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NICT NEWS

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Special Feature on New Generation Wireless Communications Research Center

Leadoff Interview

Pushing on Building Infrastructure for the New Generation Wireless Communications

Towards Realizing an Ubiquitous Network Society

Realizing a Safe and Secure Society by Using the Ubiquitous Wireless Communications System

Initiatives for R&D and Emergency-Disaster Measures towards Realizing High-speed and Broadband of Space Communications

Wireless Body Area Networks and Their Technical Challenges

TOPICS

NiCT

Pushing on Building Infrastructure for the New Generation Wireless Communications

Naoto Kadowaki
Executive Director, New Generation Wireless Communications Research Center

After completing a Master's course at Tohoku University, worked at Mitsubishi Electric Corp. before joining Communications Research Laboratory (current NICT) in 1986.

Engaged in research in mobile satellite communications, and broadband satellite networks, etc.

Yokosuka Research Laboratories, which conduct research and development on a new generation advanced wireless technologies, is building a base at the Yokosuka Research Park (YRP). YRP is located on the Miura peninsula in Kanagawa prefecture, which is well suited to conducting radio experiments.

A Base for Development of Wireless Communications Technology

What sort of research is being done at New Generation Wireless Research Center?

Kadowaki: The Research Center has conducted research in wireless communications technology continuously since the forerunner of NICT, which was called Communications Research Laboratory (CRL), always working from the perspective of what was needed for the next generation of technology, and what sort of technical development would be useful in the world. So, we try to inhabit different areas of research from those occupied by industry in pursuit of business, to fulfill our role as a public research organization, for example, as we have done with mobile phone development.

Why has the Research Center been located within Yokosuka Research Park (YRP)?

Kadowaki: YRP was established as a base for research in radio communications and mobile communications in particular, supported by Ministry of Internal Affairs and Communications (MIC), and was officially opened in 1998. It was a core national research facility at that time, and as such, built this base in cooperation with related enterprises. One of the reasons why this location was selected was because of its geographic characteristics, near Yokohama and Tokyo, with mountains to the north and facing the sea on the other side. It is suitable for radio experiments, with relatively little EM radiation noise from the urban areas.

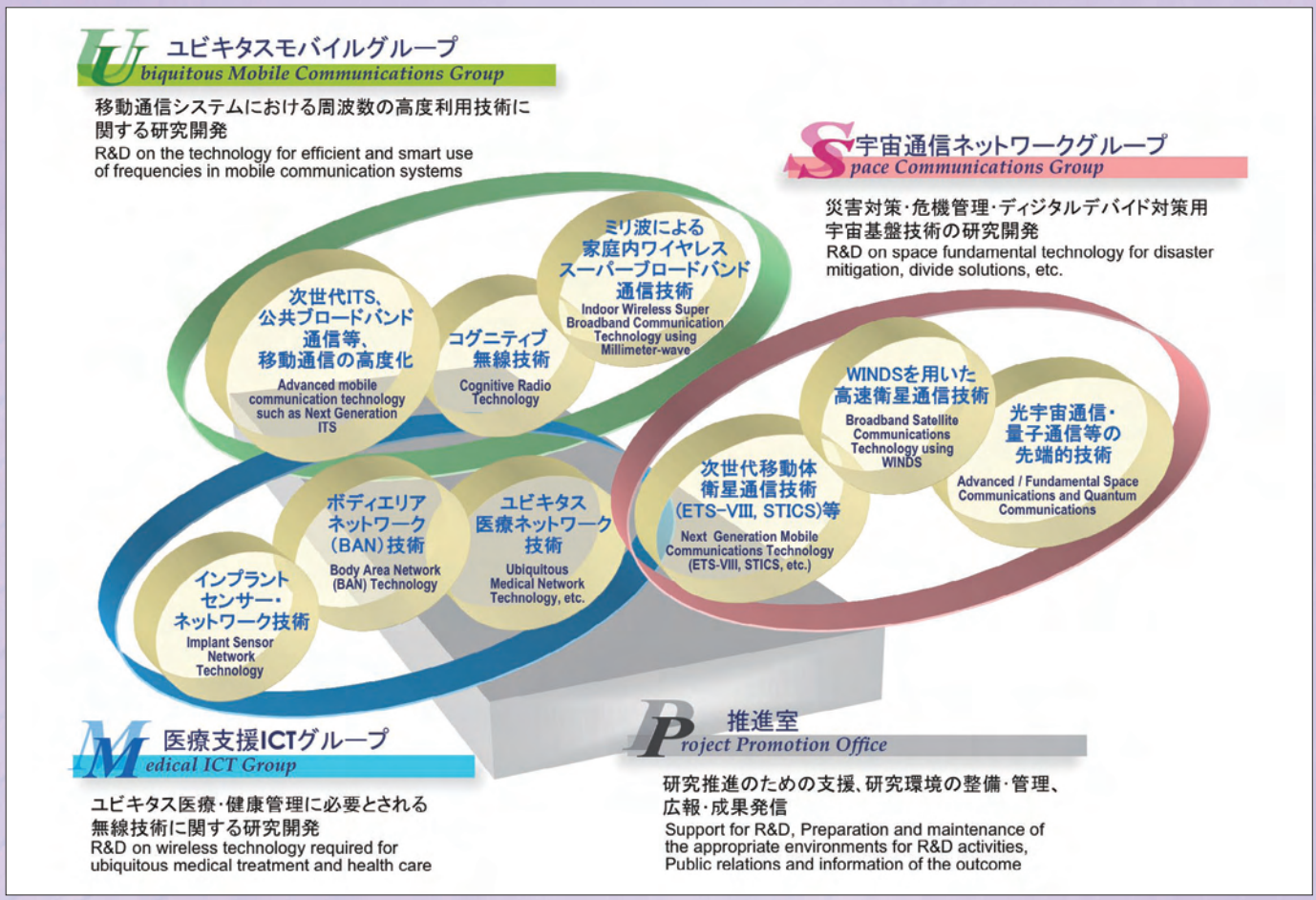
What sort of research are you focusing on recently?

Kadowaki: We are really focusing on Cognitive Radio Technology at the moment. It is new technology that allows a terminal to recognize the radio environment where it is located, select the best from multiple radio systems available to it, and help increase bandwidth efficiency by selecting frequencies not already in use. These communications systems select from different radio systems, from the systems of multiple providers, and from frequencies that are not already in use, optimizing according to the user's needs. They need to be developed now, for the future when the limited bandwidth resources will be running short. This is part of our mission as a public organization in neutral in neutral standpoint.

How far has research progressed so far?

Kadowaki: We have a basic operational prototype working as a test device. Our next step is to quickly submit proposals for technologies that we have accumulated, for international standardization. Some of our proposals in the area of cognitive radio technology

● Overall View of YRP



●Research System for New Generation Wireless Communications Research Center

have already been adopted as IEEE standards. We take the fact that it is at a level for global standardization as an indication that NICT technology is taking the lead in Japan, and furthermore, is at the leading edge globally.

Promoting technology development in collaboration with Industry, Academia and Government

New Generation Wireless Research Center has many ties with industry, academia and government, doesn't it?

Kadowaki: YRP itself symbolizes a collaboration of industry-academia-government cooperation. Corporations like NTT DOCOMO, Fujitsu and NEC share a base together with public organizations like us. This allows us to work on a variety of projects together, and simply being in the excellent YRP environment is extremely advantageous.

Can you give us an example of one of these projects?

Kadowaki: One example is Intelligent Transport System (ITS). Experiments with next-generation wireless networks connecting vehicles to each other and to the roadway infrastructure are being done using YRP roadways, in cooperation with enterprises having research bases within YRP. YRP roadways are public, but radio wave can be used experimentally in our environment because we have obtained designation as a "ubiquitous special zone" by Ministry of Internal Affairs and Communications (MIC).

Do you have much difficulty collaborating between industry, academia and government?

Kadowaki: We were talking about standardization earlier, but an extremely important aspect of obtaining standardization for technology that you have developed is cultivating alliance. Without many colleagues to endorse them, our proposals would not succeed, and one way to do this is to establish consortiums. An example of a success in this area is a gigabit-class ultra-high-data-rate wireless communications technology we developed by using extremely high frequencies in the millimeter wave band. To obtain IEEE standardization, we formed a consortium with private enterprise. By dividing up tasks such as creation of the input documents and participation in discussions, we were able to obtain standardization in the form of the IEEE802.15.3c standard, with very little change to our original proposal.

This requires quite a lot of personal power, doesn't it?

Kadowaki: Yes, standardization requires an extremely large amount of effort. Documents must be made, and appeals must be done to win over others that have different proposals. The final decision comes to a vote, but to win approval, a huge amount of effort, such as

●YRP Building 1, housing the New Generation Wireless Communications Research Center

wide-ranging lobby activity is required. However, even that is not enough, and it is also essential to create an overall research plan based on a budget and to allocate types of work in good balance. My basic role is to direct this entire chain of processes.

You also have much cooperation with overseas facilities don't you?

Kadowaki: We have joint research contracts and memoranda of understanding (MoU) with various universities, research organizations and individuals outside of Japan. For example, in space-related research, we are in collaboration with NASA in the USA, and the European Space Agency (ESA), as well as Aalborg University in Denmark and the University of Oulu in Finland in the wireless communications field.

Satellite Communications in the broadband age

Technical demonstrations from the Kizuna WINDS satellite have been in the news lately, haven't it?

Kadowaki: Feasibility studies of broadband satellite communications began in about 1992, and in February of last year Kizuna was finally launched, achieving the highest-ever speed in the world for satellite communications at 1.2 Gbps. This satellite has a device like an on-board switch, enabling functions such as changing transmission paths. A narrow spot beam must be used to achieve high-data-rate transmission, but only a small area can be covered with such a narrow beam. Thus, the ability to interconnect the spot beams of uplink and downlink is necessary to connect users in arbitrary locations, and accordingly, switching technology is indispensable to achieve broadband satellite network.

The transmission experiment of Super HiVision has a result, doesn't it?

Kadowaki: That's right. At the Open House of NHK Science and Technology Research Laboratories held in May, we demonstrated transmission of Super HiVision from Sapporo, requiring about 500 Mbps bandwidth. NHK handled aspects including capturing, compressing and displaying the Super HiVision imagery, but the actual transmission was done by NICT as joint research. Currently, the WINDS satellite is the only one capable of transmission at 500 Mbps.

Have you yourself always been involved in satellite communications research?

Kadowaki: Yes, I have. I studied communications technology in university, but from that time I have always enjoyed the night sky, and had some kind of yearning for the space. Though I didn't take it too seriously, I always thought that I'd like to do work related to space. That dream came together with combining space and communications when I joined NICT. You could say that it became reality in effect, I guess.

As a leading edge researcher, how do you see the future of wireless communications?

Kadowaki: Even though our life has become extremely convenient around the world with technologies like mobile phones and the Internet, my parents still cannot use them. Technology continues to progress, but my real feeling is that mature technology that really integrates with our lives is still one or two steps behind. I think that we need to create a wireless technology that supports and watches over our lives, subtly surrounding us so that we normally do not even notice it. That is the sort of world I would like to dream.

That really would be a ubiquitous network society of the future! Thank you very much for speaking with us today.

After this interview, on July 22, a transmission experiment of the total solar eclipse was done by using the "Kizuna," WINDS satellite. The transmission experiment is described in the article on page 7.

Realizing a Safe and Secure Society by Using the Ubiquitous Wireless Communications System

Profile

Hiroshi Harada

Group Leader, Ubiquitous Mobile Communication Group New Generation Wireless Communications Research Center

After receiving a doctoral degree, joined Communications Research Laboratory (current NICT) in 1995. Thereafter, engaged in research and development, and standardization on software wireless technology using digital signal processing technology, cognitive radio technology, and cognitive wireless network technology. In particular, leads the field of standardization regarding cognitive wireless network technology as the chairman of IEEE Standard Coordination Committee 41 (SCC41) and vice-chairman of IEEE 1900.4. Doctor of Engineering.

Background

Recently, in order to gasp not only broadband communication to users but also environment and communication information, wireless communication devices are being maintained in various environments, and it is necessary to have "an ubiquitous wireless communication system" which realizes a safe and secure society. In the Ubiquitous Mobile Communications Group (UMG), we are currently studying various fundamental technologies to realize such a society.

Cognitive Wireless Technology and Wireless Network Technology

There are various wireless systems available for users. Cognitive wireless technology implements a wireless communications system that equips wireless devices with the function to recognize the environment to use their radio waves and automatically select radio resources such as frequency ranges, time slots and transmission formats, so that they are always able to connect to networks such as the Internet. This technology addresses accordingly methods for recognizing the radio wave environment of devices, selecting systems based on the recognized environment, and redesigning wireless devices, which are themes for realizing the wireless communications system. We have already succeeded in building basic prototypes of wireless terminals (Figure 1) as well as base stations (Figure 2) equipped with this technology.

Broadband Wireless Communications System in the Public or Public Interest Field

Wireless systems currently used in the public or public interest field, which is represented by the police and fire fighting, are not adequate for transmitting high resolution imagery. The UMG is studying implementation of a wide-area (radius of approx. 10 km), broad-band mobile communications system (transmission rate: several Mbps to several 10Mbps) for public users, using the VHF band (200 MHz band). It is performing evaluations by using actual devices, and contributing to standardization and the like of the technology.

Wireless Personal Area Networks

There is also a demand for so-called Wireless Personal Area Networks (WPAN) in environments such as the home, which allow information to be transmitted between users without necessarily passing through a base station. The UMG is in the process of designing a super-broad-band WPAN, using the millimeter-wave band and capable of transferring media such as high-definition dynamic image at rates of several Gbps and more. This format has been standardized as IEEE 802.15.3c, and its prototype equipment is currently under evaluation. In other areas, the UMG is also studying the design, standardization, prototyping, and introduction into societal infrastructure, of a super-long-life WPAN system which will be used for taking automated measurements from various types of meters. The system will use a low-frequency band and terminals will be able to operate for ten or more years on two AA sized dry-cell batteries.

Next-Generation ITS Systems

In the field of Intelligent Transport Systems (ITS), the UMG is placing particular focus on the 700 MHz band, which will become available with the end of analog television broadcasting, for realizing a safer, more secure society. It is conducting research and development on a next-generation vehicle-to-vehicle communications system that is able to build and re-build networks rapidly between fast-moving entities, without interruption.

Future Prospects

The first stage of prototyping for the four research themes discussed above has been completed. Next, based on the NICT meddle-term plan, we will study ways to integrate them into new generation networks and introduce them into the societal infrastructure.

Figure 1:
Cognitive Radio Terminal Prototyp

Figure 2:
Cognitive Radio Base Station Prototype

Initiatives for R&D and Emergency-Disaster Measures towards Realizing High-speed and Broadband of Space Communications

● Profile ●

Ryutaro Suzuki

Group Leader, Space Communication Group, New Generation Wireless Communications Research Center

After completing a master's degree, joined Communications Research Laboratory (current NICT) in 1979. Engaged in research on satellite communications systems, mobile satellite communications, distance education, emergency communications, ITS and so on. Doctor of Engineering

At NICT, the Space Communication Group handles research and development in the field of space communications, from research on space-based technologies such as satellite orbits and satellite communications technology to research on satellite communications systems, and space demonstrative experiments by using experimental satellites in space.

Research on Space-based Technologies

In research on space-based technologies related to satellite communications, we developed the technology to measure very accurately the orbital position of the satellite by correlating received communication signals in research on the satellite orbit, and we have been able to know about the position of a satellite in geostationary orbit within 1 meter error.

In research on on-board transponders of the satellite and optical satellite communication technology, we have proceeded with preparation to demonstrate in space "reconfigurable communications equipment" and optical satellite communication equipment. We have also developed an ultra-compact optical space communications device that can be used for terrestrial optical space communications, and have achieved global-record speeds of 1.28 Tbps (40 Gbps multiplexed by 32 channels).

Research on Satellite Communications System

In demonstrative satellite development, we are conducting R&D on an on-board communication system in cooperation with the Japan Aerospace Exploration Agency (JAXA). We developed the on-board regenerative transponder (Figure 1) for the Kizuna Wideband InterNetworking engineering test and Demonstration Satellite (WINDS: launched in February, 2008). Since the satellite was launched, this transponder has already performed as designed for over a year and has been used in many demonstrative experiments by facilities participating in the WINDS experiment.

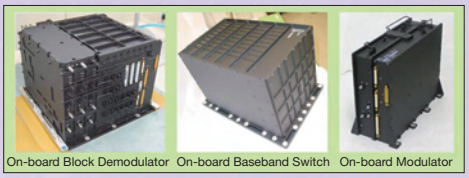


Figure 1: WINDS On-board Regenerative Transponder

Securing Communications and Grasping Suffered Damage in Large-Scaled Disaster

We are focusing on communications-network survivability (communication possibility under bad conditions), and advancing demonstrative experiment plans to secure communication networks at the time of earthquake or other large-scaled disaster (Figure 2). The time required to grasp the damage suffered from disaster could be greatly reduced by transmitting aircraft-mounted Synthetic-Aperture Radar (SAR) measurement data via WINDS. Also, by deploying vehicle-mounted WINDS stations to disaster locations to expand wireless networks, damage to communications networks just after having disaster is avoided and the areas suffered by disaster can be in supporting rapid recovery.

Future Prospects

In this group, we are aiming at realizing "broadband mobile" satellite communications that are able to cover broadband with high-speed mobile communications, which would be impossible through terrestrial communications networks. Compact earth stations that are able to secure fixed or mobile communications through broadband mobile satellite communications will contribute greatly to supporting the safety and security of people. The optical satellite communication technology advancing components development may also produce revolutionary innovations in transmission performance for communication satellites. In the future, through repeating rapid space demonstrations, we will aim at establishing NICT's optical space communication technologies.

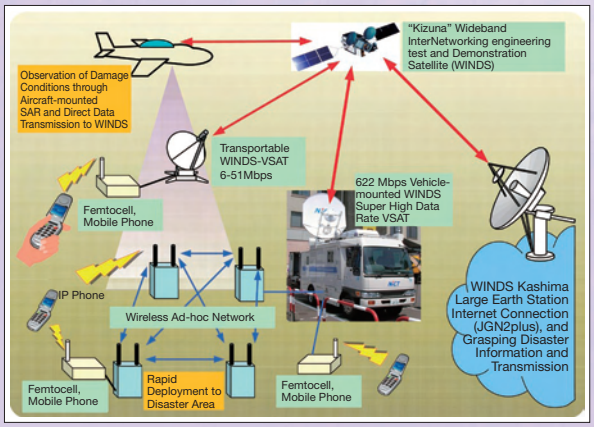


Figure 2: Overview of Research on Securing Communication Networks and Grasping Suffered Damage in Large-scaled Disaster

Wireless Body Area Networks and Their Technical Challenges

Profile

Kiyoshi Hamaguchi

Group Leader, Medical ICT Group, New Generation Wireless Communications Research Center

After completing a graduate school, worked at a manufacturer before joining Communications Research Laboratory (current NICT) in 1993. Engaged in research related to digital terrestrial mobile communications, ultra-wide-band communications systems, and communications technology for medical and health-care applications, etc. Doctor of Engineering.

Wireless Body Area Networks

Wireless Body Area Networks (BAN) are a type of wireless sensor network made up of wireless sensors positioned over the surface (wearable) or inside (implanted) the human body. The BAN creates a wireless network that envelops the user's body. An example of a BAN application in the medical field would be to have the BAN connect to an external network through a device such as a mobile phone, and then allow medical and health-care facilities to use bodily data, such as electrocardiograph, arterial oxygen saturation or body temperature, gathered through the BAN. In another example, accelerometers could be used on various parts of the body to sense momentum, allowing a physiotherapist to check the state of rehabilitation after an injury remotely, or they could detect when an elderly person experiences a fall and immediately alert first-aid providers (Figure 1). For patients in hospital, cable-less sensors for bodily information would greatly reduce the burden and restriction to movement on the patient, even if multiple sensors were in use.

A possible application for implantable BAN elements is to use an implanted blood-sugar sensor forming a BAN with a wearable insulin pump, so that the frequency of insulin injections could be controlled based on information from the implanted sensor. BAN could also be used with instruments such as capsule endoscopes or pacemakers and wearable terminals, allowing various bodily information to be extracted and used to provide optimal care, with little burden to any patient.

Technical Issues

There are many possible applications for BAN technology, but there are also many issues in establishing the technology. For example, the radio propagation model must be analyzed in order to estimate the quality of wireless links. Figure 2 shows how measurements of the radio propagation characteristics are being done at NICT. We have found that with sensor terminals in front of and behind the body, a BAN using frequencies under 1 GHz is resistant to communications interruption due to diffraction, but the usable bandwidth is quite limited. On the other hand, higher frequency wireless bands, such as Industry-Science-Medical (ISM) bands and Ultra-Wide Band (UWB) technology, can be used freely and could provide higher communications speeds. Namely, the frequencies used for BAN must be decided in consideration of radio propagation characteristics subject to the application requirements (transmission speed in this case).

With implant BAN, we are conducting analysis by using a numerical model of the body developed at NICT, which have been provided with electrical constants for the internal structure of the body. We have discovered that the lower the frequency, the lower the attenuation of radio waves. We have not been able to find any comprehensive study of a radio-wave propagation model in the vicinity of the body, and analysis of a dynamic model for the case which the body is in motion in particular is an unknown area that we are currently attempting to analyze.

In addition to the above, we have initiatives studying other issues that need to be addressed, including the effects of EM waves emitted by BAN terminals on bodies and other medical devices, modulation and demodulation, and media-access control technologies for improving the quality of wireless links, and low-power encryption technology allowing personal (bodily) information to be transmitted securely.

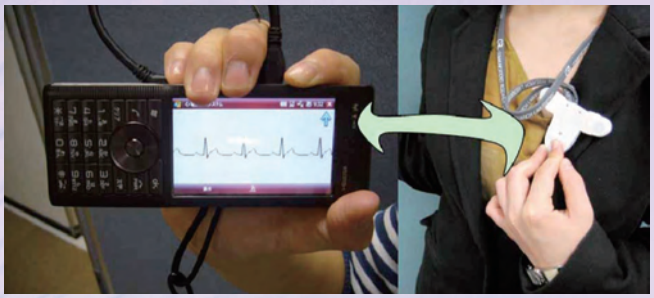


Figure 1: A prototype multi-component electrocardiograph, accelerometer in accessory form (With security technology that generates an encryption key for data retrieved from sensors, so special key configuration is not required. Key-generation is optimized especially for extremely low power consumption)

Figure 3: A View of Taking Measurements for Modeling Radio-wave Propagation around a Human Body

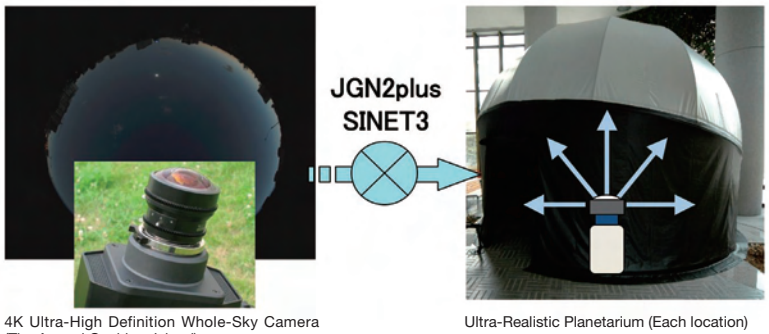
NICT Initiatives for the Total Solar Eclipse on July 22, 2009

On July 22, 2009, for the first time in 46 years, a total solar eclipse was observed at various locations in Japan. It was an excellent opportunity for NICT to transmit its video and observation results by using ICT technology and to conduct communication experiments and observations with various events for returning R&D results directly to a large number of people.

The first success in live transmission of a total solar eclipse by 4K ultra-high definition imagery

The Universal Media Research Center, in cooperation with the Ultra-Realistic Communications Forum (URCF) succeeded in transmitting live imagery of the total solar eclipse which was observed at the Amami Ooshima island. Images were transmitted by using the 4K Ultra-High Definition Whole-Sky Image Transmission System and high-speed networks including JGN2plus, and shown at the Ultra-Realistic Planetarium (Figure 1, Figure 2).

NICT began R&D on the 4K Ultra High Definition Video technology in 1997 and completed its basic technology in 2003, leading the world. The live feed was distributed to four locations, including Keihanna (Keihanna Plaza) where the technology first made its appearance, as well as Osaka ABC Hall, the Osaka Science Museum and the Tsukuba Expo Center. In addition, On July 24 and 25, we also held screenings of the 4K Whole-Sky Image Recording at the NICT headquarters in Koganei, while its facilities were open to the public, and these were very favorably received.



4K Ultra-High Definition Whole-Sky Camera (The Amami Ooshima Island)

Ultra-Realistic Planetarium (Each location)

Figure 1: Shooting Camera and Whole-Sky Image Projection Screen

A View of the Whole-Sky Image Screening (Ultra-Realistic Planetarium)

Part of the Whole-Sky Image (Just before the total solar eclipse)

Figure 2: Whole-Sky Image

Relay Experiments from the Iwo-tou Island via the "Kizuna," Wideband InterNetworking engineering test and Demonstration Satellite (WINDS)

The Space Communication Group of New Generation Wireless Communications Research Center, together with National Astronomical Observatory of Japan and JAXA, conducted experiments transmitting the solar eclipse video from the Iwo-tou island via "Kizuna," Wideband InterNetworking engineering test and Demonstration Satellite (WINDS). NICT used a 2.4 m transportable ground station (SDR-VSAT) (Figure 3) to uplink videos of the solar eclipse and the surrounding area to the satellite. This was received at the Koganei station and relayed from the National Astronomical Observatory of Japan and from NHK via JGN2plus using original NICT streaming technology, and finally being distributed successfully to the whole country. The Kagoshima station stood by as a backup. In prior communications experiments using the satellite's 155 Mbps mode, we established network environments including five 16 Mbps high-definition video channels, IP telephony, a video conferencing system and e-mail transmission. We experienced malfunctions frequently in the modem and antenna drive system due to sulfur gas, high temperature and high humidity in the environment, but we employed various measures against

Figure 3: NICT Land Mobile Station Used in an Environment Spewing Sulfur Gas after an Intense Squall Affecting the 28 GHz Uplink

Figure 4: The Iwo-tou island imagery was used in many news programs, showing the credit given to NICT and other participants.

them, and were ultimately successful. Also, just before broadcasting them, there was a severe squall, so the live broadcasting transmission speed was intentionally reduced to four 10-Mbps channels for safety reasons. This, however, did not degrade the image quality, and we were able to deliver instantaneous coverage of the eclipse to the whole country. As this was a rare, real-time transmission, the solar eclipse imagery from the Iwo-tou island was also used many times for later news broadcasts (Figure 4).

JGN2plus contributing to the solar eclipse broadcasting relay

This time, distribution of videos of the total solar eclipse to the entire country was made possible by reciprocal connection and operation between JGN2plus, "Kizuna," and the SINET3 research and educational network, which started in the previous fiscal year. The "JGN2plus Network Operation Center (NOC)" unified the arrangement and operation.

[Prior traffic adjustments]

The video distribution plan was divided among several research groups, and included various delivery destinations, so we made "a video distribution network architecture diagram" (Figure 5) based on the information from the experiment groups utilizing JGN2plus and network research associations. It allowed us to simulate the overall traffic volume, and preliminarily adjust traffic with SINET3.

[Network monitoring]

Several days before the broadcast, we made a "Traffic Weather Map" (Figure 6) for observing both-way traffic in each region. This is the technique usually used at the JGN2plus NOC. By doing this, any abnormality could be addressed immediately as real time traffic in each region can be identified with values and colors. As a result of these observations, we detected various malfunctions just before the event,

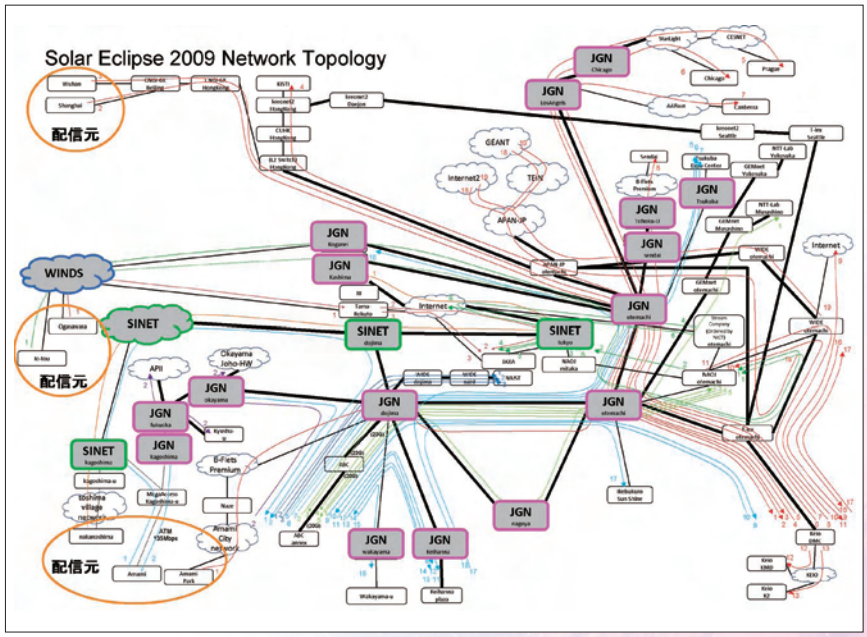


Figure 5: Architecture Diagram of Image Distribution Network

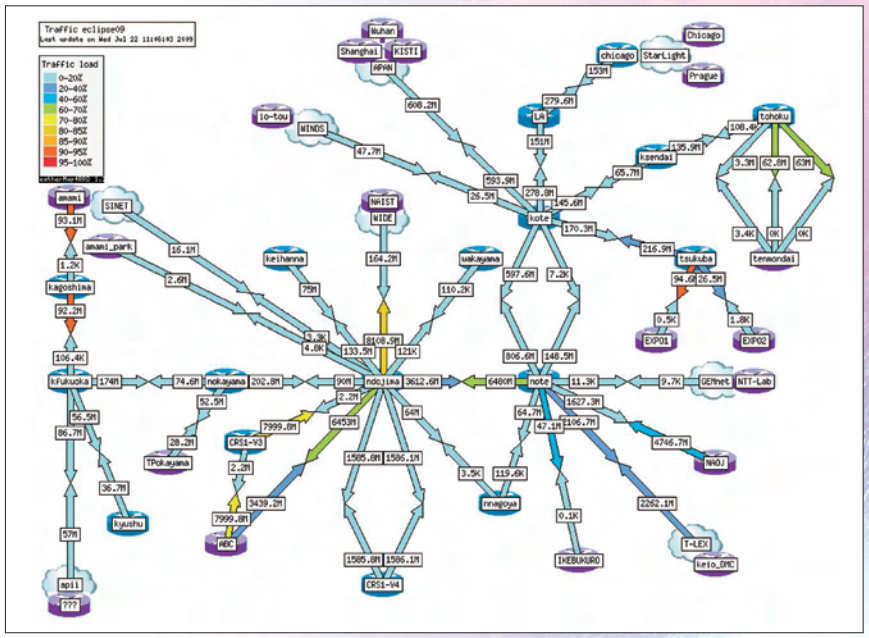


Figure 6: Traffic Weather Map

including a malfunction in distribution to Tsukuba, and more congested traffic from the Amami Ooshima island to Kagoshima than had been expected. By providing appropriate warning and suggestions, we were able to eliminate all the malfunctions by the time scheduled.

Prediction and observation of the space environment related to the solar eclipse event

The Space Environment Group of Applied Electromagnetic Research Center performed numerical simulations to predict fluctuations in electron density in the ionosphere due to the effects of the Sun being shaded by the moon. Afterwards, these fluctuations were determined to have had no effect on everyday activities, although fluctuations were observed, as shown in Figure 7 (a). These results were verified after the event using GPS-TEC results (that is, measurement results of ionosphere electron density in using GPS signals) for the day of the solar eclipse shown in Figure 7 (b), which closely correspond to the simulation and indicate that the prediction was correct.

Internet live-streaming relay

We performed a live relay of the total solar eclipse image from the Amami Ooshima island and the Iwo-tou island via the Internet. Due to the bandwidth limitation for distribution, we established a preregistration system for priority distribution and accepted organizations such as scientific institutes, educational facilities and associations. As a result, the total number of observers is estimated to have been about 15,000. Many of the organizations received more visitors than expected, and we gathered very good impressions from many viewers.

Currently, images of total eclipse highlights from the Amami Ooshima island and the Iwo-tou island (approx. 10 min.) and the entire eclipse summarized for about 10 minutes are being distributed through the NICT Website.

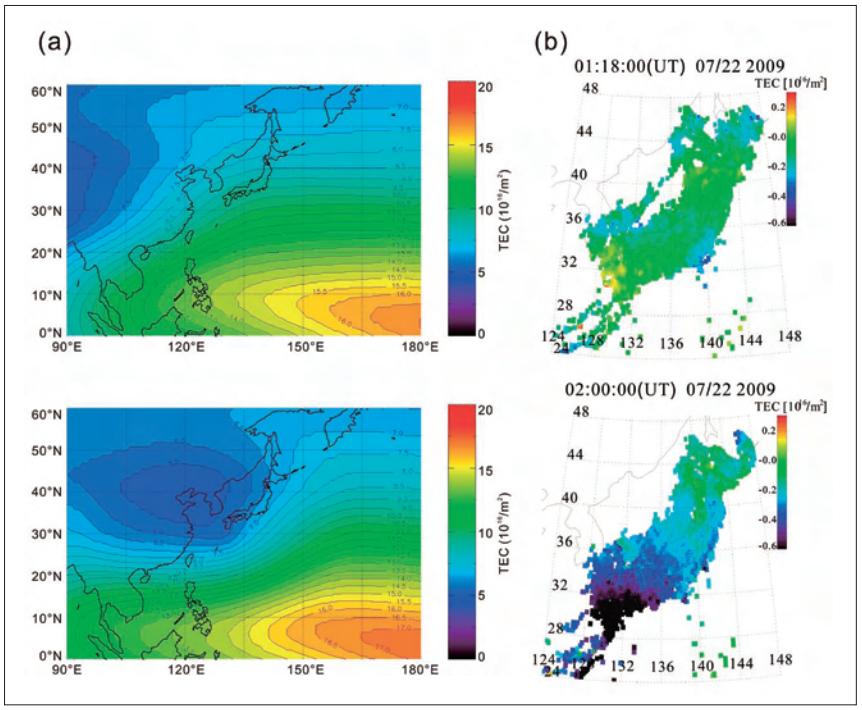
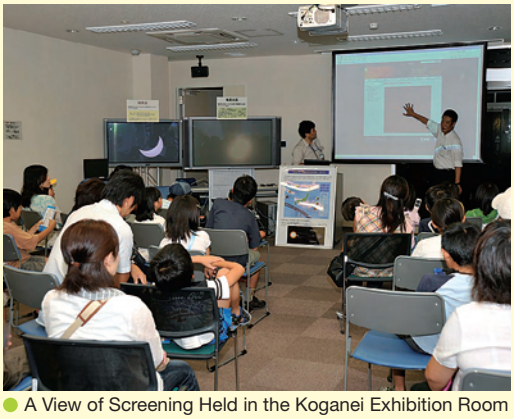


Figure 7: Fluctuations in Ionosphere Electron Density before (above) and during (below) the Solar Eclipse
(a) Prediction of Electron Density Fluctuation by Super Computer
(b) Measurement Result of Electron Density Fluctuation Measured by GPS-TEC.

Live Relay Screening of Solar Eclipse at the Koganei Exhibition Room and the Okinawa Big Conference Room.

A live streaming-relay of solar eclipse images from Wuhan in China, and the Amami Ooshima island and the Iwo-tou island in Japan was screened at the exhibition room of NICT Headquarters in Koganei. Over 65 visitors, including elementary and junior high school students and their parents from the neighborhood gathered, and enjoyed the screening after an introduction by Watari, Research Manager of Space Environment Group. Everyone held their breath as they closely watched the solar images changing moment by moment, and the venue was filled with cheering and applause when the Iwo-tou island reached total eclipse. In Tokyo, where a partial solar eclipse was visible, and various events were planned, such as filming the eclipse through the trees. They could not be carried out, unfortunately, due to cloudy weather on that day.



● A View of Screening Held in the Koganei Exhibition Room

At NICT Okinawa Subtropical Environment Remote-Sensing Center, approximately 50 people attended a screening of total solar eclipse images from the Amami Ooshima island and the Iwo-tou island, and observed the partial solar eclipse visible from Onna Village by using mirror reflections, cardboard, solar-eclipse viewing glasses and the like.

Prize Winners ◆PRIZE WINNERS' PROFILES

Prize Winner ● **Kouji Nakao** — Group Leader, Network Security Incident Response Group, Information Security Research Center
Daisuke Inoue — Senior Researcher, Network Security Incident Response Group, Information Security Research Center
Masashi Eto — Researcher, Network Security Incident Response Group, Information Security Research Center
Katsunari Yoshioka — Former NICT Researcher (Currentry Externally Funded Academic Staff (Assistant Professor), Interdisciplinary Research Center, Yokohama National University))
Eimatsu Moriyama — Research Manager, Traceable Secure Network Group, Information Security Research Center

◎DATE: 4.14.2009

◎NAME OF THE PRIZE: Prizes for Science and Technology of the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Research Category) in Fiscal 2009

◎DETAILS OF THE PRIZE: Tactical Emergency Response Research of Network Incident Analysis Center (nicter)

◎PRESENTER OF AWARD: Minister of Education, Culture, Sports, Science and Technology

◎Comments by the Winner:

We would like to express my heartfelt thanks to everyone who supported nicter in various ways, culminating in receiving this award for research initiated to contribute to the safety and security of the Internet in Japan. It is a very great honor to be recognized for this practical research in which we integrated large-scaled network observations with malware analysis, detected and investigated the causes of security incidents, and automated and accelerated creation of countermeasures to the extent possible. It is my intention to continue to promote research and development with a mission to protect information communications networks from attacks that are daily advancing and diversifying.

From the left: Masashi Eto, Daisuke Inoue, Kouji Nakao, Katsunari Yoshioka, Eimatsu Moriyama

Prize Winner ● **Hiroaki Harai** — Group Leader, Network Architecture Group, New Generation Network Research Center

◎DATE: 4.14.2009

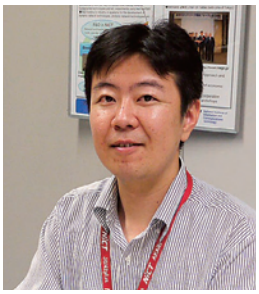
◎NAME OF THE PRIZE: Young Scientists' Prize of the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in Fiscal 2009

◎DETAILS OF THE PRIZE: Research on Multi-wavelength Packet Switching Based on High-speed Buffer Management Technology

◎PRESENTER OF AWARD: Minister of Education, Culture, Sports, Science and Technology

◎Comments by the Winner:

In this research, for development of an optical packet switch with good mix of electronic processing and optical broadband property, we designed and implemented a method for composing single optical packet by using multiple wavelengths. We also organized the electronic processing in a parallel pipeline structure to achieve dramatically increased optical buffer processing performance. I am very much honored to be recognized for this research, and plan to continue this research towards implementation. I would like to thank everyone in Network Architecture Group and Photonic Network Group as well as everyone else in joint research with us, within and outside of NICT.



Prize Winner ● **Hideyuki Sotobayashi** — Associate Researcher, Advanced Device Research Group, New Generation Network Research Center (Associate Professor, Department of Electrical Engineering and Electronics, College of Science and Engineering, Aoyama Gakuin University)

◎DATE: 4.18.2009

◎NAME OF THE PRIZE: 8th Funai Information Technology Prize

◎DETAILS OF THE PRIZE: In recognition of his prominent and pioneering contributions in the areas of photonic networks, optical communications, and new photonic devices.

◎NAME OF THE GROUP: Funai Foundation for Information Technology

◎Comments by the Winner:

I am very much honored to be recognized for my research results towards applications in photonic networks in the area of ultra-high-speed opto-electronics, from materials and basic research in physics to applied research demonstrating information communications networks. I would like to express my deep gratitude to everyone at NICT for their leadership and support. I will continue to promote joint research between the university and NICT, and also to increasingly develop ties between industry, academia and government, contributing to research in the information communications field.

Prize Winner ● **Masugi Inoue** — Research Manager, Network Architecture Group, New Generation Network Research Center

◎DATE: 4.18.2009

◎NAME OF THE PRIZE: Funai Information Technology Award for Young Researchers

◎DETAILS OF THE PRIZE: Research on Seamless Networking Technologies for Heterogeneous Wireless World

◎NAME OF THE GROUP: Funai Foundation for Information Technology

◎Comments by the Winner:

In this research with colleagues at Yokosuka, we have proposed a new communications architecture, creating an environment that allows a variety of wireless networks to be used without particular awareness of the networks. Using an arrangement that defines a control channel for exchanging information about the user's location and what wireless networks can be used at that location between terminal and network, we have created a concept that could be called cognitive radio communications control. Our empirical approach to assessing the needs of general users and system implementation has also been recognized.

Exhibition Report of Interop Tokyo 2009

Toshiyuki Okuyama, Project Promotion Office, Information Security Research Center

Interop Tokyo 2009, now in its 16th year, was held from June 10th to 12th at Makuhari Messe-International Exhibition Hall, introducing the latest network technologies, products, and solutions. The exhibition boasts the largest number of premier exhibiting companies as well as visitors in Japan. Approximately, 130,000 people visited over the three days.

As in previous shows, NICT introduced several functions of the incident analysis center (nicter) system, performing real-time analysis and visualization on "ShowNet," a network that is operated temporarily during Interop. In addition, two other research centers and one department performed exhibitions for a total of four groups participating from NICT.

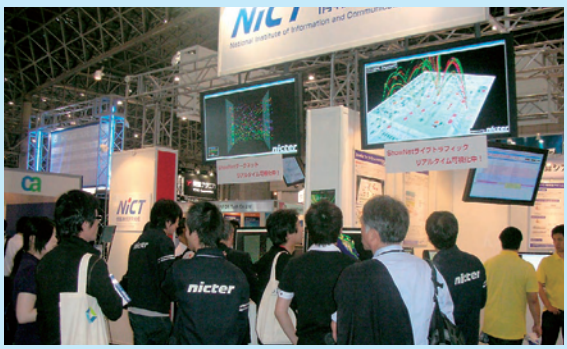
The Network Security Incident Response Group of nicter demonstrated real-time monitoring of network attacks taking place at the venue by using the nicter system. This demonstration attracted a huge amount of attention. So a lot of vistors asked many inquiries about introduction of the system.

The Traceable Secure Network Group of nicter also exhibited some of their research results while featuring a trace-back system and provided a live demonstration of the system with their Malware Experience Lab. Their activities, development effort with seed technologies, and promotion of technology transfer were illuminated.

The Collaborative Research Department exhibited Openflow, which is able to identify communications flow and impose various controls on a per-flow basis by using JGN2plus. The demonstration was performed in cooperation with NEC exhibitors. They also introduced PerfSONAR, a network instrumentation facility managed by the NICT Otemachi. PerfSONAR gathers network performance measurement data and shares it in a consolidated format.

Finally, the Network Architecture Group of New Generation Network Research Center exhibited to introduce infrastructure technology to realize new generation network communications with host IDs. Their exhibition included research results aimed at developing mechanisms to enable transparent communications over various heterogeneous networks, exploiting different protocols without requiring awareness of underlying networks.

In this year's exhibition a large number of people visited the NICT booths. They exchanged viewpoints with researchers enthusiastically and the opportunity was definitely profitable for researchers, giving them a chance to share their results of course.



Visitors Gathering to See Real-time visualizations from nicter


Visitors Enthusiastically Exchanging Views with Researchers

Information for Readers

In the next issue, we will feature the JGN2plus testbed network on which various research activities related to new generation networks are under way.

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