Business Activities for Value Creation

Business Activities for Solving Social Issues

Contribute to Creating an Equal Society in Colombia through ICT

In Colombia, South America, raising international competitiveness in some key social fields such as health care, education, politics, and agriculture, is an urgent task for economic growth and for improving the quality of citizens' lives. Yet, inequitable distribution of benefits depending on residence is a problem. To eliminate this inequality, Colombia has taken a number of measures, but among them ICT shows tremendous potential. However, hampered by a harsh environment, including rugged mountain terrain and the Amazon rainforest, the Internet penetration rate in Colombia was only about 18% in 2013 and roughly just 1% in non-urban areas (in reference to MINTIC site;

http://colombiatic.mintic.gov.co/602/w3-article-5085.html).

Support to "Vive Digital"

Colombia's Ministry of Information Technologies and Communications (MINTIC) is promoting the spread of ICT infrastructure throughout the country under the Plan Vive Digital, a measure aimed at closing the digital divide and having all citizens enjoy the benefits of ICT, and a pillar of its policy for economic development.

As part of the Plan Vive Digital, NEC participated in Kiosco Vive Digital, which aims to create more than 4,200 ICT rooms as Internet access points throughout Colombia. NEC was selected to participate as a project member, through the official public bid process in Colombia, because of its experience setting up Internet connections in numerous countries, its capability of offering detailed support locally and for proposing a deployment plan in anticipation of Colombia's future.

In this project, NEC built an Internet environment via communication satellites for approximately 650 community spaces, including schools and community centers in the areas that are located far from urban zones and have less than 100 residents, and installed PCs, printers and IP phones. In this way, places where it had been difficult to obtain the latest information, such as the Amazon wilderness and mountainous regions, can now gather information and do business via the Internet.

Always Keeping Abreast of Residents' Needs through Interactive Communication

Through this plan, the Colombian government, which until then had no means of swift and reliable communication with these remote villages, was able to communicate and provide information to all citizens, including background on vital areas such as health care, education, politics, and agriculture.

Colombia

To further enhance the plan's effectiveness and to connect to future development, MINTIC took the lead in interacting closely with residents and constantly gathering feedback from various regions. As a result, demand for ICT environments exceeded expectations and the need for an increase in network connections mounted with the sharp growth in the number of users of the terminals. In addition, the need for improved access to education has become evident with the increased ability of residents to express their needs. Colombia has begun a study to determine the best steps it can take based on this feedback.

By uncovering and solving social issues that are closely tied to the community and customers, NEC will help bring about an abundant and equal society where individuals can thrive and everyone can enjoy the benefits of ICT.



Contribute to Enhancing Expressway Safety and Security through the Use of SDN

Driven by its founding motto "100% safety and reliability," West Nippon Expressway Company Limited (NEXCO-West), which operates the expressways of West Japan, has actively promoted road maintenance and traffic safety measures. Further, NEXCO-West has taken steps to enhance disaster recovery, raise local collaboration and customer satisfaction and has contributed to the development of western Japan based on the Group's collective efforts. Above all, western Japan is the area where damage from Tonankai or Nankai earthquakes is expected and the expressway plays a key social role in delivering relief supplies and personnel in times of emergency or disaster. With that in mind, NEXCO-West is improving the earthquake resistant roads, conducting disaster-preparedness drills in collaboration with local organizations and reinforcing the functions of the traffic control centers by building a backup system and a wide area network infrastructure.

Functions of Traffic Control Centers and the Challenges of Existing Network Configuration

The traffic control centers observe local traffic volumes and weather patterns using ample information from traffic measurement facilities, and weather forecast equipment located at regular intervals on the expressway network. They also function as the "control towers" that provide guidance concerning on-the-spot traffic regulations, the handling of accidents and other matters.

NEXCO-West has set up traffic control centers in Kansai, Chugoku, Shikoku, and Kyushu that operate 24 hours a day, 365 days a year to support expressway safety.

However, at NEXCO-West, networks that connect the traffic control centers and roadside equipment such as traffic

measurement facilities and weather forecast equipment are built separately for each region and only exchange information within those regions. Therefore, if the traffic control center of one region ceases operation in the event of a disaster, its monitoring and control of that region's expressways become difficult. In order to solve this problem, a mutual backup system that could compensate and take over and manage a center's functions was required.

Achieving Flexible Operational Management through Centrally-Controlled Software

To solve this problem, NEXCO-West adopted NEC's SDN solution. NEC built an SDN network linking multiple routes between 45 traffic control centers and expressway offices within a 4,000-km-wide area to create a wide area network that connects multiple traffic control centers in each region and enables advanced route control.

Since this network's configuration can be changed instantly through centrally controlled software in case of an emergency, the access point of the network's roadside equipment can be quickly switched. Therefore, even during a disaster, a mutual backup system can cover for each region's center functions and stable expressway service is maintained.

Future Development

SDN is a technology that revolutionizes existing networks and adds new value to existing infrastructure. At NEC, SDN is held up as one key area in the "Solutions for Society." We will promote a safe and secure social infrastructure for solving social issues with customers by providing a wide range of solutions that leverage SDN.

Contribute to Solving Water-Related Social Problems through ICT Early Detection of Water Pipe Leaks with "Water Leak Detection Service" ensuring minimal wastage of water

With the world's population expected to increase to more than 9 billion in 2050 and due to economic development and urbanization in emerging nations, world water demand will continue to grow. In addition, an investigative report by the Intergovernmental Panel on Climate Change (IPCC) warns that many regions face severe water shortages due to the effects of climate change caused by global warming. If this persists, it is predicted that two-thirds of the world's population will become "water-stressed" in 2025 and experience the inconvenience that water shortage has on daily life. Under these circumstances, it is important to use precious water resource without wasting it. Unfortunately, there are many cities around the world with water leak rates exceeding 10% due to aging pipes that are not being upgraded because of cost issues and other factors. Therefore, water resources are being wasted.

However, trying to eliminate water leaks while still using old waterworks infrastructure is a global challenge.

The Water Leak Detection Service that NEC launched in September 2014 contributes significantly to the efficient use of precious water resources minimizing the wastage due to leak. With conventional water leak detection methods, the most common approach is for a maintenance specialist is to use a dedicated instrument to listen by ear from the street level for the sound of water leaking from water pipes buried in the ground. As a result, extensive checking is required and timely detection is difficult. In contrast, by simply installing a sensor in a





Example of an SDN backup traffic control-framework for traffic control centers

water pipe valve, NEC's Water Leak Detection Service can pinpoint a leak within a range of about one meter by using a large amount of minute vibration data. Therefore, water leaks that had until now been mostly left undetected for a long time can be detected at an early stage.

Stopping water leak damage early also contributes to a reduction in the energy needed for desalination. Moreover, it becomes possible to provide water tailored to demand. This is achieved with weather forecasting, demand forecasting based on the analysis of vast amounts of water usage, and predicting failures by analyzing equipment operation data. All of this is accomplished with a wide range of technologies, such as sensing, machine-to-machine communications (M2M), cloud computing, and Big Data analysis. These are areas in which NEC is competent.

In addition, the Water Leak Detection Service places no extra load on aging water pipes and can extend the life of waterworks infrastructure. Moreover, because it is possible to find signs of broken and faulty water pipes and equipment's resulting in preventive maintenance "smart water management" becomes a reality, creating a stable supply of water without waste.

NEC will continue to provide new value through smart water

management, including its Water Leak Detection Service, to solve social problems related to water.



Water leak sensor logger

Contribute to a More Efficient City through a Smart City Project in Santander, Spain

Santander has actively participated in the European Union's Seventh Framework Programme for Research (FP7)*1, Horizon2020*2. Now, Santander is also very much engaged in 12 relevant projects in the north of Spain. In addition, NEC is eagerly promoting the development of a smart city.

NEC, in partnership with a local waste collection service provider, has been participating in upgrading the city's waste collection service, and began developing a "Cloud City Operations Center." The center is not only designed to make the entire city's administrative services visible but also manages, predicts, and automates those services.



- *1 A multi-year research grant program that covers 10 fields, including ICT. FP7 was carried out over seven years starting in 2007
- *2 A seven-year funding program for EU research and innovation that started in 2014, succeeding EP7

Santander's Waste Collection Management Service

With a typical waste collection service, the waste collectors simply establish a specific collection route and times. Then, the waste is collected from containers installed in each area of the city. In contrast, NEC's waste collection management service utilizes M2M sensors mounted in collection containers. The accumulated amount of waste is turned into digital data that is transmitted through a network to a control center. At the center, the collected data is analyzed to determine the optimum collection time and route and then displayed on a monitor mounted in each waste collection vehicle.

In this way, the waste collectors can place the highest priority on collection from containers with the greatest amount of waste. This enables more efficient waste vehicle operation and reduces unimportant and useless work. The result is both lower operating costs and reduced environmental impact that would otherwise come from unnecessary vehicle exhaust.

Moreover, a smartphone application linked to the waste collection management service allows users to make reports when the collection containers are full of waste or when they discover illegal dumping. This has contributed to a cleaner and more pleasant city for the residents.

Startup of Cloud City Operations Center as Base for Smart City Operations

Santander is promoting the visual display of its administrative services in all areas of the city, including its waste-collection management services. Therefore, NEC, in partnership with Santander, started a Cloud City Operations Center.

The center constantly monitors and analyzes environmental data, such as air temperature, traffic volume, noise, CO₂ levels, and the brightness of natural light. The data comes from the M2M sensors installed throughout the city thanks to the FP7 initiative and is used for a wide range of public services.

As a result, NEC is providing services that enhance the quality of citizens' lives through the comprehensive display of the service operations, the analysis and management of integrated data, and forecasts and automation based on them. The citizens now enjoy a more efficient way of using public services in their city lives.





Infrared Thermography to Prevent the Spread of Ebola in African Countries

Preventing the spread of deadly diseases such as Ebola is an urgent task for maintaining a safe and secure society. Key points are how to suppress the disease when it is spreading and how to prevent its resurgence after it has ended.

NEC's Supply of Infrared Thermographic Cameras as an Important Measure against Ebola

In November 2014, the Japanese government added U.S.\$100 million to its aid to combat the Ebola epidemic in West Africa. As part of this effort, NEC delivered 13 non-contact infrared thermographic cameras to three African countries (Côte d'Ivoire, Ethiopia, and Ghana) through the Japan International Cooperation Agency (JICA). Operation of the cameras began in early February 2015.

NEC plans to expand delivery of the cameras to other African countries through fiscal 2016.

Because Ebola is accompanied by fever during its onset, the survival rate of an infected person increases through early fever detection enabling early isolation, and early treatment. This also lowers the risk of infection to others.

Performance and Safety of the Cameras

The cameras provided have very similar functions as cameras supplied to Japanese airports, including Narita International Airport. By not missing slight temperature changes, even for high fevers, and by making temperature distribution information visual in real time, the cameras can detect fever onset and existence with great accuracy, even in people walking rapidly. Moreover, because the cameras can measure the body surface temperature of a person passing through an airport or crossing a border checkpoint without contact in real time, the safety of personnel performing the measurements is protected. With its high measurement accuracy and safety, in addition to helping to greatly curtail the current spread of Ebola, the camera is

an effective measure against the possibility of future resurgence.

Demonstration at the African Union Summit

At the African Union Summit in Ethiopia in January 2015, NEC. which was the only corporate participant, demonstrated the cameras with the cooperation of Japan's Ministry of Foreign Affairs and the Japanese Embassy in Ethiopia. The demonstration attracted a tremendous amount of interest from African heads of state attending the summit. Taking advantage of this opportunity, NEC called attention to the usefulness of the cameras and made a strong appeal for contributions to prevent the spread of Ebola.

NEC's Contributions to Safety and Security

NEC views providing people with safety and security as benefits that the Company can contribute to society.

Therefore, NEC will continue to leverage its assets to the maximum extent and help solve the challenges facing the world.



Infrared thermography camera InfReC R300SR series (manufactured by Nippon Avionics Co., Ltd., an NEC subsidiary)



Camera being used at an international airport in Côte d'Ivoire