

Your Value Partner

CORPORATE PROFILE 2020



Message from the CEO

NTT CORPORATE PROFILE 2020

- 2 Message from the CEO
- 3 NTT Group's Response to the COVID-19 Pandemic
- 5 About NTT Group
- 7 Value Creation Process
- 9 Medium-Term Management Strategy NTT Group: Contributing to the Realization of a Smart World
 - 9 Promote the B2B2X Model
 - 10 Roll Out 5th-Generation Wireless Systems
 - 10 Enhance Competitiveness in Global Business
 - 11 Research and Development
 - 18 New Business and Regional Revitalization Initiatives

19 Initiatives Aimed at Promoting ESG Management

21 Operations in Review

- 21 Mobile Communications Business
- 23 Regional Communications Business
- 25 Long Distance and International Communications Business
- 26 Data Communications Business
- 27 Other Businesses

29 Corporate Data



To resolve social issues through its business operations, NTT Group works together with its partners as "Your Value Partner."

I express my heartfelt sympathy to those who have been infected with COVID-19 and those who have been affected by the spread of the infection. Additionally, with the number of COVID-19 infections increasing, I express our sincere hope that the global spread of this disease will be brought under control as soon as possible. NTT Group is making every effort not only to secure the health and safety of all affected parties, including customers, partners, and employees, but also to ensure that our customers, both in Japan and overseas, are able to use our services without interruption at all times.

NTT Group continues to promote its medium-term management strategy "Your Value Partner 2025," which was announced in 2018. Under this strategy, the Group is striving to solve social issues.

To promote the B2B2X model, in addition to promoting alliances with Toyota Motor Corporation, Mitsubishi Corporation, Microsoft Corporation, and other companies, we are advancing the development of smart cities in locations including the city of Austin, Texas and the University of California, Berkeley. We plan to build out our 5G coverage to 500 cities, including all government-designated cities, by the end of FY2020. In the global business, we will promote structural reforms by shifting to high value-added services and other measures to strengthen our competitiveness. We will promote the activities of the IOWN Global Forum as part of the globalization of research and development. As for new businesses, we will promote our location business initiatives and support agriculture and e-Sports as a way to contribute to the revitalization of local communities and economies.

Finally, I would like to discuss ESG. In the area of environment, we have set a target to achieve zero environmental impact by increasing our own use of renewable energy to 30% or more by FY2030, and we will contribute to reducing the environmental impact of our customers, companies, and society through the Space Environment and Energy Laboratories, which was established in July 2020. In addition, in the area of society, we are working toward our goal of increasing the ratio of female managers to at least 10% by FY2025, and preparing disaster countermeasures for the flood season. In terms of governance, after the 35th Annual General Meeting of Shareholders, the ratio of independent outside directors was raised to 50%. Furthermore, by adopting an executive officer system, we will improve management agility.

As the NTT Group accelerates our transformation as "Your Value Partner," we will always act as your valued and trusted partner so that we can help solve social challenges for people, clients and communities. I sincerely appreciate your continued support and long-term relationship with us.



Jun Sawada President and Chief Executive Officer, Member of the Board

NTT Group's Response to the COVID-19 Pandemic

In response to the global COVID-19 pandemic, in addition to ensuring the health and safety of all stakeholders, including customers, partners, and employees, we have endeavored to ensure stable availability of information and communication services, as they are crucial for people's lives and corporate activity.

Ensuring Stable Provision of Telecommunication Services as a Designated Public Institution

NTT and its major subsidiaries operating in the telecommunications business have established business plans designed to help prevent the spread of COVID-19 in the interest of fulfilling their responsibilities as designated public institutions and protecting human life.

Data Traffic Volume

The outbreak of COVID-19 has driven up Internet usage and demand for teleworking, leading to a spike in data traffic (telecommunications load) largely on landline communications, and weekday daytime traffic in particular. NTT Group companies typically design their networks to accommodate peak traffic volumes, and at present they are able to ensure sufficient capacity across the network. We will continue to expand facilities as may be required to provide stable communication services.

Telecommunications Network Operation

We will continue to provide network operation, monitoring, and troubleshooting 24 hours a day, 365 days a year as usual. We will also continue to provide line installation work and repairs upon customer request and we will take ample care to ensure safety while providing such services.

Customer Service

While truncating business hours and limiting reception services at our customer service branches as well as running our call centers with reduced staff, we will maintain efforts to provide stable telecommunication service by encouraging the use of our online customer services to handle procedures as well as providing remote consultations using ICT tools to keep our customers' telecom lines up and running and provide the services required to maintain business operations.

Customer Support Initiatives

Billing

In March 2020, NTT Group companies extended payment deadlines upon requests from customers facing difficulty paying service fees by the normal deadline.

In addition, given the constricted ability to use *d POINTs* due to shelter-in-place policies, NTT DOCOMO has re-awarded *d POINTs* that expired during March (or thereabouts), essentially extending the expiration date.

Support for Teleworking and Online Schooling

In light of schools' use of remote learning and online schooling, in April 2020, NTT DOCOMO and NTT Communications have partially waived data communications fees to customers under the age of 25 to support smartphone-based online learning.

In addition, as part of its support for teleworking, education, and health, NTT Group companies are deploying a variety of measures such as opening consultation desks and providing certain services free of charge. In conjunction with these measures, we have been using mobile handset data to analyze how populations have changed as a result of government response to COVID-19, and we provide that analysis to central and local governments as well as the media.



In the post-COVID-19 era, there may be dramatic changes in the way people conduct their daily lives and in corporate activities. NTT Group aims to solve social issues in this era by helping to establish new social systems that use digital technologies and through other innovations such as technology development.

Also, there has been a rapid increase in working from home, remote healthcare, remote education, and other measures that look to ensure social distancing. NTT Group will accelerate provision of services that promote a remote-type society and will drive the advancement of technologies such as authentication control technology. By introducing digital technology and Al into work that relies on manpower, such as agriculture, manufacturing, and construction, we aim to expand smart operations and contribute to solving the social issue of labor shortages. In addition, by building connected value chains in various fields, such as logistics, we will work to make industry more efficient, leading to optimizing the movement of people and things and the provision of energy.

NTT Group will contribute to the realization of a smart society along with our partners all over the world by leading innovation, such as the development of technology that looks toward a data-driven society which may be possible in the post-infection period.

New Services for Realization of Remote World

Online work space NeWork

(Available from NTT Communications free of charge*1 since August 2020)

Provides a virtual office environment, complete with light-hearted chit-chat-like banter features



Business chat ELGANA

(Available from NTT Neomeit since April 2020) Upgraded corporate security features such as prevention of unauthorized usage

AceReal for docomo
 (Available from NTT DOCOMO since June 2020)
 Solution service to support work and 3D design collaboration in remote
 environments





Smart local government platform NaNaTsu

(Available from NTT Data on a trial basis*² since August 2020) Automation of tasks commonly performed by local governments (revenue and expenditure management, etc.) with shared-use RPA / AI-OCR

Window Talk

(Scheduled for commercialization by NTT Group companies during 2020)

Enables discussion through closed windows of vehicles or buildings just as if there were no windows

Use of Smart City Solutions

(Provided to the City of Las Vegas by NTT, Inc. since August 2020) Uses analysis of camera images to warn of or predict crowding; uses sensors to detect people with high body temperatures

Interactive robot *Jibo*

(English version available on a paid-for trial basis from NTT Disruption since March 2020)

Support for business communication in hospitals, remote medical care, welfare,and public spheres using Al.



*1 We plan to add features gradually, and offer a high-spec version on a for-pay basis *2 We plan to offer the service for commercial use starting in October 2020

Who we are

NTT Group is a leading company in the telecommunications business. We operate in a wide range of domestic and overseas markets by utilizing the customer base and expertise in communication networks and ICT that we have cultivated over our history.

What we do

As "Your Value Partner", we aim to work together with our partners to solve social issues through our business activities. We work to make the world a place where all people can enjoy the benefits of ICT so that they may be able to live and work more comfortably and happily.

Financial Highlights (IFRS)			Billions of yen
	FY2017	FY2018	FY2019
Operating revenues	11,782.1	11,879.8	11,899.4
Operating profit	1,641.1	1,693.8	1,562.2
Profit attributable to NTT	897.9	854.6	855.3
Total assets	21,541.4	22,295.1	23,014.1
NTT shareholders' equity*1	9,050.4	9,264.9	9,061.1
Earnings per share (EPS) (yen)*2*3	224.93	220.13	231.21
Book-value per share (BPS) (yen)*2*3	2,295.79	2,416.01	2,492.60
Ratio of profit attributable to NTT (ROE) (%)	10.2%	9.3%	9.3%
Cash flows from operating activities*4*5	2,773.2	2,397.9	2,602.5
Cash flows from investing activities	(1,746.2)	(1,774.1)	(1,852.7)
Free cash flows*4 (Cash flows from operating activities - Cash flows from investing activities)	1,027.0	623.8	749.8
Cash flows from financing activities*5	(968.3)	(584.3)	(872.3)

*1 NTT shareholders' equity does not include the portion attributable to non-controlling interests.

*2 EPS is calculated based on the average number of shares outstanding during the fiscal year, excluding treasury stock, and BPS is calculated based on the number of shares outstanding at the end of the fiscal year, excluding treasury stock.

*3 NTT conducted a two-for-one stock split of its common stock with an effective date of January 1, 2020. The figures reflect the impact of this stock split.

 $\star4$ Amount excluding the impact of the last day of the previous fiscal years having been a non-business day

*5 Excludes the impact on cash flows from operating and financing activities caused by the adoption of IFRS 16 (Leases)



Nippon Telegraph and **Telephone Corporation** (Holding Company)

Main Businesses

Formulate management strategies for NTT Group and promote basic research and development

Mobile (Communications Busine	SS		Operating Revenues* (FY2019)	Operating Profit* (FY2019)
Business Activities	Mobile communications business, sn etc.	nart life business,	Main Company	¥ 11,899.4 billion	¥ 1,562.2 billion
Major Services	Mobile phone services, "d market" ser movie and music distribution and e-b finance and payment services	vices such as ook services, and			
Competitive Advantages	 A stable communication network the comfortably anytime, anywhere Top-notch research and development Large market share and stable custor 	at can be used nt capabilities omer base			
Regiona	Communications Busi	ness		33.7 % (¥4,651.3 billion)	
Business Activities	Regional telecommunications operations related businesses, etc.	ons in Japan and	Main Companies		
Major Services	FTTH and other services		Telephone East		54.5%
Competitive Advantages	 Secure, highly reliable, stable comm Provision of and support for ICT solustrong local ties 	unication network utions with	Corporation Nippon Telegraph and Telephone West		(¥854.7 billion)
Long Dis Business Activities Major Services Competitive	 istance and International Communications operations in Japan, international telecommunications business, solutions business, and related businesses es Cloud services, data center services, migration support services, and other services Comprehensive solutions from 		tions Business Main Companies NTT Ltd. (Global Operating Company) NTT Communications Corporation (Japan Operating	22.3 % (¥3,079.9 billion)	
Advantages	application to 11 infrastructureGlobal coverageStrong customer engagement	Main businesses Governance, strategy planning, and policy promotion for the global business of NTT Group	Company)		
Data Co	nmunications Business			16.0%	
Business Activities	Network system services, system intering in Japan and overseas	egration, etc.,	Main Company NTT DATA	(,,	24.8 % (¥388.3 billion)
Major Services	ERP services, ICT outsourcing, and ot	ner services CORPORATION			
Competitive Advantages	High-level technology development a management capabilities	and project			
	 Large market share and stable customer base in Japan Powerful service delivery capabilities using development bases in EMEA and in Central and South America 			16.4 % (¥2,266.8 billion)	6.6 % (¥103.6 billion)
Other Bu	isinesses				8.3%
Business Activities	Real estate, finance, construction /		Main Companies	11.6%	(¥130.9 billion)
	advanced technology development, e	tc.	Inc. NTT Anode Energy	(¥1,601.7 billion)	5.8 % (¥90.9 billion)

Mobile C	communications Busine	SS		Operating Revenues* (FY2019)	Operating Profit* (FY2019)
Business Activities	Mobile communications business, sr etc.	nart life business,	Main Company	¥ 11,899.4 billion	¥ 1,562.2
Major Services	Mobile phone services, "d market" ser movie and music distribution and e-b finance and payment services	vices such as ook services, and			
Competitive Advantages	 A stable communication network th comfortably anytime, anywhere Top-notch research and developme Large market share and stable custored 	at can be used nt capabilities omer base			
Regional	Communications Busi	ness		33.7 % (¥4,651.3 billion)	
Business Activities	Regional telecommunications operat related businesses, etc.	ions in Japan and	Main Companies Nippon Telegraph and		
Major Services	FTTH and other services		Telephone East		54.5%
Competitive Advantages	 Secure, highly reliable, stable communication network Provision of and support for ICT solutions with strong local ties 		Corporation Nippon Telegraph and Telephone West Corporation		(¥854.7 billion)
Long DIS Business Activities Major Services Competitive Advantages	 stance and International Communical Long-distance telecommunications operations in Japan, international telecommunications business, solutions business, and related businesses Cloud services, data center services, migration support services, and other services Comprehensive solutions from application to U information to U. 		Main Companies NTT Ltd. (Global Operating Company) NTT Communications Corporation (Japan Operating	22.3% (¥3,079.9 billion)	
	Global coverage Strong customer engagement	Governance, strategy planning, and policy promotion for the global business of NTT Group	Company)		
Data Cor	nmunications Business			16.0% (¥2,205.8 billion)	04.0
Business Activities	Network system services, system int in Japan and overseas	egration, etc.,	Main Company NTT DATA		24.8 % (¥388.3 billion)
Major Services	ERP services, ICT outsourcing, and o	ther services	CORPORATION		
Competitive Advantages	• High-level technology development management capabilities				
 Large market share and stable customer base in Japan Powerful service delivery capabilities using development bases in EMEA and in Central and South America 			16.4 % (¥2,266.8 billion)	6.6 % (¥103.6 billion)	
Other Bu	isinesses				8.3%
Business Activities	Real estate, finance, construction / electric power, system development, advanced technology development, e	tc.	Main Companies NTT Urban Solutions, Inc.	11.6 % (¥1,601.7 billion)	(¥130.9 billion) 5.8 % (¥00.9 billion)

Corporation

Mobile (Communications Rusing			Operating Revenues*	Operating Profit*
Business	Mobile communications business, sn	art life business,	Main Company	¥11,899.4	¥1,562.2
Activities	etc.		NTT DOCOMO, INC.	billion	billion
Major Services	Mobile phone services, "d market" ser movie and music distribution and e-b finance and payment services	vices such as ook services, and			
Competitive Advantages	 A stable communication network the comfortably anytime, anywhere Top-notch research and development Large market share and stable custor 	at can be used nt capabilities omer base			
Regiona	I Communications Busi	ness		33.7 % (¥4,651.3 billion)	
Business Activities	Regional telecommunications operations related businesses, etc.	ions in Japan and	Main Companies		
Major Services	FTTH and other services		Telephone East		54 5%
Competitive Advantages	 Secure, highly reliable, stable comm Provision of and support for ICT solis strong local ties I are market share and stable custor 	unication network utions with	Corporation Nippon Telegraph and Telephone West Corporation		(¥854.7 billion)
Long Dis Business Activities Major Services Competitive Advantages	 stance and International Communications operations in Japan, international telecommunications business, solutions business, and related businesses cloud services, data center services, migration support services, and other services Comprehensive solutions from application to 12 infortation to 12 infortation to 12 infortation 		tions Business Main Companies NTT Ltd. (Global Operating Company) NTT Communications Corporation (Japan Operating	22.3 % (¥3,079.9 billion)	
	Global coverage Strong customer engagement	Governance, strategy planning, and policy promotion for the global business of NTT Group	Company)		
Data Cor	mmunications Business			16.0 % (¥2,205.8 billion)	24.00
Business Activities	Network system services, system interint and overseas	egration, etc.,	Main Company NTT DATA		(¥388.3 billion)
Major Services	s ERP services, ICT outsourcing, and other services		CORPORATION		
Competitive Advantages	 High-level technology development and project management capabilities 				
	 Large market share and stable customer base in Japan Powerful service delivery capabilities using development bases in EMEA and in Central and South America 			16.4 % (¥2,266.8 billion)	6.6 % (¥103.6 billion)
Other Bu	Isinesses				8.3%
Business Activities	 Real estate, finance, construction / electric power, system development, advanced technology development, etc. 		Main Companies NTT Urban Solutions, Inc.	11.6 % (¥1,601.7 billion)	(¥130.9 billion) 5.8% (¥00.9 billion)

siness tivities	Network system services, system integration, etc., in Japan and overseas
ajor Services	ERP services, ICT outsourcing, and other services
mpetitive Ivantages	 High-level technology development and project management capabilities Large market share and stable customer base in Japan Powerful service delivery capabilities using development bases in EMEA and in Central and South America

usiness ctivities	Real estate, finance, construction / electric power, system development, advanced technology development, etc.

* The percentage of each segment's simple total (including inter-segment transactions)

Value Creation Process

-A Cycle of Sustainable Corporate Value Enhancement -

The Company's attributes include a solid customer base in Japan and overseas, global brand power, human resource capabilities, and world-class research and development capabilities. We will leverage these to sustainably increase our corporate value in a manner unique to NTT through digital transformation together with our partners.

Input

Management Resources, Expertise

R&D Capabilities

Human Resources

Brand Image

ICT Infrastructure

Financial Base

Customer Base





Enhancement of

Management Resources

Collaboration with Various Partners

Social Issue Resolution

through Business Operation

Accelerate Our Own **Digital Transformations**

Contribute to

Realization of Smart World / Society 5.0

Promote ESG Management, and Enhance the Returns of Shareholders to Improve **Corporate Value**

a Public Utility and a Private Company

As

Outcome



Financial Targets

EPS Growth +50% (Approximately ¥320 per share)

> **Overseas Sales / Overseas Operating Profit Margin***¹

\$25 billion / 7%

Cost Reductions (in fixed-line / mobile access networks)

at least ¥800 billion

ROIC Return on invested capital

8%

Capex to Sales

(Domestic Network Business)*2 Capital expenditure to sales ratio

13.5% or less

 The target year for EPS growth, overseas sales / overseas operating profit margin, cost reductions, and ROIC is the fiscal year ending March 31, 2024 (regarding EPS growth* and cost reductions; the targets are compared with the fiscal year ended March 31, 2018).

The target year for capex to sales is the fiscal year ending March 31, 2022.

*1 Including results from the global holding company, its subsidiaries and its affiliates. Operating profit excludes temporary expenses, such as M&A-related depreciation costs of intangible fixed assets.

*2 Excludes NTT Communications' data centers and certain other assets.

*3 Excludes the effects of the arbitration award received from Tata Sons Limited.

Medium-Term Management Strategy

NTT Group: Contributing to the Realization of a Smart World

Promote the B2B2X Model

NTT Group will accelerate the B2B2X model and provide value to end users (X) by supporting the digital transformation of the "Center B," a service provider in various fields, while leveraging digitization of information, IoT, AI, and other social and technological trends. As of June a year earlier, representing smooth progress toward our target of taking part in 100 projects by the fiscal year ending March 31, 2022.

- NTT's B2B2X models are divided into four categories in line with the following objectives:
- Evolution of industrial value chains
- Invigoration of local economies and improvement of public safety and other city functions through the realization of smart cities
- Enhancement of customer contact point platforms (evolution of customer responses with regard to distribution, services, financing, etc.)
- Development of mobile and cross-data platforms (enhancement of services and creation of businesses by combining mobile data with companies' data)

In order to further advance the B2B2X model, we have established the B2B2X Strategy Committee to formulate strategies, manage targets, and promote the business of NTT Group. Under this committee, we aim to increase the number of projects by promoting collaboration among the Group companies. For the foreseeable future, the Group will focus on developing new products. At the same time, however, we intend to improve profit margins by evolving digital technologies and increasing the economic feasibility of the scale and scope of digital data utilization.



Evolve into B2B2X model using digital services and data management



Roll Out 5th-Generation Wireless Systems

Infrastructure for the commercial 5G services launched in March 2020 had been installed in 92 cities across Japan as of June 30, 2020. NTT will expand upon this infrastructure going forward, working to install infrastructure in 500 cities, including all ordinancedesignated cities in Japan, by March 2021, and then to build 20,000 base stations throughout Japan by March 2022. Through the installation of this infrastructure, we will spread use of 5G, a new transmission frequency that can offer high-5G Area Construction speed, high-capacity communications. One characteristic of 5G services is their low latency. We aim to achieve this low latency by employing multi-access edge computing (MEC) and other technologies for reducing latency throughout network structures, including wired portions. NTT also intends to utilize network slicing 10,000 technologies that can flexibly supply low latency and other 5G benefits on an individual application and service basis.



Major 5G Initiatives in Fiscal 2020

- Development of the world's first real-time live video distribution cloud system compatible with 360-degree 8K virtual reality, 8K wide, and multi-angle viewing to provide new video viewing experiences for the 5G era (February 2020)
- ► Announcement of launch of 22 solutions as a co-creative initiative through the DOCOMO 5G Open Partner Program - Commencement of provision of comprehensive manufacturing equipment analysis solution for supporting productivity improvements and automation in equipment failure prediction and image inspection (June 2020) - Launch of remote work support solution offering real-time support to workplaces from offices via augmented reality smart glass (July 2020)
- ▶ Release of a new function for 5G-compatible smartphones that allows multiple channels to be viewed at once through the TV services of NTT DOCOMO (June 2020)
- ► Japan's first virtual communication experience event using 5G technologies and Magic Leap 1 wearable devices held at special event site in front of Takanawa Gateway Station (July 2020)
- > Start of verification test of Japan's first commercial 5G-powered system for supporting remote surgeries performed by specialists while viewing high-definition video of surgeries (July 2020)

Enhance Competitiveness in Global Business

NTT Group's growth strategies for enhancing competitiveness in its global business entail leveraging the strength of its capacity for one-stop supply of everything spanning from solutions to communications infrastructure to provide comprehensive solutions for supporting the evolution of customer businesses and to promote innovation with cutting-edge technologies. The Group is also building platforms for concerted efforts as a united "One NTT." For example, operations are being integrated into the global operating company, NTT Ltd. and its structures are being reformed to grow sales through the supply of high-value-added, high-margin services. Specifically, we are promoting sales of remote solutions in preparation for the period after the global COVID-19 pandemic and strengthening our hybrid cloud-related capabilities through partnership with Microsoft Corporation.



Research and Development

NTT Group aims to contribute to the resolution of social issues by helping drive the shift from electronics to photonics

IOWN

Di line I

114

NTT R&D is envisaging the arrival of new smart societies that are not yet possible with today's internet, with features such as mobility as a service (MaaS) for extreme failsafe systems and entertainment services offering deep immersion. To realize such smart societies, we will require innovation that cannot be achieved merely by extending the trajectory of current technologies; we will need to realize ultralow power consumption, high-speed signal processing, and the fusion of virtual worlds that can equal or surpass reality with sophisticated prediction technologies. NTT Group has proposed the "Innovative Optical and Wireless Network" (IOWN) concept to realize new smart societies, and we are making a committed effort to realize this concept.



NTT Group aims to solve social issues by aiding the shift from electronics into the world of photonics. Digital twin computing is a significant advance in existing digital twin technology. By performing calculations such as conversions, combinations, and replications for various digital twins representing things and people in the real world, and having those digital twins interact, this new paradigm allows for free interactions between people and things to be recreated and tested. This can be used to build virtual societies at a level of precision that has never been achieved before, enabling us to run predictions and testing on large-scale, highly accurate futures, and to provide high-level communications offering new value. The technology is expected to solve various social problems around the world and lead to the creation of innovative new services.

IOWN is set to change our world in new and exciting ways.

NTT has released a concrete technology roadmap for the development of its "Innovative Optical and Wireless Network" (IOWN) concept, and research and development are moving forward based on this roadmap. Starting in 2021, NTT will establish reference models for key IOWN constitute technologies, promote these to the IOWN Global Forum, accelerate examinations, and develop specifications. Specifically, four technological directions have been defined in the IOWN Global Forum whitepaper-full-stack communication acceleration; data-centric communication and computing; computing scaling across device, edge, and center cloud; and sustainable growth with energy efficiency. R&D projects are being advanced in accordance with these themes.



What's IOWN?

technology components: "allphotonics network" that uses optical processing on not only networks but also device processing; "digital twin computing" that enables high-speed, realtime interaction between things and people in cyberspace; and Cognitive Foundation[®], in which these and various other ICT resources are efficiently managed.

The all-photonics network incorporates new optical technologies at every level, from networks to devices, and even inside chips, to enable ultralow power consumption, ultrahigh speed processing that has not been possible until now.

By allocating different wavelengths to different functions in a single optical fiber, it becomes possible to provide multiple functions that support social infrastructure without mutual interference, including information communication functions such as internet and sensing functions





IOWN Global Forum, Inc., which was established together with Intel Corporation of the United States and Sony Corporation of Japan in January 2020, released a white paper describing four technological directions in April 2020. We have since commenced technological evaluations of these directions. As of September 10, 2020, the IOWN Global Forum, which is operated by IOWN Global Forum, Inc., had 29 member companies, including its three founders and 26 other companies from Japan and overseas. The first meeting of members of this forum was held in the form of an online conference in September. This meeting served as an opportunity for member companies from around the world to engage with each other

Going forward, NTT will continue to work with partners from various industries and regions with the aim of quickly making the IOWN concept a reality.

and discuss use cases and technologies in working groups.

11 | NIPPON TELEGRAPH AND TELEPHONE CORPORATION











Research and Development for Realizing the IOWN Concept

4D Digital Platform[™] Integrates Various Sensing Data in Real-Time and Enabling Future Predictions

In recent years, the remarkable advancement in IT technology enables the collection of large volume of IoT data and their analysis. Accordingly, the government of Japan as well as various companies are moving ahead with research and development for creating systems that merge cyber and physical spaces in a sophisticated manner, as advocated in the government's Society 5.0 vision. However, in the linkage of sets of statistical data or the matching of misaligned position and time data, there are cases in which the accuracy of future predictions cannot be heightened.

Our proposed 4D digital platform would resolve this by making it possible to precisely integrate position and time information from sensing data while also providing latitude, longitude, height and time data useful in future predictions.

By applying this platform to various industries, we could contribute to the resolution of social issues and the creation of value. The 4D digital platform[™] integrates sensing data with highly precise position and time information in real-time into the Advanced Geospatial Information Database, jointly developed with ZENRIN Co., Ltd. to perform high-speed analyses and the construction of future prediction.

91016318

- (1) Development of the Advanced Geospatial Information Database as a control point for sensing data
- (2) Real-time sensing data collection with highly accurate position and time information
- (3) High-speed processing of large-volume data and future predictions with various simulations

By combining with various IoT data and industry platforms, it can offer various values such as increasing smoothness of road traffic flow, improving ease of use of urban assets, and enabling cooperative maintenance of social infrastructures.

As a cross-industry platform supporting people's lives, and as the one of the key elements of Digital Twin Computing, a part of NTT's IOWN initiative, we intend to leverage NTT R&D and NTT Group technologies and assets toward sequential commercialization beginning in FY2021, with future expansion through ongoing R&D efforts.

Conceptual Diagram of 4D Digital Platform Cross-industry platform for precise sensing data integration and future prediction For various industries 4D digital platform Advanced Geospatial Information Database (2) Real-time sensing data collection with highly accurate position and (1) Development of Advanced Geospatial tion Database as a contro point for 4D digital platfor Sensing data Existing map data Rich Mobility 2D map semantic (Mobile Mapping System ensina

Demonstration of All-Optical Switching toward Photonic Integrated Circuits for Ultrafast Information Processing

NTT and the Tokyo Institute of Technology have developed an ultrafast all-optical switching operation with the lowest energy consumption ever reported for all-optical switching at less than one picosecond (one trillionth of a second). Previously, it was reported that all-optical switches would have difficulty operating at such a high speed with low energy consumption. The current achievement combines an ultrasmall optical waveguide with a height and width of a few dozen nanometers called a plasmonic waveguide, with graphene, a material that shows great promise for nonlinear optics. Such ultrahigh switching speed cannot be achieved by electrical control. It is expected that this switch will be used in future photonic integrated circuits for ultrafast information processing. In addition, this development shows a promising possibility for applications of plasmonics.



NTT, the University of Tokyo, RIKEN and NTT East have demonstrated experiments of ultra-high precision optical frequency transfer among multiple offices using a commercial optical fiber network over 200 km. This result shows that the optical frequency of optical lattice clock, which is one of the most accurate atomic clocks in the world invented by Professor Hidetoshi Katori of the University of Tokyo, can be distributed in the range of 200 km.

The technical point of this result is an optical frequency repeater that incorporates a guartz-based planar lightwave circuit (PLC). The optical frequency transmitted through the fiber suffers various noises due to temperature changes and vibrations. The repeater reproduces the received light and sends a part of the light to the previous office, where the returned light is used to detect and compensate the fiber noise. We have developed ultra-low noise optical interferometers manufactured on a small PLC chip, which can realize fiber transmission with minimal deterioration. In the future, we are planning to develop a new infrastructure such as "elevation difference measurement using relativistic effect (relativistic geodesy)" using the ultra-high accuracy of optical lattice clocks.

Long-Distance Transmission of 1 Tbit/s Ultra-High-Capacity Optical Signal

NTT and NTT Communications have successfully demonstrated long-distance transmission of a 1 Tbit/s optical signal in a commercial environment. A 1 Tbit/s optical signal using a wavelength division multiplexed technique was successfully transmitted over a world-record breaking distance of 1,122 km. This was achieved using a new large-core low-loss optical fiber cable deployed in NTT Communications' commercial environment, which reduces optical losses and non-linearity, and original NTT technologies including: (1) a precise calibration technology that compensates for imperfections in the optical transponder and enables high-quality multiorder modulation optical signals to be transmitted and received, (2) an optical transponder integrating a digital signal processor that implements the latest digital coherent technology, and high-bandwidth optical front-end circuits, and (3) transmission line design technology.

This result should lead to transmission speeds 10 times that of systems currently in use (100 Gbit/s per channel) and an 80% or greater reduction of power consumption per bit. As such, it is anticipated as a high-capacity communications network technology for the expansion of 5G services and realizing the IOWN concept in the future.





Experimental Demonstration of Ultra-High Precision Optical Frequency Transfer via 240-km-Long Telecommunications Fiber

Initiatives for Realizing a Society Characterized by Remote Interactions

27311 45633998

Highly Immersive 12K Wide Live Viewing of MLB Games Using Ultra Reality Viewing Technologies

NTT has concluded a multi-year partnership contract with Major League Baseball (MLB). Through this partnership, we are promoting the use of NTT's cutting-edge technologies for realizing next-generation baseball viewing experiences as a smart sports initiative. In October 2019, MLB and NTT conducted a verification test that used NTT's Ultra Reality Viewing technology for viewing of MLB postseason games. This was the first successful instance of highly immersive live viewing through synthesis and transmission of 12K wide video in the United States.



Real-time transmission of the game from Tropicana Field in Tampa Bay to MLB Studios in New Jersev

Verification of Network Technologies for Realizing Fully Autonomous Agricultural Equipment via Remote Monitoring through Collaboration with Hokkaido University and Iwamizawa City

In May 2020, a joint experiment agreement was formed between Hokkaido University, Iwamizawa City, SmartLinkHOKKAIDO Inc., NTT, NTT East, and NTT DOCOMO in relation to joint experiments for realizing smart agri-cities centered on smart agricultural equipment. Under this agreement, we will advance verification tests on technologies for predicting fluctuations in connection quality and automatically adjusting the network to which autonomous agricultural equipment is connected accordingly. Goals of this undertaking includes reducing the labor requirements of agricultural work by allowing agricultural machinery to be operated in an unmanned manner and helping address global food shortages.

Joint Experiment Fields

11.0

1	High-Precision Positioning	Technologies will be developed to allow for high-precision positioning even in areas in which satellite transmissions cannot
	Technology	be received directly due to reasons such as signals being reflected.
2	Next-Generation Network	Exceptionally safe, autonomous operation of agricultural equipment will be pursued through the development of technolo-
	Technology	gies for predicting the quality of connections to multiple networks and automatically changing networks accordingly.
3	Al Distforms	Al analyzes field sensors, weather information, and agricultural machinery operation information, and an Al platform auto-
	AIFIdUUIIIS	matically schedules agricultural work and makes it possible to create an optimal agricultural work plan.

Joint Research for Advancing World's First Unmanned Ship Verification Test

NTT has concluded a joint research contract with MTI Co., Ltd., a research subsidiary of Nippon Yusen Kabushiki Kaisha, for the advancement of the Designing the Future of Full Autonomous Ship Project,* the world's first verification test of unmanned ships in crowded areas of the ocean. Under this agreement, MTI will design the system concept necessary for unmanned ships and develop and explore the related technologies. Meanwhile, NTT will look into the application of its IOWN concept. In this manner, the strengths of both companies will be utilized to complete a successful verification test by the fiscal year ending March 31, 2022, to demonstrate the future potential of unmanned ships.



* A verification test project advocated by the Nippon Foundation as part of its MEGURI2040 unmanned ship project



In-Orbit Verification of Low-Orbit Satellite MIMO Technologies

In May 2020, NTT submitted a technology verification proposal in response to the No. 3 open application bid by Japan Aerospace Exploration Agency (JAXA) for verification of revolutionary satellite technologies. This proposal, which was adopted, was for the realization of communications with speeds exceeding 20 Gbps between loworbit satellites and ground facilities and ultrawide range IoT data collection. Based on this theme, NTT will conduct verification tests on the world's first low-orbit satellite multiple input, multiple output (MIMO) technology and on satellite sensing technologies. Our future plans include launching miniature verification-use satellites in the fiscal year ending March 31, 2023, and exploring and verifying essential technologies and designing and developing satellite equipment for technology verification tests leading up to the fiscal year ending March 31, 2024. In addition, we will seek to realize high-capacity commu-





nications (with speeds exceeding 20 Gbps) between low-orbit satellites and ground facilities and develop low-cost sensing technologies for use in areas across the world, including those without on-ground communications networks.

Alliance with Intel

NTT has concluded a joint research contract Intel Corporation, set to conclude in April 2023. The resulting alliance is aimed at the co-creation of technologies for the IOWN. Through this alliance, NTT and Intel will conduct research for advancing the development of technologies that can meet the massive increases in data processing capacity necessary for realizing a smart connected society.

Joint Research Fields

1	Photonics / Photoelectric Merging Technology	Development of new computing platforms using tion of optical technologies out from the conven technologies into the signal processing compon
2	High-Speed Decentralized Computing	Computing infrastructure will be developed to ful link ground, edge, and cloud systems; and efficie physical world.
3	Open Frameworks	An open software framework will be developed t evolving at an accelerated pace, through the afo

Cooperation with the ITER Organization

In May 2020, NTT concluded a comprehensive cooperation agreement with the ITER International Fusion Energy Organization (ITER Organization), which is working to be the first in the world to verify the effectiveness of fusion energy. NTT is promoting innovation through research and development and the reduction of environmental impacts through its business activities with the goal of lowering its environmental footprint to zero. As one facet of these activities, we are contributing to the plans of the ITER Organization with our IOWN and other advanced R&D projects as well as our global infrastructure development capabilities.

Specifically, we look to offer technical support for information distribution and control platforms. These platforms will be utilized for ultrahighspeed, ultralow-latency connections between the fusion reactor and control centers through all-photonic networks that use photonic (light)based technologies for everything from networks to terminals. Another application of the platforms will be fusion reactor control simulations, using digital twin computing for projecting future trends by comparing the physical world with digital models.

g photoelectric merging technology will be pursued to expand the applicational long-distance signal transmission applications and introduce these nents of processor chips coordinated with electronic circuits. ully utilize future high-capacity, low-latency communications infrastructure; ently process the massive amounts of real-time data received from the

to use AI computing devices, which are growing ever more diverse and prementioned high-speed decentralized computing infrastructure.



ITER Tokamak Machine and Plant



ITER construction site in Provence in the south of France

. . .

Alliance with NEC for Joint Research and Development and Global Rollout of ICT Products Utilizing Innovative Optical and Wireless Technologies

NTT and NEC Corporation formed a capital and business alliance in June 2020 for the purpose of joint research and development and the global rollout of ICT products utilizing innovative optical and wireless technologies. The companies aim to improve their corporate value by expanding sales of products applying jointly developed technologies. In addition, through these initiatives, the companies will contribute to the enhancement of the industrial competitiveness of Japan and to the improvement of the safety and reliability of communications infrastructure, playing leading roles in working with numerous communications equipment vendors.

To promote open architectures such as O-RAN and to give form to the IOWN concept, NTT and NEC will set up a research and development structure and focus their efforts on the following objectives.

- By developing and utilizing cutting-edge technologies, the companies will develop and sell globally a compact digital signal processing circuit-featuring both world-leading performance and low power consumption as well as quality that meets market needs and greater convenience from the customer point of view-plus optical information communications equipment incorporating this digital signal processing circuit.
- Working with global operators and communications equipment vendors, the companies will promote O-RAN Alliance specifications while developing and selling globally competitive products compliant with such O-RAN specifications. In the future, the companies aim to attain top global market shares under NEC's leadership. Moreover, the companies' development efforts will be aimed at realizing ultrahigh-speed processing, ultralow latency, and ultralow power consumption in these products at a level that has never been attained before, by applying innovative devices utilizing optical and wireless technologies to base station equipment.
- The companies will develop innovative technologies and optical and wireless devices contributing to the realization of NTT's IOWN concept. As part of the development project, the companies will seek to enable greater-capacity, higher-functionality, and lowercosting submarine cable systems; high-capacity, low-latency, and automatic and autonomous space communication; and more sophisticated technologies to ensure infrastructure network security.

Establishment of Space Environment and Energy Laboratories

The Space Environment and Energy Laboratories is a research facility established in July 2020 with the purpose of developing innovative technologies to help regenerate the global environment and realize a sustainable and inclusive society. This facility is the first NTT laboratory to have the word "space" in its name. Despite this name, however, the Space Environment and Energy Laboratories will not research space itself; rather, it will reevaluate the sun and other aspects of the space environment from earth to research means of regenerating the global environment and adapting to this environment from a dynamic perspective.

In the field of next-generation energy, the Space Environment and Energy Laboratories will research nuclear fusion together with the ITER Organization as well as space photovoltaic power generation. Meanwhile, the facility will target the creation of energy systems that improve environmental value through local consumption and production of energy in the field of energy control technologies that optimize energy distribution. As the first step of these efforts, we aim to complete development of a resilient electricity supply system based on direct current microgrid utilization within the fiscal year ending March 31, 2023. In addition, the Space Environment and Energy Laboratories is advancing a project in the field of CO2 conversion technologies, which entail absorption and fixation of CO₂ in the atmosphere. This project has the goal of commencing a verification test on technologies for improving the efficiency of the artificial photosynthesis technologies developed by NTT in the fiscal year ending March 31, 2023. This facility is also engaged in R&D projects in the field of environmental adaptation technology, which is used to respond to sudden natural disasters. Specifically, the Space Environment and Energy Laboratories is working to develop a system that uses drones and other aerial equipment to attract lightening to prevent lightening damage to communications equipment and other social infrastructure. The goal is to start a verification test in the fiscal year ending March 31, 2023.

In this manner, the Space Environment and Energy Laboratories is a research facility with a penchant for tackling ambitious research themes that have never before been imagined. Going forward, this facility will proactively collaborate with external research and other institutions through means such as joint research in a diverse range of fields.



New Business and Regional Revitalization Initiatives

New Business Initiatives

Urban Solutions Business

NTT Urban Solutions, Inc. is the sole developer of NTT Group's real estate business. The company utilizes NTT Group's telephone exchanges and other real estate while laterally drawing on the Group's real estate- and energy-related personnel and technologies. Moreover, the Group makes maximum use of its assets in a concerted effort to advance collaborative urban development projects with companies and municipal authorities. Through these initiatives, we aim to grow the sales of the urban solutions business to ¥600 billion by the fiscal year ending March 31, 2026. Urban development projects in Japan are targeting the resolution of local issues across the country in areas such as Sendai and Fukuoka. Overseas, we are developing the River Valley Project housing sales project in Melbourne, Australia as well as a housing development project in Dallas, Texas in the United States. Having generated operating revenues of ¥426.0 billion in the fiscal year ended March 31, 2020, we are making smooth progress toward the aforementioned target.

Smart Energy Business

NTT Anode Energy Corporation, NTT Group's energy business operating company, announced its medium-term vision in November 2019. Guided by this vision, the company will seek to contribute to the realization of a sustainable society through the creation of new energy distribution frameworks that complement existing alternating current networks. These frameworks will be designed to address social issues pertaining to the environment and energy, such as global warming and the need to secure emergency power sources in preparation for large-scale natural disasters. Specifically, NTT Anode Energy will develop five businesses, including green power generation and backup power businesses, in the three fields of power generation; power transmission, distribution, and storage; and power retail and wholesale. Through these businesses, we will provide new value, such as improved energy efficiency and enhanced disaster resiliency in relation to coping with such eventualities as power blackouts during disasters.

NTT Group aims to double operating revenues from its energy-related businesses to ¥600.0 billion by the fiscal year ending March 31, 2026. This target will be pursued via smart energy business initiatives advanced through investment in NTT Group as well as through capital and business alliances with and investments in wide-ranging business partners. Operating revenues in the fiscal year ended March 31, 2019 were ¥257.0 billion, and we are making progress toward achieving the target.

Regional Revitalization

Agricultural Field

In July 2019, NTT Group established NTT AgriTechnology Corporation, the Group's first company devoted to combining agriculture and ICT. This company was created with the aim to contributing to local communities and economic invigoration through next-generation facility horticulture. To accomplish this objective, NTT AgriTechnology will produce agricultural products at its own farm using IoT and AI technologies while accumulating know-how and improving the guality of its solutions. Future endeavors by this company will include utilizing cutting-edge technologies to seek out new value and possibilities in the agricultural field in a guest to invigorate local economies and contribute to urban development.

E-Sports Field

NTTe-Sports, Inc. was established in January 2020 with the goals of promoting community building and making contributions to society and to economic invigoration through e-sports. This company develops a wide range of businesses founded on its reliable, high-quality communications networks and state-of-the-art ICT. Examples of these businesses include e-sports facility operation, support and education, platform provision, event solutions, and regional revitalization consulting. NTTe-Sports will continue its efforts to combine ICT with e-sports going forward as it seeks to create new experiences and connections along with new cultures and societies





Initiatives Aimed at Promoting ESG Management

NTT Group promotes environmental, social, and governance (ESG) management to address ESG-related issues appropriately. In doing so, we reduce downside risks while expanding upside potential and driving sustainable increases in corporate value. Thinking of our influence on society and the maintenance of our management base, we have identified five material issues and set numerical targets for each of them to guide our initiatives.



Note: Underlined numerical targets relate to the standards set out by the U.S. Sustainability Accounting Standards Board (SASB).

Reduction of downside risks Expansion of upside potential

Ongoing improvements of corporate value

• Increase the proportion of our renewable energy use to

10 times the Company's own CO₂ emissions or more

• Ratio of female managers: More than **10**% (by FY2025)





Mobile Communications Business

In the Mobile Communications Business Segment, we worked to promote sales of the new billing plans, Gigaho and Gigalight, which feature simple structures and great value, and docomo Hikari, started to provide 5G services, and collaborated with various business partners in the smart life area, in an effort to provide new value-added services.

Competitive Advantages

- A stable communication network that can be used comfortably anytime, anywhere
- ► Top-notch research and development capabilities
- ► Large market share and stable customer base



Composition by Segment for the Fiscal Year Ended March 31, 2020



Churn Rate

1.22

0.86

0.65

(Fiscal year) 2017

(%)

Number of Subscriptions by Mobile Network Operator

(Thousand subscriptions)



NTT DOCOMO KDDI SoftBank * Created by NTT based on data published by the Telecommunications Carriers Association. KDDI figures include UQ mobile subscriptions. SoftBank figures include Y!mobile subscriptions (excluding PHS)



-NTT DOCOMO - KDDI - SoftBank * Created by NTT based on published financial results of each company

107

0.76

0.57

2018

0.96

0.72

0.54

2019

Number of d POINT CLUB Members



TOPICS

- > In order to reduce customer waiting times at docomo shops, we introduced the ability to book via the Internet or by telephone, and extended the time slots during which appointments are possible. In addition, from December 2019, we unified our support approach to explain to customers who purchase a terminal at a docomo shop and wish for initial setup and data transfer, that they may receive this service free of charge
- We concluded a capital and business alliance agreement with M3, Inc., the largest domestic medical IT company, which counts approximately 90% of Japan's physicians as members, and established empheal, Inc. to support corporate health management.
- > As a result of providing information related to 5G technology and specifications, and offering a 5G technology verification environment free of charge, the number of participants in the DOCOMO 5G Open Partner Program, which is an initiative aimed at creating new solutions with partner companies, had risen to 3,400 as of the end of March 2020.

FOCUS

Collaboration in Various Fields Centered on d POINTs

NTT DOCOMO has formed a business alliance with Recruit Co., Ltd., through which it seeks to grow its ecosystems. Centered on d POINTs, these efforts are aimed at increasing convenience for and improving the guality of services provided to customers of Recruit's services and d POINT CLUB subscribers.

1. Linking of Recruit Group's Online Services with d POINTs

By linking the Recruit IDs used for all online services provided by the Recruit Group with NTT DOCOMO's d ACCOUNTs, we make it possible to accumulate and use d POINTs when using the Recruit Group's online services.

Going forward, we will examine the possibility of collaborating in supporting sales promotions by d POINT affiliates and in marketing in order to further expand the base of *d POINT CLUB* subscribers.

2. Enhancement of Coordination with Air BusinessTools

From April 2020, Recruit's AirPAY service was made compatible with d POINTs, adding to prior compatibility with the d PAY payment service and making it possible to accumulate and use d POINTs at AirPAY affiliates.

Note: Using d POINTs through Recruit services requires the registration of d POINT user information.

Collaborative Ventures for Supporting Healthcare Institutions and Patients with ICT and IoT

Phase 1-Commencement of Virtual Outing Trial for Hospitalized Patients

The global COVID-19 pandemic has prompted healthcare institutions to place limits on face-to-face interactions with patients, forcing frontline healthcare workers to provide the necessary healthcare services while limiting their number of interactions with patients. In response to this situation, there is an increased need to introduce ICT- and IoT-powered remote technologies. NTT DOCOMO is examining the potential for collaborative ventures with M3, Inc. and Sony Corporation, to utilize ICT and IoT to address such issues in the healthcare field.

As the first phase of these ventures, we have commenced a trial using virtual reality (VR) and augmented reality (AR) technologies to provide hospitalized patients with opportunities for virtual outings and support virtual visits. Specifically, we offer programs that allow patients to become immersed in travel videos with a 360° viewing perspective simply by putting on VR goggles in their hospital room, giving them the opportunity to experience outings that feel almost real. Another offering is a virtual visitation system that allows patients to meet with their families even when face-to-face visits are discouraged due to fear of COVID-19 infection. Going forward, we hope to contribute to the resolution of a wide range of issues pertaining to improving patient quality of life,

facilitating treatment and rehabilitation, enabling remote examinations and remote explanations to patients' families, and allowing for communication between physicians and patients.







Virtual outing using VT and AR technologies (image)

Regional Communications Business

In the Regional Communications Business Segment, we worked on the Hikari Collaboration Model, which provides wholesale fiber-optic access services, among other things, to various service providers, as well as strengthening our solutions business with the aim of revitalizing local communities and regional economies.



Competitive Advantages

- Secure, highly reliable, stable communication network
- ► Provision and support of ICT solutions with strong local ties
- ► Large market share and stable customer base

Composition by Segment for the Fiscal Year Ended March 31, 2020



* Created by NTT from materials published by the Ministry of Internal Affairs and Communications. Includes subscriptions related to provision of wholesale telecom munications services

TOPICS

- ▶ We established NTT AgriTechnology Corporation, NTT Group's first "Agriculture × ICT" specialist company, aiming to promote urban development through agriculture by utilizing IoT / Al. In addition, in order to promote such initiatives as contributing to the revitalization of local communities and regional economies, we established NTTe-Sports, Inc. as a joint venture with SKY Perfect JSAT Corporation and Taito Corporation.
- NTT East and NTT West collaborated with many local governments nationwide, promoting a variety of initiatives aimed at utilizing ICT for urban development. Beginning in the Kyoto area, NTT West has started the staged deployment of a Local Revitalization Cloud service, which is a shared-usage cloud for universities and local governments.
- In order to address the societal issues of how to save and pass on regional cultural and artistic assets, and to respond to our customers' expectation that we will help revitalize local communities and convey their appeal through culture and art, we promoted the collection of digital data related to local culture and art, and broadcasted information using cutting-edge technology to contribute to the revitalization of local communities through local artistic and cultural traditions. We also hosted the "Digital × Hokusai (prelude)" interactive exhibition as a means of expressing the concept of this initiative.

FOCUS

Opening of eXeField Akiba Facility for Creating New Culture and Communities through E-Sports and Provision of eXeLAB Comprehensive Communication Platform

NTTe-Sports, Inc. opened eXeField Akiba, an e-sports facility located in Akihabara UDX, in August 2020. This facility will function as a pillar supporting NTTe-Sports' efforts to accomplish its mission of building communities and contributing to local economic invigoration through e-sports as well as the core that will organically link all of its various undertakings. Moreover, eXeField Akiba is equipped with cutting-edge equipment to allow for distribution of footage from online e-sports events from across Japan. By providing a venue for forming connections between different people and communities through this facility, we aim to help entrench e-sports culture, build communities, and evolve e-sports-related technologies.

In conjunction with the opening of this facility, the eXeLAB comprehensive communication platform for gamers was launched, also in August 2020. The recent boom in the video game market seen has been due in no small part to communication between players in the form of nationwide tournaments and exchanges between e-sports teams and fans. However, the differences in information available by region have led to disparities between the efforts of players. Event organizers, meanwhile, face issues with regard to the hassle of making all the necessary adjustments for arranging events, impeding the continuation of such events. To address these issues, eXeLAB provides forums for communication between gamers as well as tools for the management of tournaments and teams. We hope that these features will help promote the expansion and acceleration of gaming events while making them more efficient. Through eXeLAB, we also aim to support the development of e-sports and contribute to the creation of new connections amid the new normal.

Establishment of New Company to Realize Sustainable Next-Generation Livestock Production and **Dairy Farming and Circular Community Ecosystems**

Biostock was established in July 2020 through joint investment by Biomass Research Co., Ltd., and NTT East for the purpose of realizing sustainable livestock production and dairy farming and invigorating regional economies.

The number of people engaged in livestock production and dairy farming is declining in Japan while the number of animals each farmer has to care for is increasing. Meanwhile, many farmers have expressed an interest in introducing biogas plants, which are a means of utilizing animal excrements while eliminating odors, but have been unable to do so because of the high introduction costs, which cannot be covered through their own capital or borrowings.

Given this situation, we are working to eliminate the high hurdle to introduction of biogas plants through a monthly payment model that requires no initial investment. This is made possible by combining the biogas plant introduction expertise of Biomass Research with the ICT capabilities of NTT East. We also intend to coordinate with a diverse range of partners to offer additional solutions, such as sophisticated IoT- and AI-powered control systems that can perform farm operation procedures other than excrement disposal remotely without human involvement and optimal growth management systems that analyze environment and growth data. Going forward, we will promote digital transformations in livestock production and dairy farming through coordination capitalizing

on NTT Group's assets and Biomass Research's expertise.

Communications

23

* Created by NTT from materials published by the Ministry of Internal Affairs and



Long Distance and International Communications Business

In the Long Distance and International Communications Business Segment, in addition to enhancing our ability to provide ICT solutions, which combine network, security and other services, we worked to enhance our service provision in growth areas such as cloud services and IT outsourcing.



Competitive Advantages

- Full-stack solutions from application to IT infrastructure
- Global coverage
- Strong customer engagement

Composition by Segment for the Fiscal Year Ended March 31, 2020



TOPICS

- In order to respond to demand for cloud services and data centers, we worked to enhance our service provision structure. In Europe, we began operating Netherlands Amsterdam 1 Data Center and Germany Frankfurt 4 Data Center, while in Asia, we began construction of Indonesia Jakarta 3 Data Center.
- Together with Mizuho Financial Group, Inc., Mizuho Bank, Ltd., and Mizuho Information & Research Institute, Inc., we jointly developed a voice recognition system, a tool which automates the entry of transaction data for market instruments by utilizing voice recognition and processing technology, text mining, and RPA. Mizuho Bank has begun using the system in its market banking operations.

FOCUS

GIGA School Pack for Helping Supply a Computer for Every Student

NTT Communications has teamed up with Lenovo (Japan) Ltd. to develop the GIGA School Pack, which combines educational-use computers for elementary and junior high school students with the Manabi Pocket, a cloud-based education support platform to support the GIGA School Scheme* aimed at helping supply a computer for every student. Applications for this service have been accepted since March 2020. We will look to promote digital transformations at educational institutions by providing the GIGA School Pack to elementary and junior high schools across Japan going forward.

* Scheme aimed at helping supply every student with a computer and to develop high-speed, high-capacity communication networks in an integrated manner to ensure schools across Japan can continue to provide equal and individually optimized learning environments on into the future

Direct Access via Microsoft Azure ExpressRoute from Berlin 1 Data Center

A Microsoft Azure ExpressRoute connection point allowing for direct access to Microsoft Azure has been installed in the Berlin 1 Data Center of NTT Ltd. The ability to access Azure directly without passing through a standard Internet connection makes it possible for customers to establish hybrid clouds with increased levels of safety and reliability. This connection point can be accessed by customers using our data centers in the EMEA region.

Data Communications Business

In the Data Communications Business Segment, we responded to the acceleration of our customers' digital transformation at a global level, and to their increasingly diversified and sophisticated needs, by working to expand our business in the global market and to extend and consistently provide a range of IT services, such as offerings of digitalization and system integration, that are responsive to the changes in the market.

Competitive Advantages

- High-level technology development and project management capabilities
- Large market share and stable customer base in Japan
- Powerful service delivery capabilities using development bases around the world

Composition by Segment for the Fiscal Year Ended March 31, 2020



TOPICS

- ▶ We were selected as a strategic partner for the digital transformation project of Naturgy Energy Group, SA, a gas and electrical energy utilities company in Spain. We will provide BPO / ITO services for maintaining and operating systems related to gas and electricity distribution and various operations related to utility retail service using a advanced platform that we had developed among others.
- In pursuit of our growth strategy in North America, we converted two U.S.-based companies, Flux7 Labs Inc. and NETESOLUTIONS CORPORATION, to subsidiaries. The acquisitions of these companies will strengthen our capabilities in relation to Amazon Web Services and U.S. federal government healthcare

FOCUS

Evolution of Catch&Go, a Cash Register-Free Digital Store Service that Allows for Shopping via Facial Recognition

NTT DATA provides Catch&Go, a cash register-free digital store service. In addition to the QR code recognition systems used in prior experimental digital stores, we have introduced facial recognition systems and dynamic pricing using electronic price cards. We will test the new shopping experience that enables customers to enter a store and make payments purely through facial recognition as well as the use of electronic price cards linked to the store's inventory information to improve sales and reduce waste loss.

Global Access to Historical Cultural Heritage throughout the ASEAN Region via Digital Archiving

NTT DATA is participating in the ASEAN Cultural Heritage Digital Archive project, which entails the digitization of important historical cultural heritage from throughout the ASEAN region. Through this project, NTT DATA compiled cultural heritage from across the region into a digital archive system, making around 160 digitized cultural heritage articles from Indonesia, Thailand, and Malaysia available for viewing. This archive includes image, voice, and video data as well as 3D data of structures. In the future, the project aims to provide access to cultural heritage from the entire ASEAN region.





Other Businesses

In the Other Businesses Segment, NTT Group mainly provided services related to the real estate business, finance business, electric power business, and system development business.



Composition by Segment for the Fiscal Year Ended March 31, 2020



Details of Major Initiatives

Real Estate Business

We promoted our mainstay office and commercial business, residential business, and global business through NTT Urban Solutions, Inc., a company managing NTT Group's real estate business. In Japan, we were involved in urban development projects in Fukuoka, Sendai, and other cities.

Electric Power Business

Led by NTT Anode Energy Corporation, which promotes smart energy business in NTT Group, we worked on initiatives for a safe and secure society that uses natural energy and finite energy resources efficiently without waste, and is resilient to natural disasters and other risks.

Finance Business

We have developed financial services such as leasing and financing to facilitate the popularization of ICT devices and resolve social challenges revolving around the environmental, educational, and medical fields. Furthermore, we provided billing and collection services for telecommunication service bills, and credit card transaction settlement services.

System Development Business

In preparation for digital transformation, we have begun developing and deploying a cluster of IT systems that will become the new service platform. We were also engaged in initiatives to develop solutions for resolving societal issues, such as urban security and the revitalization of regions.

FOCUS

Collaboration in Renewable Energy and Storage Battery Businesses In December 2019, NTT Anode Energy Corporation reached an agreement with Mitsubishi Corporation to examine possibilities for collaboration in the energy field as part of their business alliance for the promotion of industrial digital transformations.

Specific Initiatives

1. Renewable Energy Projects

The companies will investigate the possibility of joint investment in domestic and overseas renewable energy projects and of supplying electricity to NTT Group companies.

2. Energy Management Businesses with Electric Vehicles and Storage Batteries

Mitsubishi Corporation and NTT Anode Energy are looking into the possibility of developing microgrid platforms* that incorporate electric vehicles and storage batteries, new decentralized power businesses that use microgrid platforms, and new energy solutions businesses that utilize the business networks of both companies.

Through these initiatives, we will combine NTT Group's ICT and direct current supply technologies with the Mitsubishi Corporation Group's power business insight and expertise to provide customers with clean power options and the kind of energy-management services that will make them more resilient to change in the energy landscape.

* Business platforms that provide optimal energy solutions to customers by organically linking storage batteries, electric vehicles, and chargers throughout a given area via ICT

Launch of Corporate Wellness Support Service-Support for Health Management via Big Data Analysis

In April 2020, NTT Life Science Corporation launched *Genovision*, a new health management support service to help promote corporate health management and employee health.

As employee health is becoming an important issue for companies, there is an increase in need for health management that approaches employee health from a management perspective and implements it strategically.

To cater to the demand associated with this trend, NTT Life Science offers *Genovision* packages bundling *Genovision Dock*, a genetic testing service for employees; *Genovision Action*, a lifestyle habit improvement support service for employees; and *Genovision Insight*, a health management consulting service for companies. Based on the ICT and security technologies, NTT Group has developed thus far, these services combine big data analysis with healthcare data and genome data acquired through genetic testing to deliver lifestyle habit improvement support that is optimized for every employee.

We are rolling out these services for use by domestic employees via healthcare institutions operated by NTT Group, and we plan to gradually expand the scope of availability to the various healthcare institutions across Japan with which Group companies have contracts. These services will also be made available for external companies, and we aim to support the health improvement and health management efforts of companies nationwide and their employees through *Genovision* services.





Corporate Data

Name	NIPPON TELEGRAPH AND TELEPHONE CORPORATION
Head Office	Otemachi First Square, East Tower, 5-1, Otemachi 1-Chome, Chiyoda-ku, Tokyo 100-8116, Japan
Date of Establishment	April 1, 1985 In accordance with the Nippon Telegraph and Telephone Corporation Law (Bill No. 85, December 25, 1984)
Paid-In Capital	¥938 billion (As of March 31, 2020)
Total Number of Shares Issued	3,900,788,940 (As of March 31, 2020)
Number of Employees	319,050 employees (As of March 31, 2020, on a consolidated basis)

Member of the Board / Audit & Supervisory Board Members

Chairman of the Board	Hiromichi Shinohara
President	Jun Sawada
Senior Executive Vice Presidents	Akira Shimada Naoki Shibutani
Outside Members of the Board	Katsuhiko Shirai Sadayuki Sakakibara Ken Sakamura Keiko Takegawa
Audit & Supervisory Board Members	Takao Maezawa Kanae Takahashi
Outside Audit & Supervisory Board Members	Takashi lida Hideki Kanda Kaoru Kashima
	(As of June 23, 2020)

Executive Officers Representative Member of the Board Jun Sawada President CEO (Chief Executive Officer) Representative Member of the Board Akira Shimada In charge of business strategy Senior Executive Vice President CFO (Chief Financial Officer) CCO (Chief Compliance Officer) CHRO (Chief Human Resource Officer) Representative Member of the Board Naoki Shibutani In charge of technical strategy Senior Executive Vice President CTO (Chief Technology Officer) CIO (Chief Information Officer) CDO (Chief Digital Officer) Executive Vice President Katsuhiko Kawazoe Head of Research and Development Planning Senior Vice President Ryota Kitamura Head of General Affairs Senior Vice President Atsuko Oka Head of Technology Planning Senior Vice President Tadao Yanase Head of Business Strategy Senior Vice President Shinichi Yokohama Head of Security and Trust CISO (Chief Information Security Officer) Senior Vice President Hideaki Ozaki Head of Global Business Senior Vice President Kazuhiko Nakayama Head of Finance and Accounting Senior Vice President Katsuichi Sonoda Head of Strategic Business Development Senior Vice President Akiko Kudo Head of Public Relations

Takashi Taniyama

Hiroki Kuriyama

Deputy Head of Business Strategy

In charge of 2020 Project and

Business Collaboration

Head of Corporate Strategy Planning

(As of October 30, 2020)

Senior Vice President Senior Vice President (part time) Access Otemachi First Square

Tokyo Metro: Chiyoda Line / Tozai Line / Hanzomon Line / Marunouchi Line Toei Subway: Mita Line

Otemachi Station, direct connection from exits C8, C11, and C12 $\,$ JR lines

Tokyo Station, Marunouchi North Exit, 5 minute walk from exit







29 | NIPPON TELEGRAPH AND TELEPHONE CORPORATION

Underpass





Facebook facebook.com/NTTgroup/



Twitter twitter.com/NTTPR



LinkedIn linkedin.com/company/ntt



Instagram instagram.com/nttgroup_official/



YouTube youtube.com/c/NTTofficialchannel





https://www.ntt.co.jp/index_e.html