinical research aimed at improving the level of leukemia treatment in Japan. Its membership stood at 213 hospitals as of February 2012.

NTT

Achieving practical performance levels in fine-grained encryption for ensuring the security of data in the cloud

With no signs of significant decline in information leakage incidents, corporate information management has become a critical issue. Although advances in cloud computing and other new forms of network utilization are driving demand for services that enable data to be exchanged or shared on the cloud, security concerns are making many businesses reluctant to migrate confidential data to the cloud.

NTT Secure Platform Laboratories (NTT SPL), which has long been involved in research on encryption technologies to protect information, has developed a fine-grained encryption technology that embeds advanced logic into the encryption/decryption mechanism.

Fine-grained encryption enables the detailed configuration of access rights according to data item, so that even if encrypted data is stored on the cloud or otherwise leaves company premises, only those users with the appropriate attribute information (e.g. Sales Department section managers or higher) will be able to decrypt a particular data item.

As a result of tests using software candidates, NTT SPL had by the end of fiscal 2013 reduced encryption/decryption processing time on a standard PC to less than 0.1 seconds, a performance level sufficient for practical implementation. It also completed testing to confirm security of the same level as the world's most commonly used encryption standard (AES 128-bit).

This technology holds promise for applications such as the management of confidential corporate information or databases of personal information maintained by public authorities, and NTT is aiming to enable its practical implementation within two years.

Ensuring information security

Developing technology for maintaining and improving information security

NTT DaTa

### Deployment of new measures to counter unauthorized access

Internet Protocol (IP) addresses serve as the Internet equivalent of street addresses by identifying individual devices participating in a network, and because the current IPv4 addresses are approaching exhaustion, initiatives are underway worldwide to deploy a new protocol named IPv6.

NTT DATA Group is addressing the situation by developing services that can be used without problems in IPv6 environments.

NTT DATA Group company NTT DATA INTELLILINK has extended the service contents of its unauthorized access monitoring and blocking services, which had formerly supported only IPv4-compatible devices. It began to offer its customers the same quality of service for IPv6-compatible devices from August 2012.

NTT DATA will continue to expand its services to enable its customers to utilize the Internet without worry even as it continues to evolve.

How monitoring and blocking unauthorized access works
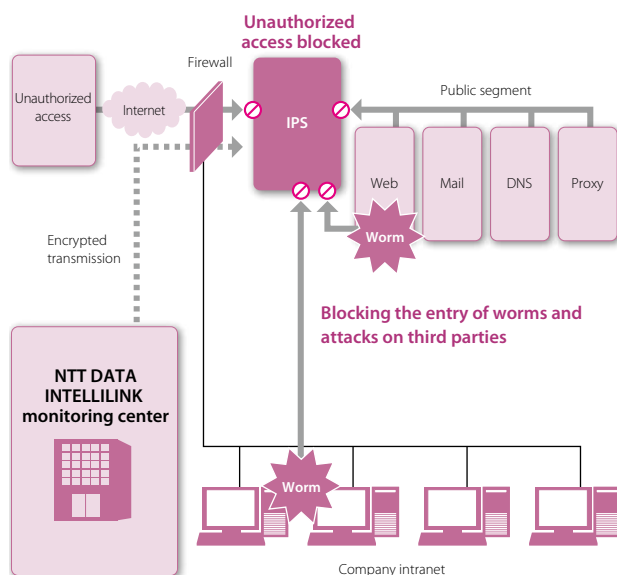
Ensuring information security

Supporting and promoting information security management

NTT Group

NTT CERT: Supporting security across the NTT Group

A computer security incident response team (CSIRT) is an organization that gathers information on computer security threats, investigating them and implementing appropriate response activities. NTT-CERT, operated by NTT Secure Platform Laboratories, is the CSIRT for the NTT Group.

In addition to handling inquiries regarding NTT Group information security, NTT-CERT also works with security managers and system administrators of group companies to minimize security threats. It helps, for example, to test the security of Web servers used by group companies, as well as conducting experiments and providing consulting support related to the security of the next-generation network (NGN)[1] provided by NTT East and NTT West.

As in fiscal 2012, it received an increasing number of inquiries in fiscal 2013 from group companies in the face of growing domestic and overseas cyber attack risks, and strove to provide stable handling as NTT-CERT. In addition to providing group companies with security support on numerous occasions in response to their requests, it also worked with them to enhance monitoring and enable early detection and response.

In the area of security analysis and evaluation, NTT-CERT endeavored to boost its forensic investigation capabilities and provided group companies with technical support for their own investigations. It also looked into methods for evaluating the security products being used by group companies, and worked to build its expertise through actual product evaluation.

It is furthermore working on security measures for newer technologies, including the formulation of cloud configuration guidelines and security guidelines for smartphone application developers.

NTT-CERT contributes to improving the security level not only of the NTT Group, but also of Japan as a whole by actively cooperating with other members of the Nippon CSIRT Association[2], sharing its know-how and raising awareness of the importance of establishing internal CSIRTs, as well as helping to recruit members to the Association and otherwise promoting its activities.

In addition to conducting further R&D on diverse security analysis and response technologies, NTT-CERT will endeavor to improve its support capabilities and efficiency in line with the NTT Group's global expansion and business diversification.

1. **Next-generation network (NGN)**
   A telecommunications network that combines the reliability and stability of conventional telephone networks with the flexibility and economy of high-speed, high-capacity IP networks. NTT has led the world in bringing NGN to fruition, and has launched commercial NGN services.
2. **Nippon CSIRT Association**
   A Japanese CSIRT organization established in April 2007 by NTT-CERT, JPCERT/CC and others

NTT DaTa

Driving the establishment of a global information security governance system

The NTT DATA Group has divided its group companies into five regions (Japan, Americas, EMEA, APAC and China) to conduct its business operations around core companies in each region since fiscal 2013. In conjunction with this reorganization, it is rebuilding its information security structure along the same lines around its regional core companies.

In fiscal 2014, it launched security operations around its regional core companies in line with regional levels. As a result, its governance structure changed from separate 1:1 relationships between NTT DATA and its group companies to a structure centered on its regional core companies.

Ensuring information security

Protecting the personal information of customers

NTT Group

Group company initiatives to enhance the protection of customer information

The NTT Group has established an NTT Group Information Security Policy that states its position on information security, and is doing its utmost on a groupwide basis to protect the personal information of its customers and prevent information leaks.

NTT East
- Promotion of integrated NTT East Group-wide information security management through its Information Security Department, an organization that reports directly to the president
- Further enhancement of employee skills, awareness and practice of policies related to information security through training, education, checks and other measures
- Stronger system and other technological measures to ensure information security, including functions for preventing e-mail and other information from being sent to the wrong address
- Use of physical measures such as the installation of cameras and biometric authentication-based entry and exit controls to bolster information security

NTT West
- Provision of training for all employees (manager training, face-to-face training, e-learning, targeted e-mail attack training, etc.)
- Establishment of a Customer Information Protection Reinforcement Period and Information Security Awareness Period, and implementation of education and checks to ensure sound information management
- Restrictions on the use of external memory devices with company terminals, and required usage of USB flash drives protected by fingerprint authentication for output of customer information
- Deployment of a filtering tool that requires recipient address preregistration or third-party authorization for all e-mails with attachments destined for non-company e-mail addresses

NTT Communications
- Yearly training according to level (yearly information security training for all employees, including directors and temporary staff, using video and educational texts followed by e-learning to measure understanding. Also training for IT system administrators etc.)
- Vulnerability diagnosis performed on information systems, including those of group companies, to protect them from Internet security threats
- Reinforcement of security governance as a group through conducting security surveys of domestic and overseas group companies

Initiatives launched in fiscal 2013
- Implementation of Biz Managed Security Service for all company information systems to enhance defenses against targeted attacks and other external threats

NTT DOCOMO
- Holding of regular Information Management Committee meetings chaired by the Chief Privacy Officer (Senior Executive Vice President) to consider and promote personal information protection and periodically check and survey personal information management and operations status
- Creation of learning tools covering personal information handling and management methods, and implementation of repeated and continuous training for directors, employees, temporary staff, docomo Shop (business partner) personnel, etc.
- Provision of e-learning for all employees, including managers, on the importance of strict information security compliance

NTT DATA
- Yearly implementation of personal information protection self-evaluation according to individual, organization and system
- In-house training (training according to level, e-learning-based training, training focused on the protection of individual rights) and targeted e-mail attack training for all employees
- Deployment of tools for countering targeted e-mail attacks by monitoring traffic for suspicious communications and blocking unnecessary communications

Ensuring information security

Protecting the personal information of customers

NTT FACILITIES
- Nationwide acquisition of ISO 27001 certification from 2006, and continued implementation of information security activities
- Provision of e-learning-based training for all employees
- Limitation of USB memory sticks used for work to those provided by the company that are equipped with fingerprint authentication to restrict access
- Use of terminal management tools to prevent the connection of USB-based external recording media other than USB memory sticks permitted by the company

Initiatives launched in fiscal 2013
- Deployment of functions for blocking access to websites posing virus infection risks in addition to URL filtering
- Prevention of spoofing-based unauthorized access through enhancement of authorization for i-mode connection to company systems
- Deployment of mechanism for ensuring that no company data remains on external terminals when smartphones or PCs are used to connect with company systems

NTT COMWARE
- Establishment of rules based on the Personal Information Protection Law, ISO 15001 and ISO 27001, acquisition of PrivacyMark in 1999, continued implementation of information security activities and personal information protection, including the handling of customer information and measures based on rules
- In-house training in information security and protection of personal information (training according to role, e-learning-based training in targeted attacks for all employees, including those of partner companies, security training for newly appointed and transferred managers, etc.)
- Implementation of Web access and e-mail tracing management, virus protection and other measures
- Implementation of unauthorized communications detection

NTT Urban Development
- Provision of training for all employees
- Strict account management and allocation of company IT system access rights according to authority level
- Strict supervision of personal information handling by subcontractors

Creating a sound user environment

Promoting safe and secure ICT use and user etiquette

NTT EAST NTT WEST docomo

Providing e-Net Caravan instructors to help protect children from Internet-related trouble

NTT East, NTT West and NTT DOCOMO provide employees as instructors for e-Net Caravan, an initiative organized by the Ministry of Internal Affairs and Communications and others to protect children from computer viruses, spam e-mail, theft of personal information, fraudulent claims and other Internet-related trouble. Instructors give classes on safe Internet use for parents/guardians and school personnel as well as students. These classes have been held throughout Japan since fiscal 2007.

Classes tailored to adults, elementary/junior high school students and high/junior high school students are available. The text for the adult class can be downloaded from the e-Net Caravan website. The basic texts for the high/junior high school student talks have recently been revised and videos created with the cooperation of the Ministry of Internal Affairs and Communications and other parties so as to keep abreast with the rapid spread of smartphones, and these materials are now being used.

In fiscal 2013, NTT East provided instructors for 80 classes, NTT West for 90 classes, and NTT DOCOMO for 59 classes that were attended by a total of 13,376 parents/guardians and teachers and 18,169 students nationwide.

Web **e-Net Caravan**
http://www.e-netcaravan.jp/ (in Japanese only)

e-Net Caravan web page screenshot

docomo

Nationwide participants in Mobile Phone Safety Program classes top five million

Owing to the emergence of mobile phone-related crime and other problems as a social issue, NTT DOCOMO has since 2004 dispatched instructors to schools and communities around the country to hold Mobile Phone Safety Program classes for children and elderly people on mobile phone etiquette and how to avoid trouble.

The company has over the years broadened its choice of classes to provide introductory classes for 4th-6th grade elementary school students, higher level classes for high/junior high school students, classes tailored to parents/guardians and teachers, and classes for senior citizens. From fiscal 2012, it also started to provide classes for children with disabilities who are attending special needs schools. E-learning video materials designed to enable teachers to hold their own classes can also be downloaded by anyone from NTT DOCOMO's website.

Furthermore, with the rapid spread of smartphones driving an increase in smartphone-related educational initiatives, NTT DOCOMO has bolstered smartphone-related content.

In fiscal 2013, it held approximately 6,700 classes in elementary, junior high, high and special needs schools as well as community centers and similar facilities that were attended by a total of about 930,000 people. The cumulative total for participants since 2004 topped five million by the end of March 2013.

Moving forward, in addition to dispatching instructors to hold classes around the country, NTT DOCOMO aims to further promote awareness regarding wise mobile phone use through actively publicizing the availability of educational videos on its official website.

Mobile Phone Safety Program class

Web **Mobile Phone Safety Program**
http://www.nttdocomo.co.jp/k-tai-anzen/ (in Japanese only)

Creating a sound user environment

Providing services to ensure child safety

NTT Communications docomo

Protecting children from sex crime by restricting access to child pornography sites

Blocking child pornography on the Internet is important from the perspective of protecting children's rights and ensuring a safe Internet usage environment. The Internet Content Safety Association (ICSA) was established in March 2011 to manage a child pornography site address list, and started to provide a list of such sites in April 2011 for the ISPs that make up its membership.

Group providers OCN and Plala have blocked access to child pornography sites and images based on ICSA's address list since April 2011. The ICSA list has also been used since April 2011 to find and remove child pornography-related entries from the Group's goo search portal database. NTT DOCOMO too has been blocking access to child pornography sites through its i-mode, sp-mode, mopera U and docomo WiFi Internet access services since May 24, 2012, based on the ICSA list.

In fiscal 2012, NTT Communications and group company NTT Plala as well as NTT DOCOMO participated in a child pornography blocking field test organized by the Ministry of Internal Affairs and Communications in fiscal 2012. The test compared the effectiveness of various blocking methods, identified issues and looked into technical issues related to improving accuracy to prevent overblocking. The test's findings were collated as reference data for drafting a guidebook for ISPs on the deployment of blocking technology.

This guidebook was created in fiscal 2013, and ISPs participating in the field test have since utilized it to implement blocking.

Child pornography constitutes a serious violation of children's rights, and the NTT Group will continue to work with ICSA to implement measures to prevent such violations by blocking the distribution of child pornography.

docomo

Launch of Kids' PHONE emergency dispatch service to protect children

NTT DOCOMO and SOHGO SECURITY SERVICES (ALSOK) have teamed up to offer ALSOK's emergency dispatch service for children from October 2012 as a service that leverages DOCOMO Kids' PHONE GPS functions to protect children.

Two Kids' PHONE models currently on sale (HW-01D and HW-02C) support the service, which alerts ALSOK security guards when a child who senses danger presses the protection alarm on a Kids' PHONE. ALSOK guards are on standby around the clock to the location obtained from Kids' PHONE positional data.

The service offers two plans, one that sends positional data to family etc., and one that sends such data direct to ALSOK. If the service is set to send the positional data to the child's family, ALSOK guards will rush to the location on being alerted by the family. If the service is set to send data direct to ALSOK, guards will rush to the location after checking with the child's family.

Since launch of the service, NTT DOCOMO has been informing customers of its availability through leaflets placed in docomo Shops, inside phone product boxes and elsewhere, as well as on both the DOCOMO and ALSOK websites.

Customer satisfaction initiatives

Pursuing customer satisfaction

NTT Communications

Improving services based on customer feedback posted on dedicated OCN feedback site

NTT Communications has long made improvements to its OCN ISP service for consumers based on feedback from customers posted to Action! OCN, a website dedicated to this purpose. In fiscal 2012, this site was completely overhauled to be reborn as OCN Customer Feedback so as to better leverage user views to improve services.

The name change has helped to raise awareness of the site as a channel for customer feedback, and the amount of such feedback has since increased steadily. OCN has received a great many suggestions for improvements along with both gripes and praise regarding its services, and all of this feedback has helped it to improve and enhance quality of its services. It posts examples of improvements triggered by user feedback on the OCN Customer Feedback website. Provision of feedback through telephone or fax is not supported at present, but call center operators handling inquiries from OCN customers pass on any requests and other feedback provided by them.

Any requests that cannot be acted on immediately continue to be considered for implementation at the earliest opportunity.

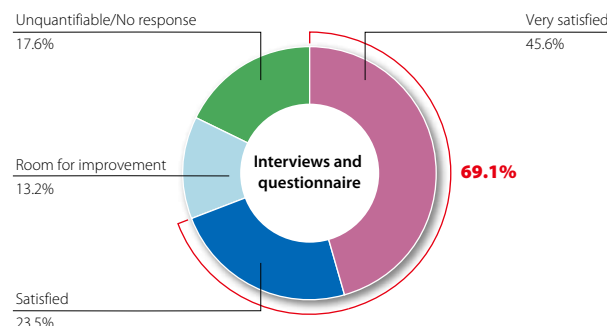OCN Customer Feedback web page screenshot

NTT DATA

Driving improvement through interviews and questionnaires

Based on the tenet that a customer-oriented stance is crucial to continued growth, NTT DATA conducts interviews and questionnaires every year among its regular and long-standing customers to check on its performance and provide better services from the customer standpoint.

In fiscal 2013, it gathered feedback by interviewing 68 customer businesses and other organizations, and conducting a questionnaire that gleaned responses from 344 members of 148 customer businesses and other organizations. Results from these activities revealed that 69.1% of customers are either very satisfied or satisfied with NTT DATA's endeavors.

In fiscal 2014, NTT DATA will continue to work across its organization to implement improvements and further boost customer satisfaction.

Overall level of satisfaction with NTT DATA's endeavors

Unquantifiable/No response 17.6%

Very satisfied 45.6%

Room for improvement 13.2%

Interviews and questionnaire

69.1%

Satisfied 23.5%

Customer satisfaction initiatives

Building a quality management framework and making quality improvements

NTT Group

Building a quality management framework and making quality improvements

To provide telecommunications services that will meet the expectations of its customers, the NTT Group is constantly striving to improve its technologies and the quality of its products and services, and provide a safe and secure platform for ubiquitous broadband communications.

As part of these efforts, group companies have built quality management systems and obtained ISO 9001 certification and other quality management international standard certification according to the nature of their business. Logistics outsourcing specialist NTT LOGISCO, for example, also earned ISO 13485 certification for medical devices industry quality management in 2005 so as to provide medical equipment makers with logistics services that they could use with confidence. In fiscal 2013, it brushed up the 2S (*seiri-seiton*: Sort and Set in order) activities that comprise the cornerstone of its improvement efforts so as to turn its logistics centers into showrooms for customers to come and view. It also introduced Toyota's production methods to further improve its productivity, work process quality and customer satisfaction, while at the same time reducing its energy consumption.

NTT Communications became certified in 2009 for COPC-2000, a quality management standard designed specifically for call center services, so as to provide even higher quality support to its customers and further cultivate trust in its ICT services. It completed its renewal of this certification in September 2012.

NTT Communications

Working with overseas telecommunications partners to improve global network quality

NTT Communications holds an annual Arcstar Carrier Forum (ACF) to provide its customers with stable networks and address growing business continuity demands.

NTT Communications has held ACF since 2000 to gather its overseas telecommunications partners under one roof with the aim of improving the quality of its global network service operations. Far-ranging discussions are held every year on subjects such as methods for resolving malfunctions and integration issues, infrastructure design and integration processes aimed at preventing problems from occurring and operation support systems that enable the prompt analysis and resolution of problems.

In fiscal 2013, ACF was held in Chiba Prefecture on February 26-27, 2013. The 20 participating companies held discussions on further improving the quality of the Arcstar Global Network Service and agreed on priority initiatives.

As a result of continued quality management through ACF, the failure rates for services offered by participating carriers have declined every year. Arcstar partner carriers are working to deliver the kind of quality that satisfies their customers by sharing the same awareness of issues and processes for resolving these issues.

NTT Communications will continue to work with carriers providing access line and network interconnectivity to improve global network quality through combining collective initiatives like ACF that gather all concerned parties under one roof to discuss quality improvements with regular quality improvement activities with individual carriers.

Arcstar Carrier Forum

Customer satisfaction initiatives

Building a quality management framework and making quality improvements

NTT DaTa

Sharing development quality information through a quality management portal site

NTT DATA launched a Quality Management Portal Site in fiscal 2011 to share information with group company development sections and other developers on its approach to quality management and answers to various questions regarding quality.

This portal site has been designed to make it easy for developers to navigate. In fiscal 2013, NTT DATA endeavored to provide up-to-date information through monthly updates and also added a page for gathering user feedback. The site is now attracting users in increasing numbers as a place for finding and sharing useful information, with approximately 1,500 visits per month, and cumulative visits now topping 20,000. NTT DATA has also received thank you e-mails from grateful users.

In fiscal 2014, NTT DATA is planning to add a FAQ page and make the site even easier to navigate and search.

It will also add new content such as case studies of projects being undertaken by the NTT DATA Group, and will hold briefings and education on its quality management as occasion demands.

Customer satisfaction initiatives

Promotion of universal design

NTT

Promoting the use of universal design to provide ICT services that are easy for everyone to use

NTT Service Evolution Laboratories' ICT Design Center devotes itself to the development of design techniques for providing ICT services that elderly people and novice users as well as ordinary people will find easy to use, and will want to use. It also helps to promote the creation of user-friendly services through the application of ICT design techniques to NTT Group service design.

For example, it conducts a great many user evaluation experiments on ICT device connection and configuration to assist in the design of instruction manuals that enable customers to connect and configure devices without any hitches. NTT East and NTT West apply the findings of these experiments to their product manuals.

In fiscal 2013, it conducted repeated user tests to identify key points in making Web services easier for elderly people to use, and put together its Guidelines for Senior Citizen-Oriented Web Design. NTT West, NTT Communications and NTT DATA now refer to these Guidelines when designing their own and customer websites.

The ICT Design Center has also produced a Color Universal Design Handbook that provides information on color schemes distinguishable to people with impaired color vision and explains color scheme design methodologies. The Handbook is available on NTT DATA Group's portal site to be used by employees for reference and study.

In addition to disseminating information through its website, the ICT Design Center holds study sessions for the whole NTT Group, and will continue to promote awareness of user-friendly design and adoption of ICT design techniques across the NTT Group.

docomo

Implementing universal design in docomo Shops

Based on its DOCOMO Hearty Style concept for making products and services easy to use for all people based on universal design, NTT DOCOMO is endeavoring to make all of its docomo Shops throughout Japan barrier-free by eliminating entrance steps, installing wheelchair-accessible counters and restrooms, and providing parking spaces for people with disabilities.

As of March 31, 2013, entrance steps were eliminated at over 90%, wheelchair-accessible restrooms facilities were in place at over 80%, parking spaces for people with disabilities at over 70%, and wheelchair-accessible counters at over 90% of docomo Shops.

Overall, approximately 99% of docomo Shops around the country have implemented at least one of these barrier-free measures. NTT DOCOMO is also making progress installing communication boards* and videophones with sign language support for people with hearing impairments. Over 20% of docomo Shops were equipped with these videophones by the end of fiscal 2013.

Customers can also try out the latest models in the Raku-Raku PHONE series at docomo Shops.

In addition to such equipment-based measures, NTT DOCOMO provides all new docomo Shop staff with "Hearty Mind" training and otherwise endeavors to promote awareness of its Hearty Style initiatives. In fiscal 2013, over 10,000 personnel nationwide received Hearty Mind training.

* Not available at all shops

Videophone with sign language support

Customer satisfaction initiatives

Promotion of universal design

NTT CLARUTY CORPORATION

Lectures and training for promoting the spread of universal design and accessibility

To educate website designers and administrators as well as those involved in assisting people with disabilities, NTT CLARUTY provides a range of training and lectures on universal design and the do's and don'ts of creating accessible websites that are easy for anyone to use.

In fiscal 2013, in addition to giving seven lectures for local authorities, students, and members of the Japan Web Accessibility Consortium on the importance of Web accessibility from the perspective of people with visual impairments, it also gave four lectures for people with disabilities and their carers to develop their understanding of disabled employment.

Other activities included sign language classes given by employees with hearing impairments, and workshops designed to enable employees to experience visual impairment through walking and being guided while wearing eye masks or headgear designed to simulate tunnel vision. NTT CLARUTY also organized visits to company sites where employees with intellectual disabilities are working, and otherwise expanded the variety of training it offers for understanding disability.

In 2010, the JIS standard for Web accessibility was revised, and the Ministry of Internal Affairs and Communications issued a directive requiring local authorities throughout Japan to formulate their own policies concerning accessibility. Also, the new Basic Program for Persons with Disabilities currently being formulated by the Cabinet Office obliges all providers of public services to provide their employees with training in understanding disability. Because this is likely to spur demand for accessibility training particularly among local authorities, NTT CLARUTY is planning to make the most of its strengths in providing training in understanding disability and Web accessibility evaluation from the disabled person's perspective to expand its accessibility training and lecture offerings.

NTT CLARUTY training

Team NTT
communication

As Team NTT, we pledge to contribute to society by conducting our business according to the highest ethical standards and awareness of human rights and creating agreeable workplaces where diversity is respected.

Promoting respect for diversity and equal opportunity

NTT Communications   **NTT DaTa**

Nurturing a new generation of people capable of matching global standards and leading overseas subsidiaries

With its business becoming more global with every passing year, the NTT Group is endeavoring to nurture and hire people capable of performing various roles at the global level.

NTT Communications is pursuing global human resources management (GHRM) under its "Global One Team" slogan with the aim of creating a corporate culture that makes the most of a diversity of personnel irrespective of nationality or other differences. In line with this policy, it is focusing on nurturing leaders of overseas subsidiaries by having their employees work in Japan for spells of two years or six months. In July 2011, it promoted employees of overseas subsidiaries who had completed two-year assignments at its head office to managerial posts in their companies.

NTT DATA is nurturing agile software development experts as a pillar of its global human resource development strategy. Agile development is a new development methodology that involves dividing system development into multiple small functions so as to develop working software incrementally in short periods of time. As a first global initiative in this field, NTT DATA opened its Agile Professional Center (APC) in India in October 2012. This facility constitutes the core of the company's plans to create teams of agile development experts throughout the world to build a development structure capable of responding to global customer needs with speed and flexibility, while also proactively helping employees to develop their careers.

Training session (NTT Communications)

Training session (NTT DATA)

CSR Priority Activities

Promoting respect for diversity and equal opportunity	To meet the diverse needs of customers as a global ICT group, we respect diversity in both values and individuality, and seek to generate new value through innovation by creating a corporate culture and agreeable workplaces that support and encourage personal growth.
Citizenship activities	We pledge to marshal our manpower as Team NTT to work for the further development of a flourishing and vibrant community.

Citizenship activities

NTT Communications   **docomo**   **NTT DaTa**

Continuing volunteer and fundraising activities to support recovery efforts in the Great East Japan Earthquake disaster zone

The NTT Group continues to carry out volunteer activities to support recovery efforts in the Great East Japan Earthquake disaster zone.

NTT Communications is supporting such efforts in the town of Shichigahama in Miyagi Prefecture. In fiscal 2013, a total of 529 employees volunteered to help clear debris and carry out other tasks on weekends from May to September.

NTT DOCOMO has established a corporate matching gift program, and 26 companies in the DOCOMO Group are also participating in its Tohoku Reconstruction Employee Volunteer and Fundraising Program. In fiscal 2013, a total of 549 employees participated in 18 employee volunteer sessions in the town of Minami Sanriku in Miyagi Prefecture. Approximately 11,000 employees have donated to the fundraising program, which with matching gifts from DOCOMO Group companies had as of

the end of March, 2013 raised approximately ¥75 million for the recovery efforts.

The NTT DATA Group is carrying out IT-based volunteer activities in the city of Ishinomaki and its surroundings in Miyagi Prefecture. Leveraging the knowledge and skills of its employees as an IT services provider, the Group is working with local organizations to assist with such activities as computer skills class instruction and streamlining of the management processes of the Japan Car Sharing Association, which is helping to provide disaster victims with affordable access to vehicles. In fiscal 2013, a total of 92 employees were dispatched to volunteer their services on 22 occasions from May 2012 to March 2013. NTT DATA provided backup for these activities by covering the travel and insurance costs for the volunteering employees.

Helping to clear debris (NTT Communications)

Volunteer activity (NTT DOCOMO)

Computer skills classroom (NTT DATA)

Promoting respect for diversity and equal opportunity

Creating workplaces where everyone can realize their full potential

NTT Group

Ensuring diversity

The NTT Group has always striven to create diverse workplaces in which people can realize their full potential irrespective of sex, age, race, nationality, disability or other factors. In October 2007, NTT established a Diversity Promotion Office to bolster workplace diversity efforts across the whole group, and by April 2008, diversity promotion supervisors were in place in group companies. In the shared conviction that diversity can drive
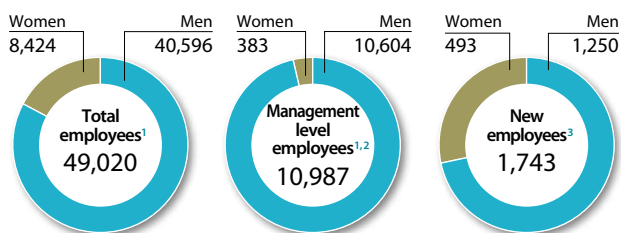

innovative actions and outcomes, the Diversity Promotion Office and diversity promotion supervisors have worked together to support work-life balance improvements and career development for an increasing diversity of employees, and conduct educational activities aimed at reforming corporate culture and ingrained practices.

Communication Handbook

Diversity Promotion Office web page screenshot

Employment in the NTT Group

| Women 8,424 | Men 40,596 | Women 383 | Men 10,604 | Women 493 | Men 1,250 |
| Total employees[1] 49,020 | | Management level employees[1,2] 10,987 | | New employees[3] 1,743 | |

The above data represents nine core NTT Group companies: NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO, NTT DATA, NTT FACILITIES, NTT COMWARE and NTT Urban Development.
1. As of March 31, 2013
2. Section managers and above
3. As of April 1, 2013

NTT Group

Actively providing equal opportunities for female employees and others

The NTT Group is working across its whole organization to provide female employees with equal opportunities.

The Diversity Promotion Office and group company diversity promotion supervisors share information on nurturing female leaders, supporting the balancing of work with child-rearing, boosting individual and workplace awareness and other common goals, so as to implement the successful initiatives of individual companies across the Group. In fiscal 2013, such initiatives included the provision of company information to employees on childcare leave, training for employees preparing to return to work after childcare leave, and use of e-learning materials to promote understanding for diversity.

Nine NTT Group companies also hold joint forums to promote networking among managerial level female employees and motivate them to nurture future female leaders. These forums provide female employees from different group companies with an opportunity to exchange views, inspire each other, share concerns and otherwise boost motivation.

Joint forum held by nine companies

NTT EAST

NTT East positions equal opportunities for female employees as a litmus test of its promotion of diversity, and has enhanced a wide range of career development support programs. In November 2012, it expanded the content of its career development training for women, but is also focusing on raising awareness among superiors, for example, by providing a series of training sessions for male managers who have female subordinates. In fiscal 2013, it also held 11 support program events for female employees to listen to female managers talk about their experiences and ideas and ask them for advice. These events have hopefully created opportunities for female employees to pick up useful tips about pursuing their careers and communicating with others, and

Promoting respect for diversity and equal opportunity

Creating workplaces where everyone can realize their full potential

represent one way in which NTT East is endeavoring to build an environment for female employees to network across the organization and make friends willing to lend an ear and provide mutual support.

Employees who have participated in these events rate them highly from the perspective of career development and personal motivation, one commenting that she felt the events provided valuable food for thought regarding work-life balance and career building, and another that hearing about how successful female superiors approach their work enabled her to envisage her own future.

One of the targets of these efforts is to boost the number of female managers from 140 at the end of fiscal 2012 to about 300 by the end of fiscal 2017 in five years' time. The number had already risen to 170 by the end of fiscal 2013.

NTT East will continue to beef up its measures for cultivating awareness and supporting career development.

NTT WEST

NTT West has always endeavored to create a corporate culture that encourages employees to enjoy their work and realize their full potential, and to be a company whose employees will always want to work for. To further drive these efforts, it launched an Embrace Diversity movement in April 2008 to promote diversity in the workplace and a healthy work/life balance.

In fiscal 2013, it held a variety of seminars on diversity and work/life balance and provided training for all its employees aimed at leveraging diversity to boost its organizational strengths and core competencies so as to better contribute to the creation of a prosperous society. New initiatives include a mentor system for potential female managers and training for male managers who have female subordinates (provided for approximately 40 managers). These initiatives will be continued in fiscal 2014.

Also, a survey conducted in fiscal 2013 showed that the number of employees who understand the movement launched in 2008 to promote diversity and work/life balance to be a part of the company's management strategy rose by over 10% over the previous year, and topped 50%. NTT West will continue to cultivate employee awareness of the movement and its aims.

Training for male managers

NTT DaTa

NTT DATA is aiming to leverage diversity in both human resources and work styles to help generate corporate value as one of its management strategies so as to prevail in global competition.

From fiscal 2013, it is focusing on providing genuinely equal opportunities for women, driving work style transformation, and promoting diversity and inclusion in its workforce in line with global standards.

As one aspect of this, it conducted an attitude survey on diversity among all of its employees, and interviewed about 350 female employees. Based on an examination of assumptions and analysis of results, it launched a Career Imaging Program in March 2013 as a measure for raising the awareness of female leaders in particular.

In January 2013, it joined Aozora Bank, Asahi Breweries, Sumitomo 3M, Hewlett-Packard Japan and Hitachi in staging the Women's Summit Tokyo 2012. This, the 5th Women's Summit, was devoted to the subject of business leadership for women as an initiative to actively work with other industries to nurture female business leaders.

These initiatives won recognition in March 2013 when NTT DATA was selected for the Ministry of Economy, Trade and Industry's Diversity Management Selection 100 list.

Promoting respect for diversity and equal opportunity

Creating workplaces where everyone can realize their full potential

NTT Group

Expanding employment of people with disabilities

The NTT Group actively recruits people with disabilities and endeavors to expand hiring opportunities for them. Following NTT's establishment of NTT CLARUTY in 2004 and NTT DATA's of NTT DATA DAICHI in 2008, NTT West founded NTT WEST LUCENT in July 2009 as the third special purpose subsidiary within the NTT Group.

NTT CLARUTY CORPORATION

NTT CLARUTY works for the expansion of employment opportunities for people with intellectual disabilities, as well as operating the Yu Yu Yu information portal site for people with disabilities and elderly people, universal design/accessibility support services, printed material digitization service and a call center business. In April 2012, it also launched a business for sending direct mail and soliciting subscribers for a fixed price information device maintenance service, and had by May 2013 hired 31 people with disabilities for this business.

From the perspective of promoting diversity, NTT CLARUTY also opens its doors to workplace tours and training. In fiscal 2013, it provided training to organizations that train job coaches specializing in disabled employment (2 sessions for 4 trainees), and workplace training to students from special needs schools seeking employment (1 occasion for 2 students), as well as workplace tours for groups from special needs schools (6 tours for 86 visitors), government agencies and employment support organizations (10 tours for 111 visitors), and group companies and other businesses (39 tours for 205 visitors).

NTT CLARUTY furthermore provides NTT Group companies with information and expertise on procedures for hiring people with disabilities, employment management, and the creation of workplaces that address a diversity of disabilities. Employment of people with disabilities in NTT CLARUTY-affiliated companies***** on June 1, 2013 complied with the mandatory employment quota of 2.0% for people with disabilities.

* NTT companies certified as affiliates of NTT CLARUTY special purpose subsidiary
Holding company NTT and 32 other NTT Group companies

Workplace tour

NTT WEST

NTT WEST LUCENT is a special purpose subsidiary of the NTT West Group involved in creating work opportunities for people with disabilities and environments that enable them to work. It started business with a document digitization service and digital map production and maintenance service that employs people with disabilities working from home through broadband networks. In fiscal 2014, NTT West entrusted it with other new business. By June 2013, it had hired 22 people with physical disabilities, and also actively provided workplace training to special needs school students (4 students, 3 sessions in fiscal 2013) as a registered Osaka Prefecture Employment for the Disabled Support Company.

Employment of people with disabilities at NTT West companies certified as affiliates of NTT WEST LUCENT special purpose subsidiary stood at 2.03% on June 1, 2013, exceeding the mandatory employment quota for people with disabilities.

Document digitization

Promoting respect for diversity and equal opportunity

Creating workplaces where everyone can realize their full potential

docomo

NTT DOCOMO actively hires people with disabilities in the belief that supporting their independence is one of its corporate social responsibilities. As of the end of March 2013, it employs 204 people with disabilities, which at 2.05%* of its workforce exceeds the mandatory employment quota for people with disabilities.
* Figure for NTT DOCOMO

NTT DaTa

NTT DATA has long employed people with disabilities in areas such as system development and sales, but to enable more people with disabilities to realize their full potential, it established NTT DATA DAICHI in July 2008 as a special purpose subsidiary for creating work opportunities for people with various disabilities. The company provides a Web accessibility diagnosis service, as well as being involved in website production, telephone switchboard/line management, forestry dairy farming and other businesses.

In fiscal 2013, NTT DATA DAICHI's website production business performed well, and it also expanded its lines of business to create more work opportunities for people with disabilities by taking on smart card creation processes and other work. Employment of people with disabilities stood at 2.02% on June 1, 2013.

The company will endeavor to promote hiring, expand its businesses and ensure their stable operation so as to further boost its employment of people with disabilities.

NTT Group

Retirement-age employees able to continue working

The NTT Group launched its continuing employment program for retirement-age (60 years) employees in 1999. Employees wishing to do so can continue to work up to the age of 65 provided their health permits it. Employees using this program can work in positions that make the most of the knowledge and skills that only they, with their rich work experience, can offer. The program also offers choice to match lifestyles, enabling its users to work full-time, short-time or 3 or 4 non-consecutive days a week. Most retirement-age employees take advantage of this program, and in fiscal 2013, it was being used by 20,412 employees*.

While further improving the hiring situation for post-retirement employees so as to ensure that they are able to maintain their skills and motivation until the age of 65, the NTT Group is implementing multi-tracked compensation according to performance and expected roles so as to motivate retirees to continue to perform well, and has introduced performance-based mechanisms for adjusting the level of annual income for the first time in its continuing employment program. Hiring under this new continuous employment scheme will start on April 1, 2014.
* Yearly average number of retirement-age employees using the program in fiscal 2013

Promoting respect for diversity and equal opportunity

Supporting teleworking, childrearing and family care

NTT Group

Promoting the use of teleworking systems to change work styles

From the perspective also of further boosting productivity, the NTT Group is promoting the use of teleworking to enable more flexible work styles and better balancing of work with private life so as to support childrearing and family care.

NTT Communications

NTT Communications is endeavoring to change work styles by promoting teleworking and implementing other measures to boost productivity. It also seeks to educate employees by holding lectures and posting talks between its top executives and outside experts on its intranet. In December 2012, it held an event to present excellent examples of kaizen (continuous improvement), and selected three examples from the 21 entries for recognition as particularly excellent examples.

It has also further developed its remote work environment with the use of tablets and thin clients to enable employees to work as normal on business trips and other times when they are away from the office, and is promoting the use of BYOD (Bring Your Own Device) to create an environment that enables about 70% of its employees to make effective use of spare moments. This initiative, which involved teamwork not only between human resources and general affairs sections, but also information security, systems and sales sections (the latter because sales involve frequent outside work), was recognized with an Information Technology Management Award at the Japan Institute of Information Technology's 30th Information Technology Awards.

Event to announce excellent examples of kaizen (continuous improvement)

NTT Data

NTT DATA conducted teleworking field trials from July 2006, and from February 2008 started to officially implement teleworking. The company actively utilized teleworking during the 2009 novel influenza virus outbreak and Great East Japan Earthquake of March 2011, and also as a summer power saving measure.

In addition to teleworking, it also provides an environment for employees to connect to its servers from PCs, tablets and mobile phones when away from the office, enabling them to work away from their physical desktops irrespective of occupation or age.

In fiscal 2013, NTT DATA equipped its Training Center with a shared space for company sites to enable trainees to handle any urgent work duties promptly and save time before and after training.

In addition to location-free work styles, the company is also utilizing discretionary work and other time-based systems to promote flexible work styles. The discretionary work system is designed mostly for development and sales sections, and about 50% of eligible employees are making use of it.

Promoting respect for diversity and equal opportunity

Supporting teleworking, childrearing and family care

NTT Group

Encouraging the use of childrearing and family care programs

The NTT Group believes in the importance of balancing careers with private life, and offers child care and family care benefits that go beyond legally mandated levels. To address the issue of low birthrate and aging population, we also place no limits on the number of dependents that employees may claim under our family allowance system. In April 2008, NTT's initiatives in this area earned it the Kurumin Mark*, a certification provided by the Ministry of Health, Labour and Welfare in recognition of company efforts to support child rearing by employees. Group companies have also obtained the Kurumin Mark.

We are endeavoring to further improve our childrearing and family care programs to address the needs of employees and revisions in laws. In fiscal 2011, we revised these programs in line with the 2009 revision of the Child Care and Family Care Leave Law so as to better enable our employees to balance work with childrearing and family care commitments. We have also created NTT-LiFE+, a childrearing and family care support site, on the NTT Group intranet. In addition to providing details and instructions on the use of the various programs, NTT-LiFE+ carries all sorts of other information, including articles about employees who have succeeded in balancing work, childrearing and family care commitments.

Group companies organize family care study sessions and other events aimed at creating an environment that enables their employees to balance work with family care commitments in the coming age when such needs are predicted to become greater than ever. Many employees participate in these events, demonstrating that this is a matter of keen interest to them, and we plan to continue providing such opportunities.

* Key Kurumin Mark-certified group companies
NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO, NTT DATA, NTT FACILITIES, NTT COMWARE, NTT Software and Nippon Information and Communication

Kurumin Mark

NTT Communications

In fiscal 2013, NTT Communications held a seminar for employees returning to work after taking childcare leave to help them through the process, and a career design seminar for working mothers. A total of approximately 170 employees participated in these seminars. Combining talks by outside experts with panel discussions between seniors and discussions between the participants themselves, the seminars provided an opportunity for participants to rethink their careers at various life stages.

docomo

NTT DOCOMO holds seminars to help employees balance work with family care. In fiscal 2013, it invited an expert from a social welfare corporation to hold a seminar titled "The key to balancing work with family care: leveraging nursing care insurance to cope with family care while continuing to work" that attracted the participation of 139 employees ranging from 30 to 60 years old.

The company's Tochigi and Yamanashi branches also respectively invited a nursing care manager and social welfare worker to hold similar seminars that were attended by 43 employees. Participants reported that the seminars enabled them to grasp the basics of family care and understand the circumstances of both caregivers and care recipients.

NTT DOCOMO will continue to support the further improvement of employee work-life balance through initiatives of this kind.

Attracting and retaining talented employees

Fair evaluation

NTT Group

Introducing measures for boosting employee motivation and satisfaction with evaluation

The NTT Group implements policies aimed at enabling each and every employee to make the most of their abilities as members of Team NTT, and to grow steadily as competent professionals and take the initiative in developing their careers.

Improving personnel and pay systems
We strive to create personnel and pay systems that reward team play, special skills and other strengths as well as individual performance.

Helping employees to develop their abilities
In addition to group training and OJT to enable employees to gain necessary skills in various fields of business, we provide many other opportunities for employees who are eager to get ahead, including e-learning, distance learning, in-house certification of skill levels, and support for earning qualifications.

We actively support career development, holding management training for those ready to move to the next level in line with their personal goals, as well as enabling employees to discuss career development in personal interviews with their superiors held at the start, middle and end of each fiscal year.

To nurture personnel capable of performing on the world stage, we also send employees to study at overseas graduate schools or participate in our overseas work experience programs.

In-house recruitment programs
We raise motivation and promote networking within the Group by providing ambitious employees with opportunities to seek new challenges through our NTT Group Job Challenge in-house recruitment program. In fiscal 2013, about 250 employees used this program to transfer to their desired workplace.

NTT Group Job Challenge web page screenshot

NTT WEST

Enabling non-regular employees to become regular employees

NTT West Group enables non-regular employees who show exceptional skills in cloud business and other system engineer work, contact center processes, consumer subscriber repairs, accounting and payroll, SOHO sales, real estate and other fields to become regular employees.

Group companies NTT BUSINESS SOLUTIONS, NTT MARKETING ACT, NTT FIELDTECHNO, NTT BUSINESS ASSOCIE WEST, TelWel West Nippon, and NTT WEST ASSETPLANNING are all endeavoring to create opportunities for a diversity of people, and as of April 1, 2013 had hired a cumulative total of 1,940 such employees.

Nurturing talent

Support for developing capabilities

NTT EAST

Nurturing professionals with practical skills for supporting business

To provide secure and reliable services, NTT East is committed to creating an environment in which all of its employees can make the most of their abilities and deliver high added value.

In addition to providing group training, e-learning and distance learning programs according to business field to complement on-the-job skills development and improve skills, NTT East has also introduced an in-house qualification certification system for checking skills improvement achievement levels.

In fiscal 2013, it held a total of 157 training courses and tests for in-house certification of 134 qualifications. Approximately 4,100 employees took training courses, and approximately 11,300 took in-house qualification tests. NTT East also actively supported the earning of outside qualifications, providing support for the acquisition of 282 such qualifications in fiscal 2013.

NTT East has also totally renovated the NTT Central Training Center to enable it to better serve as a place for passing on the Group's "Connecting DNA" philosophy, technologies and expertise. In the first year since renovation, it was used by a cumulative total of approximately 258,000 employees.

NTT WEST

Creating systems for developing abilities with a focus on self-reliance

NTT West is promoting the development of abilities with a focus on self-reliance, based on its human resource development vision. To encourage its employees to plan their own careers and drive their own development, NTT West has established a systematic human resource development program that enables employees to set targets and check the effectiveness of their efforts to hone their skills. This program provides training manuals (self-learning guides) and a computer-assisted training system (CATS) as tools for employees to implement the program. By also providing various training programs for boosting motivation and ambition, NTT West is endeavoring to nurture people who can pass muster as professionals in their own right in society at large.

At the same time, NTT West recognizes that the contribution of veteran employees that make up a large segment of its workforce is likely to become more and more important, and accordingly provides "Business Life Value Training" for employees aged 51 aimed at motivating veteran employees and enabling them to leverage their skills and lead useful and fulfilled lives. This program provides veteran employees with training in seven practices considered to be essential for individuals to win trust and exercise leadership within an organization.

Nurturing talent

Support for developing capabilities

Providing young employees with overseas work experience

NTT Communications launched a program in fiscal 2012 aimed at nurturing people capable of performing globally as early as possible by sending young employees to work overseas. Under the program, first and second-year employees are sent overseas for one year to develop universally applicable practical skills through actual work. In fiscal 2013, it sent approximately 70 such employees overseas.

NTT Communications is also providing more opportunities for refining specializations based on career development plans designed to nurture professionals. In addition to testing the skills of all of its employees each year and helping them to earn official qualifications, it provides a training platform with a rich selection of courses for employees to choose from according to their needs and career paths. As of May 2013, this platform offered 24 special technical training courses, 571 skills improvement courses and 397 self-education support courses.

An overseas placement training session

Nurturing employees capable of performing on the world stage by posting them to overseas companies

To nurture people capable of working in a global capacity, NTT DOCOMO offers a Global OJT program for employees of three years' standing or more to work for one year at an overseas subsidiary or partner company. Global OJT aims to cultivate an international mindset and skills in overseas business practices as well as language proficiency through actual work experience. In fiscal 2013, it sent six employees to companies in the U.S.A., U.K., Singapore and Germany for one year, and two employees to India for three months.

In fiscal 2014 too, it sent four employees to the U.S.A. and Germany for one year. The program, which offers a diversity of training in sales, service planning and development and other areas in line with the careers of the employees concerned, represents an opportunity for employees to gain valuable experience of a kind that would be difficult to come across in Japan. NTT DOCOMO will review work destinations based on business environment and trends as it continues to implement the program.

Creating safe and healthy workplaces

Occupational safety and health

NTT Group

Establishing management systems and cultivating everyday awareness for protecting safety and health

In addition to observing relevant laws and regulations, the NTT Group endeavors to provide further protection of its employees' safety and health by establishing its own Safety Management Rules and Health Management Rules and taking measures to ensure their smooth implementation.

More specifically, we appoint safety managers and establish safety management organizations, provide regular health checks, arrange workplace inspections by industrial physicians, and otherwise endeavor to create safe and comfortable workplaces and promote the health of our employees.

From December 2012, we launched a field trial with the NTT Health Insurance Union and NTT Medical Center Tokyo on the utilization of the latest ICT technologies to prevent lifestyle-related illness and promote health. By April 2013, some 1,500 NTT Corporation employees (approx. 50%) were participating in this trial. We plan to leverage such initiatives to maintain and improve employee health and reduce our healthcare bill. We also aim to utilize the data and knowledge gained from such initiatives to contribute to society by developing and providing services for local authorities and corporate customers.

Creating safe and healthy workplaces

Preventing overwork

NTT Group

Group company measures for preventing overwork according to business

The NTT Group takes measures to protect the health of its employees and prevent them from overworking, including designating every Wednesday as a day when employees should refrain from working outside business hours. Group companies also actively implement their own measures for preventing overwork tailored to their particular businesses.

For example, some NTT Group companies make use of PC log management functions that record login and logout times to help promote appropriate work habits and prevent overwork.

NTT DaTa

Preventing overwork is a constant challenge in the IT industry. NTT DATA is striving to prevent overwork by setting itself the targets of keeping average hours worked per year to under 2,000 hours and if possible even less, and reducing the number of employees clocking over 2,300 hours.

In fiscal 2013, NTT DATA sought to protect the safety and health of its employees and meet compliance requirements through implementing various measures to reduce work hours, including reporting monthly hours worked and annual leave usage status to respective sections, and requiring employees whose overtime has exceeded 360 hours during the year to submit upcoming overtime schedules and plans for reducing overtime. As a result of these efforts, average annual hours worked per employee for fiscal 2013 came to 1,996 hours.

The company also sought to promote workplace reform through the continued utilization of employee computer login/logout records to review work hours and improve communication with superiors based on these records.

NTT DATA plans to promote comprehensive change in work styles by taking a flexible approach to time and space, while at the same time driving further progress with existing policies by setting targets according to section based on figures for the previous year and utilizing quarterly PDCA cycles to monitor and drive the implementation of measures for achieving those targets.

NTT FACILITIES

In addition to using PC log management functions, NTT FACILITIES seeks to manage and reduce employee work hours by measures such as requiring employees to post color cards specifying anticipated overtime hours. It also helps employees to manage their health through ensuring strict compliance with rules designed to prevent impairment of health through overwork, and requiring employees working long hours outside normal business hours to consult with an industrial physician or other specialist.

In fiscal 2013, NTT FACILITIES continued to beef up PC log management and implement multi-layered checking of operational status, including quarterly checks of each employee's log by work management handlers in each group company, regular checks of branch and regional company logs by head office work management personnel, and voluntary checks by each section. These efforts have served to further boost employee awareness of work hour log management.

Overtime per employee in fiscal 2013 rose by eight hours over the previous year owing to work pressure from the increased demand for solar power generation systems and other factors. Although it failed to keep overtime below the previous year's level, NTT FACILITIES met its commitments and considers its various measures to have been reasonably effective.

In fiscal 2014, it has set itself the target of keeping overtime below the fiscal 2013 level, and will continue to enforce strict compliance with no overtime days and encourage employees to utilize leave entitlements. It also plans to tackle the issue prevalent in some sections of work falling unequally on the shoulders of specific individuals by promoting communication between members of the sections concerned.

NTT COMWARE

NTT COMWARE is endeavoring to instill healthy work practices and reduce overtime both through using an employee PC log-based work hour management system and requiring employees to display cards detailing planned overtime on their desks. To further protect the health and safety of employees, it has configured its work hour management system to alert managers to instances of overtime that constitute overwork, and requires overworking employees to see industrial physicians and take other steps to lessen their work hours.

In fiscal 2013, it also created a new office management manual and formulated rules aimed at ensuring that employees take the breaks that they are entitled to. These efforts proved to be effective to a certain extent, reducing annual overtime, including overwork, to below the previous year's level.

Creating safe and healthy workplaces

Mental health care

NTT Group

Expanding mental health care programs

NTT Group companies are endeavoring to enhance the day-to-day management of the mental health of their employees through providing an increasing range of programs and services tailored to their respective businesses and type of work.

NTT

NTT holds regular training sessions and otherwise endeavors to nip mental health problems in the bud by providing its employees with both in-house and external mental health consultations services, mental health examinations and consultations for employees considered to be overworking.

In fiscal 2013, in addition to self-care e-learning programs for non-managerial employees and managers, it provided staff care programs for managers that incorporate exercises in communication with staff, and ensured that all employees were able to take these programs.

It also made the contact desk for outside counseling available on a 24-hour basis from fiscal 2013, enabling employees to seek advice on holidays and during nighttime.

NTT EAST

In fiscal 2013, NTT East published an article titled "Our support framework for maintaining and promoting physical and mental health" in its in-house newsletter to raise awareness regarding its support framework by re-introducing details regarding health management and contacts for seeking advice on various matters.

With the help of staff from its Health Management Center, the company provided managers with education on skills in handling employees returning to the workplace after leave for mental health reasons, and lectures on mental health and ways of preventing or coping with mental health issues as part of training for newly appointed managers. Other initiatives in its efforts to improve workplace mental health management included a special lecture by an outside expert on workplace mental health measures that was held in January 2013 for top executives of NTT East Group companies.

It also launched an NTT East Group advice help line that uses an outside organization to provide NTT East Group employees and their family members with advice on health matters and personal concerns.

NTT WEST

In addition to mental health self-care through online questionnaire-style checkups, NTT West supports the prevention and early detection of mental health problems by providing a counseling center that both employees and their family members can contact around the clock to seek professional advice. It also disseminates information regarding this service to remind employees of its existence.

To raise the staff care skills of managers who are able to monitor their staff on a daily basis, the company provides an online mental health management manual that managers can access at any time to read up on methods of detecting and resolving causes of workplace stress and utilize in the early detection of staff with mental health issues. It is also implementing various measures for employees with emotional problems that are preventing them from coming to work, including working with health management doctors and family doctors to establish a structure for supporting the smooth return to work of such employees.

NTT Communications

NTT Communications provides its managers with "mental health keeper" training to promote staff mental health care, and almost all of its managers had earned the Mental Keeper qualification by fiscal 2013. The Mental Keeper program is a systematic training program designed to enhance the ability of managers to watch over the mental health of their staff and respond appropriately to any personal problems.

In fiscal 2013, this program was augmented with a mental health management training program for newly appointed section managers and others to further enhance abilities covering everything from everyday staff care to the care of staff on leave for mental health reasons and their smooth return to work.

NTT Communications is applying these measures also to its domestic group companies to promote mental health management across the whole Group.

In fiscal 2014, it plans to expand the Mental Keeper training program to include department managers so as to further develop its staff mental health care capabilities.

Creating safe and healthy workplaces

Mental health care

docomo

NTT DOCOMO's key policies include mental health examinations and stress checks for self-care, staff care training of various kinds for managers, and workplace inspections, post-health check follow-up and interviews by in-house occupational health personnel. These professionals also offer guidance to employees showing a tendency to overwork. NTT DOCOMO also provides external counseling contacts for employees to seek mental health care advice outside of the company.

From fiscal 2014, it made these external counseling services available across the whole DOCOMO group.

NTT DATA

NTT DATA has since fiscal 2010 required all of its managers to take a mental health care management certification test so as to better enable them to watch over the mental health of their staff. In fiscal 2013, 162 managerial level personnel, most of them newly appointed section managers, took the test, with 84% passing it.

NTT DATA will continue to cultivate awareness of mental health issues among its managers by combining the provision of staff care training by industrial physicians with the implementation of the certification test.

NTTFACILITIES

NTT FACILITIES provides an independent counseling center not directly connected to the company to offer counseling to employees and their families on matters related to their work, interpersonal relationships, private life and other personal issues. The center respects the privacy of employees seeking advice, and reveals no details of consultations to the company without the permission of person concerned. In its in-house Welfare Newsletter, NTT FACILITIES encourages employees to make use of this counseling service. It also continues to provide e-learning in mental health basics and the prevention of personal problems, and occupational stress diagnostic checks for all employees.

In fiscal 2013, it augmented existing measures with follow-up measures for transferred personnel, newly appointed managers, new employees and other groups generally known to be susceptible to mental health risks. It also used e-mail to disseminate articles on mental health care topics and encourage employees to make use of the counseling service, and held seminars to provide workplace superiors with practical education in everyday mental health care management and other topics so as to help prevent the recurrence or aggravation of emotional problems among their staff.

NTT COMWARE

NTT COMWARE provides all employees with guidance on health issues and educates them about the importance of maintaining good health through its health management center. It also distributes to all managers its Health Management Guidebook which brings together important information related to maintaining good health, and sends e-mails to all employees encouraging them and their families to make use of an independent counseling service for seeking help on matters related to their work, interpersonal relationships, private life and other personal issues.

In fiscal 2013, NTT COMWARE required all new employees to be interviewed by a public health nurse in October, six months after joining the company, to check for any outstanding physical or emotional health issues, and it also extended the scope of the managerial mental health training previously provided for section managers to include assistant section managers too.

Citizenship activities

Citizenship activities: basic policy and its implementation

NTT Group

Implementing citizenship activities in environmental conservation and five other areas

All NTT Group company personnel and their families as well as former NTT employees and people from local communities actively participate on a sustained basis in our citizenship activities as members of Team NTT.

In line with the Team NTT communication pledge set forth in our CSR Charter, we carry out citizenship activities in the following six areas: environmental conservation, social welfare, education and cultural promotion, local community development and dialog, international exchange activities and sports promotion.

Particularly where environmental conservation is concerned, since fiscal 2010 we have been implementing groupwide environmental contribution activities that involve the participation of employees under the slogan "Green with Team NTT".

In fiscal 2011 we started implementing common priority policies to promote groupwide initiatives. In fiscal 2013, we carried out Operation Clean Environment local community cleanups, Ecocap Movement PET bottle cap collection, energy saving in employee households, and employee hands-on environmental education activities.

As a result of setting groupwide quantitative targets for top priority policies and working as the NTT Group to achieve them, in fiscal 2013 we managed to surpass both fiscal 2013 targets and fiscal 2012 results for Operation Clean Environment and PET bottle cap collection by a considerable margin.

Green with Team NTT is one of the three approaches set forth in THE GREEN VISION 2020, the NTT Group vision for the environment announced in November 2010. We will continue to involve our employees in efforts to further reduce environmental impacts. Details regarding specific initiatives can be found under "Green with Team NTT" in the "Communication between people and the global environment" section of this report.

Green with Team NTT policy

In addition to our business activity-based initiatives, we encourage all of our employees to reduce environmental impacts by participating in eco-friendly activities in their homes and local communities as well as workplaces.

Green with Team NTT priority policy progress status

Policy	Fiscal 2013 target	Fiscal 2013 result
Operation Clean Environment (local community cleanup) participants	100,000	118,730
PET bottle caps collected	30,000,000	Approx. 33,000,000*
Employee hands-on environmental education activities	–	7,415 participants for the year

* Equivalent to 242 t-CO_2 and vaccinations for approx. 38,400 children in developing countries

NTT Group

Support for citizenship activities

Based on the belief that participation in citizenship activities can help to broaden the mind, NTT Group companies are implementing an increasing range of policies to support employee citizenship activities, informing employees of support programs, and commending citizenship activities carried out under such programs. Other programs include a Matching Gift Program under which group companies match donations collected independently by employees, and a Volunteer Gift Program under which group companies donate goods to facilities etc. where employees are engaged in voluntary citizenship activities.

Under the fiscal 2013 Matching Gift Program, NTT matched funds raised by voluntary employee activities for donation to a social welfare corporation based in Taito Ward, Tokyo.

Key programs in support of volunteer activities

Program	Details
Volunteer Gift Program	This program provides goods from the volunteer's company to facilities etc. where the volunteer has been active over a long period of time.
Matching Gift Program	Under this program, NTT Group companies support employees' fund-raising and charity activities by matching donations made by employees.
Volunteer Leave Program	This program enables employees to take extended leave for volunteer activities or other purposes in line with life design plans.

Citizenship activities

Examples of citizenship activities

dimension data

Welfare   Celebrating Chinese New Year with nursing home residents

Dimension Data Singapore employees joined counterparts from Cisco Systems Singapore to celebrate Chinese New Year on February 15, 2013 in a nursing home for senior citizens.

In what turned out to be a very heartwarming and meaningful experience for all concerned, the employees joined residents in singing songs, playing bingo and other activities, and an employee dressed up in a red costume and long black beard as the God of Fortune went around the home to well-wish the residents.

Sing-along session

Well-wishing residents as the God of Fortune

docomo

Welfare   Classes in mobile phone use for people with disabilities

NTT DOCOMO has every year since fiscal 2007 held classes in mobile phone use for people with visual or hearing impairments. The classes introduce useful applications and handy ways of using feature phones and smartphones.

The basic curriculum for the 62 such classes held at social welfare facilities throughout Japan in fiscal 2013 included instruction in Raku-Raku PHONE 7's Call Voice Memo, text-to-speech operation and other convenient functions together with usage scenarios and tryouts with working handsets. Approximately 1,000 people participated in these classes.

NTT DOCOMO will continue to provide classes for people with visual and hearing impairments to learn about convenient ways of using mobile phones.

Class in mobile phone use

Corporate governance

Ensuring sound management, decision making and business activities

Basic philosophy

As the holding company of the NTT Group, NTT believes that raising the effectiveness of corporate governance is an important management issue for maximizing corporate value and meeting the expectations of its various stakeholders. Accordingly, NTT is working to strengthen corporate governance based on its fundamental policies of ensuring sound management, conducting appropriate decision-making and business activities, clarifying accountability and maintaining thorough compliance.

Board of Directors

NTT maintains a Board of Directors with 12 members, including two outside directors. The Board of Directors meets in principle once per month, also holding extraordinary meetings as occasion demands, to address matters specified by laws and regulations, take decisions on important holding company and group management issues as a holding company responsible for overseeing and coordinating the NTT Group, and supervise the execution of duties of individual directors by having them provide regular status reports.

Board of Corporate Auditors

NTT's Board of Corporate Auditors has five members, two of whom are internal corporate auditors, and three of whom are outside corporate auditors and include a female corporate auditor. In addition to attending Board of Directors meetings and other important meetings, corporate auditors audit the performance of NTT's directors in the execution of their duties as they see fit. The corporate auditors also work to bolster auditing functions through maintaining close contact and regularly sharing information on audit plans and audit results with the Independent Auditor, and they share information with NTT's Internal Control Office and question it about the results of internal audits. The Board of Corporate Auditors works with the auditors of group companies to conduct audits.

Executive Officers Meeting and committees

In principle, important company matters are deliberated and decided by NTT's Executive Officers Meeting, which is made up of the President, Senior Executive Vice Presidents, full-time directors and the heads of staff organizations. Executive Officers Meetings are held once a week in principle. One corporate auditor also attends these meetings to boost the transparency of decision making. Under the Executive Officers Meeting, committees have been created to discuss specific issues related to the management strategies of NTT Group companies. In principle, each committee is chaired by either the President or a Senior Executive Vice President, with other directors and senior executives involved in relevant areas participating in meetings held throughout the year as occasion demands.

Internal control systems

NTT is working to strengthen the Group's internal control systems with the Board of Directors adopting a Basic Policy on the Maintenance of an Internal Control System to ensure the appropriate execution of duties within each group company. In line with the U.S. Public Company Accounting Reform and Investor Protection Act (Sarbanes-Oxley Act) and Japan's Financial Instruments and Exchange Act, NTT is working to document business processes and conducts repeated tests to confirm the effectiveness of its financial reporting internal control system.

The Internal Control Office monitors the status and operating effectiveness of internal controls across the Group as a whole through such measures as conducting standardized audits that target all group companies and checking the work of internal auditors in each group company, as well as implementing improvements to the Group's internal control systems.

Clarifying accountability

NTT strives to maintain appropriate, timely and fair information disclosure, and is aware that obtaining proper corporate valuations in the market through such disclosure is essential. It accordingly holds press briefings, discloses information promptly on its website, and otherwise endeavors to clarify accountability.

Corporate governance structure (including an outline of the internal control system)
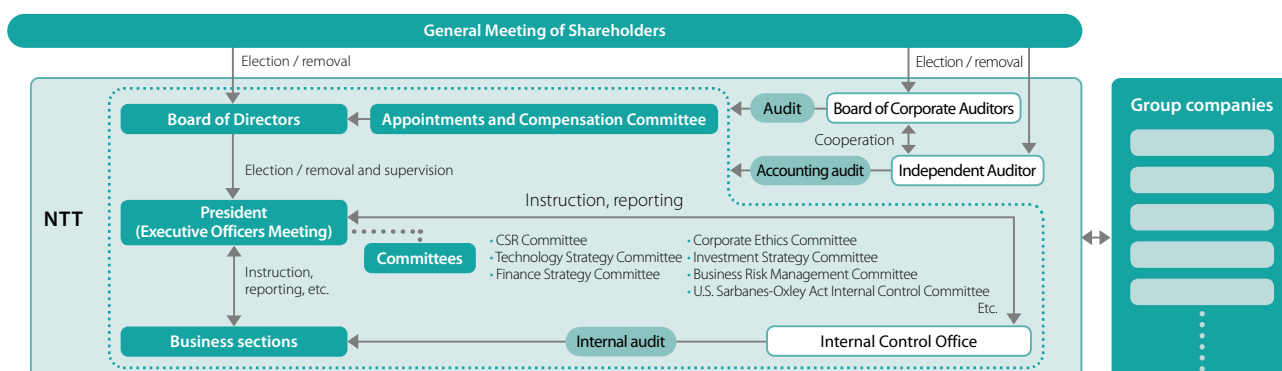
Ensuring compliance

The NTT Group runs its businesses in compliance with its Corporate Ethics Charter.

Recognizing that it is imperative to conduct business in compliance with laws and regulations, and maintain the highest ethical standards in order to promote sound corporate activities, NTT drew up the NTT Group Corporate Ethics Charter in November 2002.

The Charter, which applies to all officers and employees of the NTT Group, lays out the basic principles of corporate ethics and provides specific guidelines for ethical behavior. To ensure that the Charter is effective, NTT strives to raise employee awareness of its goals by providing training in corporate ethics and introducing case studies involving group companies, including overseas examples on our website, as well as conducting annual employee attitude surveys.

To prevent dishonesty and misconduct, each company has in place a system for employees to report and consult on ethical issues. NTT has also established a groupwide Corporate Ethics Help Line to enable employees to go outside their company for help if required. In line with Japan's Whistleblower Protection Act and other laws, this Help Line also accepts reports from companies outside the Group that do business with the NTT Group. In February 2013, NTT changed the location of the Help Line and clearly stated the name of the law firm serving in this role so as to further enhance trust in the system.

Corporate ethics website

NTT DaTa

About the arrest of a subcontractor and measures for preventing the recurrence of unauthorized acquisition of bank card transaction information

On November 26, 2012, the employee of a subcontractor engaged in NTT DATA's development of systems for financial institutions was arrested by Kyoto Prefectural Police in relation to the unauthorized acquisition of bank card transaction information and withdrawal of cash. We sincerely apologize to the persons and the many financial institutions affected by this incident.

NTT DATA set up a task force on November 21, 2012, and fully cooperated with police investigations while also conducting its own internal investigation. It also launched a committee on November 27 to consider and implement measures to prevent the recurrence of such incidents across the company.

Risk management system

The NTT Group has a framework to prevent risks and to minimize the impact of any risks that do emerge.

Functioning as they do in a rapidly changing business climate marked by increasingly fierce competition in the fields of information and communications, NTT Group companies face a wide variety of business risks.

We make efforts to anticipate and prevent potential risks at hand and minimize the impact should they emerge. As part of these efforts, we have prepared a standard manual for distribution to all group companies to ensure a unified approach to risk management.

Each group company also prepares its own manual or other mechanisms tailored to its specific business activities and environment to manage and mitigate business risks.

Human rights awareness

We make groupwide efforts to raise human rights awareness and create a corporate culture that respects human rights and is free of any discrimination or harassment.

Based on the Universal Declaration of Human Rights and other references, NTT has long endeavored to address the Dowa problem (discrimination based on ancestry in Japan) and other human rights issues, and create a corporate culture opposed to any form of discrimination. To take an even more proactive approach to respect for human rights in the light of growing awareness of their importance worldwide, we established our Basic Policies on Human Rights in June 2012.

Furthermore, all NTT Group companies provide workshops, e-learning courses and other programs that enable employees to learn about these issues on a multifaceted continuing basis. Other activities to boost and establish awareness of human rights include soliciting slogans and ideas for posters promoting awareness of human rights from NTT employees and their families, the best of which are compiled into calendars and distributed around the workplace.

NTT Communications provided e-learning with streamed video on the themes of respect for human rights as a global enterprise and human rights in the workplace.

NTT DOCOMO conducted a questionnaire to ascertain the awareness of compliance and human rights among the approximately 38,000 employees (including temporary staff) in the NTT DOCOMO Group. The questionnaire results showed that employees had a generally high awareness of compliance and human rights, but that there were still some areas requiring further attention. Based on these results, NTT DOCOMO is planning to focus in fiscal 2014 on measures to promote communication in the workplace and to continue to message its employees on compliance and human rights.

Our Basic Policies on Human Rights

Nippon Telegraph and Telephone Corporation, hereunder NTT, believes that human rights is an important issue, and recognizes the fact that making efforts towards promotion of and respect towards human rights is a social responsibility that all companies should discharge. NTT aims to build up corporate culture that respects human rights in order to build a safe secure and enriched society.

- The NTT management themselves take a lead in respecting human rights of all the stakeholders.
- NTT will, through its business activities, strive for a solution on the Dowa Issue* and other human rights issues.
- NTT respects diversity, promotes equal opportunity, and strives to create a healthy working environment that is free of harassment issues.
- NTT will, and from the standpoint of respect to human rights, review its operation, as appropriate, and will adapt and improve these to its business activities.
- NTT will, through its Human Rights Education Committee, initiate and execute employee-focused activities.
- NTT is committed to supporting its Group companies in their efforts to raise awareness on human rights issues.

* Owing to discrimination which had been formed based on the structure of social status in the course of the historical development of Japanese society, some Japanese people have been forced to accept a lower status economically, socially and culturally, and they are subject to various kinds of discrimination in their daily lives even today. This is the Dowa issue, which is a unique Japanese human rights problem.

Seminar on business and human rights for group companies

NTT Group

In July 2013, NTT invited a speaker from an overseas NPO involved in CSR consulting to hold a seminar on the subject of business and human rights. Managers responsible for CSR and human rights in major group companies participated in the seminar to learn about the latest global trends in human rights from the speaker. The speaker focused in particular on the Guiding Principles on Business and Human Rights endorsed by the United Nations Human Rights Council in 2011, providing an overview of the "Protect, Respect and Remedy" framework of the Principles and a detailed explanation of the most important points. The speaker also explained specific aspects of human rights that are particularly relevant to the ICT industry.

We will share information on these latest global trends in human rights with the whole Group as part of our efforts to further promote groupwide awareness of human rights.

Seminar on business and human rights

Supply chain management

Working with suppliers to create outstanding services and reduce environmental impacts

To provide its customers with valuable services, the NTT Group uses cost-effective products and technologies, and practices green procurement, buying products designed to minimize environmental impacts. Building trust-based partnerships with suppliers is essential to implementing such policies.

We have accordingly published our Basic Procurement Policy since 1999, and create regular opportunities to listen to our suppliers. We also post procurement information on our website, and have contact points for fielding inquiries and providing guidance on procurement.

Individual group companies are also implementing their own initiatives. NTT East and NTT West, for example, use check sheets to assess the ways in which their suppliers meet their responsibilities to the environment and society.

Basic Procurement Policy

When procuring products, NTT will:
1. conduct its procurement in an open and transparent manner, taking into account its business needs;
2. provide non-discriminatory and competitive opportunities to both domestic and foreign suppliers; and
3. conduct global and market-driven procurement of competitive products that meet its business needs.

The NTT Group Guidelines for Green Procurement

These Guidelines represent the NTT Group's basic stance on green procurement and set forth the general areas in which the NTT Group and its suppliers address environmental issues on a continuing basis.

Web	Procurement website
	http://www.ntt.co.jp/ontime/e/index.html

Cooperating with suppliers on conflict minerals

NTT Group

The trade in minerals originating in the Democratic Republic of the Congo and nine adjoining countries has become a global human rights issue owing to the likelihood that some of these minerals have become a source of financing for violent armed groups suspected of committing inhumane acts.

Companies listed in the USA are obliged by law to disclose any use of these conflict minerals in their products. With NTT and NTT DOCOMO listed in the USA, the NTT Group issued its NTT Group's Approach to Conflict Minerals in March 2013 as a basic policy with respect to conflict minerals so as to fulfill its social responsibility in the area of procurement in line with the American law.

We also held seven briefings on conflict minerals for our suppliers between May and July 2013. We are conducting surveys to investigate usage of conflict minerals in preparation for disclosure, and are planning to work with our suppliers toward eliminating the use of any suspected conflict minerals.

Web	NTT Group's Approach to Conflict Minerals
	http://www.ntt.co.jp/ontime/e/policy/conflict/index.html

Briefing on conflict minerals for suppliers

Communicating with our shareholders and investors

The NTT Group strives to improve management transparency through proactive disclosure and IR activities.

Basic philosophy

The NTT Group recognizes that enhancing its corporate value in the medium to long term and realizing appropriate returns to shareholders are crucial aspects of its business. At the same time, we are striving to improve the transparency of management through proactive disclosure and IR activities to enable our shareholders, investors and other stakeholders to appropriately evaluate our business performance.
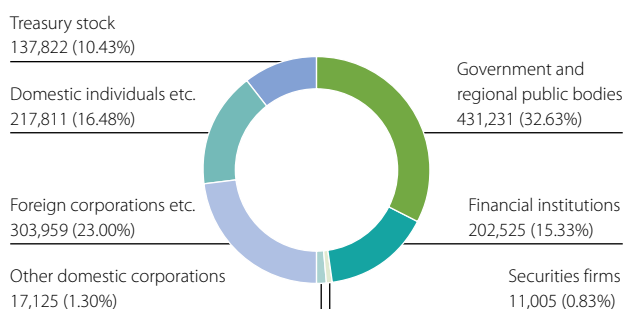
NTT shareholders

As a result of six offerings of government-owned shares since NTT's privatization in 1985, NTT stocks are in the hands of approximately 1.11 million* shareholders as of the end of March 2013.

* Including shareholders who own only shares representing less than one unit

Number of shares held according to shareholder category

Share numbers in thousands, rounded down to the nearest thousand, with percentage of total shown in brackets

Treasury stock
137,822 (10.43%)

Domestic individuals etc.
217,811 (16.48%)

Foreign corporations etc.
303,959 (23.00%)

Other domestic corporations
17,125 (1.30%)

Government and regional public bodies
431,231 (32.63%)

Financial institutions
202,525 (15.33%)

Securities firms
11,005 (0.83%)

1. The percentage distribution is for shares remaining after subtraction of shares representing less than one unit (1,716,335 shares) from total issued shares.
2. Shares of "Other domestic corporations" include 16,000 shares held by Japan Securities Depository Center, Inc.
3. There are 225,485 shareholders who own only shares representing less than one unit.

Returns to shareholders

In the period ended March 31, 2013, NTT acquired shares with a value of ¥150 billion as treasury stock, and plans to acquire further treasury stock with an upper limit of either 50 million shares or ¥250 billion in value in the period ending March 31, 2014.

For the year ending March 31, 2013, NTT paid yearly dividends of ¥160 per share. We will endeavor to raise dividends over the medium term based on an overall consideration of factors such as business performance, financial position, and dividend payout ratio, focusing also on stability and sustainability.

Disclosure and IR activities

NTT has listed its shares on several domestic and foreign stock exchanges (Tokyo*, New York and London), and has issued domestic and foreign bonds to procure funds. We consider it important to establish and maintain relationships of trust with our shareholders and investors in both domestic and foreign capital markets, and accordingly disclose information in a timely, appropriate and fair manner, fulfilling our accountability as a business corporation.

To help shareholders and investors to better understand our management strategy, we also actively conduct IR activities and create opportunities for our top management to directly communicate with our shareholders and investors by holding various events in addition to the General Meeting of Shareholders, such as briefings for institutional investors, financial analysts and individual investors, briefings on specific themes and overseas IR roadshows, as well as participating in securities company conferences. We are also making efforts to enrich IR content on our corporate website.

* We delisted from the Nagoya, Fukuoka and Sapporo stock exchanges on June 16, 2013. On July 16, 2013, the Osaka Securities Exchange merged with the Tokyo Stock Exchange.

Briefing for individual investors

T O P I C S

Listed on overseas Socially Responsible Investment (SRI) indexes

NTT has been highly rated by SRI evaluation organizations. As of April 1, 2013, we are listed on international SRI indexes such as Ethibel Sustainability Index (ESI) Excellence Global (Belgium).

included in
ETHIBEL
SUSTAINABILITY
INDEX
EXCELLENCE Global

Mariko Kawaguchi

Senior Analyst, Management Strategy Research Department, Daiwa Institute of Research Ltd.

Ms. Kawaguchi joined Daiwa Securities Co. Ltd. in 1986 after completing a Master's degree in public finance and environmental economics at Hitotsubashi University's Graduate School. She transferred to Daiwa Institute of Research Ltd. in 1994, and after conducting corporate credit research, served in 2010-2011 as General Manager for CSR in Daiwa Securities Group Inc.'s Corporate Communication Department. She returned to Daiwa Institute of Research in July 2011, and became a senior analyst in April 2012, focusing on environmental management, CSR and socially responsible investing.
Chief Executive and Secretary General, Social Investment Forum Japan. Trustee of the Sustainability Forum Japan, Member of the EcoAction 21 Auditor Certification Committee, Member of Ministry of the Environment's Environmental Businesswomen, Member of Tokyo Metropolitan Government's Environmental Committee.
Co-author of *Introduction to Socially Responsible Investing, CSR: Raising Corporate Value* (both in Japanese, pub. Nikkei) and other works

Following last year, I have been asked once again by the NTT Group to review its CSR report. I feel that this year's report succeeds in establishing clear links between the NTT Group's overall CSR vision and its CSR strategies and activities. The NTT Group is involved in a diversity of CSR activities, but the president in his message gives clear focus to this diversity by positioning the NTT Group as a Value Partner to its stakeholders and defining the basis of the Group's CSR as being "to contribute to the resolution of social issues through leveraging ICT".

The report presents a wide range of examples of the Group's best practices with respect to each of its four chosen CSR goals. I was particularly impressed this time by the sections related to disaster mitigation. The Great East Japan Earthquake served to raise public awareness of the importance of preparing for disasters, and people are more concerned than ever now about the possible occurrence of large-scale disasters such as further powerful earthquakes or a Mount Fuji eruption. More localized events such as tornadoes or flooding and landslides caused by heavy rainfall have also caused extensive damage in recent years. Telecommunications infrastructure can make all the difference between life and death when disasters strike. The talk between the field managers impressed me for the way it communicated the sense of urgency and mission of NTT Group personnel out in the field with regard to disaster countermeasures, technological development, and infrastructure restoration and maintenance.

Where environmental initiatives are concerned, I asked last year for more focus on energy-efficient data centers and other equipment and buildings, deployment of renewable energy sources, conservation of biodiversity and other initiatives, and this year's report presents details of the Group's efforts as requested. The one thing that disappointed me was that despite all its efforts to reduce CO_2 emissions, the NTT Group's emissions have risen rapidly since fiscal 2012. I would also like to have seen more emphasis on the Group's extensive efforts to recycle telephone directories, communications equipment and other resources, since this is an indispensable aspect of building a sustainable society, even if such initiatives are less eye-catching than energy-saving innovations. The report introduces a number of interesting topics on the conservation of biodiversity such as the raising of honeybees, but one area in which Japanese

companies lag behind those of other countries is the conservation of marine ecosystems. The report includes a story on the laying of submarine cables in relation to environmental conservation, but Japan is an island nation of fish lovers, and so I hope the NTT Group will consider implementing more CSR activities related to the conservation of marine resources and ecosystems.

Where human resources are concerned, Japan's Prime Minister Shinzo Abe has called for the wider utilization of women, and diversity is currently a hot topic. ICT is an important tool for enabling a variety of work styles. I hope to see the NTT Group doing more in its role as a global ICT leader to promote diversity in its workforce, focusing not only on women, but also on elderly people, foreigners and people with disabilities.

Since this year's report focuses on leveraging ICT to resolve social issues, it features a great many topics on the utilization of ICT in business, services and technologies, but what about the negative impacts of ICT? Social network-mediated crime and Internet addiction among younger generations have become increasingly serious social issues. In my own immediate surroundings too, I can't help feeling that the thought processes of older generations who have had to familiarize themselves with the digital world in adult life differ from those of young people who have grown up with the Internet from the day they were born. I would therefore like to see the NTT Group shed light on research into the adverse impacts of ICT on the emotional lives of young people and ways of addressing those impacts.

Lastly, I would like to see the NTT Group wielding the influence of its immense purchasing power wisely. I imagine that the Group procures and purchases huge quantities of equipment, materials, buildings and other facilities as well as services such as data entry. It has vowed in this report to provide services that resolve social issues in its role as a Value Partner to its customers. It reports in detail on this, the conspicuous side of its corporate social responsibility, but other behind-the-scenes stakeholders, namely its suppliers, are equally important from the CSR perspective, and so I look forward to seeing it also present concrete details about its efforts with respect to these stakeholders too. The NTT Group is one of the leading lights of Japanese industry, and the way it greens its supply chain has the potential to change society.

Our response

Ms. Kawaguchi praised this year's report for the way that it "succeeds in establishing clear links between the NTT Group's overall CSR vision and its CSR strategies and activities". We also take particular pride in Ms. Kawaguchi's comment that the report "communicated the sense of urgency and mission of NTT Group personnel out in the field" with respect to our efforts to beef up our disaster mitigation and response measures in the wake of the Great East Japan Earthquake.

However, as she did last year too, Ms. Kawaguchi again expressed the view that while we are contributing to the resolution of social issues through leveraging ICT, we need to do more in the way of addressing the "negative impacts of ICT", particularly with respect to young people. She also wrote that she hoped to see us focus more attention on initiatives targeting the supply chain that enables us to offer services that help resolve social issues, and on initiatives to promote diversity. We much appreciate these and other valuable opinions proffered by Ms. Kawaguchi, and we will put even greater priority on our efforts in these areas as we implement the NTT Group's CSR policies.

To create a safe, secure and prosperous society through communications as pledged in our NTT Group CSR Charter, we intend to focus not only on leveraging ICT to enhance convenience, but also on reducing the negative impacts of ICT on younger generations. In addition to further beefing up initiatives already been implemented nationwide by group companies to educate children in the safe and secure use of ICT, and focusing even more resources on the development and provision of services for protecting young people from cyber crime and other threats, we will hold continuing discussions on how to reduce negative impacts, and apply our findings to our initiatives moving forward. We also consider our supply chain to be an important issue, and are currently holding groupwide discussions on how to strengthen our CSR initiatives with respect to procurement with the aim of enhancing transparency moving forward. Where diversity is concerned, group companies are implementing various measures, including plans to double the number of female managers and equip workplaces with crèches, and we are also holding fresh discussions on ways of further driving diversity across the whole Group.
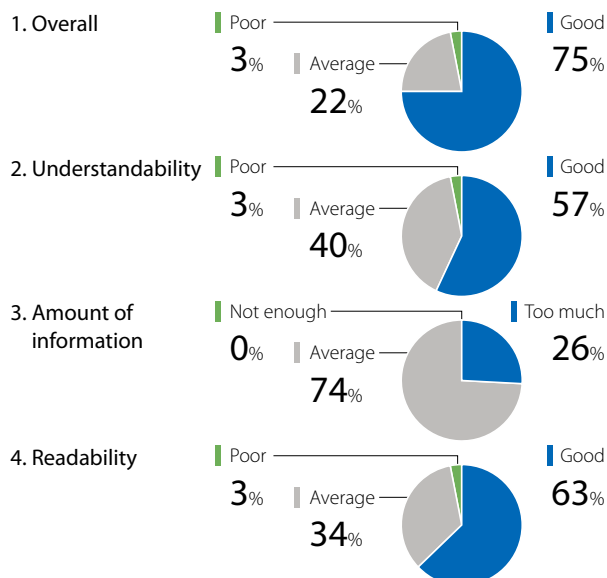
We will continue to make earnest efforts to fulfill our social responsibility and contribute to the sustainable growth of society by serving as a "Value Partner" that earns the trust of its stakeholders.

CSR Promotion Office
NIPPON TELEGRAPH AND TELEPHONE CORPORATION

Reader feedback

Results of NTT Group CSR Report 2012 questionnaire survey

We would like to thank all those throughout the world who responded to our questionnaire both by post or fax, and via our website. We will make use of your valuable opinions in the planning of future CSR activities and reports.

1. Overall
Poor 3% | Average 22% | Good 75%

2. Understandability
Poor 3% | Average 40% | Good 57%

3. Amount of information
Not enough 0% | Average 74% | Too much 26%

4. Readability
Poor 3% | Average 34% | Good 63%

▌ Reader feedback

- Raising the level of education it provides is the best thing that a country can do to increase its wealth, and is something that also brings significant benefits to the whole world, and so I'd like to see such initiatives succeed. In Japan, not only is the population aging rapidly, but doctors are becoming increasingly concentrated in the cities, and so any initiatives that benefit healthcare in the regions are of tremendous importance to society. I think that the pursuit of such initiatives is the mark of a global enterprise.

- I think that checking remotely on the well-being of elderly people who are living on their own by monitoring for sudden changes in electricity consumption rather than using more invasive methods is a good idea, but I couldn't help wondering whether such monitoring would detect sudden changes in an elderly person's condition soon enough.
  I agree with the idea of switching to more efficient power supply systems.

- I was able to gain an idea of the Priority Activities and an outline of concrete initiatives being carried out, but I felt that the report didn't go far enough in examining the extent to which targets had been met (evaluation of results), pinpointing of problems and explaining what you intend to do to resolve them.

- The more serious a disaster, the more urgently people need information, and so the more they tend to depend on telecommunications. As such, I was much impressed by your efforts to implement various disaster-related measures and develop new technologies. However, ensuring that these measures and new technologies are effective when disaster strikes depends not only on NTT's management of operations, but also on the awareness and knowledge of users. In this respect, NTT could perhaps do even more than it is already at the grassroots level to make sure that users know more about its services before disaster strikes. I feel that targeting different categories such as schools, local communities, households and businesses with information on disaster measures could be very effective.

- A lot of evacuees living in temporary housing have been cut off from wider society. The same goes for elderly people living in depopulated areas. I would like to see NTT create the mechanisms for delivering information to such people.

Contact information

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http://www.ntt.co.jp/csr_e/

Detailed information pertaining to NTT Group CSR activities can be accessed via our website.
We are grateful for any comments or suggestions that we receive through the website.