独立行政法人
情報通信研究機構

NICT NEWS

National Institute of Information and Communications Technology

2014 MAY
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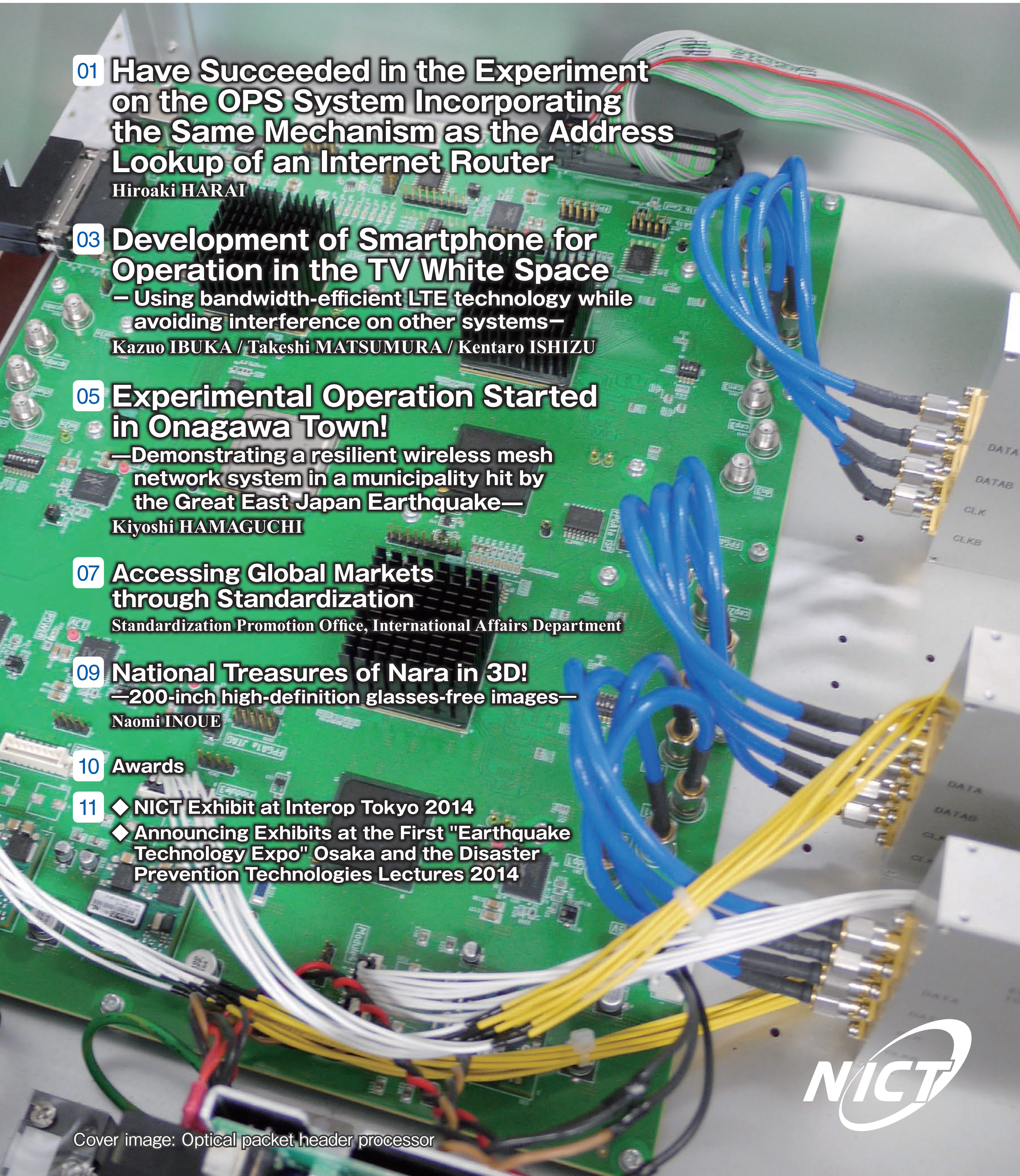

Cover image: Optical packet header processor

Have Succeeded in the Experiment on the OPS System Incorporating the Same Mechanism as the Address Lookup of an Internet Router

Hiroaki HARAI
Director of Network Architecture Laboratory, Photonic Network Research Institute
After completing his doctoral course, he entered Communications Research Laboratory (currently NICT) in 1998. Engaged in research on Future Networks and Optical Networks. Ph.D. in information and computer science.

Address lookup

The address lookup in the router is the function to determine where to transfer the relevant incoming packets. To be more specific, it conducts the whole processes to read destination addresses of incoming packets, search the routing tables and determine the appropriate output ports for each packet.

It is said that an Internet router consumes 14% out of whole electricity consumption of ICT equipment and that, among other things, an address lookup facility eats up 30% of the electricity the high-end router demands. Therefore it is important to enhance the capacity of the address lookup in terms of high-speed processing and energy-saving in order to promote power efficiency of ICT equipment.

OPS and the Internet

In the Internet of packet transmission, high-speed optical signals transmitted by optical fibers are converted to the electrical signals at the router, switched electronically, converted back to the optical signals again and transmitted through optical fibers (Figure 1). In switching process, a header processor searches the destination IP address out of the route information of over 500,000 stored in the router in order to transfer the incoming packet to an appropriate output port. However, upgrading parallel processing is essential for high-speed packet communication due to a limit on electronic processing speed. In fact, high-power consumption of the router has long been pointed out.

Not only NICT but also the R&D institutes all over the world are anxious to develop the Optical Packet Switching (OPS) system which enables optical signals to be switched with no electrical conversion and thus achieves high-speed processing with low-power consumption (Figure 2). The OPS system NICT has developed is expected to be put into practice as kernel equipment in the high-speed and low-power consumption future networks.

The existing OPS system necessitates a specific identifier (ID), which is different from an IP address, added to the optical packet, which once caused some problems in complication of network control. That required other feature to establish routing tables for these IDs, separate from Internet routing control.

To simplify network control, NICT's Photonic Network Research Institute has worked on a new control processing of address lookup and statistic information accumulation, in collaboration with RENESAS Electronics Corporation (RENESAS), a contracted company of the NICT's commissioned research program.

Have succeeded in the experiment on low-power consumption address lookup and the OPS

This time, NICT has succeeded in the world's first experiment on the OPS in developing the optical packet header processor (Figure 3) that mounts the address lookup system depending on the Internet IP addresses (Figure 4).

RENESAS has developed high-speed and low-power consumption search engine LSIs for address lookup of optical packets and statistical information accumulation of communication traffic. Owing to this search engine LSI, they have also succeeded in developing an optical switching control electronic circuit. Most notably, the search engine LSI has the capacity to maintain a sufficient speed to search all the incoming packets transferred relentlessly over high-speed lines at 125 Gbps. Moreover, it reduces total electricity consumption down to 1/20 in comparison to the traditional technology of TCAM used in the router.

NICT's R&D has been working on network architecture and optical switching and communication systems. This time it has suc-

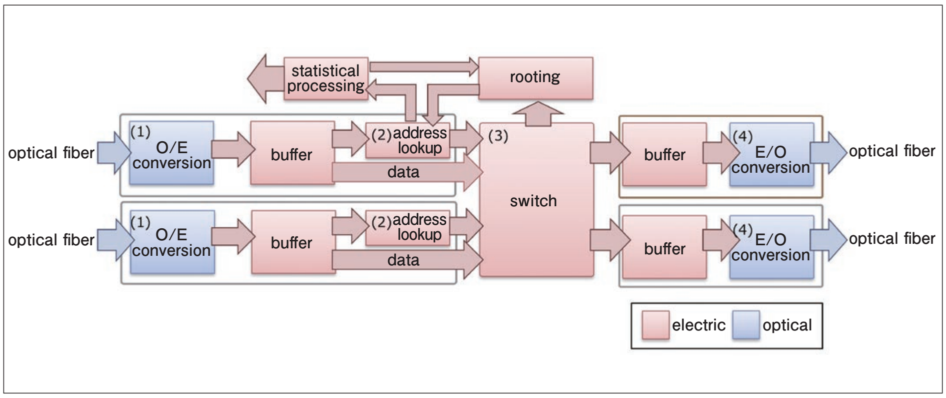

Figure 1 Internal structure of the Internet router
All the optical packet signals are converted to electronic signals in the Internet router (1). Then they match both packet IP addresses and routing tables in order to determine an appropriate output port (2) and to allocate to each port (3). After that, those electronic signals are converted back to optical signals again (4).

ceeded in newly developing an optical packet header processor which incorporates both RENESAS' LSIs and electronic circuits. In order to read optical packet addresses, all that is required is just to copy the 16-bit data which is part of IP addresses.

This successful and innovative experiment to use the Internet IP addresses as address lookup information has not only made the structure extremely simple but also allowed the optical network to access the Internet easily. Acceleration of R&D efforts will boost deployment of the OPS system in the field of the Internet.

Future prospects

The OPS excels the traditional electronic circuit processing router in energy-efficiency. This time, by incorporating search engine LSI with low-power consumption, OPS has further enhanced energy-efficiency of the forwarding process of high-speed packets. As for the search engine LSI, solely, it requires a longer bit-length to search than now. However, due to the low-power consumption nature, it enables the router to cut down power consumption by 15%, while the electricity consumption is reduced to 1/20 to access the LSI that consumes about 15% of the electronic router.

In the hope of contributing the search engine LSI technology to low-power consumption of electronic routers, NICT pursues stabilization of the system by way of practical use of OPS and its networks. Also, NICT continues to strive for incorporating the OPS system in the Internet by adding the routing function to both the OPS system and the router, together with implementation of hierarchical IP addressing technology to resolve routing information into several tens of thousands of route aggregation.

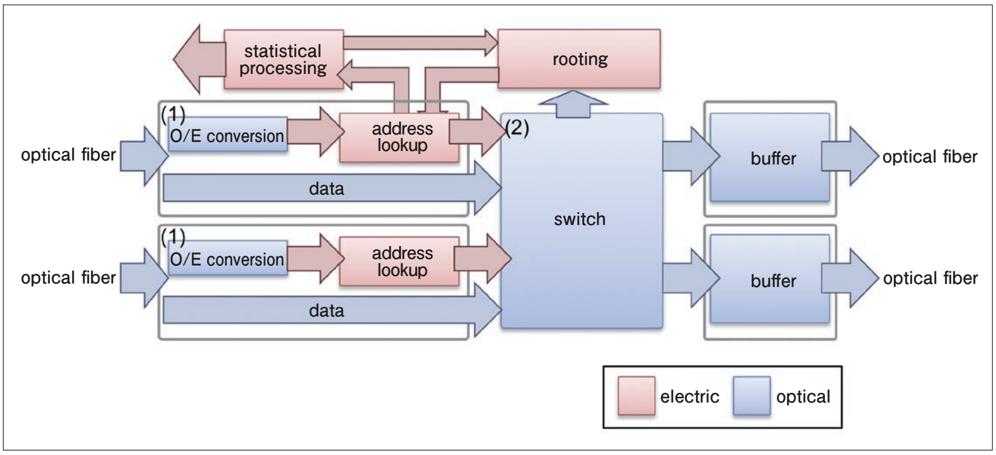

Figure 2 Internal structure of the optical packet switching system

The optical packet switching system converts part of optical signals only (including address information) to electric signals (1). The packet data remains as optical signals afterwards, straight to be allocated to an appropriate port (2). Accordingly electric signals process and optic-to-electric conversion decrease. Consequently it enables a switching process to accelerate and save power.

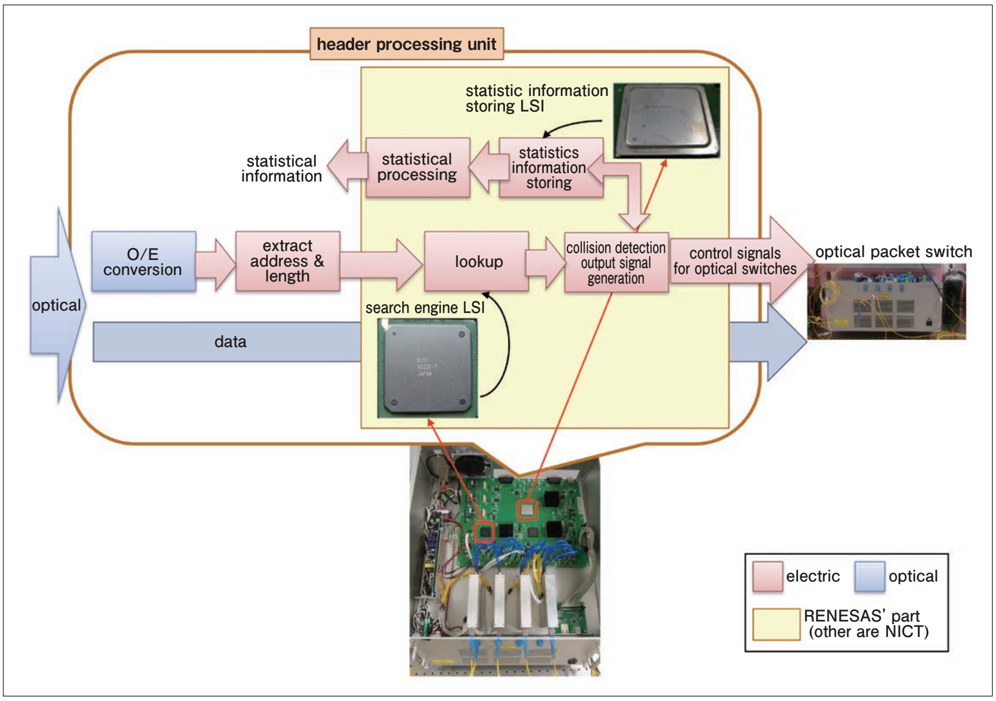

Figure 3 Process flow of the header processor

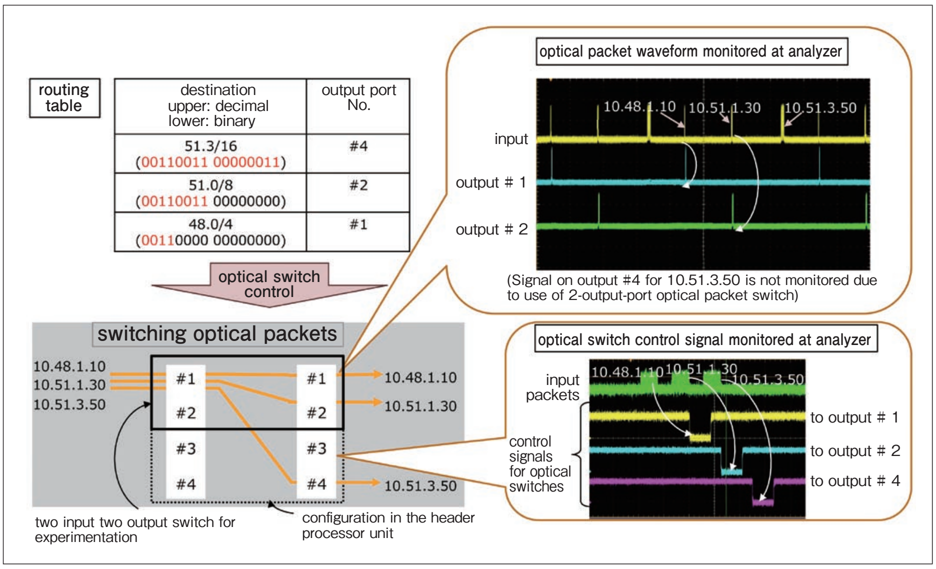

Figure 4 Experiment result of the optical packet switching system

The optical packets are allocated and switched to the appropriate output port by looking up destination addresses.

Development of Smartphone for Operation in the TV White Space

－Using bandwidth-efficient LTE technology while avoiding interference on other systems－

Kazuo IBUKA
Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

After working for ISB Corporation, he joined NICT in 2012. He has been engaged in research and development in Cognitive Radio, Software Defined Radio (SDR), and White Spaces.

Takeshi MATSUMURA
Senior Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

After joining Uniden Corporation in 1998, he was engaged in R&D on wireless communication systems and devices. He joined NICT in 2009. He has been engaged in R&D on communication devices for cognitive radio systems and White Space communication systems, and also on component technologies for further miniaturization and reduced-power consumption. Ph.D.

Kentaro ISHIZU
Senior Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

He joined NICT in 2005. He has been engaged in R&D on heterogeneous wireless network systems, cognitive radio systems, and White Space communication systems. He has also dedicated time to standardization of these technologies. Ph.D.

The need to use White Spaces and related issues

As mobile communications devices such as smartphones and tablets have spread explosively, the demand for high-speed, high-capacity communications on mobile terminals, for video streaming and other services, is increasing daily. With the bandwidth currently allocated for mobile communications, it will be difficult to satisfy this increasing need for communications in the future. One way that is being studied to secure new bandwidth is to use White Space[*1] in television broadcast bandwidth. NICT has developed an LTE[*2] communications system supporting White Space, which enables the LTE communications system to be used in White Space.

The system is composed of a White Space LTE base station, a communications terminal adapter which connects to a PC or other terminal, and a White Space database[*3], which manages and controls the frequencies used based on a set standard.

However, there are various conceivable scenarios for using White Space, and in particular, to support use of White Space with by individuals compact, mobile terminals such as smartphones, compact, low-power devices that are portable and can operate for practical amounts of time must be developed. In this article, we introduce a smartphone that we have developed to solve these technical issues while also supporting White Space.

Overview of the smartphone operating in White Space

The White Space smartphone that we have developed is shown in Figure 1. It supports the LTE communications system and is able to connect with an experimental White Space base station operating in the television broadcast band (470 to 710 MHz) as well as the existing 2 GHz band LTE network.

The smartphone has the same form as other smartphones on the market, with some additional technical developments to enable communication using White Space. For example, the White Space frequencies used for communication are lower and the bandwidth

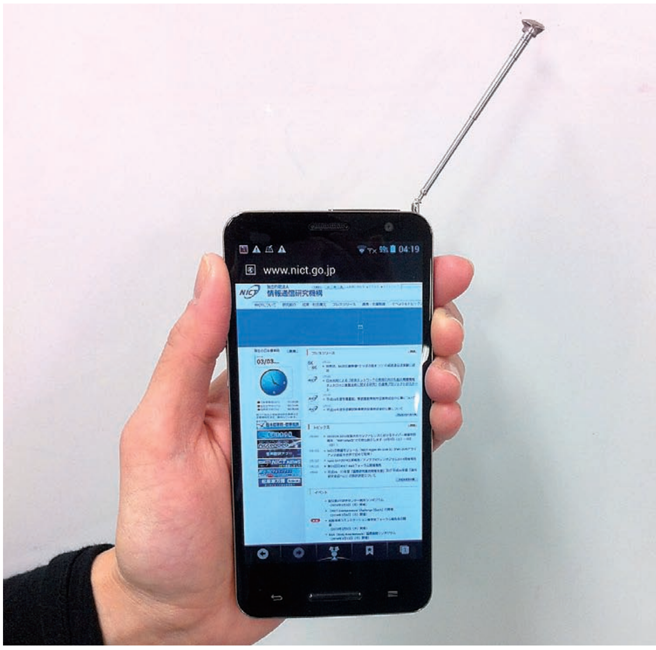

Figure 1　Smartphone operating in White Space
(with White Space antenna extended)

＊1　White Space
This refers to frequencies within bands that are already allocated for some purpose such as broadcasting (primary use), but that can be used for some other purpose (secondary use) as long as any effect on use for the primary purpose is sufficiently small. In particular, White Space within television broadcasting bands is being studied in various countries and regions.

＊2　LTE (Long Term Evolution)
A standard for broadband mobile communications created by the 3GPP standards organization. Its use for mobile telephones has begun to spread in Japan, and commercial services are being operated in the 800 MHz and 2 GHz bands. Further services in the 700 MHz and 900 MHz bands are planned for the future.

＊3　White Space database
Computes the White Space available for a secondary user based on the secondary user's position, antenna height and capability, desired time frame and other information, and considering primary user usage state and the surrounding geography.

is wider, so developing a compact, practical antenna is an outstanding research issue. For this smartphone, White Space communication is implemented using the extendable rod antenna designed for viewing One-Seg broadcasts. It is also possible to connect additional sub-antennas to obtain more-stable communication through diversity reception. To reduce the size and power consumption of the terminal, we implemented it using the existing smartphone LTE signal processing circuits and connecting them to the television band radio circuits. We also supported dual SIM*4 cards, one for the White Space LTE system and one for the existing LTE network system, and enabled switching between the two SIM cards through software, so that the network to be used for communication can be selected. Currently, connecting to NICT's experimental White Space LTE network requires a different SIM card than for the existing LTE network, but it could be possible to support both networks with one SIM card in the future, by using common wireless network management equipment (EPC*5). It will also be possible to switch seamlessly between the existing LTE network and the White Space system.

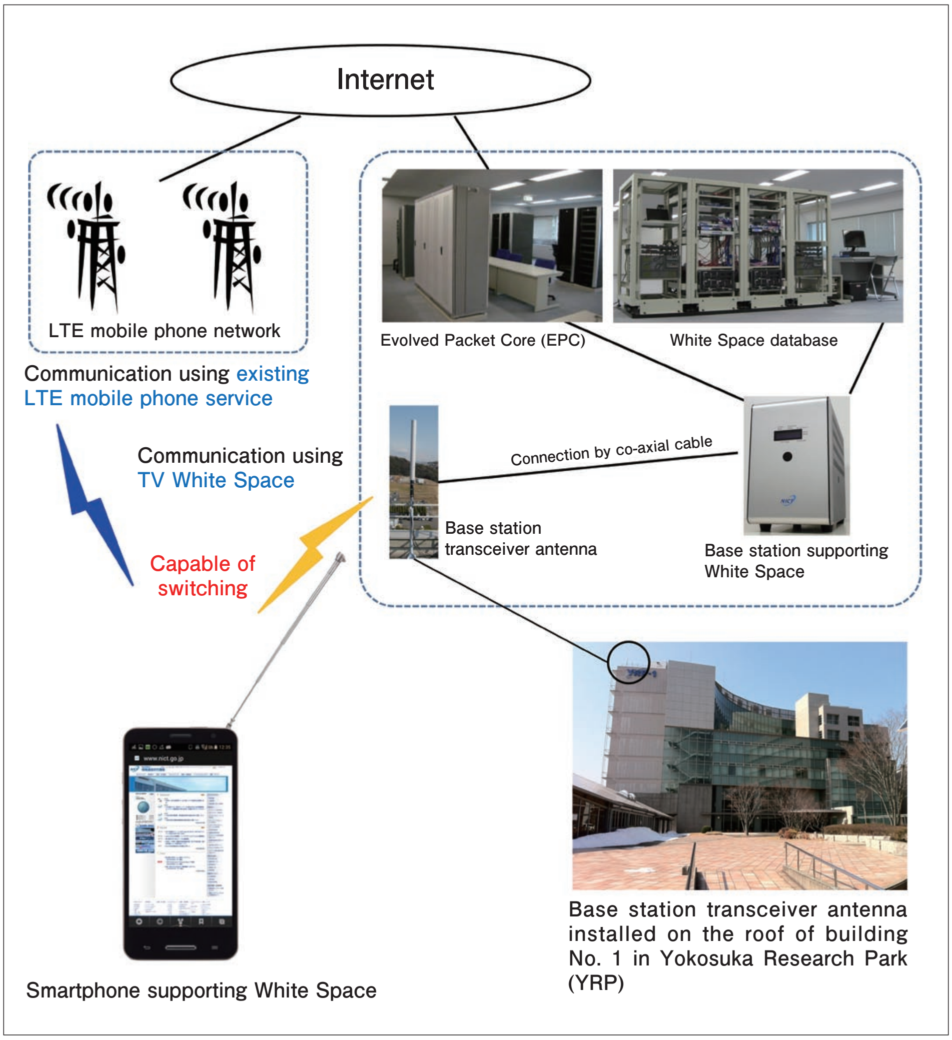

Figure 2 Field test system

Field test system architecture

The architecture of the system built for field testing is shown in Figure 2. In the figure, the White Space base station and the White Space database for computing the frequencies that can be used were developed by us earlier. The EPC equipment was implemented by NICT, and is necessary for controlling the White Space base station. The transceiver antennas for the White Space base station were installed on the roof of building No. 1 in Yokosuka Research Park (YRP). The smartphone we developed first transmits its location and various other radio parameters to the White Space database. It then receives information such as usable frequencies and transmission power limitations, which it uses to start White Space communication. Note that the query to the White Space database occurs through the Internet, and initially, the terminal is not yet able to use White Space frequencies, so other means such as the existing LTE network or the phone's wireless LAN functionality is used.

Also, since switching between the White Space system and the existing LTE network is possible when using the networks, the average communication speed for users can be increased by distributing traffic (load balancing) over the usable White Space, even when communication on the LTE network is slow due to effects such as crowding.

Future issues

The smartphone we have developed demonstrates that a compact, low-power terminal supporting White Space communication can be implemented. This has been an issue for some time, so it is a very significant result. However, there are still several issues remaining before White Space bands can be used for communication, such as further improvements in device performance, discussion of sharing conditions, and deciding operational systems. In the future, we plan to evaluate performance in various usage scenarios and to identify technical potential and issues.

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*4 SIM (Subscriber Identity Module) card
An IC card used inside mobile phones and other terminals that is issued per subscriber and identifies the subscriber for the mobile phone operator.

*5 EPC (Evolved Packet Core)
Wireless network management equipment for operating LTE. It authenticates subscribers, manages terminal position and movement, and relays communication to external networks.

Experimental Operation Started in Onagawa Town!

—Demonstrating a resilient wireless mesh network system in a municipality hit by the Great East Japan Earthquake—

Kiyoshi HAMAGUCHI

Director of Wireless Mesh Network Laboratory, Resilient ICT Research Center

After completing a Master's degree in 1993, joined Communications Research Laboratory, the Ministry of Posts and Telecommunications (currently NICT). He has been engaged in R&D in areas including mobile radio communication schemes, radio propagation measurement, and short-range wireless communication systems. He has been in his current position since April, 2012.

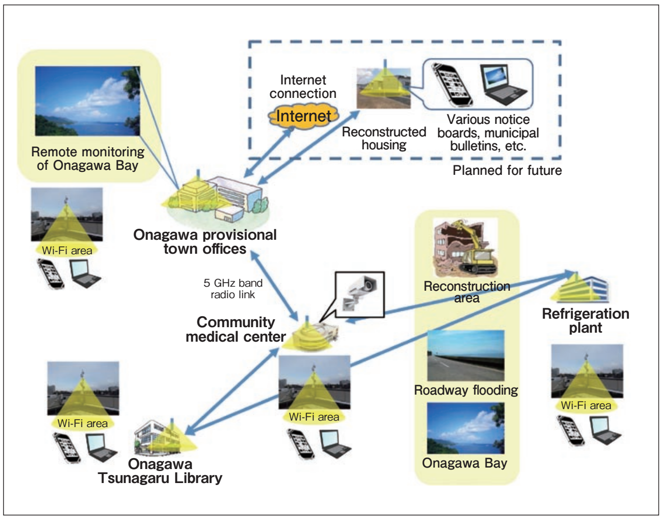
Introduction

At NICT, we are engaged in practical research and development to implement "resilient" wireless communications networks that will not be interrupted in times of disaster. These implement disaster resistant wireless network systems by combining wireless mesh networking technology, which has widely-distributed, autonomously-operating wireless stations, satellite communications, which guarantees communications over even wider areas, and mobile wireless systems, which are used in automobiles and air planes.

NICT has reached an agreement for collaborative research with the town of Onagawa*1 in the Oshika District of Miyagi Prefecture, which is in the area struck by the Great East Japan Earthquake and is undergoing reconstruction. A resilient wireless mesh network*2 developed by NICT has been built and begun trial testing in Onagawa. This wireless mesh network forms a mesh of wireless connections between bases within the network, giving it excellent features for maintaining communication even if some of the communications paths are cut.

System location

Four locations (the Onagawa provisional town offices, the community medical center, the Onagawa Tsunagaru Library, and the refrigeration plant) were connected by a wireless network that does not require a radio license and is used by the municipality as an independently operated network. It is expected to have many users, providing information to residents and businesses and for municipal promotions, so bases were established at locations where residents gather, such as the library and the refrigeration plant, which is the center of harbor industry.



Mesh network utilization

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*1 The town of Onagawa
Located in the east of Miyagi Prefecture, at the base of the Oshika peninsula and in the region designated as the Minami Sanriku Kinkasan Quasi-National Park. The scenic ria coastline, where the Kitakami mountain range meets the Pacific Ocean, forms a good natural harbor. There is an abundance of farmed marine produce including oysters, scallops, sea pineapple (hoya), and Coho salmon, and it is near to the Kinkasan fisheries, which are one of the top three in the world, so the fish market has many varieties of fresh-caught warm and cold-current fish throughout the year. In recent years, it has attracted many tourists for sight-seeing, mainly related to the fresh seafood, but the town center was devastated by damage from the Great East Japan Earthquake on March 11, 2011. The town is making an all-out effort and working continuously to rebuild and establish the town, more than ever before, as a center for marine production.

*2 Resilient wireless mesh network
A network able to maximize communication capabilities even if some paths are interrupted, and also to find destinations and preserve communication within the wireless mesh network, even if the connection to the Internet is lost. This is done by enabling the wireless stations that comprise the system to temporarily store and share data among themselves. It also provides applications such as checking the welfare of others and distributing location information between terminals.

System installed at the community medical center

The community medical center provides a platform overlooking Onagawa Bay and the reconstruction of the town, and is excellent for wireless communication. The antennas, cameras, and the box housing wireless network equipment (within the dotted line) comprise part of the system installed for this project.

In the future, we will continue to cooperate with Onagawa and advance trial testing of this wireless system based on input from the municipality including its experience from the disaster. It will also be used during ordinary times to study the town's promotional activities and how it can be used for reconstruction, and also to advance R&D in ICT for resilient wireless communications and regional reconstruction.

Example image from the cameras (Onagawa Bay)

This is an example of camera video that can be viewed from the Onagawa provisional town offices.

System objectives and overview

The NICT Resilient ICT Research Canter (Sendai City) is conducting R&D on disaster-resistant networking using the strengths of radio based on collaboration among industry, academia and government, and learning from how data communications were interrupted during the Great East Japan Earthquake. One aspect of this is the completion of a testbed for resilient wireless mesh network technology within Tohoku University. The technology is structured to prevent concentration of communication and is robust against damage or disconnection of wireless stations. Trials are being conducted to verify the basic performance of this testbed.

For the trial tests discussed here comprehensive understanding and cooperation from the town of Onagawa, as a victim of the disaster, was obtained. Specifically, four facilities presumed to have many users (the provisional Onagawa town offices, the community medical center, the Onagawa Tsunagaru Library, and the refrigeration plant) were connected by wireless network. A monitoring system was also built with cameras installed at the community medical center, which is on high ground (elev. 16 m), obtaining video of locations including Onagawa Bay, the national highway, the reconstruction site, so that they can always be checked from the provisional Onagawa town offices. Till now, it was not possible to check the state of Onagawa Bay, or highway flooding during heavy rainfall, directly from the Onagawa provisional town offices, which are located on a hill away from the sea, and observers had to be sent to look. With the installation of this wireless network, these conditions can be determined directly from the Onagawa provisional town offices.

Future prospects

By having people from Onagawa use the wireless network system, we will get feedback from users on any issues in using the system and what applications they might hope for, from the perspective of a municipality hit by disaster, and we will apply these to future research and development. We also hope to implement network systems that can be used for purposes besides remote monitoring of Onagawa Bay, flooding of the national highway, and other conditions, such as providing PR for the municipality, public service announcements, or for commercial or tourism purposes after reconstruction is complete.

There was concern in Onagawa that a tsunami would strike after an earthquake occurred off the coast of northern Chile on April 1, 2014, UTC, but fortunately it was only barely discernible visually, and there was no damage to the town. Town staff was prepared for the tsunami, which was expected to arrive early in the morning, with a round-the-clock schedule. The system built by NICT provided clear video of Onagawa Bay that workers could monitor day-and-night, without repeated dangerous trips from the office to the sea. The system was also very useful for monitoring those who came to check whether a tsunami was coming.

Through these trial tests, NICT and Onagawa town are cooperating to build a model case for ICT in regional reconstruction and are contributing to building systems that are useful during disaster.

Accessing Global Markets through Standardization

Standardization Promotion Office, International Affairs Department

Standardization

Standardization may not be an area that is generally well-known, but it permeates deeply into our daily lives. For example, items such as batteries and screws can be used commonly, no matter who the manufacturer is, and this is only possible due to standardization. In the field of information and communications in particular, we need to be able to interconnect the various networks and terminals that we use, within Japan and internationally, so standardization is extremely important.

There are various types of standards. Standards from organizations like the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunication Union (ITU) are very important from the perspective of promoting smooth trade and developing global markets, as the Agreement on Technical Barriers to Trade (TBT) from the World Trade Organization (WTO) enforces international standard procedures for evaluating conformity to compulsory and optional regulations in each signatory country, and the Agreement on Government Procurement ensures that performance-related technical specifications of products procured by governments and related agencies conform to international standards, if they exist.

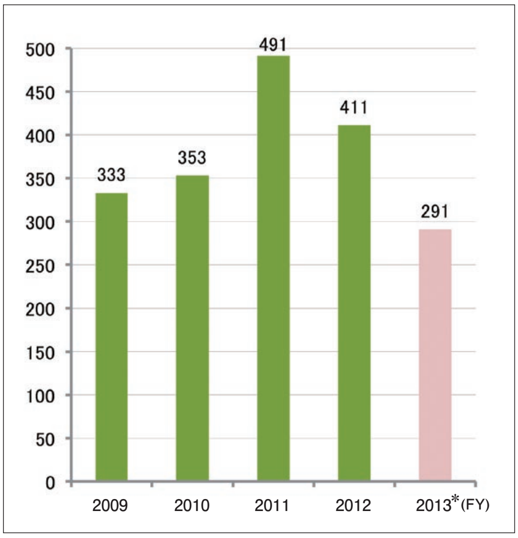
ITU-T Focus Group meeting

Presentation at ITU Telecom World 2013

Trends in international standardization

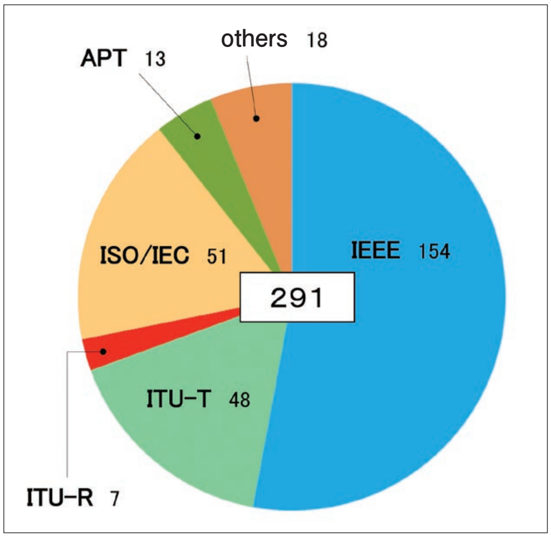
In the field of international standardization, participating countries and corporations engage in diverse negotiation and bargaining to create rules that allow them to take advantage of their own strengths or to secure positions in various markets. In the past, the main business model in Japan has been to adopt excellent systems and standards from the West and to manufacture and sell products, but as competition in manufacturing has intensified, it has become much more important to participate actively in international standardization, and to ensure a position in markets by taking the lead in creating rules that enable us to utilize our strengths.

In the past, most international standardization activity in the field of telecommunications was done at ITU, but technical specifications are now also being developed at IEEE, IETF, and many other forums, so a much wider range of activities than before must be addressed.

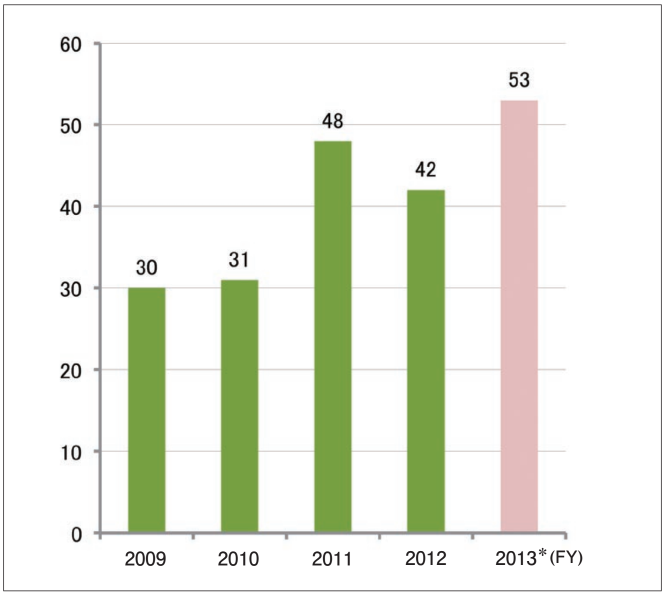


Trends in contributions for international standardization

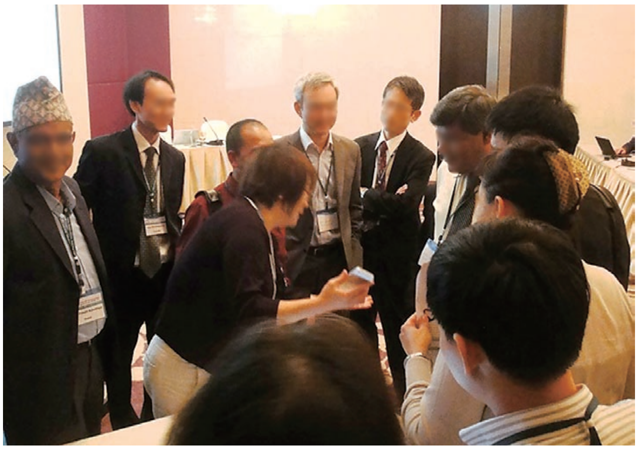
*Note: Data for FY2013 includes from April to November



Breakdown of standardization contributions by standardization organization from April to November, 2013



Trends in number of officers in international standardization
*Note: Data for FY2013 includes from April to November



Demonstration of multi-lingual speech translation system at APT (ASTAP meeting)

NICT's standardization activities

At NICT, we are engaged in R&D on advanced technologies in the ICT field, as well as standardization of outcomes from R&D, promotion of such technologies, and finding solutions to global issues.

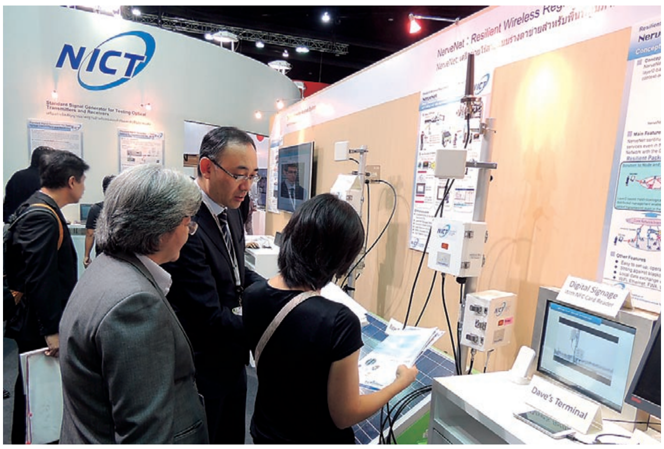
Currently, NICT has standardization activities covering R&D outcomes in fields such as new-generation networks, optical networks, wireless networks, network security, large-scale information processing, and electro-magnetic wave measurements, with international standardization organizations such as ITU, ISO, and IEC, regional standardization organizations such as the Asia-Pacific Telecommunity, with organizations such as IEEE and IETF, and also with domestic and international forums. Also, as a neutral public research facility, we have members working in positions such as chairperson in national committees on standardization and in international standardization organizations, in addition to being active in forums related to standardization, and providing support for international conferences and other events held in Japan.

To promote the return of R&D outcomes to society, it is important to promote international standardization, and also to promote the spread of products and services conforming to the standards. To do this, we are cultivating alliances and securing relationships with providers of products and services that conform to standards, from a neutral position that is not bias toward particular manufacturers or enterprises. As a concrete example, for the Wi-SUN wireless communication standard, which is expected to be used widely for smart meters and home networks in the future, we have been promoting international standardization through IEEE and have also established the Wi-SUN Alliance with related enterprises, to promote the standard through activities such as organizing interoperability testing to ensure compatibility.

We are also actively promoting research outcomes and links to the industry by exhibiting equipment and making presentations at ITU and APT workshops and international symposiums on topics such as: (1) regional wireless mesh networks and disaster data analysis systems using outcomes from research on resilient ICT, (2) portable health clinics using body area network technology, and (3) a networked multi-lingual speech translation system.

We are also engaging in standardization that contributes to solving global issues. Examples include providing technical support for medical examination systems, which will help to solve the problem of insufficient medical services in developing countries, promoting smart meter technology, which will realize energy savings by responding ally to power supply and demand, and standardizing the exchange of security information for building a framework for international cooperation.

In standardization activities, it is required to work steadily to build collaborative relationships with domestic and international governments, industries, and research organizations, to provide on-going contributions to the standardization discussion and to negotiate persistently. NICT is the only public research organization specializing in the information and communications field in Japan, and as such, it conducts basic and foundational R&D, while also actively returning results to society by promoting standardization activities.



NICT booth in the Japan pavilion at ITU Telecom World 2013

National Treasures of Nara in 3D!
—200-inch high-definition glasses-free images—

Naomi INOUE, Distinguished Researcher,
Universal Communication Research Institute

Standing Juichimen Kannon (Ekadasamukha, eleven-faced Kannon) (Important cultural property)

As part of our R&D on ultra-realistic communication, NICT is developing a 200-inch glasses-free high-definition 3D display. Starting in April, 2013, this display was installed on the third floor of the Knowledge Capital building in the Grand Front Osaka, Umekita area in front of Osaka Station, and used for experiments on ultra-realistic communication in society.

We obtained 3D images of valuable cultural properties including the Standing Juichimen Kannon (Ekadasamukha, eleven-faced Kannon, an important cultural asset) and the Gojushoto (five-storied small pagoda, a national treasure), with the cooperation of the Kairyuouji temple in Nara, and displayed them on the 200-inch glasses-free 3D display. These images were very popular among the many visitors.

There were also visitors that visited the actual Kairyuouji temple after viewing these 3D images, and there were reports about Kairyuouji temple in newspapers and on TV, prompted by the exhibition. Consequently, use of the display to promote the many other valuable cultural properties in the Kansai region, as well as Kairyuouji temple in its serene environment was recognized, and it was awarded a "Knowledge Innovation Award 2013," acknowledging concrete results in "Creating new value causing change in the world."

Gojushoto (five-storied small pagoda) (National treasure)

Knowledge Innovation Award 2013 Trophy

Awards

Recipient ● **Hiroaki KATO**/ Senior Researcher, Spoken Language Communication Laboratory, Universal Communication Research Institute

◎Award Date: December 8, 2013

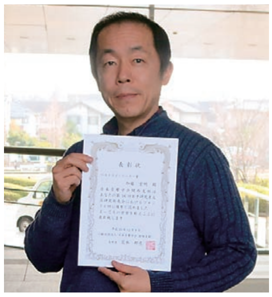
◎Name of Award:
Best Commentator Award

◎Details:
In recognition of excellent comments at the 16th Young Researcher Exchange Research Conference

◎Awarding Organization:
Kansai Chapter of the Acoustic Society of Japan

◎Comment from the Recipient:

This is a unique award, in which the presenters evaluate the audience at a research conference. It was established by the steering committee organized by young researchers, and it contributed greatly to enlivening the conference. Comments from commentators were evaluated based on (1) whether they identified new perspectives, (2) whether they identified critical points needing further study, and (3) other significance for presenter's future research. I hope I have conveyed, even a little, my desire to support these young researchers.



Recipients ● **Shin-ichi YAMAMOTO**/ Senior Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute
Naoko YOSHIMURA/ Senior Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute
Naoto KADOWAKI/ Senior Executive Director

Co-recipients: Yuichi KAWAMOTO (Tohoku University)
Hiroki NISHIYAMA (Tohoku University)
Nei KATO (Tohoku University)

◎Award Date: December 11, 2013

◎Name of Award:
IEEE GLOBECOM 2013 Best Paper Award

◎Details:
Recognizing the excellence of the paper: "A Centralized Multiple Access Scheme for Data Gathering in Satellite-Routed Sensor System (SRSS)"

◎Awarding Organization:
IEEE GLOBECOM 2013

◎Comment from the Recipients:

From the left: Shin-ichi YAMAMOTO, Naoko YOSHIMURA, Naoto KADOWAKI

We are very honored to receive the Best Paper Award for our presentation at IEEE GLOBECOM 2013.

This research is regarding the channel control for satellite sensor networks, which considers the real-time nature of the data and is an important technology for accommodating the many sensor stations installed for early detection of disasters. The satellite sensor networks are for early detection of disasters, and are expected to enable accurate evacuation instructions and support. We will continue to advance efforts toward the realization of the satellite sensor networks in the future.

We would like to express thanks to those at and related to the Space Communication Systems Laboratory, who constantly provide support and advice for this research.

This research is a result of joint contract research with Tohoku University.

Recipients ● **Huan-Bang LI**/ Senior Researcher, Dependable Wireless Laboratory, Wireless Network Research Institute
Ryu MIURA/ Director of Dependable Wireless Laboratory, Wireless Network Research Institute

◎Award Date: December 12, 2013

◎Name of Award:
BEST PAPER AWARD

◎Details:
The paper, "UWB Radar with Array Antennas for Human Respiration and Heartbeat Detection" was selected for the Best Paper Award.

◎Awarding Organization:
International Academy, Research, and Industry Association (IARIA)

◎Comment from the Recipients:

UWB radar holds promise for use in the fields of medicine, health care and rescue. The authors have performed basic research and evaluated performance of using UWB radar for detecting respiration and heart rate and have evaluated the effectiveness of different UWB bands through computer simulation.

This is the sixth time CENTRIC has been held, but the first paper submitted and presented by the authors, so we are very happy to have been selected for this award. UWB radar presents various possibilities, so we hope to continue and expand on this research in the future.

From the left: Ryu MIURA, Huan-Bang LI

Recipient ● **Toshio IGUCHI**/ Director General, Applied Electromagnetic Research Institute

◎Award Date: January 1, 2014

◎Name of Award:
IEEE Fellow

◎Details:
For contributions to spaceborne meteorological instruments and radar

◎Awarding Organization:
The Institute of Electrical and Electronics Engineers (IEEE)

◎Comment from the Recipient:

I am very pleased to be elevated to the grade of IEEE Fellow. I see it as recognition of my research and development of rain retrieval algorithms for spaceborne radar. I hope on this occasion, that this field of research will become more widely known and active. I am grateful to those who supported my elevation to the IEEE grade of Fellow.

NICT Exhibit at Interop Tokyo 2014

Dates: June 11-13, 2014
Location: Makuhari Messe

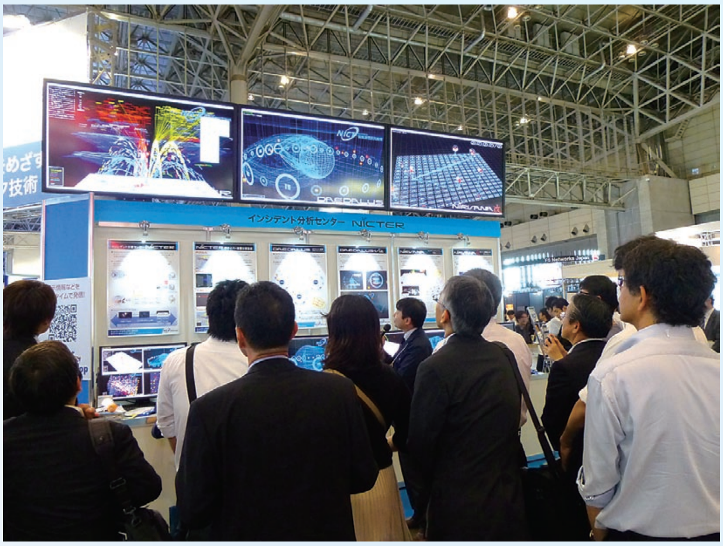
NICT will introduce dynamic exhibits with technologies including new-generation networks, network security, advanced testbeds, and wireless networks, on the theme, "Opening the Big Data Era with New-Generation Network Technology."

Details will be provided as necessary on Twitter (@NICT_Interop).

We look forward to many visitors at the NICT booth (Hall 6: 6H08).

＊Free admission to the venue is available by pre-registering on the Interop Tokyo 2014 website.

http://www.interop.jp/2014/english/



NICT booth at Interop Tokyo 2013

Announcing
Exhibits at the First Earthquake Technology Expo Osaka and the Disaster Prevention Technologies Lectures 2014

NICT will present various exhibits at the First Earthquake Technology Expo Osaka, including "Surveillance of disasters such as tornados and Guerrilla rainstorms (unexpected strong rain) using phased-array weather radar," "Data transmission from maritime buoys using Engineering Test Satellite VIII for early detection of tsunamis," and "Technology for connecting isolated regions to networks using a system with small, unmanned aircraft."

At the same time nearby, we will also be holding the Disaster Prevention Technologies Lectures 2014.

Please plan to attend!

First Earthquake Technology Expo Osaka

Date/Time: **June 17-18, 2014, 10:00 to 17:00**
Location: Congrès Convention Center ＊3 min. walk from JR Osaka Stn.
Grand Front Osaka, 3-1 Ofuka-cho, Kita-ku, Osaka
http://www.congre-cc.jp/en/
Organized by: Earthquake Technology Expo Osaka Executive Committee
Admission: Free. Registration required (2-Day admission pass in exchange for completed survey at reception)
For details, please visit the following URL.
http://www.exhibitiontech.com/etec_osaka/gaiyou.html (Japanese only)

Disaster Prevention Technologies Lectures 2014

Date/Time: **June 18, 2014, 14:00 to 16:45**
Location: 10F, Tower B, Grand Front Osaka, 3-1 Ofuka-cho, Kita-ku, Osaka
Knowledge Capital Conference Room B01
＊4 min. walk from JR Osaka Stn. http://kc-space.jp/ (Japanese only)
Lecture content: Disaster prevention technologies utilizing ICT, such as advanced uses of a disaster prevention and administrative radio system.
Organized by: NICT, ICT Forum for Security and Safety
Admission: Free
To register, please visit the following URL.
http://ictfss.nict.go.jp/ictfss-2014/ (Japanese only)

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〈Recycled Paper〉