# **Review of Operations**

# Public Business



### Public Business Comprised of Two Areas

Public Business consists of "Public Solutions," which is responsible for business involving regional sales functions, local governments, and medical institutions, and "Public Infrastructure," which manages business involving government organizations and enterprises supporting national and social infrastructure.

Based on the new organization established in April 2017, Public Solutions considers both local needs and required policy seeds. In

this area NEC works together with regional stakeholders, such as local governments, universities, and enterprises, to accelerate the development of new regional businesses, such as smart cities and the utilization of the Social Security and Tax Number System ("My Number"), and healthcare. Based on NEC's many years of achievements gained in supporting government agencies, the Public Infrastructure area further improves the social infrastructure we provide to support safe and comfortable lifestyles for everyone.

### [STRENGTHS]

- Strong track record gaining high credibility, advanced technologies, and high market share in Japan in delivering systems for governmental organizations, local governments, broadcasters, power companies, as well as in cyber security.
- Ability to propose concepts for customers' future based on "domain knowledge," specifically operational expertise and deep understanding of the data acquired and handled through many years of working with customers.
- Provision of vertically integrated solutions with the "NEC the WISE" lineup of Al technologies, "Bio-IDiom" biometrics, IT and networks including security, and full-layer ICT, including sensing technology.

### [OPPORTUNITIES]

- Digitalization of government services with the Japanese government's "Digital Government Action Plan", and wider use of the My Number System.
- Safe, secure, efficient administration of the Olympic and Paralympic Games Tokyo 2020 and further investment to prepare for the increasing number of tourists visiting Japan.
- Transmission between generations and renewal of systems in the Social Infrastructure Business (electric power, broadcasting, roads, etc.).
- Expansion in demand for strengthening of systems and monitoring services for cyber security
- Increased investment toward the utilization of ICT, such as AI and IoT across a variety of domains, such as healthcare and education

### Need for continuous investment to maintain advanced technology and reliability.

[WEAKNESSES AND COUNTERMEASURES]

Need for handling complex project management for large-scale projects and the issues inherent in system development using cutting-edge technology to control the impact of additional costs on operating results,.

### [THREATS AND COUNTERMEASURES]

- Declining tax revenues due to the falling population in Japan have created a need for solutions that increase government efficiency and performance.
- Need for a new business structure that can cope with changes in the market environment, such as the trend towards broadcasting via IP and transformation of the viewer rating and advertising models.
- Need for constant improvement of quality and cost competitiveness in response to intensifying competition for orders, increasing the number of projects with difficult requirements in cost and quality.
- Need for a business strategy that anticipates changes in existing business fields due to the entry of new participants.

# Digital Healthcare: Contributing to the Transformation of Healthcare and Society Using Al

Kitahara Neurological Institute (KNI) and NEC are engaged in co-creation to solve issues in healthcare and society through a trial using AI. The system predicts restless patient behavior 40 minutes in advance with 71% accuracy, and detects patients at high risk of aspiration pneumonia with 87% accuracy, enabling nursing staff to focus on the identified patients and administer preventive intervention. This is expected to help avoid protracted hospitalization for the patient and reduce the workload on medical staff. In addition, the system uses speech information classification and structuring technology to effectively reduce nurses record-keeping duties by 58%. NEC will use advanced ICT, such as AI and IoT, to create systems that support healthcare and people in the future.

# Investment into Advanced Technologies with an Eve to the Future -Taking on the Challenge of Control in the Aerospace Field

NEC has been involved many years in the development of advanced technologies aimed at resolving social issues, such as control technologies for unmanned aircraft, satellites, air traffic, satellite operation technology and electromagnetic wave monitoring technology.

### Satellite Operation

In 2018, NEC Corporation initiated at space project offering comprehensive space solutions, including the development of satellites and ground systems, satellite control, mission operation, and image sales using its own earth observation satellites. This is the first instance in Japan that a manufacturer operates its own satellites. Going forward, we will contribute to solutions and services for social issues, such as ascertaining conditions following a disaster, as well as monitoring and managing environmental resources.

### Flving Cars

Flying cars hold strong potential in commuting, moving to remote islands or into mountainous areas, emergency transportation, and carrying supplies.

NEC Corporation concluded a sponsorship agreement with CARTIVATOR Resource Management, which develop flying cars in Japan for the first time, and participated the Public-Private Conference for the Future Air Mobility Revolution established by the Ministry of Economy, Trade and Industry and the Ministry of Land, Infrastructure, Transport and Tourism. NEC Corporation will supply flying control related technologies to contribute to realizing future air traffic control.

### Public Solutions



### Public Infrastructure



NEC Satellite Operation Center

# **Public Solutions Business**

# Expand business domain for solving social issues



Chikara Nakamata Executive Vice President

# Providing Value across Industry Boundaries by Solving Social Issues

Japan is facing social issues arising from declining birthrates and an aging population, increasing social security costs, a declining work force, and reduced spending and economic power. NEC's job is to grasp these issues and address them firmly and create sustainable social value. Using our accumulated experience, the latest AI and biometrics technologies, and co-creation, we will take the lead on these issues and provide value across industry boundaries. In this way, we will contribute to sustainable growth and achievement of the company-wide profit target under the Mid-term Management Plan 2020.

# Our Environment and New Market Opportunities

The domestic market has remained active, and business model innovation using Al and IoT (Digital transformation) is progressing rapidly beyond the conventional framework of ICT vendors. On the other hand, as the existing ICT market is contracting, our continued growth will require us to expand our business into new domains and contribute even further through solutions to social issues.

Contributing to the Digital Government Action Plan In this environment, under the Japanese government's Digital Government Action Plan, the status of government itself has been reviewed with a view to digitalization, placing a priority on increasing convenience for citizens and business operators. NEC will contribute to realizing the Digital Government Action Plan by creating highly convenient services from the user perspective, making use of the My Number System and biometric authentication in the area of government and in fields where government and the private sector are working together.

### Digital Healthcare Using ICT

In the area of healthcare, NEC will contribute to dealing with labor shortages and curbing social security costs through measures that include the use of advanced technology to improve the quality of healthcare, such as an endoscopy diagnosis support system that uses AI, predictive simulation of health check results, and detection of advance signs of restless behavior. In this way, we will help to realize a healthy, long-living society where individually tailored, high-quality healthcare and medical services can be provided to people easily.

### Renewing Social Infrastructure

In the lead up to the Olympic and Paralympic Games Tokyo 2020, we will ensure safety and security by providing public safetyrelated solutions such as biometrics and behavior detection and analysis, as well as providing wireless networks for administration use and urban operation centers. Furthermore, the games will serve not only to invigorate the domestic market in the short term, but also as a major turning point for the renewal of social infrastructure, much of which was installed during Japan's high economic growth period. The new infrastructure will need to embody not only safety and security, but also place greater emphasis on the values of efficiency and equality to solve Japan's social issues going forward. NEC will help to realize this infrastructure using advanced ICT such as AI and IoT.

The Public Solutions Business will focus on these NEC Safer Cities themes in order to build an infrastructure that supports abundant living for people.

# Public Infrastructure Business

# Establishing Stable Profitability and Investing in Advanced Technologies to Prepare for the Future

# Supporting Key National Infrastructure and Establishing Stable Profitability

In the public infrastructure business, we support the stable running of mission critical operations in the field of national security using ICT for customers including governments, governmental agencies, broadcasters and power companies. By supporting these key national infrastructures over the long term, we will establish stable profitability. Under the Mid-term Management Plan 2020, we will generate stable operating profit and an operating profit ratio in excess of companywide targets as an earnings base for the whole company.

# Investment in Advanced Technologies to Prepare for the Future

I am responsible for the public infrastructure business, which is where many of NEC's largest individual projects with long development lead times take place. Many of these projects involve key national infrastructure, making it important to maintain our leading position through continuous technology development and to secure resources. To achieve this, we will improve our profitability through measures such as streamlining our costs, including cost reduction, strengthening our project management capabilities, and achieving appropriate sale prices. By securing resources in this way, we will conduct continuous investment into advanced technologies. The strengths that we have developed in this business include biometric authentication offering world-leading accuracy developed in the law enforcement and justice fields, cutting-edge cyber-security, and achievements in the field of space, carrying out missions in Noritaka Taguma Executive Vice President



uncharted places in the harsh environment of space, such as "Hayabusa 2." These technologies currently represent NEC throughout the world in businesses conducted across a variety of fields.

Going forward, we will continue to invest in advanced technologies to ensure our technological advantage as we reinforce our foundations in the public infrastructure field.

### Expanding Business over the Medium- to Long Term

To support business expansion over the medium to long term, we will leverage our advanced technologies to contribute to the creation of a safe and secure society. We will focus on fields such as security ICT, including cyber-security, image analysis, and accident prediction solutions, as well as biometrics solutions used in boarding and customs procedures at airports. We are also making a significant contribution in the field of 4K and 8K satellite broadcasts, which commenced in December 2018, helping the Japan Broadcasting Corporation, key commercial TV stations, and other broadcast stations to realize next-generation broadcasts. Other areas of activity have included trials of a Virtual Power Plant (VPP), which has drawn increasing attention just before the legal separation of power generation and transmission systems to be implemented in 2020, a space utilization service business that makes use of satellites and other technologies, AI-based visualization and analysis of learning status in primary, middle, and secondary school level education, a highlevel air traffic control system using GPS and guasi-zenith satellites, and the start of discussions on "Future Air Mobility Revolution" as a joint publicprivate initiative. By leveraging NEC Corporation's advanced technologies, we will drive the creation of new value and expand our business.

# Enterprise Business

# **Creating Social Value through NFC Value Chain Innovation**



Kazuhiro Sakai Executive Vice President

### Initiatives in the Medium- to Long-Term

Our society faces various kinds of social issues, such as food waste, labor shortages, changes in the consumption environment, and diversifying threats. NEC's Enterprise Business aims to realize a world where cutting-edge digital technologies are used to address these issues and new value is created through co-creation with customers, connecting people, goods, and processes, reaching across the boundaries between enterprises and industries in a process that we call NEC Value Chain Innovation (VCI). To support a more sustainable planet, sustainable growth for companies, and a society where people can live in abundance, NEC is working to promote five values: "Connected Manufacturing," which will usher in industrial innovation from the manufacturing sector by fusing digital technology with frontline systems; "Intelligent Logistic & Mobility," which will use intelligent ICT to make human mobility more comfortable and optimize the flow of physical goods; "Smart RetailCX," which will drive innovation in operations and customer experience (CX) and lead the digital shift and beyond; "Smart VenueCX," which will use the links between the senses and digital technology to deepen the bonds between people, communities, and society; and "Digital Finance," which will provide financial services to people and industries using the power of digital technology.

# Achievements toward Medium-to Long-term Targets in Fiscal 2019

For many years, the Enterprise Business has provided IT services to customers in the finance, manufacturing, logistics, retail, and service industries, and in fiscal 2019 our growth outpaced the market. As we continue to respond strongly to our base business fields, we have already started to provide social value through VCI, and we are now accumulating specific use cases such as the following:

- We started collaborating with INTAGE Inc. on a business for optimizing supply and demand across the entire value chain to help solve the issue of food loss and waste. By pairing NEC's data distribution platform with INTAGE's various data and analysis expertise, we aim to increase the accuracy of demand forecasting and make use of this to provide a product demand forecasting service.
- NEC has provided a facial recognition authentication system that uses NEC's facial recognition authentication AI engine, NeoFace, and a POS system that uses image recognition for X-Store, a future convenience store opened by President Chain Store Corporation (7-Eleven Taiwan). The system offers shoppers a new purchasing flow and a more efficient way to pay.
- Mitsui Sumitomo Financial Group, Inc. has introduced dotData, analysis software that automates data science processes. The software was developed by dotData, Inc., a Silicon Valley venture of NEC established through a carve out. The software is helping to increase the sophistication of data analysis throughout Mitsui Sumitomo Financial Group companies. In fiscal 2020, we will strengthen our initiatives, aiming to expand our provision of social value even further.



solving these social issues.

# Initiatives to Solve Labor Shortages

As labor shortages become more acute in the retail sector, there is a need to increase the efficiency of store operations. At the same time, the sector also needs to improve CX with a limited workforce and build good relationships with customers.

To help address such issues, in 2018 we opened a labor-saving store with Seven Eleven Japan Co., Ltd., making use of NEC's AI and IoT technologies. The store features systems to provide comfort and convenience to customers, such as NEC's first implementation of payment by face recognition authentication in Japan and targeted advertising signage. It also has staff-support systems to reduce the number of staff required to run the store. These include facility operation monitoring, which

collects information about equipment such as refrigerators 24 hours a day to support stable operation, and ordering proposals that use AI. NEC will continue to utilize cutting-edge digital technologies such as AI and IoT to provide systems that are designed for customers' businesses and market needs. In this way, we will contribute to service quality improvements and operational efficiency gains in the retail sector.



A labor-saving store using AI and IoT technologies

# Network Services Business

# Leading Digital Transformation (DX) by Connecting Value



Atsuo Kawamura Executive Vice President

# Networks for the DX Era: The Importance of **Connecting Value**

In recent years, DX has been progressing in various industries to solve social issues such as environmental issues, labor shortages, and security threats.

DX links the real world with the cyber world through networks, which is the key to creating new value using digital technology. As the volume of information increases and networks become increasingly complex, reliable, fast connections are extremely important for realizing DX.

In addition, high-speed, large-capacity, low-latency communications enabled by the spread of 5G will open the door for services that require detailed control, such as automated driving, remote medical care, and remote construction.

NEC will lead DX by combining its strengths in networks cultivated in the telecommunications market, and high-level IT assets such as AI, security, and biometrics, with industry expertise to enable wide-ranging connectivity in the enterprise and public markets as well as the telecommunications market.

### Initiatives in Fiscal 2019 and Fiscal 2020

NEC executed structural reforms in fiscal 2019, successfully shifting to a highly profitable structure. In fiscal 2020, we will continue to invest in the network services field for 5G and industry, which are key areas, while maintaining the structure we have achieved through structural reforms to expand highly profitable businesses. In particular, we will develop the globally

recognized OSS/BSS of Netcracker Technology Corporation, and increase profitability by expanding the maintenance and operation services field, making use of the expertise we have developed to date.

### Towards Realizing 5G

With 5G, we will execute the timely launch of advanced wireless technologies, such as miniaturization, power-saving, and beamforming technology. In July 2019, we started shipping commercial 5G radio units to NTT DOCOMO, INC. Moreover, through a partnership with Samsung Electronics Co., Ltd. we will expand our product portfolio while also making joint proposals to global telecom carriers. Furthermore, starting with our selection as an equipment provider for Rakuten Mobile, Inc., which promotes "Open vRAN" with cloud native networks, NEC will expand our business with telecom carriers seeking to build open networks.

# Co-Creation in the Field of Network Services for Industry

In the field of network services for industry, NEC provides not only applications, but a comprehensive lineup of services from consulting to operation to realize optimal networks for business operations. By utilizing our strengths in both IT and networks, we will promote customers' DX while continuously engaging in co-creation between businesses and companies using 5G. The Network Services Business will expand through connecting new value and contributing to DX.



NEC is creating various services using 5G through co-creation with telecom carriers and industry partners. As part of this initiative, we are working on safe disaster recovery through remote control of construction machinery.

Restoration of social infrastructure is an urgent priority in disasteraffected areas. However, there is a need to ensure the safety of worksites by avoiding secondary disaster risks, such as landslides. Together with Obayashi Corporation and KDDI Corporation, NEC carried out field experiments involving remote control of construction machinery using 5G.

Using 5G to transmit high-resolution images and sound data from cameras mounted on construction machinery in real time, we achieved operability equivalent to onboard operations in a remote control system. NEC will contribute to the realization of new 5G services through various field tests.

# Initiatives for Leading DX



Remote control of construction machinery using 5G

# System Platform Business

# Platforms to Support Business Innovation through Digitalization



Tomoyasu Nishimura Executive Vice President



The System Platform Business does more than simply streamline customers' business operations by providing highly reliable ICT products, we also provide platforms that are both advanced and reliable to enable rapid start-up and stable operation of services. Our aim is to be a partner for customers seeking to reform their businesses through digital transformation (DX), and help them accelerate their value creation.

To this end, in the System Platform Business, we combine knowledge of cutting-edge digital technology and experience in dealing with a broad range of industries, the ability to develop a deep understanding of our customers and propose new value, and the optimal ICT technologies, products and services to realize these proposals. We provide these ICT technologies, products and services as needed with a high standard of quality as we continue to hone our ability to support the operation of reliable systems.

### Medium- to Long-Term Policy

As customers seek to transform their businesses through DX, there is a rising demand for utilization of conventional IT assets and the data accumulated in them, as well as hybrid IT, which makes appropriate use of the considerably more flexible public and private cloud systems in each case, and rapid, highly accurate analysis of exponentially increasing data and the use of this analysis in business.

The System Platform Business has accumulated strengths in reliability, quality, and the ability to provide maintenance, operation, and support through our nationwide service center network. We will leverage these strengths while differentiating our platform through the use of hybrid IT, AI for data analysis, including image recognition technologies such as facial recognition, and accelerators such as vector computing technology.

### Initiatives Up to Fiscal 2021

The System Platform Business is expected to see a continuing harsh business environment; however, we will make advances in streamlining existing businesses and expanding our focus businesses. During fiscal 2019, we carried out business structure reforms, such as reorganizing our factories in Japan in order to streamline our production system. In fiscal 2020, we will continue to improve our costs, while accelerating DX in our own development, production, and maintenance sites, with a view to increasing their efficiency.

On the other hand, in our focus businesses, we will expand our provision of hyperconverged systems<sup>\*1</sup> and container platforms<sup>\*2</sup> as an initiative to promote hybrid IT. We also focus

on expanding the vector computing-based next-generation

platform, SX-Aurora TSUBASA into new fields such as AI big-data analysis and resource exploration.

- \*1 Integrated products that provide server, storage, networking, and virtualization software together in a single system.
- \*2 Platforms for integration and management of a container environment used to virtualize the application execution environment in a hybrid or multi-cloud.



# Next-Generation Platform, SX-Aurora TSUBASA

With the arrival of the big data era, there are growing needs for rapid, highly accurate processing of vast quantities of data generated in various fields.

SX-Aurora TSUBASA is a platform that provides high speed, high performance systems with models for a wide range of customer needs, from use in offices to data centers, by offering a vector processor previously only found in a super computer in a card format. The platform is helping to expand the range of applications for supercomputers beyond the traditional areas of weather and academia. In doing so, we will contribute to the realization of a safe, secure, highly efficient, and abundant society by promoting expansion in usage fields and applications including industrial fields such as manufacturing as well as AI and big data analysis.

SX-Aurora TSUBASA

# **Global Business**

# **Profitable Growth - Strengthening** Profitability to Achieve Sustainable Growth



Akihiko Kumagai Senior Executive Vice President

### Initiatives for Medium- to Long-Term Growth

Realizing "NEC Safer Cities" based on the safety business is the main growth engine for the Global Business. While globalization and technological advances have made life more convenient, there is a growing urgency to respond to global issues such as labor shortages, rapid urbanization, and the risk of terrorism spreading due to geopolitical factors. In addition to the area of public safety, where NEC's biometric authentication technologies have been used to provide safety and security, we will provide solutions that pursue efficiency and convenience not only for our customers, but also for their customers, such as ID solutions at airports.

Moreover, we acquired the U.K. company Northgate Public Services Limited in January 2018, and the Danish company KMD Holding ApS in February 2019, converting both into subsidiaries. Both countries' governments and local governments are leading the advance into digitalization of asset management, fee payments, and other operations. We will use the platforms developed by these companies as a base for enhancing our own solutions, while expanding our business in the digital government field.

NEC will contribute to the realization of a safe, secure, efficient, and equal society by applying advanced AI and biometric authentication technologies and strengthening our capabilities through M&As and partnership activities, while always placing top priority on respecting human rights and observing the laws and regulations of each country.

In the service provider markets, such as telecom carriers, investment into fields of software and services, such as customer, fee, and operation management systems, will increase their

operational efficiency, flexibility and rapid responses to new services based on digital transformation (DX). In addition to the strong competitive advantages of customer, fee, and operation management solutions offered by Netcracker Technology Corporation, we will offer new solutions that incorporate advanced virtualization technologies to meet the needs of the new era. In the field of 5G networks, demand is expected to reach full scale going forward. Here, NEC will leverage its results as a leader in adoption of this new technology in Japan while looking to expand its business by enhancing its product portfolio with its accumulated virtualization technology and collaboration with partners.

### Initiatives for Strengthening Profitability

To realize growth in the Global Business, our No. 1 priority in fiscal 2020 is achieving profitability in our operations.

In markets that are maturing or expected to see increased competition, such as wireless solutions, submarine cables, and displays, we will leverage our accumulated track record and technologies to maintain our business scale and strengthen profitability through partnering and business model transformation.

In the energy business, we have been focusing on the advanced U.K. and U.S. markets for energy storage systems, putting priority on expanding our track record. However, we will now prepare for further market growth, creating a profitable business structure by expanding solutions such as software and services in response to market changes such as deregulation of the electricity markets, as well as by further cost reduction.



- markets and the spread of renewable energy.

# Airport ID Solutions Create a New Customer Experience

At airports, passengers are required to present their passports and boarding passes when checking in and dropping off baggage, and at each step in the boarding procedure. NEC has applied its world-leading biometric authentication technology\* to simplify this laborious procedure and make it seamless. The airport ID solution creates a new customer experience by reducing procedures for both travelers and airport staff and shortening waiting times. It will be provided to airports and airlines in various countries including the U.S.

We now plan to expand this business field by linking it to various services in and outside airports, such as airport lounges, aiming to increase customer value.



\* NEC's solution ranked first in performance on evaluation tasks conducted by the U.S. National Institute of Standards and Technology (NIST).