



01

Research on Security Architecture to Realize Optimal Security

—Toward tailored security suitable for any network usage—

Shin'ichiro Matsuo



03

Innovation of Optical Fiber Communications Infrastructure

—Dawn of spatial and mode division multiplexed transmission era—

Yoshinari Awaji



05

Solid, reliable technology that expedites research activities
Prototype Development Part 2

Manufacturing an engineering model of an onboard optical component for a Japanese satellite

— Machine shop with highly trained support accessible daily to realize new ideas in space technology at NICT —

Hiroo Kunimori

07 Prize Winners

09 Report on holding the Disaster Crisis Management ICT Symposium 2012 and participating in the 16th Technology Against Earthquake Expo

10 Report on NICT Information Communications Security Symposium 2012

11 MOU between NICT and Information Technology Laboratory, National Institute of Standards and Technology (NIST), United States Department of Commerce, has been signed

Research on Security Architecture to Realize Optimal Security

—Toward tailored security suitable for any network usage—



Shin'ichiro Matsuo

Director, Security Architecture Laboratory, Network Security Research Institute

After completing a doctoral course, Matsuo joined NTT Data Corporation in 1996 and researched the application of encryption and information security. He joined NICT in 2009 and has been in his current position since 2011. Ph.D. (Engineering)

Diversification of network usage and complexity increase of security countermeasures

Recent years have seen significant changes in the network environment in terms of processing methods and services. In the past, services were provided for a structure that consisted of clients and servers, and information security was also designed for this structure. With the rise in cloud computing, however, the storage of information assets—a starting point for thinking about security—has become diversified. At the same time, more and more devices that were not protected by conventional security technology, including smart phones, sensors, and RFID tags, are now connected to a network. The goal of the new-generation network currently being developed by NICT is to provide a communications environment that flexibly responds to specific situations based network virtualization, ID Locator Separation^{*1}, and other technologies for networks connecting approximately 10 trillion devices.

The technologies standardized by ITU-T^{*2}, IETF^{*3}, and other bodies have been used to achieve system security by using traditional information and communications technology (ICT), but those technologies only apply to stereotypical environments and security requirements. As network environments diversify and become more complex, however, security threats to networks have also become complex, making it extremely difficult to determine what measures are appropriate for such threats. In such situations, existing security technology may not be good enough to take the necessary security measures in some cases. In other cases, communications speed must be sacrificed due to the excessive measures taken.

We need an architecture that provides optimal and timely security measures to handle threats against complex networks.

Optimal and timely security countermeasures

The basic idea behind how to ensure security in ICT has always been very simple. When designing a system to provide a certain service, list all the places that store information assets requiring protected (credit card number, personal information, and password). Next, estimate the likelihood of a successful attack on the information stored in each place, prioritize them by the value of the expected losses from damage. Finally, incorpo-

rate measures to protect the system against such attacks. This way of thinking itself is universal and probably will not change much in the future. When it comes to a newly discovered vulnerability in a system after the system begins operation, however, we still must rely on a labor-intensive method involving network security experts who have a good knowledge of the specifications of the applicable system. We must determine the appropriate type of patch and ensure that it does not cause security or performance problems, so managing security patches alone is an enormous and difficult task (Figure 1).

A network in the new era must remain secure even after the system design phase. For that purpose, we must determine the measures to take at the system design phase, respond quickly to any vulnerability found while operating the system, and make sure that the measures taken against the vulnerability and threats are optimal. In other words, they should be effective and minimally affect communications performance.

	(I) Attacks not caused by vulnerability	(II) Attacks caused by vulnerability
Attacks	Denial-of-Service (DoS) attacks, etc.	Cracking, malware, information theft, privacy leakage, etc.
Observation /Analysis technology	Observation and analysis of attacks by nictcr system (Cybersecurity Laboratory)	
		Analyzing vulnerabilities and applying countermeasures for the resulting attacks is labor intensive.
Countermeasure technology	NICTER alert/Malware countermeasures user support technology/Preventive fundamental technology (Cybersecurity Laboratory)	
	Hard to automate the system level migration against attacks	Current authentication and privacy protection technology cannot handle enormous numbers of diverse devices.

Figure 1 ● Classification and challenges of security analysis and measures in ICT

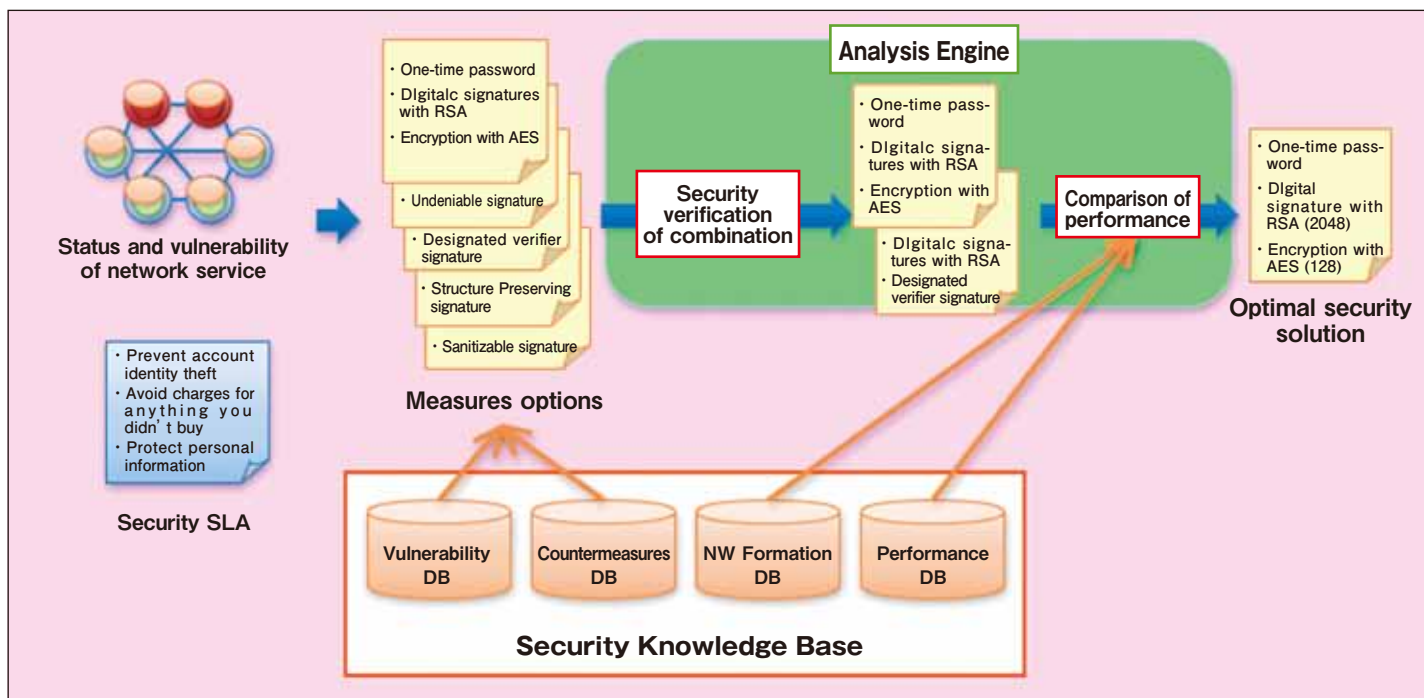


Figure 2 ● Conceptual diagram of security knowledge base and analysis engine

A new security architecture

The security architecture that we are currently working on aims to achieve two things through new technology development. The first is a flexible security foundation that provides optimal and timely security in an increasingly complex network. The second is a security component—authentication and privacy protection—that can connect 10 trillion nodes, including devices with low computational capability.

In the flexible security foundation, we try to establish a security knowledge base and analysis engine that can be used to develop optimal and timely security measures (Figure 2). The security knowledge base is a collective term for the database that contains information about vulnerabilities hidden in network equipment, technology for countermeasures, network formation, the performance of network equipment, and so on. This is also linked with the observation results from NICTER (Network Incident analysis Center for Tactical Emergency Response)^{*4} operated by the Cybersecurity Laboratory. The analysis engine achieves optimal security by selecting in coordination with the security knowledge base those security measures that are safe and have the highest processing performance. We have already taken the first step by developing a prototype of the Risk Visualizer (Figure 3) that can use the security knowledge base to determine and visualize vulnerabilities in the service being used by users of mobile equipment. This flexible security foundation will serve as a base for next-generation security in a new-generation network by making the most of the features of new-generation networks, such as network virtualization and ID Locator Separation.

As for the security component, we aim to establish authentication and privacy protection technology that can be used even by devices with low computational capability. We have been researching technologies that will enable authentication and privacy protection even between networks controlled by different systems. We have developed a privacy protection technology that can simultaneously ensure the anonymity and confidentiality of a document, as well as an authentication technology for RFID tags. We will incorporate these technologies in a demonstration of a new-generation network.



Figure 3 ● Example of Risk Visualizer system's display of risks associated with the use of a network.

Glossary

*1 ID Locator Separation

A technology being developed by NICT separately manages the identifiers for the name and location of a terminal to ensure continued communications. The technology uses the same ID across networks under the control of different systems or even when the network is switched due to a relocation of the terminal or obstacles in the path.

*2 ITU-T

International Telecommunication Union Telecommunication Standardization Sector (ITU), a specialized agency of the United Nations.

*3 IETF (The Internet Engineering Task Force)

An organization that reviews the standardization of internet technology. The technical specifications established by the IETF are published as RFC (Request for Comments).

*4 nictcr

(Network Incident analysis Center for Tactical Emergency Response)

A composite system being developed by NICT that analyzes the information obtained by observing network attacks and collecting malware, and determines the cause so that various Internet security threats can be identified promptly and effective measures derived.

Innovation of Optical Fiber Communications Infrastructure

—Dawn of spatial and mode division multiplexed transmission era—



Yoshinari Awaji

Research Manager, Photonic Network System Laboratory, Photonic Network Research Institute

After completing a doctoral course, Awaji joined Communications Research Laboratory, Ministry of Posts and Telecommunications (CRL; currently NICT) in 1996. He has been mainly researching optical signal processing, optical amplifiers, and optical packet switching. He was engaged in information security strategies at the Cabinet Secretariat from 2004 to 2006. Ph.D. (Engineering)

Capacity crisis in optical fiber communications

It is well known that optical fiber communications are behind the explosive increase in the population of Internet user, the remarkable spread of smart phones and tablets, and the generalized rich content services on the Internet. Optical fiber boasts exceptionally large capacity and low loss compared to other transmission media. Optical fiber, however, does not have limitless bandwidth. Not much has been said about it, but a sense of crisis about capacity exhaustion is rapidly spreading within the optical fiber communications research community.

The silica-based^{*1} optical fiber used for communications has a transparent band at around the 1.55 micrometer wavelength, where loss is very low. After the invention of a practical optical amplifier for this waveband, a rapid expansion in communications capacity occurred the late 1990s (Figure 1). Optical fiber has such a large capacity because the low-loss area of the available transmission bandwidth overlaps the amplification area of the optical amplifier over a wide waveband. Therefore, in the early stage of wavelength-division multiplexed (WDM) communications, research efforts were directed mainly at exploring frequencies, developing a laser optical source for unused oscillation wavelengths, and developing optical amplifiers in order to expand the number of wavelength channels. After exploring the band close to 1.55 micrometers, the focus of research activities shifted to making spectral efficiency better, such as in the wireless communications. Optical technology is now making it possible to implement more sophisticated modulation formats, such as differential quadrature phase shift keying (DQPSK), quadrature amplitude modulation (QAM), and orthogonal frequency division multiplexing (OFDM).

Theoretically, spectral efficiency is enhanced by improving the optical signal-to-noise ratio (OSNR) along the Shannon

limit^{*2}, but we faced an issue specific to optical fiber. The power of the signal light must be increased to improve the OSNR, but the total power of those signal channels with multiplexed wavelengths is concentrated on the core of the optical fiber, which has a diameter as small as 9 micrometers. For such an exceptionally high power density, even optical fibers made from silica exhibit notable third-order non-linearity (the phenomenon where the optical signal changes with the light intensity. The degree of the effect determines whether it is second-order, third-order, or higher, depending on the material). The effect causes waveform distortion and spectral change of the signal light, and the local maximum value appears in the spectral efficiency. Moreover, an excess power density will trigger the fiber fuse phenomenon in which the core of the optical fiber becomes activated by plasma^{*3} and burns, which may damage communications equipment or start a fire.

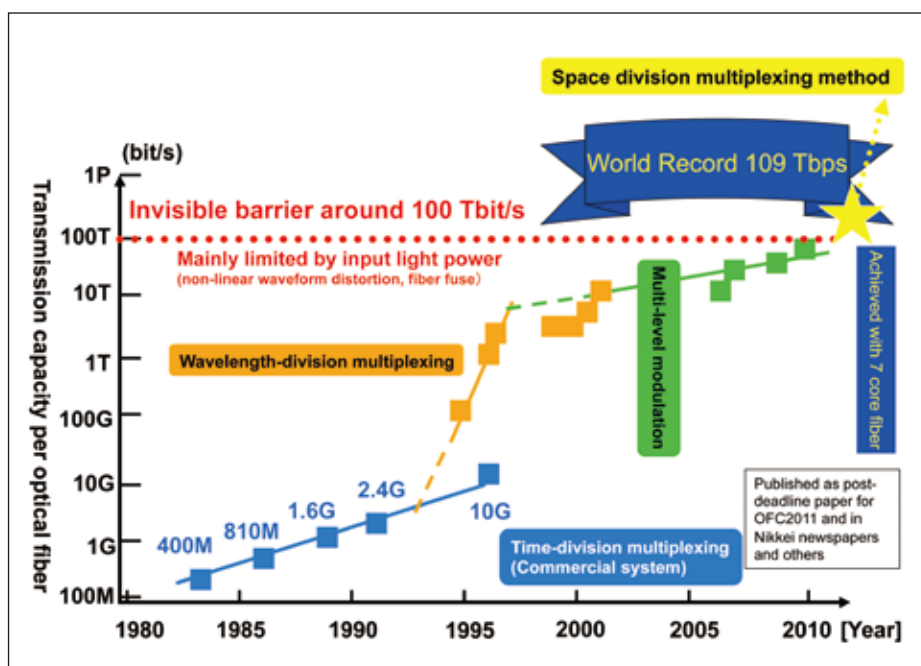


Figure 1 ● Capacity exhaustion and breakthrough

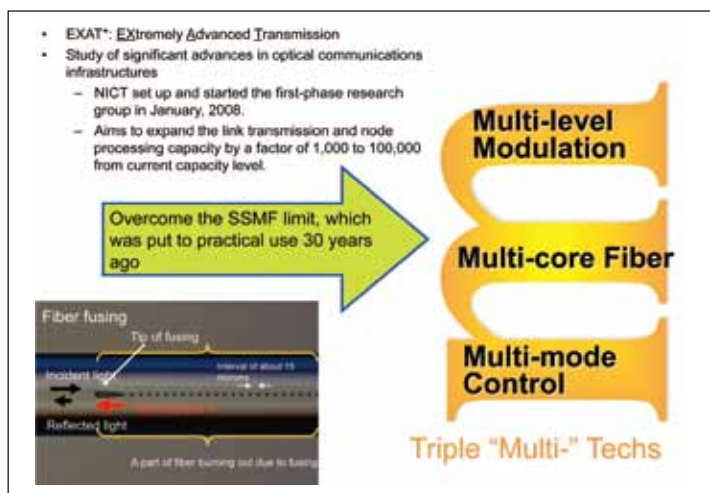


Figure 2 ● Lens-coupled multi-core fan-in/fan-out and trench-assisted seven-core fibers

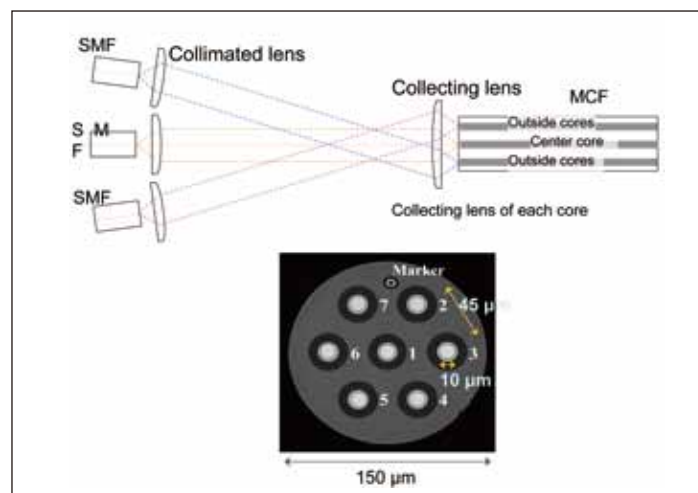


Figure 3 ● Lens-coupled multi-core fan-in/fan-out and trench-assisted seven-core fibers

EXAT initiatives started at NICT, spread to the world

Considering this power insertion limit, the band boundary of an amplifier, and the predicted traffic demand, E. Desurvire, then working at Alcatel Lucent, France, raised the question of capacity exhaustion in a paper published in 2006. In fact, the growth in the transmission capacity per optical fiber seemed to be nearing saturation after 2001 as it approached 100 terabits per second (Figure 1). Not many people, however, responded to this critical issue and it was virtually neglected. Then, in response to the initiatives of NICT, a study group on Extremely Advanced Optical Transmission Technologies (a research group working on significant advances in optical communications infrastructure) was formed and began comprehensive activities in January 2008 with researchers from government, industry, and academia. After discussions, we reached the conclusion that, to overcome capacity exhaustion and increase capacity by a factor of 1,000 to 100,000 within the next twenty years, we must develop 3M technologies (triple multi-techs): multi-level modulation, multi-core fiber, and multi-mode control (Figure 2). We then held an international symposium in November 2008 and started sending out information to the world about the EXAT initiatives that had started in Japan. We subsequently publish one paper after another from relevant research institutes, leading to the rapid development of the field, not just domestically, but overseas, as well. One notable development was the spatial and mode division multiple transmission method that actively utilizes multi-core fibers and multi-mode fibers, thereby significantly raising the optical insertion power limit.

World record generated from multifaceted research structures

Through commissioned research of innovative optical fiber technology and innovative optical fiber communications infrastructure, NICT well utilizes the power of domestic research institutes to accelerate R&D activities in this field while working on its own cutting-edge and high-risk research.

As an example, we managed to develop in 2011 a lens-coupled multi-core fan-in/fan-out combined device, which common sense in the space optics field said was impossible, and achieved a then-world-record transmission capacity of 109 terabits per second using trench-assisted seven-core fibers (Figure 3). The rate of 100 terabits per second was considered a barrier in this capacity exhaustion problem, so breaking the barrier with the new space division multiplexing method should be historically

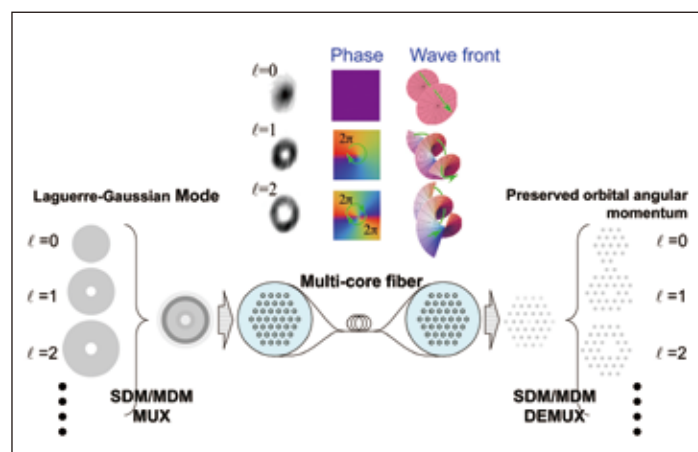


Figure 4 ● Laguerre-Gaussian mode division multiplexing signal transmission with multi-core fibers

meaningful.

Furthermore, instead of using the mode division multiplexing method in a high-order LP mode, which accounted for the majority in academic meetings, NICT implemented the world's first demonstration of optical fiber transmission and the mode division multiplexing method using a Laguerre-Gaussian mode, about which the optical communications industry knew little (Figure 4).

Future perspective

For the future, we would like to more actively promote international cooperation and contribute to faster standardization and the practical use of the relevant technology while Japan continues to play an important role in the field.

Glossary

*1 Silica

Silicon dioxide (SiO₂), or glass

*2 Shannon limit

The limit in transmission capacity that is determined by the communications channel's signal-to-noise ratio and the frequency bandwidth. This was formulated in 1948 by C. E. Shannon.

*3 Plasma

When the temperature of a gas rises, the molecules of the gas dissociate into atoms, and the electrons orbiting the atomic nucleus move away from the atom and split into cations and electrons (ionization). The gas containing the charged particles generated through ionization is called plasma.

P

– Solid, reliable technology
that expedites research activities –

Part 2

prototype Development

Manufacturing an engineering model of an onboard optical component for a Japanese satellite

– Machine shop with highly trained support accessible daily to realize new ideas in space technology at NICT –

Researcher who requests prototyping



Hiroo Kunimori

Senior Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute

After graduating from university, Kunimori joined Radio Research Laboratories Ministry of Posts and Telecommunications (currently NICT) in 1981. He was engaged in VLBI (Very Long Baseline Interferometry) at the Kashima branch and standardization of electrical communications at the Ministry of Posts and Telecommunications (currently Ministry of Internal Affairs and Communications). He has been researching space-time measurement SLR (Satellite Laser Ranging) since 1989 and is engaged in component development and management while in charge of the Optical Ground Station for Space Laser Communications.

Introduction

The Space Communication Systems Laboratory, Wireless Network Research Institute, researches and develops element and operation technologies for components that allow satellites to optically communicate with other satellites and optical ground stations. I am responsible for communications experiments and positioning at the Optical Ground Station for Space Laser Communications, one of the major optical ground stations in Japan.

My area of expertise is the technology for satellite laser ranging (SLR). In SLR, the distance between a satellite and a ground station is measured by aiming a laser at a satellite and receiving the reflected light on the ground. This technique can determine the trajectory, acquire and track satellites to support optical communications, and also make comparison between a station and a satellite.

A satellite is equipped with a mirror prism called a corner cube reflector (CCR). A Laser Retroreflector Array (LRA) comprises several of these components, the number, size, and arrangement of which depend on the purpose of the satellite. I would like to introduce the prototype of the LRA.

What motivated me to ask for prototyping components?

About ten years ago, while researching the laser and reception system for a ground station, the prediction of trajectory, and the accuracy of the distance measurement, I became strongly interested in how CCR and LRA in orbit are made and with what kinds of material so that they remain accurate, and not just in the ground stations. LRA have been installed in more than fifty small

satellites and science satellites across the world, and more than thirty are still being used for conducting observations. However, only a few examples of domestically produced LRA are in use, including the LRA on the experimental geodetic satellite AJISAI (EGS), which was launched in the 1980s by the National Space Development Agency of Japan (currently Japan Aerospace Exploration Agency, or JAXA). What motivated me to start using the prototype development service went back to about five years ago, when JAXA's Institute of Space and Astronautical Science asked us to develop an LRA for a science satellite. JAXA later joined the LRA research activities.

Difficulty in making a device that works in space

A CCR is a prism with three surfaces exactly orthogonal to each other and several centimeters in diameter. Incident light is reflected once at each of the three surfaces and then returned in the direction from which it came. Even this simple component required us to rethink everything about using it in space. CCR is passive equipment that does not consume electricity. Even so, we had to make it compatible with the launch environment and the space environment in terms of mechanics, heat, radiation, optics, and static electricity.

Asking for prototype development service

Mainly because we did not have enough budget, our policy was to do everything we could on our own rather than rely on major manufacturers. That actually helped us notice what was missing. We started to have more interactions with those who have know-how about space equipment development. We became a team by learning from each other.

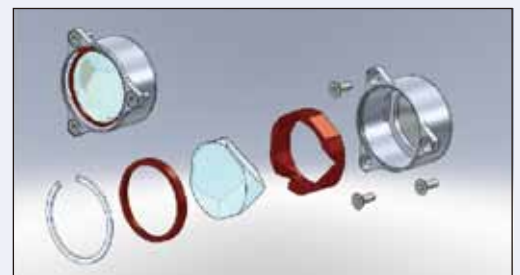


Figure 1 ● CAD drawing for structure ideas

Many research activities at NICT require parts that cannot be found in the market. Such parts must be made in-house. “Prototype Development”, one of the services offered by the R&D Activities Support Office of the Outcome Promotion Department, is meeting these needs by fabricating the parts that researchers require. This article is the second in a four-part series on the achievements of Prototype Development from the researchers’ viewpoints.



We requested the prototype development team, the Outcome Promotion Department, to make a holder for a CCR. This is a small part 30 mm in diameter and 25mm in height. Not just within our team but among the prototype development staff members, we discussed the requirements of the part, such as, it should not damage or strain the CCR even under vibration, shock, or temperature variations of $\pm 100^{\circ}\text{C}$ (Figure 1).

Among the various environmental tests, the pyro shock test is the severest. We had to undergo a continuing process of trial and error to come up with a holder structure that could pass the test. One time, the CCR came out of the holder during a pyro shock test (Figure 2). Several prisms, each of which costs several tens of thousands yen, broke (Figure 3). Every time we failed, we changed the structure and repeated the test. It took us over a year to develop the final structure.

On the other hand, we had many problems optically examining a CCR strained by heat. Here again, the prototype development group helped us by creating a jig (instrument for holding a part during processing) for the holder that allowed us to better examine the holder. The LRA was actually assembled in the prototype development building (Figure 4). We made an engineering model^{*1} of part of the LRA (Figure 5), and conducted a vibration test, pyro shock test, thermal cycle test on the material coating, and radiation exposure test. The prototype passed all of the environmental tests except the thermal cycle test on the coating.

Toward future

The project for the above-mentioned science satellite was cancelled, so the fabricated engineering model was not used as a flight model^{*2}. We did, however, accumulate know-how about developing a prism type CCR. We are now working on a different type of CCR structure and how to mount it and are asking for help from the prototype development team regarding CAD and model fabrication. We hope that those components will become a flight model and be mounted in a satellite (Figure 6).

Glossary

*1 Engineering model

A model that is subjected to environmental and functional tests to determine whether it meets all the conditions required for mounting in a satellite. The satellite (component) model has the same design as that to be actually used. The challenges identified during the process are fed back to the design phase.

*2 Flight model

A model that is created after then engineering model and is actually mounted and is fabricated according to the final design.



Figure 2●Shock hammer test



Figure 3●Prism broken during a test



Figure 4●Assembling an LRA in the clean booth at the NICT prototype development building

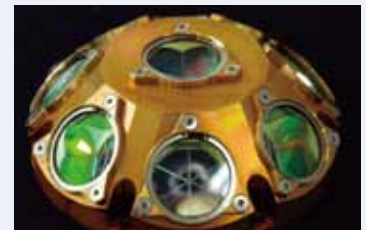


Figure 5●Completed LRA



Figure 6●The next step is to send a laser beam from the ground to a flight model.

Comments from the prototype development staff



Junichi Komuro

Expert, R&D Activities Support Office,
Outcome Promotion Department

When they consulted us about a CCR made of silica glass that broke during a pyro shock test, we thought the problem lay with the CCR’s support method. So we came up with ideas and proposed a new support method that has a simple structure and uses only a small number of parts, but provides every function needed. Fabricating this required certain processing skills, so this design may not have been developed outside the field of manufacturing. We created samples again and again and felt so relieved when the samples finally passed all of the environmental tests, including vibration and pyro shock tests, and the idea was adopted.

We started actively using 3-dimensional CAD design software about that time. It has proved quite useful for calculating the weight of a model created using CAD software and the interference between parts in space, as well for presentations. We also recently introduced a 3-dimensional printer, since much time is need to actually machine a prototype at the early stage of design. The printer makes it easier to fabricate a 3-dimensional model, helping us to more efficiently do design work.

Prize Winners

Prize Winner ● **Mohammad Azizur Rahman** / Expert Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

©Date:2011/7/21

©Name of Prize:

IEEE Standards Association Award (as Contributor)

©Details of Prize:

In recognition of his contribution to the development of IEEE Standard 802.22TM-2011

©Name of Awarding Organization:

IEEE Standards Association

©Comments by the Winner:

It is my great pleasure to receive this 'Certificate of Appreciation' from the IEEE Standards Association for my contributions to the development of IEEE Std. 802.22-2011. I have been active in the IEEE 802.22 working group since July 2009. I contributed sensing technologies and developed system concept intellectual property. I am also currently chairing a study group within the working group. This award is an inspiration for me to work hard.



From left, Mohammad Azizur Rahman, Dr. Apurva Mody (802.22 WG chair)

Prize Winner ● **Eloy Gonzales** / Expert Researcher, Information Services Platform Laboratory, Universal Communication Research Institute

©Date:2011/8/2

©Name of Prize:

Distinguished Young Researcher Award

©Details of Prize:

In recognition of the excellent paper published at the iDB Workshop 2011 (authored by: E Gonzales, T Nakanishi, K Zettsu).

©Name of Awarding Organization:

The 3rd International Workshop with Mentors on Databases Web and Information Management for Young Researcher

©Comments by the Winner:

This award is a great motivation for further researching about the uses and applications of large amounts of data. In this study, notions of bio-inspired evolutionary mechanisms are applied to improve the knowledge discovery process, especially for heterogeneous databases. I also would like to express my appreciation and gratitude to those people who offered their guidance and support for this study.

In the future, I will do my best to contribute to the development of information technologies in such way to serve to society effectively and help to reduce the digital divide.



Prize Winner ● **Iwao Hosako** / Associate Director General of Advanced ICT Research Institute/Director of Terahertz and Millimeter Wave ICT Laboratory

Joint Prize Winners:

Naoki Oda (NEC Corporation)
Susumu Komiyama (The University of Tokyo)

©Date:2011/9/22

©Name of Prize:

The 10th Distinguished Service Award of Conference for the Promotion of Collaborations Among Business, Academia, and Government; Award of the Minister of Public Management, Home Affairs, Posts and Telecommunications

©Details of Prize:

Development of terahertz imager consisting of uncooled terahertz array detector with the world's highest sensitivity and a small terahertz illumination source system

©Name of Awarding Organization:

Conference for the Promotion of Collaborations Among Business, Academia, and Government

©Comments by the Winner:

The imager team in the commissioned research project, Terahertz Technology R&D for Achieving Safety and Security with ICT, comprises NEC, the University of Tokyo (array sensor), and voluntary research at NICT (optical source). We all worked together and succeeded in developing technology with wide applications. The award is a result of everyone's excellent skills and great teamwork. It is a true honor for us to receive the award on behalf of each organization.



From left, Iwao Hosako, Naoki Oda, Susumu Komiyama

Prize Winner ● **Iwao Hosako** / Associate Director General of Advanced ICT Research Institute/Director of Terahertz and Millimeter wave ICT Laboratory

Joint Prize Winners:

Eiji Higurashi, Ryuji Kurayama, Yinghui Wang, Tadatomo Suga, Yoshihiro Sawayama, and Yasuo Doi (The University of Tokyo)

©Date:2011/9/27

©Name of Prize:

Best Technical Paper Award

©Details of Prize:

In recognition of our paper "Direct bonding of Ge wafer at room temperature with the aim of application to far-infrared ray detectors" published at the 28th Sensors, Micromachines, and Application Systems symposium held under the auspices of the Sensors and Micromachines Society, the Institute of Electrical Engineers of Japan.

©Name of Awarding Organization:

The Institute of Electrical Engineers of Japan

©Comments by the Winner:

We first verified the ideas and feasibility of the basic technology on our own and then developed a cooperative relationship with outside researchers with better skills. I believe that this was the main factor leading to this award. It is a great pleasure for us to be recognized despite the fact that the detector has not been fully developed.



Prize Winner ● **Kim Kyoung-Sook** / Researcher, Information Services Platform Laboratory, Universal Communication Research Institute
Ryong Lee / Researcher, Information Services Platform Laboratory, Universal Communication Research Institute
Koji Zettsu / Director, Information Services Platform Laboratory, Universal Communication Research Institute

◎Date:2011/11/4

◎Name of Prize:

Best Demonstration Award Runners up

◎Details of Prize:

For remarkably excellent demonstration paper published at the ACM SIGSPATIAL GIS 2011

◎Name of Awarding Organization:

ACM SIGSPATIAL (ACM Special Interest Group on Spatial Information)

◎Comments by the Winner:

The award was granted for the technology of analyzing the spatio-temporal information with social media in order to understand the situation of events happening in the real world and their changes. The demonstration paper comprehensively shows the changes in topics (movement) about the Great East Japan Earthquake in time and space based on Twitter messages. The award is a great inspiration to us, and we would like to research and develop more promptly the foundation technology to process the wide variety of space-time information that is flowing in large volumes on a network. Lastly, let us express our deep appreciation to those who support us.



From left, Ryong Lee, Kim Kyoung-Sook, Koji Zettsu

Prize Winner ● **Toshiyuki Miyachi** / Expert Researcher, Network Testbed R&D Laboratory, Network Testbed R&D Promotion Center
Razvan Beuran / Expert Researcher, Network Testbed R&D Laboratory, Network Testbed R&D Promotion Center
Shinsuke Miwa / Associate Director, Network Testbed R&D Laboratory, Network Testbed R&D Promotion Center
Yoshiki Makino / Expert Researcher, Network Testbed R&D Laboratory, Network Testbed R&D Promotion Center

Joint Prize Winners:

Satoshi Uda
(Japan Advanced Institute of Science and Technology)
Yasuo Tan
(Japan Advanced Institute of Science and Technology)
Yoichi Shinoda
(Japan Advanced Institute of Science and Technology)

◎Date:2011/11/11

◎Name of Prize:

AINTEC2011 Best Paper Award

◎Details of Prize:

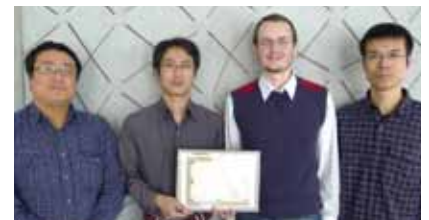
In recognition of "Fault Injection on Actual Node-Based Large-Scale Network Testbed" as the best paper in the paper review by the Technical Program Committee

◎Name of Awarding Organization:

AINTEC2011 Committee

◎Comments by the Winner:

Experimenters basically only focus on their target technologies in experiments and effects by faults on surrounding technologies are not deeply examined. The research proposed a framework that enables to introduce faults into experimental setups. The framework and some example experiments using it on StarBED received high evaluation. We believe that these experiments are important for verifying the kinds of impact that the whole network will receive when the network experiences trouble due to a natural disaster or other event. We will now proceed with research that will make it easier to conduct experiments using the framework.



From left, Shinsuke Miwa, Toshiyuki Miyachi, Razvan Beuran, Yoshiki Makino

Prize Winner ● **Toshiki Yamada** / Senior Researcher, Nano ICT Laboratory, Advanced ICT Research Institute

◎Date:2011/11/11

◎Name of Prize:

Award for Encouragement of Research in Thin Films

◎Details of Prize:

For presentation of excellent research outcome in the international conference for thin films.
(Titled: Development of New Microscopy Light Collection Unit for Single Molecule Spectroscopy under Various Ambient Conditions)

◎Name of Awarding Organization:

The 15th International Conference on Thin Films (ICTF-15)

◎Comments by the Winner:

At the international conference on thin films, a technology for analyzing various organic and bio thin films was presented. I made a presentation about optical microscope measurements with high-resolution and high-brightness for single molecule fluorescence spectroscopy under various ambient conditions, such as high vacuum and pure nitrogen gas, as well as its application to various studies. Our measurement system can be applied to various kinds of microscope measurements. I expect that it will be applied widely in the nano and bio fields.



Prize Winner ● **Yuichi Sakano** / Expert Researcher, Multisensory Cognition and Computation Laboratory, Universal Communication Research Institute
Hiroshi Ando / Director, Multisensory Cognition and Computation Laboratory, Universal Communication Research Institute

◎Date:2011/12/3

◎Name of Prize:

The second prize in the third Illusion Contest in Japan 2011

◎Details of Prize:

The illusion (Walking Robot) and demonstration are awarded the second prize in the third Illusion Contest in Japan 2011.

◎Name of Awarding Organization:

Illusion Contest Review Committee

◎Comments by the Winner:

We found a new illusion when creating a visual stimulus for research to determine the mechanism of visual perception when people experience presence, which eventually led to this award. In the future, we hope to propose a method for creating presence using the characteristics of human visual mechanisms including illusion and its evaluation technique. We would like to extend our sincerest gratitude to the members of the Multisensory Cognition and Computation Laboratory and other persons concerned who have supported our research.



From left, Yuichi Sakano, Hiroshi Ando

Report on holding the Disaster Crisis Management ICT Symposium 2012 and participating in the 16th Technology Against Earthquake Expo

Shinsuke Satoh, Research Promotion Expert, Planning Office, Applied Electromagnetic Research Institute
Yūki Kubo, Research Promotion Expert
Mamoru Ishii, Director

NICT's Applied Electromagnetic Research Institute, Wireless Network Research Institute, Network Security Research Institute, and ICT Forum for Security and Safety held the Disaster Crisis Management ICT symposium 2012—Lessons Learned from the Great East Japan Earthquake, at the Annex Hall of Pacifico Yokohama on Friday, February 3, 2012. The ICT forum for Security and Safety has been verifying the cases where the technology and services using ICT were successful or unsuccessful in mitigating damage from the Great East Japan Earthquake that hit Japan on March 11, 2011, and reviewing the measures to be taken to prepare for the next disaster and which direction in R&D should be taken. They are now compiling the proposals. With the proposals at the core, the symposium started with lectures by municipality officials on the needs side and by researchers and developers on the seeds side, followed by panel discussions based on the proposals in which we reviewed the kind of technical development needed to deal with future earthquakes.

The symposium kicked off with the organizer's greeting by Hiroshi Kumagai, Vice President of NICT, who also serves as chairman of the forum planning sub-committee. Then, as a guest speaker, Naoki Okumura, an executive member of the Council for Science and Technology Policy, Cabinet Office, and Isao Sugino, Director of Research Promotion Office, Ministry of Internal Affairs and Communications, gave opening addresses.

Yuko Endo, mayor of Kawauchi village, Fukushima, delivered a keynote speech titled "Current situation of Kawauchi village and challenges 11 months after the earthquake." It was followed by lectures by Naoto Kadowaki, Director General, Wireless Network Research Institute, NICT, Teruyuki Kato, Professor at Earthquake Research Institute, University of Tokyo, Seiho Uratsuka, Director of Radiowave Remote Sensing Laboratory, Applied Electromagnetic Research Institute, NICT, and Makoto Hanashima, Senior Researcher, Institute for Areal Studies Foundation. Panel discussions subsequently were held with Toshio Iguchi, Director General of Electromagnetic Research Institute, NICT, serving as a coordinator. We welcomed more than 200 participants. There were lively questions and comments from the audience during the lectures and panel discussions.

We also participated in the 16th Technology Against Earthquake Expo, which was held at Pacifico Yokohama on February 2nd and 3rd at the same time as the symposium. In tandem with the lectures at the symposium, our exhibitions covered securing a means of communication in disaster-affected areas using the ultrafast Internet satellite Wideband InterNetworking engineering test and Demonstration Satellite (WINDS)*, measuring radiation levels with smart meters, the possibility of predicting tsunami with a GPS buoy, observing damage caused by the Great East Japan Earthquake using the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2)*, and cloud and storage technology to protect information assets from natural disasters and unauthorized access. 14,000 people visited Technology Against Earthquake Expo, or 150% more than last year, perhaps reflecting a high level of interest after the earthquake. The NICT booth welcomed many of them.

Lastly, we would like to extend our deepest gratitude to the many people who helped us organize the symposium and participate in the Technology Against Earthquake Expo. For detailed information about the programs of the symposium and the lectures, please visit <http://ictfss.nict.go.jp/yokohama2012/>

*You will find related articles in the NICT News 2011 May issue.



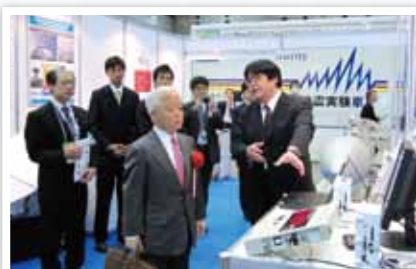
●Yuko Endo, Mayor of Kawauchi village, giving a keynote speech



●Panel discussions



●Symposium venue



●Naoki Okumura, CSTP executive member, looking around the exhibition booths



●Observation images on a tiled display, gathered by Pi-SAR2

Report on NICT Information Communications Security Symposium 2012

Fumihiko Numata,

Director, Planning Office, Network Security Research Institute

NICT held the NICT Information Communications Security Symposium 2012—Current Situation and Future of Information Security Technology, at BELLESALLE Kudan (Tokyo) on Friday, February 10, 2012.

The symposium has been held annually as an event related to Information Security Awareness Month, and this year marked the 6th symposium. With the rise in public interest in information communications security, we welcomed many participants. The event provided a good opportunity to share the challenges we are facing related to information communications security and to let the public know about the research activities underway at NICT Network Security Research Institute.



●Greeting by Kazumasa Enami, Vice President of NICT



●Greeting by Kenji Sato, Director, ICT Security Office, Ministry of Internal Affairs and Communications.

The symposium opened with greetings by Kazumasa Enami, Vice President of NICT, as an organizer, and Kenji Sato, Director, ICT Security Office, Information and Communications Bureau, Ministry of Internal Affairs and Communications. The event consisted of three parts in which invited guests delivered lectures and we described how the NICT Network Security Research Institute tackles various challenges.

【Part 1】 Current situation and future of cloud security/Security of future network

【Part 2】 Current situation and future of cyber security technology

【Part 3】 Current situation and future of encryption technology

Reflecting the increasing interest in information communications security technology, more than 250 people from various institutions, from private companies related to information communications, to universities and public offices, participated in the events and actively participated in the question and answer session. The symposium ended with the words from Yukio Takahashi, Director General of Network Security Research Institute, who said that, as threats against information communications security become more sophisticated and complicated, cyber-attacks are being used to make a point, and Japan is not at all immune to such threats. Therefore, it is imperative to fortify the collaborative relationship between relevant organizations and make efforts throughout Japan to deal with the threats. NICT would like to play a key role in these efforts.

Lastly, we would like to extend our gratitude to those who gave us kind support and help in organizing the symposium.



●Symposium venue

For detailed information about the program and lectures, please see <http://www.nict.go.jp/info/event/2012/02/pdf/20120210-01.pdf>

MOU between NICT and Information Technology Laboratory, National Institute of Standards and Technology (NIST), United States Department of Commerce, has been signed

NICT and the Information Technology Laboratory of the National Institute of Standards and Technology (ITL/NIST, United States Department of Commerce) have signed a Memorandum of Understanding (MOU) on comprehensive research cooperation in the information and communications research field at the headquarters of ITL/NIST on Tuesday, February 7, 2012 (Eastern Standard Time, (US)).

NIST, headquartered in Gaithersburg, Mainland, is one of the comprehensive research laboratories on science technology of the U.S. Department of Commerce. Six research institutes specializing in information technology, physical measurement, industrial technology, and other areas conduct R&D on measurement science, standardization, and enhancing the safety and quality of daily life. ITL, one of those research institutes, establishes interoperability and evaluation methods for information systems for U.S. government organizations and industry, conducts R&D for usability, security, and reliability, and carries out various tests.



●Kazumasa Enami, Vice President of NICT (Left) and Charles H. Romine, Director of ITL/NIST (Right) shake hands after the conclusion of the MOU.

* Cyber physical data cloud

A platform constructed in cyberspace that stores physical data, such as various environmental measurement data in the real-world, as well as social media information from individuals on a cloud server so that the data and information can be integrated, analyzed, and utilized.

With this MOU, ITL/NIST and NICT will deepen research cooperation by establishing common research subjects highly interested. We have already taken form to a cooperative relationship for research themes related to the cyber physical data cloud* and been planning to work together to establish a cloud system and research data management approaches and analysis methods targeting medical information and disaster-related information. We will also consider cooperation in the research and development of information and communications technology, such as network security technology.

Information for Readers

The next issue will take up the research to utilize DNA's excellent information processing ability, as well as information foundation technology for storing large volumes of information and support research.

NICT NEWS No.414, MAR 2012 ISSN 1349-3531

Published by
Public Relations Department,
National Institute of Information and Communications Technology
<NICT NEWS URL> <http://www.nict.go.jp/data/nict-news/>

Editorial Cooperation: FULFILL co., Ltd.

4-2-1 Nukui-Kitamachi, Koganei, Tokyo 184-8795, Japan
Tel: +81-42-327-5392 Fax: +81-42-327-7587
E-mail: publicity@nict.go.jp
<NICT URL> <http://www.nict.go.jp/>