NICT NEWS

独立行政法人
情報通信研究機構

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9

National Institute of Information and Communications Technology

Special Feature on JGN2plus

NICT

Successful in Live 4K/2K Total Eclipse Broadcast, from JGN2plus to the World!

Shinji Shimojo

**Executive Researcher
Director, NICT Otemachi**

After completing a specialty in physical science at Graduate School of Engineering Science of Osaka University, became a lecturer, assistant professor and then professor at the Osaka University Computation Center, and then later, became a professor, vice-director and director of the Osaka University Cybermedia Center (CMC), and he has been in his present post since April, 2008. Doctor of Engineering.

JGN2plus: The fastest, highest-capacity network in Japan. Used as a testbed for experiments and research in various fields, and also connected to overseas networks, it reexamines the whole current networks to present a vision of the New Generation Network.

Whole-Sky Imagery of Total Eclipse in the 4K/2K live to be accessed from all parts of the World

Could you give us a simple overview from the initial JGN to the current JGN2plus network?

Shimojo: The project of Japan Gigabit Network (JGN) began with a five-year plan in 1999, followed by the JGN2 in 2004, and the JGN2plus, which is scheduled to operate for three years starting in April, 2008.

During the time of JGN and JGN2, Information and Communication Technology (ICT) had not yet spread throughout Japan, but it has spread rapidly ever since, and now there are many other private networks also being built.

At the same time, NICT has been building a New Generation Network, performing various experiments, and conducting research how this network can be used and commercialized. Thus, we decided to use JGN2plus as a testbed, and we are now performing tests towards building the new network.

We are currently in the middle of a three-year testing period, but in two years, R&D being advanced for the New Generation Network will be combined with JGN2plus for completing a new form of testbed.

Could you describe the structure of JGN2plus more concretely?

Shimojo: With the NICT Otemachi as its core, it has low-loss optical fiber cables connecting 56 access points throughout Japan and is also connected with overseas locations including the USA. Many universities and research facilities participate in JGN2plus, and a variety of experiments and research are being done using this network as a testbed.

For the July 22 total eclipse, the 4K live video (with four-times the resolution of Hi-Vision) was streamed over the JGN2plus network, allowing 360-degree whole-sky images having the feeling of being at a live performance to be projected at facilities having the required equipment, such as planetariums.

The whole-sky live images from Amami Ooshima were also reproduced at the recent NICT Opening Facilities to the Public (July 24,25), which was really worth seeing.

Shimojo: Yes, we ran a content distribution to locations in Japan, Asia, America and Europe, and I believe that it had been the largest-scale experiment so far. We have been conducting experiments connecting JGN2plus with world-wide academic research networks for quite a while, but we were a little nervous this time because of the number of simultaneous connections.

You must have been quite happy with the success. And all of the network control was done from Otemachi, wasn't it?

Shimojo: That's right. The center is now called the "NICT Otemachi", and it engages in research and development activities focusing on the New Generation Network Promotion Forum promoted by NICT, including operations and management technologies and in cooperation with overseas research and development projects.

So it appears to be providing services on the JGN2plus network as a testbed while providing network control and to also doing technical development while conducting demonstration experiments, doesn't it?

Shimojo: That's right. Starting this April, we began offering the "Platform Service", which brings research and development together with operations.

Aiming to overcome the limitations of current network environments

Will this be something completely different from current network environments?

Shimojo: It is quite difficult to imagine what form the

Service Platform Architecture Research Center

Research Theme "R&D on Operations & Management Technology for New Generation Network"

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6
R&D on NWGN Service Platform Fundamental Technology	R&D on NWGN Service Testbed Federation Technology	R&D on Middleware and Application of Optical Path	Establishment of Translational Technologies for NWGN Operation	International Federation of Testbed	Research and development on the integrated wired and wireless network platform

Testbed Network Operation & Management

JGN2plus Utilize Research Projects   **Funded Research Projects**

Collaboration — Research Activities on Internet/ NGN

Collaboration — Worldwide R&D Network/ Projects

new generation network will take, but there are various limitations on current Internet environments, such as the difficulty in sharing wide bandwidth with everyone. On the other hand, personal media such as Peer-to-Peer (P2P) is spreading, and the ways in which the network is being used are changing.

There is currently some discussion in security about protecting end-to-end connections, but there are also limitations with this approach, and it will not provide a fundamental solution.

With the current Internet, not many functions are included in the network itself, and it has been structured to place functionality in the terminals as much as possible. One of the objectives of the new generation network is to bring more of these functions over into the network.

Will the new generation network handle specialized needs in areas such as academia and medicine, or will it handle more general needs?

Shimojo: It will need to be able to handle all kinds of requirements. Right now, in the discussion of the new generation network, the idea of network virtualization is resulting in various new requirements.

For medicine, some video should only be seen by the doctor, and not be shown to laypersons. It uses much bandwidth and is extremely important during surgery, so the required bandwidth must be preserved. When considering P2P, speed is not important, but as little delay as possible is desirable. The requirements differ, depending on the type of application. The current Internet is attempting to meet all of these requirements on a single network.

One possible form of the new generation network would be to group these different types of application on different networks. We are conducting research on technology to achieve this and implement it as middleware.

Will this result in several different networks to handle different needs?

Shimojo: Right now at JGN2plus, we are creating six

research groups in the NICT Otemachi, working together with the New Generation Network Research Center to build a virtualization infrastructure. We also have groups such as a group for P2P application and another group researching how optical signals can be controlled for even faster networks. Besides, another group is researching what sort of network is needed for those using it as an extension to the current Internet.

International Standardization and Wireless are keywords

Shimojo: International Standardization is certainly a keyword. Spreading Japanese technology and standardizing it internationally improves Japan's ability to competitiveness. For this reason, international cooperation is important. Wireless is another area where we are currently putting in efforts. Many people think that the state of current networks, with wired being central and wireless being peripheral, will reverse with the next generation of networks. However, even if wireless begins to dominate, the core will be wired. It is our group that is also doing research to cover up this sort of infrastructure.

Is JGN2plus going to make use of existing networks or will there be a need to maintain an entirely new infrastructure?

Shimojo: Even if we try new things on the testbed, we really will need to build a broad-band network, and actually, we will use services from providers such as NTT. However, we won't be using the network IP services, but rather, will create various virtual networks almost manually, without limitations.

Does it mean that, rather than selecting software on the network, we will be selecting the type of network itself?

Shimojo: It is the basic goal of the new generation network, but there are various approaches to attaining it. We are preparing a network to allow for experiments implementing all kinds of ideas building towards this goal. That is the JGN2plus testbed.

Using Japan's strength in photonics as a key feature for international strategy

I understand that you're hoping for international standardization with JGN2plus, but what sorts of overseas trends are going on?

Shimojo: International standardization sounds simple enough, but this is not a single technology that can be standardized all at once. Network technology is a combination of various different technologies, not all of which were created in Japan. There are areas where we excel and others where we do not, so some technology we may borrow from another country to create the overall system. That is the process of standardization. Japan is very strong in optical communications technology right now, so we can use it to expand our international collaboration.

For example, Dynamic Circuit Networks (DCN) are a mechanism for connecting any two points over the Internet in a way similar to circuit switching of the past.

The mechanism itself is a system used in Europe and the USA for Internet2, and we are only the organization in Asia, which is participating in it. Within this, Japanese technologies, including switches and optical routers, are being used as elements and thereby getting standardized. That is the sort of strategy we're using.

The network is being used for research as well as scholarship, isn't it?

Shimojo: Internet2 hasn't been commercialized, but it is the biggest network in the USA, with participation from many universities, as a backbone network for research and education.

Their stance is very similar to ours with a section for users and another section for experiments together with experiments running on top of it as part of the basic infrastructure. The GEANT2 network in Europe has a similar structure.

Distribution of 4K video to every home as a goal

What sort of communications society can we see beyond JGN2plus?
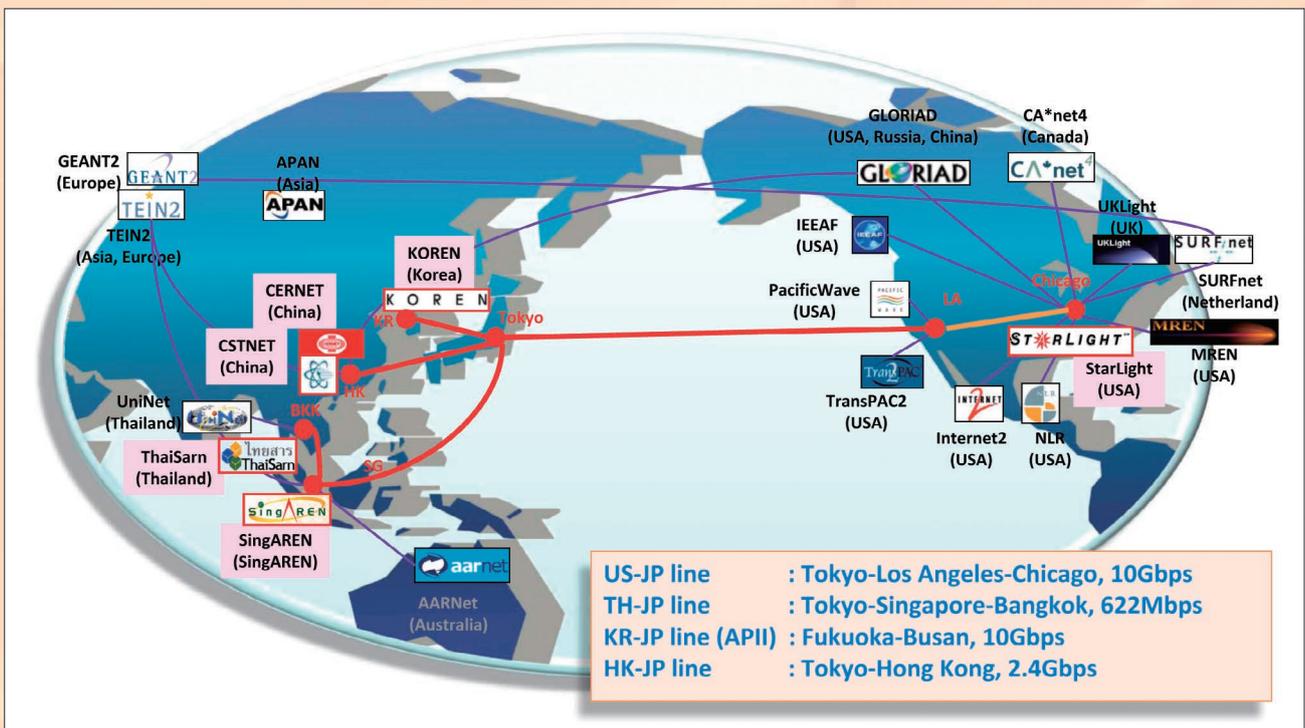
Shimojo: As a very advanced example, we transmitted 4K video of the total eclipse over the network. This used an extremely large amount of bandwidth and required devising a network capable of handling that level of traffic. One of our goals is to build an environment capable of bringing this sort of thing to individual homes.

We are also hearing a lot about creating a "Ubiquitous Network Society".

Shimojo: JGN2plus is also a testbed for ubiquitous networks. For example, in the Live E! project, much more precise weather forecasts are possible by using weather sensors, so that even recent phenomena such as guerrilla rain storms can be tracked instantly. These types of networks also make a contribution to our lives. As well, sensor networks that indicate where you are and what you are doing down to the hour and minute will be an essential part of the Ubiquitous Network Society.

The real role of the new generation network is to perform various functions well and automatically rather than needing them to be done by people, advancing coordination of the network to handle the various possibilities. We are setting this role as our goal and working very hard to achieve it.

Thank you very much for speaking with us today.

US-JP line	: Tokyo-Los Angeles-Chicago, 10Gbps
TH-JP line	: Tokyo-Singapore-Bangkok, 622Mbps
KR-JP line (APII)	: Fukuoka-Busan, 10Gbps
HK-JP line	: Tokyo-Hong Kong, 2.4Gbps

● JGN2plus International Circuits

Promoting R&D on Fundamental Technologies towards the New Generation Network

Introducing Six Themes of JGN2plus

Theme 1

## R&D on NWGN Service PlatformFundamental Technology

Yuichi Teranishi

Expert Researcher, Network Testbed Research Promotion Group, Collaborative Research Department
(Associate Professor, Graduate School of Information Science and Technology, Osaka University)

In the ubiquitous network environments which could be considered for the future, various kinds of devices such as sensors, appliances and PDAs will need to be connected to the network uniformly, regardless of the scale of the network, in order to realize services like controlling general household appliances and security monitoring under unified rule, among others. Accordingly, we are studying network service platforms that are able to absorb the differences between these devices and construct scalable networks that meet the needs of a variety of applications. Our research concerns a network technology called overlay networks, and we are conducting R&D that extends a Japanese open-source overlay network platform called PIAX (P2P Interactive Agent eXtensions). Our research includes the topics of distributed data fusion technology, which efficiently gathers information from a huge number of sensors located everywhere, and the technology for handling multiple structured overlay networks which create

network structures based on criteria such as geographic location. By deploying the results of this research on JGN2plus, we are consolidating it into a service platform available to all kinds of users. At the NICT Otemachi, we have begun cooperation with the Live E! sensor-network project, which deploys and shares a large number of weather sensors mostly in Japan and Asia, as well as other external projects such as the IP-Ubiquitous Sensor Network (IP-USN); a similar project promoted by the National Information Society Association (NIA) of Korea. In this way, we are studying service platforms that are able to use data flexibly from sensors spread over a wide area. We are also planning to deploy our service platform for practical services such as product recommendation services for shopping malls, security monitoring services for regional communities, and sensor network research testbeds, from which we study the required features and operational issues.
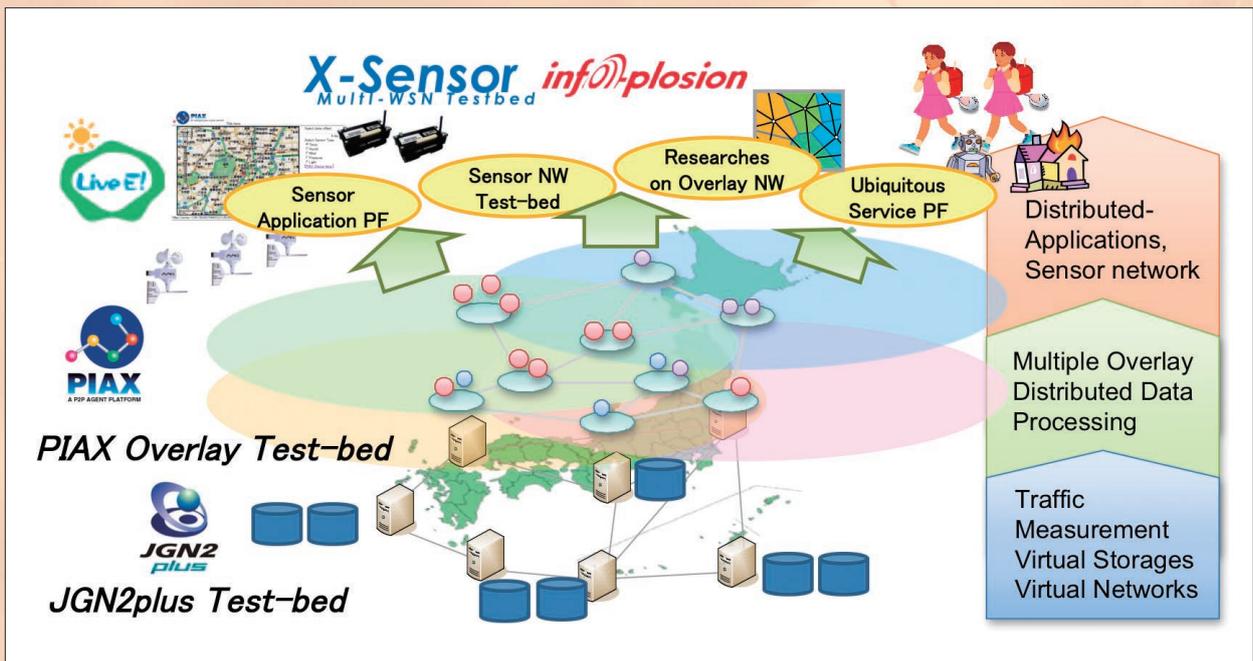
● Service Development of Overlay Network

Theme 2 — R&D on NWGN Service Testbed Federation Technology

Akihiro Nakao
Guest Researcher, Network Architecture Group, New Generation Network Research Center
(Associate Professor, Graduate School of Interfaculty Initiative in Information Studies, the University of Tokyo)

Building and using Virtual Private Networks (VPN) over shared networks or the Internet is already being done practically. We have significantly advanced this idea of local virtualization, and are conducting research in virtualization of the entire network (Hereinafter, Network Virtualization). Network Virtualization refers to the technology which uses virtualization technology to separate the physical resources of a network, such as cables, routers, and switches, from the actual (physical) architecture, so that it can be divided and recombined regardless of the physical structure, allowing multiple independent logical networks to coexist. Through this technology, it is expected that a testbed for the new generation network, encompassing networks and services with differing design philosophies, can be built. It is

also possible to build multiple highly flexible and stable logical networks simultaneously, even for networks with conventional architecture, so that this technology is expected as a fundamental one for current and near-future communications providers.

The University of Tokyo and the NICT New Generation Network Research Center's Network Architecture Group are promoting projects for node virtualization technology, node management and a virtual node router, derived from the PlanetLab testbed project, which conducts tests for new generation Internet applications and services.

Also, mainly during this fiscal year, we have developed J-Lab (a private PlanetLab environment testbed) and CoreLab (a testbed reusing the PlanetLab management technology and incorporating a variety of virtualization technologies) on JGN2plus, and have completed installation in 12 bases throughout Japan.

In the future, we plan to strengthen cooperation with research activity being done on overseas testbeds (GENI in the USA, FIRE in Europe, etc.), to begin to study virtualization of optical, wireless, and other technologies and to develop them as experimental environments for new generation network architectures and services.
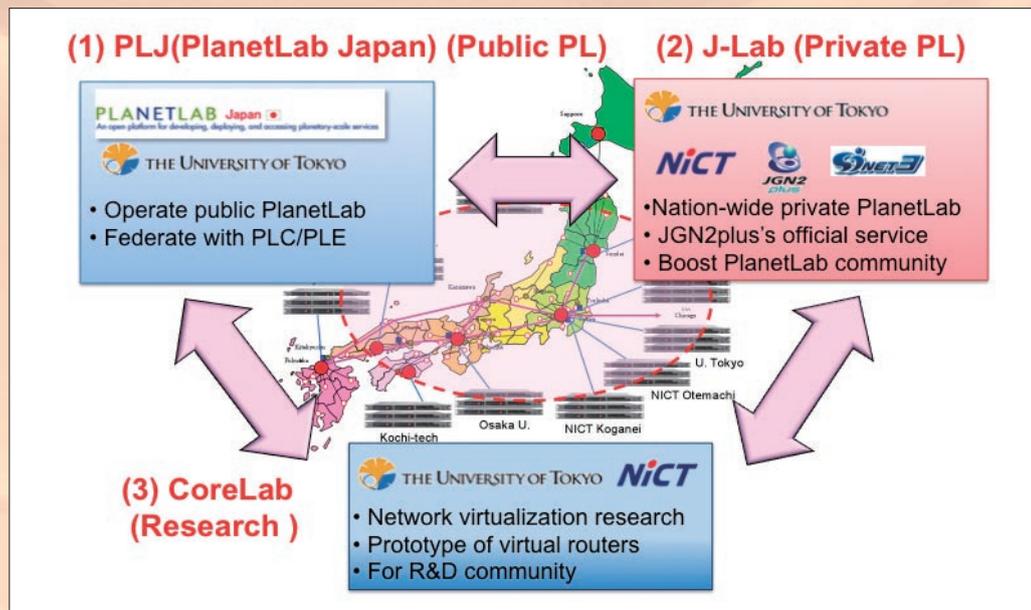
● Network Virtualization and Overlay R&D on JGN2Plus

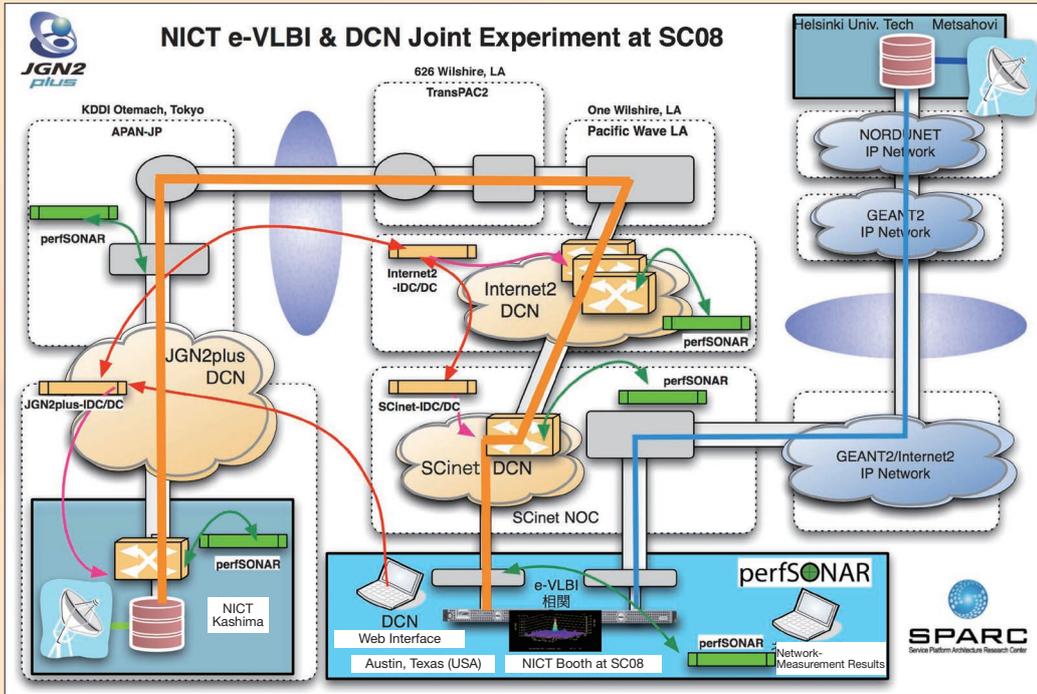## Theme 3 — R&D on Optical Path Networks and Applications

Hideki Otsuki
Senior Researcher, Network Architecture Group, New Generation Network Research Center

The Internet as currently in general use is a so-called "Best Effort" structure, for which bandwidth is not guaranteed, and permitting both delay and errors to occur. In contrast, our research activity is searching for methods to implement end-user application requirements such as guaranteed ultra-high bandwidth, low latency, and error-free connectivity, and to provide them as services.

Also, controlling the optical signal path is an issue with optical signal transmission technology, which is the key to expanding the bandwidths of networks, and the standardization of control methods for interconnectivity is important for this. Thus, we are studying path control methods that are able to control by wavelength and also to control multiple wavelengths simultaneously, in order to establish methods for optical path control. We are

NICT e-VLBI & DCN Joint Experiment at SC08

- Helsinki Univ. Tech. Metsahovi
- NORDUNET IP Network
- GEANT2 IP Network
- GEANT2/Internet2 IP Network
- 626 Wilshire, LA / TransPAC2
- One Wilshire, LA / Pacific Wave LA
- KDDI Otemach, Tokyo / APAN-JP
- perfSONAR
- Internet2-IDC/DC
- Internet2 DCN
- perfSONAR
- JGN2plus DCN
- JGN2plus-IDC/DC
- SCinet-IDC/DC
- perfSONAR
- SCinet DCN
- SCinet NOC
- perfSONAR
- NICT Kashima
- DCN Web Interface
- Austin, Texas (USA)
- e-VLBI 相関
- NICT Booth at SC08
- perfSONAR
- Network-Measurement Results
- SPARC Service Platform Architecture Research Center

● e-VLBI and DCN Joint Demonstrative Experiment at SC08

■ Terminology

e-VLBI: VLBI is an abbreviation for Very Long Baseline Interferometry, in which electromagnetic waves emitted by a radio star that is several billion light years distant are received simultaneously by multiple antennas, and the time difference between their waves is measured very accurately to find the difference between the receiver locations. e-VLBI is a method of making VLBI observations in which data is exchanged by using networking technology, rather than exchanging data in off-line, as having been done earlier.

conducting demonstrative experiments on the testbed, and will aim at standardization of signaling methods required to reserve wavelengths for communications between end-points and the path control. We will also aim at spreading their development internationally while collaborating closely with the Keihanna Interoperability Working Group and several other overseas communities studying interconnection.

Last year, the world's largest international conference and exhibition of the leading edge technology on super computing, Super Computing 2008 (SC08) was held in Austin, Texas, USA and the three domains, JGN2plus, Internet2 and SCinet (the network at the SC08 venue), were interconnected, scheduling times when particular users required communications bandwidth and using a Dynamic Circuit Network (DCN) technology to set up virtual circuits not affected by other communications. It was used to connect the NICT Kashima Space Research Center with the SC08 venue, and transfer result data from a VLBI computation in order to successfully demonstrate an application performing real-time correlation processing. It was the first attempt to use the DCN technology by a research facility in Asia and it received high praise.

Theme 4

## Establishment of Translational Technologies for NWGN Operation

Hiroshi Esaki
Executive Researcher, Invited Executive Researcher
(Professor, Graduate School of Information Science and Technology, the University of Tokyo)

In order to communicate safely on the Internet as it is today, users are required to consider safety measures themselves, so this could be quite troublesome. Our research activities include providing a safe and secure information communications service that addresses inadequacies in the current Internet, establishing basic technologies that will contribute to building new generation Internet systems for the development of broadband in the future, and establishing operations technologies. We are exploring four research themes, while building relationships with domestic and international standards organizations and vendors. The four research themes are as follows: (1) Network measurement research, which involves research and development of tools for building, operating and supporting the networks, creating links with the seven commercial ISPs operating in Japan, and gathering and analyzing domestic Internet traffic data; (2) Traffic management research, which involves R&D on component technologies for optimizing network traffic in a variety of environments and achieving continuity and robustness for services, along with the related operations technologies; (3) P2P Traffic Engineering research, which involves R&D on technology for P2P traffic control needed to achieve efficient distribution of content by transferring data directly between terminals connected as peers; and (4) Research to establish IMS-SIP operations technology, which involves integrating the public communications services, built on circuit and packet switching, with the Session Initiation Protocol (SIP), used with IP technology and Internet telephony, as well as standardizing and spreading use of the IP
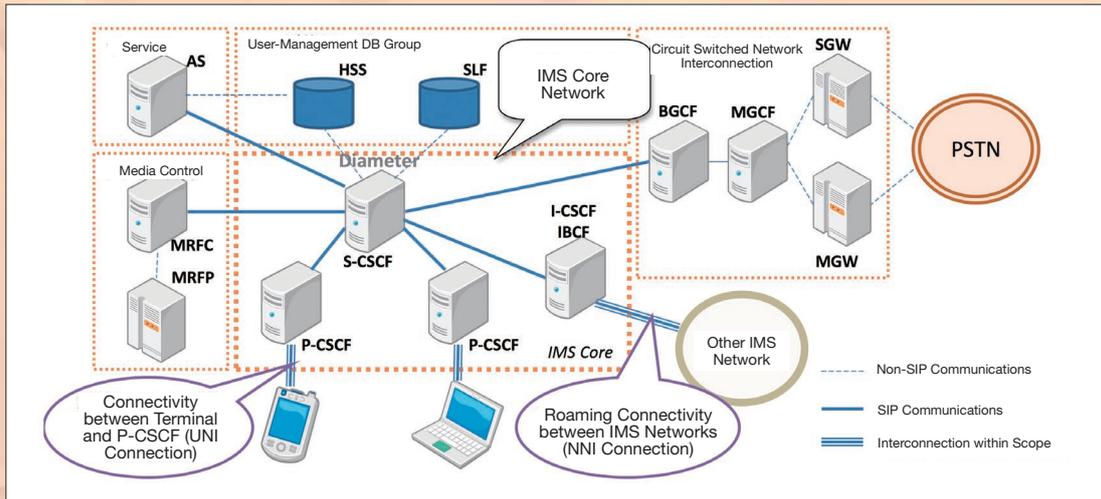
● Scope of HOTARU Development

Multimedia Subsystem (IMS), a communications system for implementing multimedia services.

For (4) in particular, in order to spread the use of IMS generally, and not just within communications operators, we are cooperating with the HOTARU Project established in 2007 to create a standard reference code that can be used for implementing IMS software. We are developing and implementing IMS reference code, conducting interconnection tests, applying improvements based on the results of private testing, and by obtaining feedback from the reference code and development documentation, refining and maturing the reference code.

Theme 5
Verification of Technology for International Testbed Federation Operation
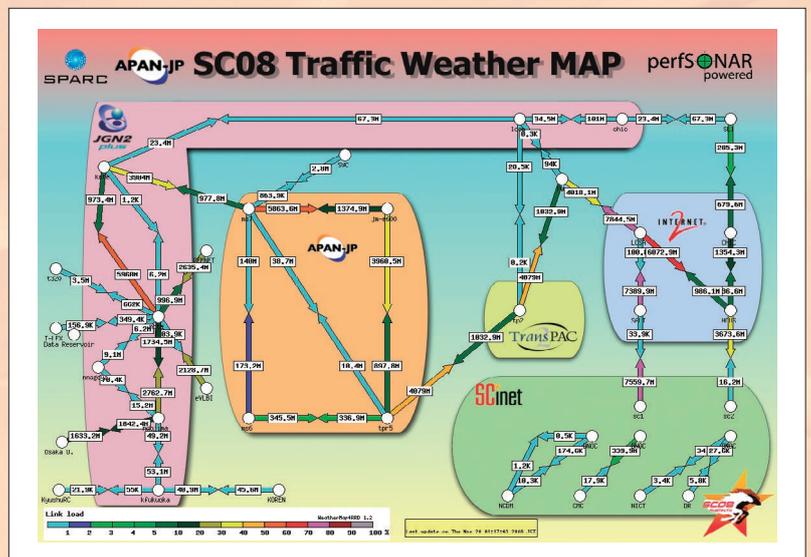
Yasuichi Kitamura
Senior Researcher, Network Testbed Research Promotion Group, Collaborative Research Department

The Research and Education Network (REN) provides interconnectivity for a variety of research and educational activities using Internet technology and these activities are becoming active. This interconnectivity is extremely flexible but it is also resulting in unforeseen difficulties. Besides, this experimental elements are high level so that communications methods that are not capable of experiments in the marketplace are also conducted. The objective of this research is to develop technology to inform of these conditions clearly and to show the observed data to users at a technical level that they can understand. Specifically, we are conducting R&D towards implementation of a method for gathering and sharing network performance measurement data by using perfSONAR, and through it, automatically creating diagrams of the state of the network for the user. perfSONAR: performance Service Oriented Network monitoring ARchitecture is set by the Open Grid Forum (OGF), which promotes standardization of grid technologies.

At SC08, in order to understand the communications conditions for experiments conducted between the SC08 venue and various related facilities, we made and published a diagram showing the degree of network congestion based on perfSONAR data and using different colors. This was called a "weather map" because of its similarity to a regular weather map. This weather map made it possible to see the traffic between Japan, the USA, and the venue, as well as within the venue, all at once. Therefore, it deserved of high praise from users, as well as from the SC08 network (SCinet) operations group and from Internet2, which provided support for traffic within the USA. In the future, we plan to provide opportunities for general JGN2plus users to use perfSONAR and to raise the level of research yet further.

● SCO8 Traffic Weather Map

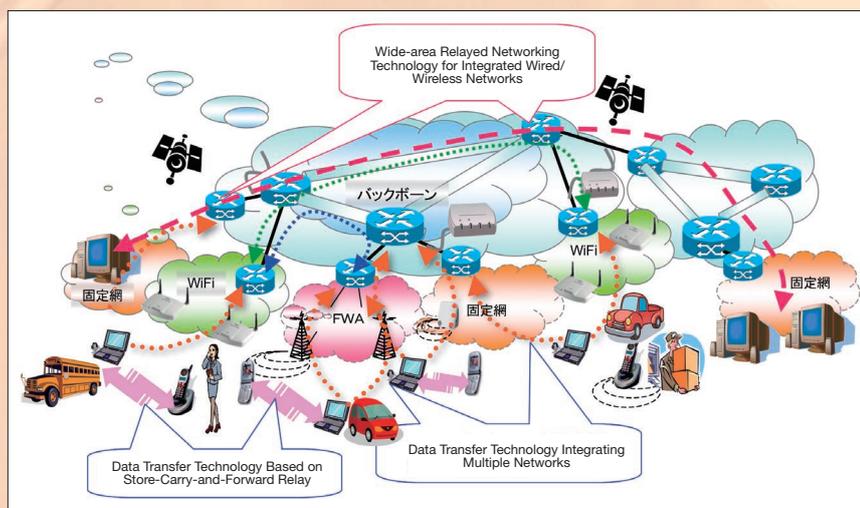# R&D on the Integrated Wired and Wireless Network Platform Technology

Masato Tsuru

Expert Researcher, Network Testbed Research Promotion Group, Collaborative Research Department
(Professor, Faculty of Computer Science and Systems Engineering, Kyushu Institute of Technology)

The current Internet is composed of a high-speed, over 100 Gbps backbone and various access networks with speeds from several tens of kbps, such as mobile phones, up to several Mbps. For the new generation Internet, however, a global information distribution network available at any place or time is needed, and integrating even more varied, non-uniform access networks (particularly including various types of wireless and mobile environments with different characteristics) with the ultra-high-speed core network. We have begun this researching theme this year, and are conducting research, development and implementation related to the integrated wired and wireless network platform technology which will overcome discontinuities in time and space in this sort of network, realize the requirements of a variety of applications, and achieve efficient distribution of information while taking fairness among users into consideration. We are focusing in particular on Delay, Disruption and Disconnection Tolerant Networking (DTN), and through study of the architecture and component technologies, we aim to establish fundamental technologies as the service platform in the new generation network. Research on the DTN technology was originally designed to overcome limitations in connectivity or performance in challenging environments such as in space, the deep sea or on the battle field, or data gathering and distribution for mobile sensors. These included extremely long delays, frequent packet loss and disconnections, and other conditions which do not satisfy the prerequisites for conventional Internet protocols and the services based on them (domain name service, etc.). Later, however, due to emerging issues such as dead areas in municipal wireless broadband, high-speed wide-area mobile communications, connections between extremely heterogeneous networks or terminals, energy-saving intermittent connections, and communication in times of disaster, there has been increasing awareness of the generality and importance of DTN technology. Within these research themes, our research and development is focused on data transmission technology integrating multiple networks, data transfer technology based on store-carry-and-forward relay, and wide-area relayed networking platform technology for integrated wired and wireless networks, while also including effort towards international standardization. Through these efforts, we are hoping to contribute to a future network platform based on DTN technology integrating wired and wireless networking. This will provide general functionality, technology and architecture needed for the new generation network, and achieve effective and economical end-to-end communication in a non-real-time and asynchronous manner.

● Overview of Research on Integrated Wired/Wireless Network Platform Technology

Acceptance of Exchange Students from the Prime Program

Starting in July, NICT has accepted two exchange students from the University of California, San Diego for a nine-week academic internship with the Applied Electromagnetic Research Center.

This is part of the Prime Program of the National Science Foundation (NSF) in the USA (similar to the Ministry of Education, Culture, Sports, Science and Technology in Japan). The program is designed to broaden the perspective of students, letting them participate in a collaborative project between the USA and Japan, and giving them work experience in a real research facility.

As part of the research being done by NICT in cooperation with Calit2 a San Diego research facility, Jade Kwan is conducting R&D on interactive manipulation of 3D visualizations effect with the Space Environment Group under Shinji Shimojo, Executive Researcher, while Isabelle Fanchiu is conducting R&D on high-resolution display related to analyzing paintings using terahertz technology with Dr. Kaori Fukunaga, Research Manager.

● Exchange Students, Isabelle Fanchiu (left) and Jade Kwan

NICT's Facilities Opened to
— Infinite Possibility!

Each year NICT facilities are opened to the public during summer holidays for elementary and middle schools. We also held this event at our facilities this year. We hope that this provided people in the community with an opportunity to understand daily research activities at NICT, and showed our visitors how interesting science and technology can be.

NICT is also planning to open facilities after July, next year. So please visit the facility near you.

Headquarters (Koganei)

Date: July 24 (Fri) and 25 (Sat) Visitors: 3,687

This year, the facility opening was held after the total eclipse, so our whole-sky, high-resolution theatre booth showing the eclipse was the most popular exhibit.

Many visitors arrived, even before the doors opened.

The exhibit, "Experience the eclipse in whole-sky high resolution!" was the most popular.

"Handicraft Workshop for Children"

Kobe Research Laboratories, Kobe Advanced ICT Research Center

Date: July 25 (Sat) Visitors: 475

In spite of the weather report forecasting violent rain on the event day, visitors were able to visit all of the research project booths in a quiz-rally format. Researchers also gave lectures giving easy explanations about DNA, superconductivity and neuroinformatics, introducing the latest leading-edge research, and later received many questions from enthusiastic audience members. In many cases, originally scheduled times needed to be extended.

"The Ultimate Information Machine – Cells –," in Bioinformatics Project

"Nanotechnology through Molecular Function" in Molecular Photonics Project

"Learning from the Flexible Information Processing of Living Things – Towards Molecular Communications – " in Bioinformatics Project

"DNA from Birth – What is DNA? – " Explained in the Lecture

the Public in Fiscal 2009

New Technology! —

Kashima Space Research Center

Date: August 1 (Sat) Visitors: 1,501

A long line of visitors formed as early as 30 minutes before the doors opened. In the handicraft workshops, which are very popular every year, 200 elementary school students attempted to assemble an electrical generator. Visitors also assembled air guns and crushed cans (by creating a vacuum inside them) in the projects taken from Dr. Denjiro (a science program) by using household objects.

A View of Entrance of Kashima Space Research Center, 30 Minutes before Opening

A View of the Ever-popular Handicraft Workshop

A View of Experiments to Experience Atmospheric Pressure

Okinawa Subtropical Environment Remote-Sensing Center

Date: August 23 (Sun) Visitors: 570

This year, the handicraft workshop event, which is a drawing card, was held in late August, and visitors (including school students) were accepted without reservation on the day. They wanted to use the handicrafts made there as independent research during the school summer-vacation. Overall, the event was a great success, with over 200 more visitors than the previous year.

Tour of Facilities

Science Workshop

Exhibition Room

The Facilities of the Keihanna Research Laboratories will be opened to the public on November 6 and 7 during the "Keihanna Information and Communications Research Fair 2009" held from November 5 to November 7. Visitors are encouraged to attend it.

Announcement of NICT Super Event 2009

To People, to the Earth, to the Future. The Latest Research in ICT.

October 6 (Tue) to 10 (Sat), 2009
At the Digital Networks Stage (Hall 5) of CEATEC JAPAN 2009 (Makuhari Messe)

Exhibiting Research Results
The latest research results at NICT will be exhibited.

Zone of New Generation Network
"More Convenient, More Comfortable"

Zone of Universal Communications
"More Fun, More Creative"

Zone of ICT for Safety and Security
"More Safe and Secure"

Zone of Industry-Academia-Government Collaboration
"Stronger Collaboration among Industry-Academia-Government"

NICT Symposium 10:30-13:30, October 7 (Wed)
Meeting Room 201, International Conference Hall (2F)

The Future of Data Communications
– NICT introduces its future vision of data communications –

1. R&D Strategies for the New Generation Networks
2. Basic Technologies Supporting the New Generation Networks
   – Towards Networks with No Apparent Restrictions for Users –
3. JGN-X, a New Testbed for Open Innovation
4. Data Communications Learned from Brain Function
   – NICT Research Integrating Brain and Information Communications –
5. The Future and Research Trends in Ultra-Realistic Communications

Participants wishing to attend symposiums and seminars should make a reservation through the CEATEC JAPAN Web site.

Seminars by Exhibiting Companies
All will be held in Exhibition Hall 4, the Exhibitors' Seminar Hall

Announcement of Research Results from the NICT Industry–Academia-Government Collaboration and Support System	11:00-13:30, October 8 (Thu)
Announcement of Research Results	11:00-12:00, October 9 (Fri)
Introduction of the Seeds of Transferrable Technologies	15:30-16:30, October 9 (Fri)

Inquiries: TEL: +81-42-327-5392
(Mr. Yamada, Mr. Hashimoto)
E-mail: publicity@nict.go.jp

Registration for admittance is required prior to entering the CEATEC JAPAN venue.
http://www.ceatec.com (CEATEC JAPAN Website)

* Various additional details will be posted on the CEATEC JAPAN Web site whenever necessary.

36th International Home Care & Rehabilitation Exhibition 2009 (H.C.R. 2009)

NICT will exhibit at the 35th International Home Care & Rehabilitation Exhibition 2009, which is held at Tokyo Big Site from September 29 (Tue) to October 1 (Thu), 2009. In the booth, companies operating businesses based on NICT initiatives, "Promoting and assisting development providing communications and broadcast services to the physically disabled," and "R&D assistance enriching communications and broadcast services for the aged and disabled" (13 completed businesses in total as of the end of FY2008) will give demonstrations and hold informational meetings together with announcements of their business results. We encourage all interested parties to attend.

Prior to entering the H.C.R. 2009 venue, the admittance registration is required.
http://www.hcr.or.jp

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Information for Readers

In the next issue we will commemorate ten years of low-frequency Standard time and Frequency transmissions with a special interview feature.