Provision of High-quality ICT Infrastructures: An Introduction of NEC's Global Initiatives

Shin Sakamoto
Vice President
Global Business Unit
NEC Corporation

1. Introduction

NEC has defined the values that the NEC Group must offer as "safety," "security," "efficiency," and "equality"—social values that are essential in realizing "for all people, an abundant society."

In particular, this article introduces a few global market use cases on utilizing ICT to "close the social divide and eliminate inequality," as well as to "provide equally high quality of life" to all people.

First are examples of submarine cable and terrestrial digital broadcasting solutions, which are critical infrastructures in the broadband communications era, serving as core infrastructure solutions that close the social divide in broadband accessibility and information delivery between urban and rural areas. Next are examples of solutions that offer an equally high quality of life to all people.

2. Introduction of use cases

2.1 Submarine cable solution

Optical submarine cables are a core infrastructure solution necessary in providing communication services between continents and islands. They enable equal opportunities for access to broadband communications by underpinning the information exchange and communication systems for not only large-scale data transmission, such as in online transactions and in transmission of videos, music, games, and other entertainment media content, but also for education, healthcare, and economic transactions between and within local communities for people living in rural areas.

NEC is one of the few solution providers throughout the world that have the capability to provide turnkey solutions needed in completing a submarine cable project, including the terminal equipment for submarine communications installed at the landing points and the optical submarine cables and repeaters for laying on the seafloor, as well as the submarine construction knowhow for laying down the optical submarine cables.

A recent example is the Hong Kong Guam Cable System, a 3,900-km large-capacity optical submarine cable system connecting Hong Kong and Guam.

The cable system, which is scheduled to begin operation in January 2020, supports the optical wavelength multiplex transmission system with a capacity of 100 gigabit per second (100 Gbps) per wavelength. The cable system consists of four fiber pairs that can accommodate 120 wavelengths each pair, enabling a total capacity of 48 terabits per second (48 Tbps). NEC takes pride in the project, which is partially funded by the Fund Corporation for the Overseas Development of Japan's ICT and Postal Services (Japan ICT Fund), as a successful case of a public-private partnership that is consistent with the strategy of exporting infrastructure from Japan.

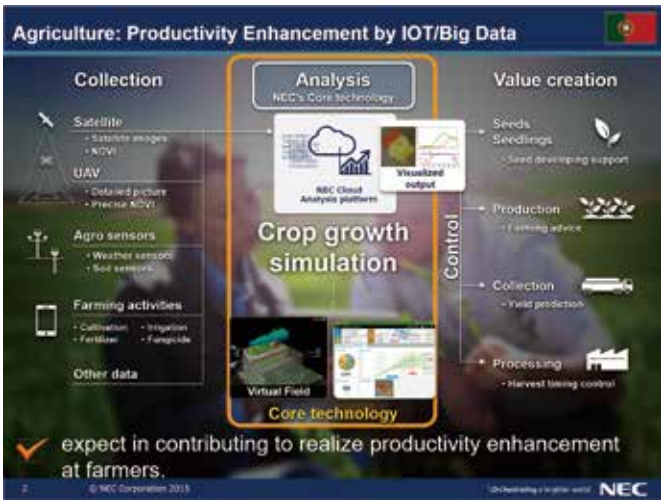
2.2 Terrestrial digital TV infrastructure solution

Many countries around the world have either already introduced or are planning the introduction of terrestrial digital TV broadcast, an advanced solution that offers high-quality broadcast services, such as HDTV programs, multi-programs, and datacasting and interactive services, which are not available through analog broadcasts.

Figure 1: Hong Kong Guam Cable System Project Route Map

Figure 2: Dissemination of disaster prevention information using terrestrial digital broadcast

Figure 3: Overview of agricultural solution utilizing ICT



NEC is one of only a few providers that are able to provide end-to-end solutions for terrestrial digital TV broadcast, including studio systems for creating TV programs and transmitters for distributing program contents.

The terrestrial digital platform and datacasting functions can also be used for widely and efficiently disseminating disaster information to residents, thereby contributing to disaster prevention and mitigation.

2.3 Agricultural solution

NEC is working with Kagome Co., Ltd., a global tomato processing company, to maximize tomato cultivation yields.

Tomato is an agricultural crop that is difficult to grow, requiring long years of cultivation experience. To address this issue, we tried to increase productivity by applying digital technologies.

Use of NEC's advanced AI technologies enabled highly accurate production forecasts in the first year of introduction, an achievement that normally takes a few years, without the need for accumulating massive amounts of past data.

Although climatic conditions are highly uncertain in open-field cultivation, simulations to forecast crop growth and development can be carried out for any number of times to take into account ever-changing climatic and cultivation conditions. NEC's solution performs simulations for more than 20,000 patterns of farmers' daily agricultural practices.

NEC's IoT and AI technologies enable simulating the real world in a virtual farm in such a way that even previously unrecognized changes are visualized. Going forward, NEC plans to expand this solution for maximizing harvest using AI beyond agricultural production, to cover the entire process that includes post-harvest processing and distribution, and conduct simulations of the entire value chain.

2.4 City Video Surveillance Solution

NEC deployed the solution in the city of Tigre, Argentina, contributing to the building of safe and secure cities and to crime prevention using the world's most accurate image recognition technologies.

The high prevalence of crime had been a serious problem in Tigre City. After NEC introduced an image recognition solution at the city's surveillance center, remarkable improvements in safety were achieved, such as reduction of car theft by 80% from 2008 to 2013.

Besides urban safety and security, the introduction of the solution resulted in economic benefits as well, wherein income from tourism has tripled in the last 10 years.

These safety and economic benefits are the very fruits of the digital transformation, via "visualization, analysis, and prescription," made possible by NEC's AI and other cutting-edge technologies.

Moreover, NEC's video face recognition technology has garnered the first place with a matching accuracy of 99.2%, an overwhelming lead over other companies, in benchmark tests conducted by the U.S. National Institute of Standards and Technology (NIST), the world's leading authority in measurements.

This is the fourth consecutive time that NEC's face recognition technology took first place in NIST benchmark tests, following the previous still image face recognition tests. The latest technology can be used to prevent untoward incidents and accidents through detection of suspicious individuals via rapid analysis of surveillance camera feeds, and enables recognition as subjects walk naturally without stopping or acknowledging cameras installed at gates of critical facilities, greatly improving convenience and utility.

2.5 Solution for educational centers in Colombia

NEC has constructed 648 ICT Rooms that allow the use of ICT environment, such as Internet connection via satellite communications, wireless LAN, computers, and printers, in schools and community centers throughout seven of Colombia's regional departments. In addition, NEC also provides maintenance and operation services as well as training for users of the ICT rooms.

The ICT Ministry of the government of Columbia, under its

Figure 4: Surveillance solution deployed at Tigre City

"Kiosco Vive Digital" plan for promoting the nationwide spread of broadband Internet and for narrowing the country's digital divide, aims to build more 4,200 ICT rooms throughout the country and connect them via high-speed Internet. This project is part of the national plan and involves the construction of the ICT environment by NEC and other partners.

NEC is involved in building ICT environments geared at the nationwide uptake of broadband Internet and at closing the digital divide in Colombia. Further, NEC will promote the construction of ICT infrastructures in the country and contribute to their efficient use and advancement, as well as continue to globally expand the construction of ICT environments going forward.

2.6 Biometric identification solution to support the school feeding program in Chile

Guaranteeing that all school children are given equal access to nutritionally healthy meals is part of the health and nutrition policies of the government of Chile.

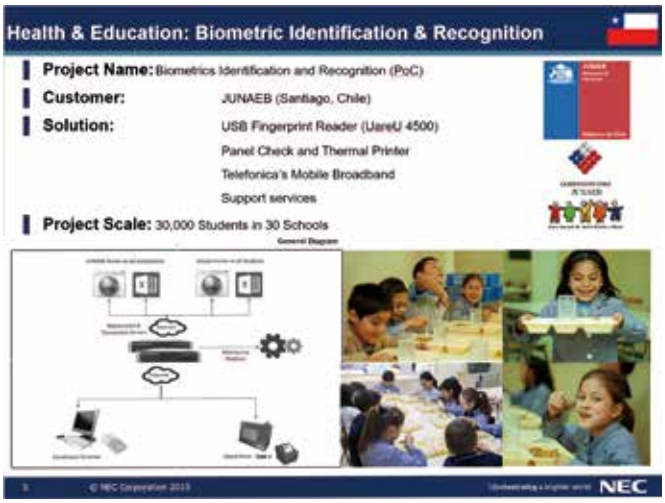
JUNAEB* is a public institution that was created in 1964 to administer the public school feeding programs of the government in order to address the nutritional deficiency among children. The activities of the institution have led to significant alleviation of the nutritional deficiency in school children, as well as to the increase in school attendance, leading to Chile's having the lowest illiteracy and malnutrition rates in Latin America.

Presently, however, Chile is faced with an increasing rate of childhood obesity. As a measure to address this issue, JUNAEB is planning to introduce a scheme to monitor individual student records in the distribution of meals and optimize the management and improvement of nutrition and health.

NEC's biometric authentication system has been chosen in validating the practicability of the scheme, and NEC conducted

Figure 5: Overview of initiatives in building educational ICT environments

Figure 6: Project to support the school feeding program using fingerprint identification



* JUNAEB : Junta National de Auxilio Escolar y Becas

the trial throughout 30 schools in three cities in Chile. Results of the trial have demonstrated the effectiveness of the solution.

The system is slated for implementation across all public schools through the country.

2.7 Financial inclusion solution in Mozambique

Hunger and poverty are serious issues in Mozambique, where agriculture is the main industry. NEC is working with the UN Food and Agriculture Organization (FAO) to improve agricultural productivity in the country. FAO had been handing out paper vouchers that could be used to purchase agriculture supplies as part of a project aimed at supporting farmers. The system, however, had been encumbered by a number of practical issues, such as safety, convenience, and traceability.

Under the FAO's agricultural support voucher project, farmers are provided with vouchers that could be used particularly for agriculture-related purchases, wherein they pay 1,000 yen for a voucher that could buy 2,000 yen worth of agricultural supplies. There were risks, however, in paying for the vouchers in cash and in keeping the paper vouchers at home.

Also, although they were able to monitor the recipients of the vouchers, they had no way of tracking how the vouchers were actually used. Further, since the farmers needed to spend the voucher in a single purchase, it was not very convenient to use.

NEC, therefore, introduced an e-voucher system using mobile technologies—a project that could not have been possible without the cooperation of various partners, including a mobile telecom carrier, the Japan International Cooperation Agency (JICA), Nippon Biodiesel Fuel Co., Ltd., as well as the FAO.

The introduction of NEC's e-voucher IC card system resulted in the following benefits:

- Ability to trace when and where the e-vouchers are used
- Ability to use the e-vouchers only for the required amount
- Ability to use the cash payments for harvest to charge the IC cards, providing an alternative to banks

The system encouraged the wide use of agricultural vouchers and enabled farmers to obtain farming implements for enhancing their productivity, leading to increase in their income. We believe that the introduction of similar financial platforms will contribute to the economic progress of developing countries.

Figure 7: Cooperation towards FAO's agricultural support voucher project

3. Conclusion

Other than the use cases introduced today, NEC is providing global ICT infrastructures and solutions in all aspects of human life, literally from the seafloor to outer space.

The NEC Group has consolidated its management resources to Solutions for Society that bring about new and advanced ICT-based social infrastructures, and is continually endeavoring to transform itself into a Social Value Innovator—a company that continues to grow as it contributes to the realization of an abundant society by providing "safety," "security," "efficiency," and "equality."

Cover Art

Ichimura Hazaemon (Picture of kabuki actor Ichimura Hazaemon (1841). It is said that he is playing the role of a legendary Japanese poet Ariwara no Narihira (825-880).)

Utagawa Kunisada (1786–1865)

Collection of the Art Research Center (ARC)
Ritsumeikan University
Object number: arcUP3562