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情報通信研究機構
NICT NEWS
National Institute of Information and Communications Technology

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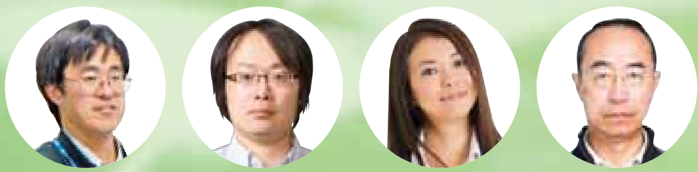
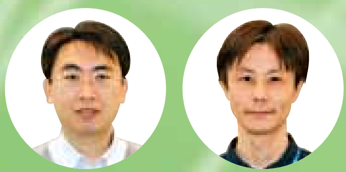




NICT

Wireless Relay Using Small Unmanned Aircraft Systems

—To provide connections to isolated areas in large-scale disasters—

MIURA Ryu

Director, Dependable Wireless Laboratory
Wireless Network Research Institute

After completing a master's course, he joined Radio Research Laboratory (currently NICT) in 1984. After being involved in R&D on satellite communications, stratospheric wireless relay, and intelligent transport systems, he now works on the disaster-resilient network and ultra wide band systems.
Ph.D. (Engineering).

TAKIZAWA Kenichi

Senior Researcher, Dependable Wireless Laboratory
Wireless Network Research Institute

He has been with the Communications Research Laboratory (currently, NICT) since 2003. He currently works on systems design to deliver dependable wireless networks.
Ph.D. (Engineering).

ONO Fumie

Senior Researcher, Dependable Wireless Laboratory
Wireless Network Research Institute

After completing a doctoral course, she was with the Faculty of Engineering, Tokyo University of Science from 2004 to 2006 as a research associate. From 2006 to 2011, she was an assistant professor in the Yokohama National University. She joined NICT in 2012. She is engaged in research and development of MIMO relay network and network coding.
Ph.D. (Engineering).

SUZUKI Mikio

Senior Researcher, Dependable Wireless Laboratory
Wireless Network Research Institute

Graduated in 1970 and joined Mitsubishi Electric Corporation. After being involved in development on microwave parts and radar engineering, he moved to TAO (Telecommunications Advancement Organization of Japan) for R&D on stratospheric platform system in 1998. In 2004, TAO & CRL was merged to NICT, and he engaged in developing millimeter communication system and now works on wireless relay using unmanned aircraft systems. Bachelor (Engineering).

Background

Due to destroyed communications facilities and roads in the Great East Japan Earthquake, many areas became isolated, and unable to determine the local damage situation, relief activities slowed. Among other events, scarce supplies could not be requested nor could safety of local residents be confirmed. In response to these types of issues, it is expected that the practical use of the "radio relay system," a portable system based on small unmanned aircraft systems capable of computer-controlled autonomous aviation that do not require a runway, will enable prompt identification of isolated areas during a disaster, tracking of the disaster situation, and securing of communications in disaster areas.

In recent years, there is growing interest in the small unmanned aircraft systems for use as even a disaster monitor and environmental sensor, but as for the development of a "radio relay system" that targets times of disasters in particular, there are still very few examples both within and outside Japan.

Outline of radio relay system

At NICT, we introduced one of the world's most advanced small unmanned aircraft systems, Puma-AE (AeroVironment, Figure 1), and developed the "radio relay system" which uses a small unmanned aircraft system and is composed of a Puma-AE-mounted radio relay device and a simplified, earth-based ground station device (Figure 2). This system, when relayed with one small unmanned aircraft, can connect two ground-based points that are approximately 4–5 km from one another. Furthermore, flying two aircrafts simultaneously and relaying between the two in the sky can extend the communication distance approximately 2–3 km further. The radio relay device for on-board aircraft use that we developed is extremely small and lightweight, fitting cleanly inside a space with 10 cm sides

Figure 1 The small unmanned aircraft
(Wingspan: 2.8 m, Length: 1.4 m, Weight: 5.9 kg, Flight duration: 2–4 hours, Wind speed: 25 knots, Electric motor, Hand-launch system)

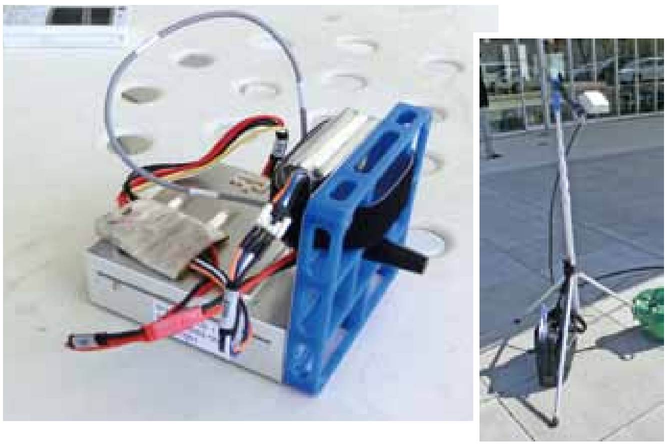


Figure 2 Developed onboard wireless repeater (left) and ground station (right)

along with the dedicated battery and weighing just under 500 g (including the battery). Its frequency is 2 GHz, transmission output 2 W, effective transmission speed

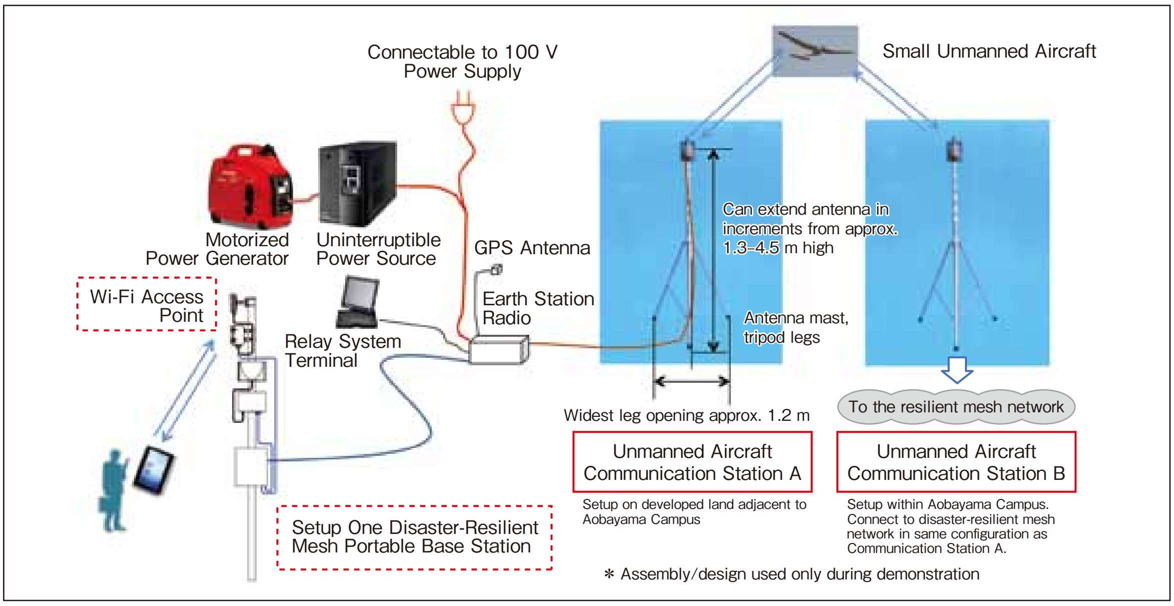


Figure 3　System overview of the demonstration experiment

approximately 500 kbps, and has a communication uptime of approximately one and a half hours. By using one of two ground-based stations as a wireless LAN access point and the other to access an Internet connection (both equipped with a LAN interface), a wireless LAN (Wi-Fi) zone can easily be built in isolated areas through unmanned aircraft systems.

Open demonstration experiment of this system

At the Resilient ICT Research Symposium and Demonstration held in Sendai on March 25 to 26, 2013, we conducted an actual open demonstration experiment on radio relay with both a single and other times two unmanned aircrafts in actual circular flight (200–400 m above the target area) (Figure 3). In the experiment, with one ground station setup on developed land adjacent to Tohoku University at Aobayama Campus, simulating an isolated area, and the other ground station at a technology exhibition hall on the same campus, we connected the latter ground station to a separately constructed “Resilient Wireless Mesh Network” on the campus. The Resilient Wireless Mesh Network is a network system that maintains communication functions within an area even when part of a ground-based network sustains damage and Internet connection is lost. We demonstrated that it is possible to communicate human safety information and disaster information between isolated areas through unmanned aircraft systems during a large-scale disaster by working with our radio relay system. The ground stations are small enough to hand-carry and so can be installed in a disaster area on foot or by bicycle when a vehicle cannot be used. In this experiment where we conducted a total of more than 15 flights over five days starting from the experiment preparatory stage, we successfully confirmed flight stability even in relatively strong winds.

Figure 4　Flight scene and visitors looking up at the aircraft (in the background is a portable mesh network base station with a solar battery attached)

Figure 5　Monitor image showing the communication link between the isolated area and the ground mesh network via the aircraft in real time (the icon the finger is pointing to is an unmanned aircraft relay station)

Future prospects

The realization of swift communication securement during a large-scale disaster is expected in the future by disaster-prevention-related organizations always having this system on hand. In the future, we will strive to extend the communication range/distance and speed up communications using many unmanned aircrafts. We will also strive for the sharing and coexistence of radiowaves between unmanned aircraft systems and ground-based wireless systems, and for further expanding the field of usage.

Please note that this demonstration experiment was conducted in collaboration with the Wireless Mesh Network Laboratory, Resilient ICT Research Center, Space Communication Systems Laboratory, Wireless Network Research Institute, and Network Architecture Laboratory, Photonic Network Research Institute.

Strong Backup! Re-Constructing the Emergent Optical Network in Disaster Recovery by Integrating Survived Optical Network Systems

—Interconnecting multi-vendor optical network systems—

Xu Sugang

Senior Researcher, Photonic Network System Laboratory, Photonic Network Research Institute and Resilient ICT Research Center, Robust Network Platform Laboratory

After completing a doctoral course and having worked at Okinawa Research Center of the Telecommunications Advanced Organization of Japan and Global Information and Telecommunication Institute, Waseda University, he joined NICT in 2005. He is engaged in research on network architecture and photonic network control. Ph.D. (Engineering).

SHIRAIWA Masaki

Senior Researcher, Photonic Network System Laboratory, Photonic Network Research Institute and Resilient ICT Research Center, Robust Network Platform Laboratory

After working at a telecommunications equipment vendor, Semiconductor startup and Semiconductor foreign-affiliated firm, he joined NICT in 2012. He is engaged in research on photonic networks.

Introduction

Earthquakes and tsunamis in the Great East Japan Earthquake damaged many optical fiber and network node systems, and communication service recovery required long periods of time. Optical networks are important key infrastructures that need to be quickly reconstructed when damaged.

Focusing on making use of survived optical network systems to construct an emergent optical networks as soon as possible, we developed an emergent integrated network control and management system—a system that coordinates different vendors' node systems. Normally these multi-vendor systems-based networks are not connected with each other due to the incompatibility of optical control, and system control schemes, etc., among different vendors.

Hereinafter, we will introduce our study of emergent optical network integration, which will enable quick, emergent recovery of optical networks.

Equipment from different vendors don't communicate with each other?

Normally, due to the lack of compatibility in control of different vendors' products, different vendors' products will not communicate with one another. Vendors are independently implementing advanced technology into their optical communication devices. As a result, many optical communication devices are unique, original products of vendors. Specifically, equipment control mechanisms/commands, and optical network management mechanisms have specifications unique to a vendor, causing a situation in which direct connections between the equipment of different vendors is virtually impossible.

Thus, each optical network managed and operated by optical network carriers are composed of vendor-specific equipment and independent from other optical networks. There is no mixing of multiple-vendor equipment within one optical network (Figure 1).

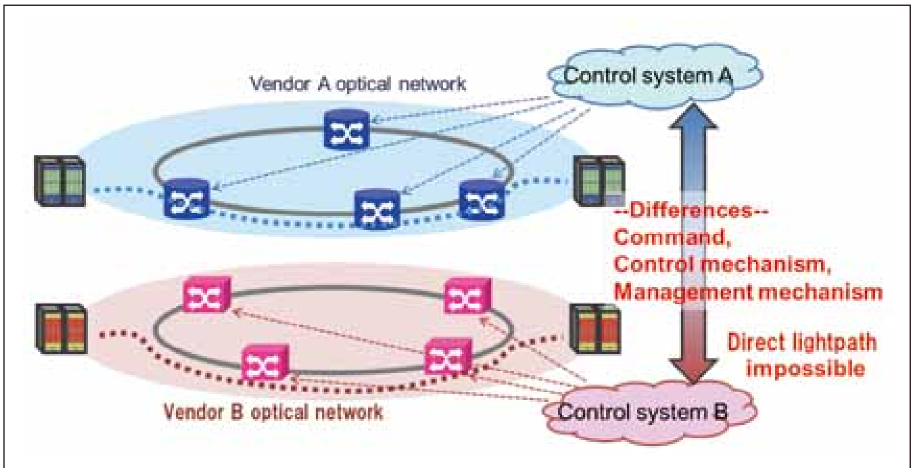


Figure 1　Original vendor-dependent optical networks (before disaster)

Integrate different vendor equipment into one optical network !

Building an emergent optical network and operating it using survived systems after a disaster would allow prompt, provisional recovery of optical networks. For this reason, we developed an emergent integrated network control and management system in collaboration with KDDI R&D Laboratories for integrally controlling and managing equipment of different vendors.

The integrated control and management system is composed of an emergent integrated network manager, all vendor-specific command translation middle-ware, and all vendor-specific controllers. The emergent integrated network manager designs and manages lightpath provisioning via command translation middle-wares and individual original networks' controllers or management systems. Each vendor-specific command translation middle-ware converts the nodal configuration information yield from the emergent integrated network manager to commands of the vendor equipment. Finally, each vendor-specific controller delivers commands to vendor-specific equipment.

Launching this system allows commands from the emergent integrated network manager to be automatically sent and executed in different vendor equipment and also allows integrated management and control (Figure 2).

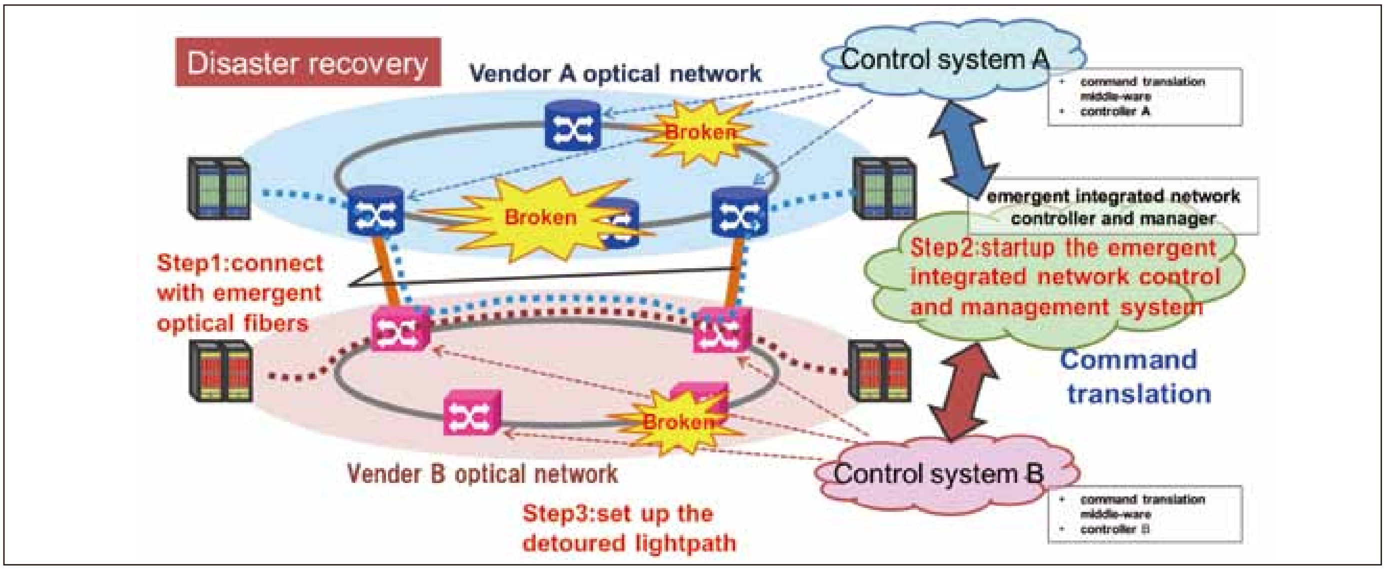


Figure 2　Process of disaster recovery by using emergent integrated network control and management system

Demonstration of Emergent Integration among Multi-Vendor Optical Network Systems in Disaster Recovery

Using the emergent integrated network control and management system, we performed a set of lightpath configurations, including the design of lightpaths that cross over equipment of different vendors and the control of the equipment, and finally validate the lightpath provisioning by delivering the video contents via the established lightpath (Figure 3).

Furthermore, at "The Resilient ICT Research Symposium and Demonstration" held in Sendai City, Miyagi Prefecture on March 25 to 26, 2013, the proposed emergent integration of survived multi-vendor optical network systems for disaster recovery has been implemented in a two-vendor-based prototype testbed and successfully demonstrated for the proof of concept (Figure 4).

This technology enables quick, emergent recovery of optical network communications in disaster area by merging the survived multi-vendor optical systems into one emergent optical network. Pre-implementing this technology into communications carriers' management systems will become a significant safeguard against disasters.

Future prospects

Although the proof of concept has been conducted, we will improve the system that also manages alarms from equipment and aim for the quick, practical use of this technology against large-scale disasters.

Figure 4　Demonstration of disaster recovery

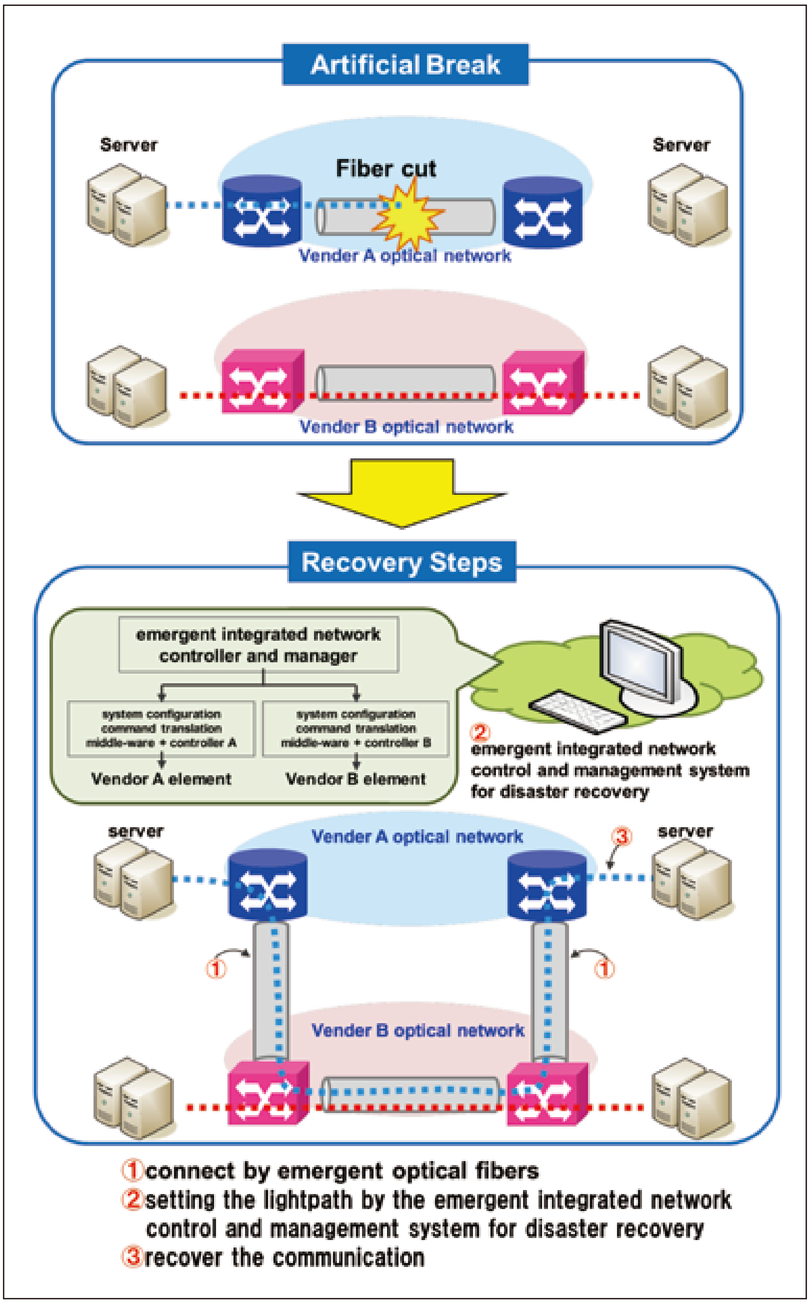


Figure 3　Disaster recovery demonstration based on emergent integrated network control and management system

Disaster Information Analysis System
−Preparing for information overflow in future large-scale disasters−

TORISAWA Kentaro

Director of Information Analysis Laboratory, Universal Communication Research Institute/ Director of Information Distribution Platform Laboratory, Resilient ICT Research Center

After serving as Associate Professor, Japan Advanced Institute of Science and Technology, TORISAWA joined NICT in 2008. He has been engaged in research on language processing technology and information analysis technology.

OHTAKE Kiyonori

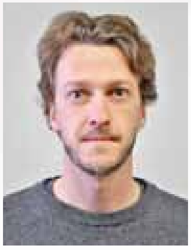
Senior Researcher, Information Analysis Laboratory, Universal Communication Research Institute

After completing a doctoral program and working at ATR Spoken Language Translation Research Laboratories, OHTAKE joined NICT in 2006. He has been engaged in research on spoken language processing, dialog systems, and natural language processing (NLP).
Ph.D. (Engineering).

GOTO Jun

Research Expert, Information Analysis Laboratory, Universal Communication Research Institute

After completing a doctoral program and working at NHK Science & Technology Research Laboratories (STRL), GOTO joined NICT in 2011. He has been engaged in research on question answering technology.



Stijn De Saeger

Senior Researcher, Information Analysis Laboratory, Universal Communication Research Institute

After completing a doctoral program in 2006, Saeger served as a NICT Expert Researcher and from 2012, an NICT Senior Researcher. He has been engaged in research on automated acquisition of knowledge.
Ph.D. (Knowledge Science).

What happened after the Great East Japan Earthquake?

After the Great East Japan Earthquake, assessing damage and rescue situations quickly and accurately was extremely difficult. Various organizations and people involved in relief operations could not share information, which caused much trouble. Moreover, the many rumors and false alarms also caused problems.

Aiming for effective use of disaster-related information

In order to resolve such issues, at NICT, in collaboration with Tohoku University, we are developing a system that supports adequate disaster situation assessment and decision-making. Specifically, we are developing the Disaster Information Analysis System that collects, stores, and analyzes large quantities of disaster-related information that emerges during a disaster, which it then provides to the users. We aim to implement the system by using computer clusters in FY 2014 and have it used during a disaster in various areas of society—in other words, by various relief organizations and disaster victims.

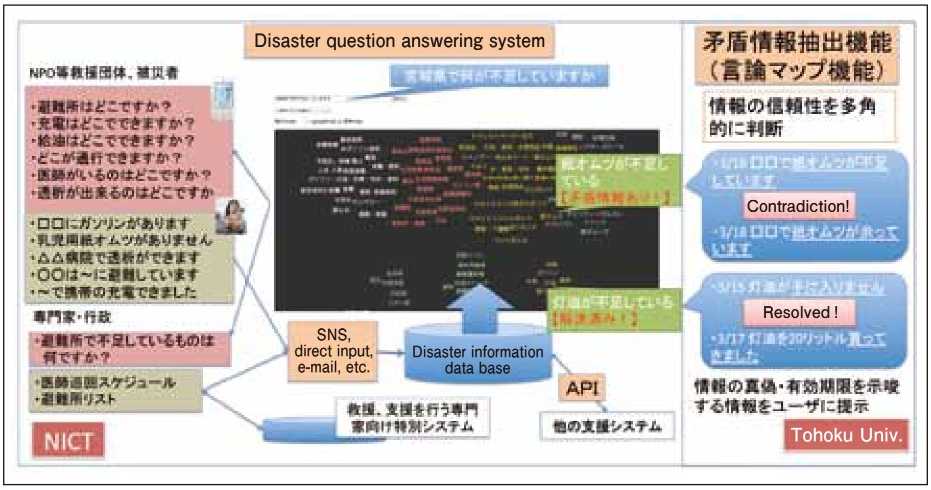


Figure 1　An outline of the Disaster Information Analysis System under development (implementation expected in 2014)

Figure 1 is an outline of the system under development. First, we collect and store a vast amount of information via the Internet transmitted from a wide range of individuals and groups during a disaster including disaster victims, aid organizations, and the mass media. When text questions are given to the system via smartphones or PCs in natural Japanese such as, "What are the shortages in Miyagi Prefecture?" and "Where are the soup kitchens being run in Miyagi Prefecture?" a list of answers such as "medical product," "poly-tank," and "… Elementary School" are presented by the question answering system (left-side of Figure 1) based on the collected/stored information. Figure 2 shows the answers when the question, "What are the shortages in Miyagi Prefecture?" is entered into the prototype we are currently operating with approximately 50 million Twitter entries made immediately after the Great East Japan Earthquake as sources of information. The answers are classified by their semantic similarities and displayed in each cluster of similar answers by color—white, yellow, blue, etc. This interface was developed to help quickly determine the necessary information from the number of responses displayed (the colors themselves do not have meanings). We can see that a very broad range of supplies is scarce. One lesson from this earthquake disaster is that during extremely large-scale disasters, various unforeseen events occur. Scrolling down and looking at the response list in Figure 2, we learn that there was a shortage, in great numbers, of supplies that were difficult to anticipate before the disaster such as "antiallergic food for children," "psychotropic drugs," "artificial dialysis instruments," "underwear," and "sign language interpreters". One aim of our system development is to exhaustively analyze damage conditions, including these unexpected events, and eliminate relief oversights. You can click each answer to view the original text with more detailed information.

The important thing here is that if you use existing search engines by entering queries such as "Miyagi Prefecture, shortage," you will receive results with too much information. In order to find specific needed resources, we must read over all the presented documents and manually create lists. Moreover, this means that we must perform the redundant work of reading over text many times that displays major responses such as “gasoline.” For relief activities that require promptness, this is a serious problem. Also, like the example given above, finding unanticipated scarce supplies in the vast amounts of words is extremely difficult. We are aiming to provide users with this kind of exhaustive information instantaneously.

Figure 3 is an example in which a “where”-type question, “Where are soup kitchens being run in Miyagi Prefecture?” is fed into the system and shows the locations on a map of where the soup kitchens are run. From the displayed map, areas where there are little presence of relief activities and information transmissions become obvious. If these areas were discovered, this would facilitate decision-making such as prioritizing deployment of aid workers to these areas.

In order to handle unreliable information such as false rumors and information that becomes inaccurate with time, we are also developing a system that allows users to assess the reliability of presented information from the diverse standpoints by displaying information that supports the answers provided by the question answering system above and also information that contradicts the answers. As shown on the right side of Figure 1, this is where we are using Inui-Okazaki Laboratory, Tohoku University’s STATEMENT Map technology. Figure 4 is an example of this STATEMENT Map technology applied to responses to the question, “What is effective against radiation?” We assist in determining information reliability by presenting not only information that agrees with the response of a supposedly false rumor, “Isodine,” but also information that disagrees, in other words, discrepant information. One reason why false rumors spread during the recent earthquake disaster was because the public could not find information that corrected the false rumors in the first place. We are anticipating that this system, which automatically displays contradictory information alongside information at the same time, such as “Isodine safeguarding against radiation is a false rumor” when “Isodine is effective against radiation” is displayed, will encourage the public to make more levelheaded decisions and be an effective way of preventing the spread of false rumors.

Future prospects

The Disaster Information Analysis System, which we have described, will be put into practical use in FY 2014 and aims to provide information to a wide variety of people. Currently, a prototype is running with one computer, but in the future, we are now implementing a parallel version on large-scale clusters, clouds, etc. and will extend to a system with larger amounts of information that works smoother with large amounts of questions. Also, in addition to continuing to improve the accuracy of question answering and STATEMENT MAP, we will proceed with research and development on functions that make analysis for aid workers easier and automatically mediate between aid workers and disaster victims.

Figure 2　Example answers of disaster question answering system

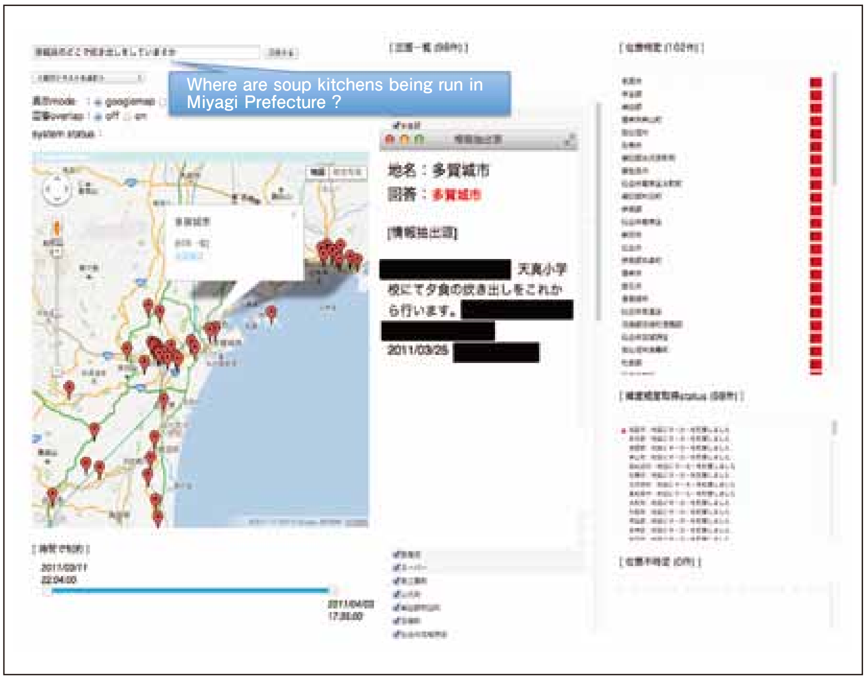


Figure 3　Example that shows answers to disaster question answering system on a map

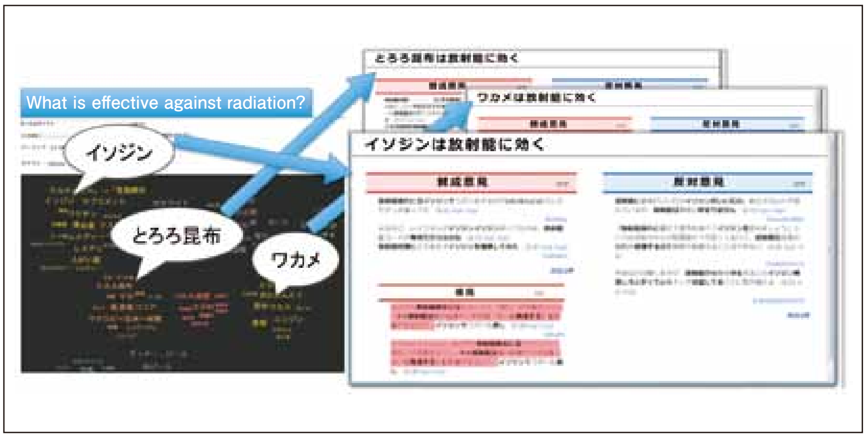


Figure 4　Example of STATEMENT MAP technology applied to anti-disaster question answering system responses

Development of Small Mobile Vehicle Station Which can Communicate with Satellites While in Motion

Byeongpyo Jeong

Researcher, Space Communication Systems Laboratory, Wireless Network Research Institute

After completing a doctoral course, Jeong worked for National Research Institute of Fire and Disaster, and joined in NICT in 2012. He is engaged in research on disaster response application using satellite communication. Ph.D. (Engineering).

Introduction

To minimize damage from a large-scale disaster, it is crucial to gather disaster information as quickly as possible during the emergency response phase (approximately within one week after the disaster) and share this information among relevant organizations. Emergency response organizations are required to take prompt and precise disaster response action.

When the Great East Japan Earthquake occurred, disaster response organizations including emergency fire response team from all over Japan were dispatched to the devastated area, Tohoku region, where they conducted relief operations. However, with physical damage sustained from earthquakes and tsunamis in the information-communications infrastructure and line disruptions in the early stages of the earthquake, information sharing among disaster response organizations was hampered due to congestion that occurred in the communications networks. Specifically, because most communication failed between the disaster site and disaster response teams, courses of action could not be adequately transmitted, creating a difficult situation for rapid response. At NICT, at the request of the Tokyo Fire Department, we assisted in disaster response activities by providing broadband communication lines between the disaster site fire fighting headquarter and the Tokyo Fire Department using the Wideband InterNetworking engineering test and Demonstration Satellite KIZUNA (WINDS)*. This, however, highlighted the need to develop satellite-communication earth stations able to communicate even while moving when a large-scale disaster occurs.

As a result, here at NICT, we developed a small mobile vehicle station that allows emergency response organizations to collect and transmit the latest disaster information in real time while moving.

The small mobile vehicle station

The small mobile vehicle station (Figure 1)—composed of a radome-attached axisymmetric reflector antenna with a 65 cm aperture, 20 W-class solid-state power amplifier, triaxial gimbal mechanism and modulator/demodulator—enables satellite communications with 24 Mbps transmission rates while traveling by using WINDS multi-beam antennas. Also, because GPS compasses and receivers are mounted, it is easy for non-experts to setup a satellite connection as it automatically acquires satellites. A high definition camera is mounted on the vehicle roof from where the disaster area conditions can be transmitted in real time while moving during a disaster, which allows prompt sharing of information among associated organizations. In addition, the antenna part is detachable and operable on ships. With a WINDS Active Phased Array Antenna, 6.5 Mbps communication is possible at sea.

Figure 1 Small mobile vehicle station

Open experiment of the small mobile vehicle station

At "The Resilient ICT Research Symposium and Demonstration" held in Sendai on March 25 to 26, 2013, we conducted an open experiment using a WINDS small mobile vehicle station. The overview of the open experiment was to provide information to secondary rescue teams and disaster prevention headquarters in real time by collecting disaster information (video, road damage, etc.) while moving with an emergency response organization right after a disaster occurred in order to assist in the emergency response. Figure 2 shows the open experiment overview of a small mobile vehicle station, and Figure 3 displays a video of a disaster situation sent in real time from a hypothetical disaster-affected area (left image) and road damage information from earthquakes and tsunamis (site of occurrence, uneven road information, image: right figure).

* Wideband InterNetworking engineering test and Demonstration Satellite KIZUNA (WINDS)
An experimental satellite jointly developed by NICT and the Japan Aerospace Exploration Agency (JAXA)—aimed at development of wideband internetworking technology—was launched in February 2008. NICT is now developing broadband satellite communication technology that contributes to disaster countermeasures using WINDS. WINDS is equipped with a fixed multi-beam antenna and active phased array antenna.

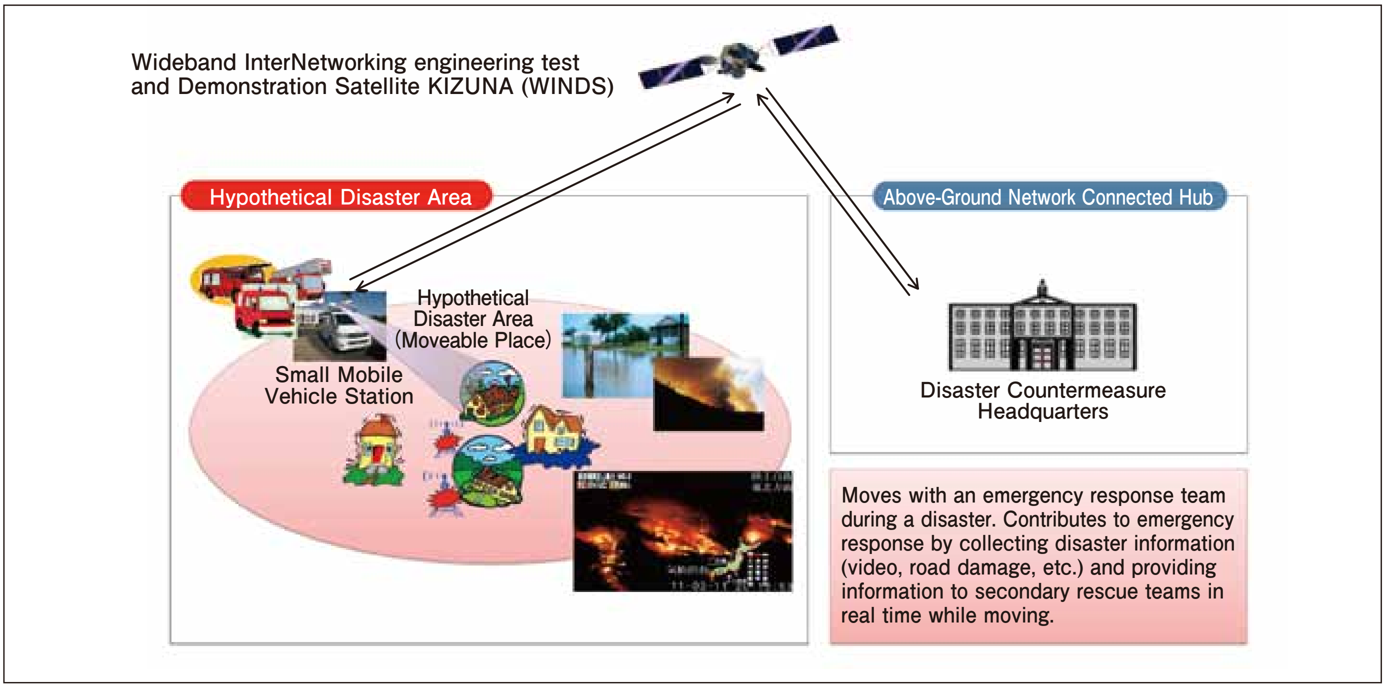


Figure 2 Overview of the small mobile vehicle station open experiment

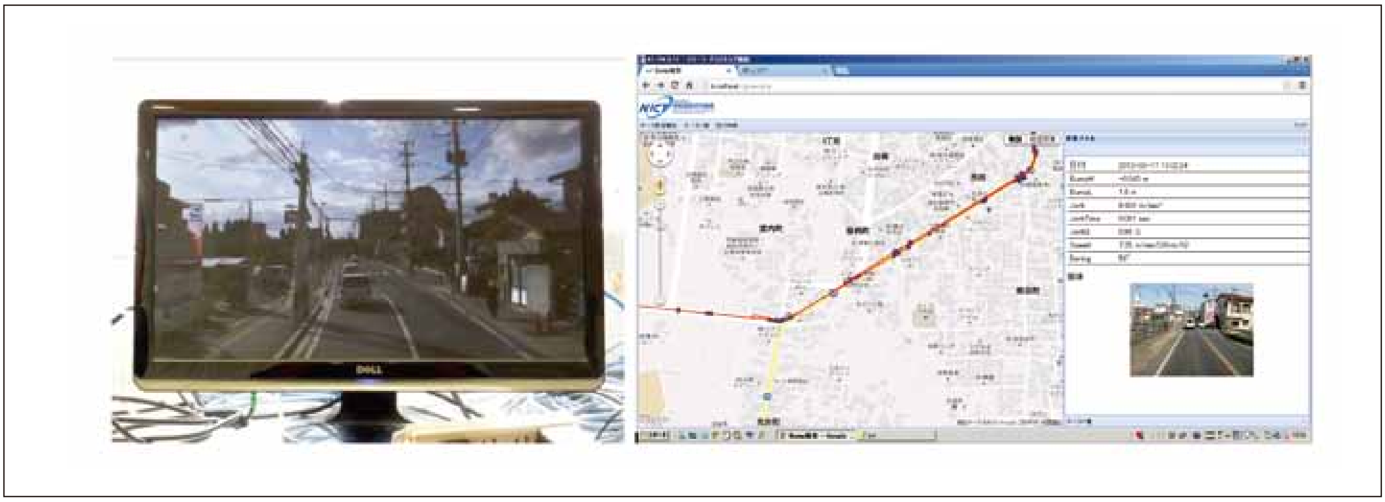


Figure 3 High-definition picture transmitted from a hypothetical disaster-affected area in real time (left image) and road damage information (right image)

In Figure 2, disaster headquarters used the fully-automatic transportable earth station, developed together with the small mobile vehicle station (Figure 4). This portable earth station, developed with usability in mind for disaster personnel unfamiliar with satellite communications, is composed of an offset reflective antenna with a 100 cm aperture, an antenna feed section, antenna mount doubling as a storage box, and modulator/demodulator. A 75 W traveling-wave tube power amplifier and low noise amplifier, which are integrated and implemented in an antenna feed section, can be easily assembled without tools. Equipped with a GPS compass and GPS receiver, it also has automatic input functions for automatically capturing satellites and tracking station locations. The earth station's default configuration operations are also automatized.

This open experiment demonstrates a technology for transmitting high definition video and road damage conditions to disaster countermeasure headquarters in real time when disaster information is unavailable right after a disaster, and its prompt realization is being anticipated from relevant organizations (firefighters, police, municipalities, road administrators, etc.).

In the future, we plan to create a pilot case in the Nankai Trough region through collaborations with disaster emergency response organizations.

Figure 4 Fully-automatic transportable earth station

Report on the Resilient ICT Research Symposium and Demonstration

Planning Office, Resilient ICT Research Center

For two days from March 25 to 26, 2013, “The Resilient ICT Research Symposium and Demonstration” (Organized by: Resilient ICT Forum, NICT, Tohoku University) was held at The Westin Sendai (symposium and exhibition), and Katahira Campus and Aobayama Campus of Tohoku University (demonstration venues). The symposium and demonstrations were intended to introduce research achievements promoted under industry-academia-government collaborations aimed at realizing “disaster-resistant information-communications technology” to those concerned in such research and the broader public.

The symposium’s first day, opened to affiliates of related government ministries, municipalities, telecommunications carriers, and equipment manufacturers, had approximately 280 participants, and the second day, open to the public, received close to 250. Both days at the demonstration venues were a great success, with the first day having close to 240 participants, and the second day, 220.

On the first day of the symposium, following greetings from the hosts and guests, a total of 13 research result presentations were held, each on necessary technical issues in response to time passing in a disaster, the initial response after a disaster, when confirming safety, when assisting disaster victims, and during recovery. In response to these presentations, we received a great amount of valuable feedback from potential users, including TAKEDA Toshihiko, Assistant Commissioner of the Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications, municipalities (Sendai City, Miyagi Prefecture) and communications/broadcasting organizations, on the practical use of the research results such as that they expect the early realization of a genuinely useful information-communications system that makes use of lessons from the Great East Japan Earthquake. Meanwhile, at the demonstration venue, we showcased many dynamic exhibits on research results. These exhibits were easy to comprehend for participants, leaving strong impressions on them about our research achievements.

At NICT, we will strive for the establishment and early practical application of disaster-resistant information-communications technology by extending industry-academia-government collaborative relations and accelerating research and development based around the NICT Resilient ICT Research Center, established in cooperation with Tohoku University on the university’s campus.

Talk by NEMOTO Yoshiaki, Director General of Resilient ICT Research Center

Demonstrating a small unmanned aircraft system (See pp. 1-2 of this issue)

Demonstrating emergent optical network in disaster recovery (See pp. 3-4 of this issue)

Report on NAB Show 2013 Exhibition

The NAB Show, held every April in Las Vegas, USA, is widely known as the world's largest media and entertainment event, gathering around 100,000 visitors each year. With an invitation from the host of the event, The National Association of Broadcasters, NICT held an exhibit at the 2013 NAB Show (April 8–11) on its TV White Space Wireless Regional Area Network System Based on IEEE802.22*, the international standard which NICT contributed to establishing.

Set up in a corner of NAB Labs Futures Park, where organizations from Japan (NICT and NHK), Korea, Singapore, and Europe held exhibits, the NICT exhibition booth demonstrated devices and databases on the world's first wireless regional area network system jointly developed by NICT, Hitachi Kokusai Electric Inc., and ISB Corporation. During the exhibition, the NICT exhibition booth was visited and well received by many people including Mr. Gordon Smith, Chairman of NAB, Mr. Peter Owen, Chairman of IBC (International Broadcasting Convention), and staffs from FCC (Federal Communications Commission.) We could see the high level of interest towards the communication using TV white spaces in the broadcasting industry as many visitors to the NICT booth were knowledgeable about it. It was a productive exhibit where we received many questions and opinions and had lively exchanges of opinions.

* TV White Space Wireless Regional Area Network System Based on IEEE802.22:
White spaces indicate frequencies which are essentially allocated for broadcasting use but can be used for other purposes depending on geographical and temporal conditions. The secondary use of white spaces by other systems is being examined for either broadcasting or communication purposes in cases when the spectrum is not in use or when the minimum effect on the primary system is assured. IEEE802.22 is a specification formulated in IEEE802.22 working groups of the IEEE 802 LAN/MAN Standards Committee for the purpose of drafting an international standard for operating wireless regional area networks in TV white spaces.

View of the IEEE802.22 Wireless Regional Area Network System on display


View of the venue and the Las Vegas Convention Center

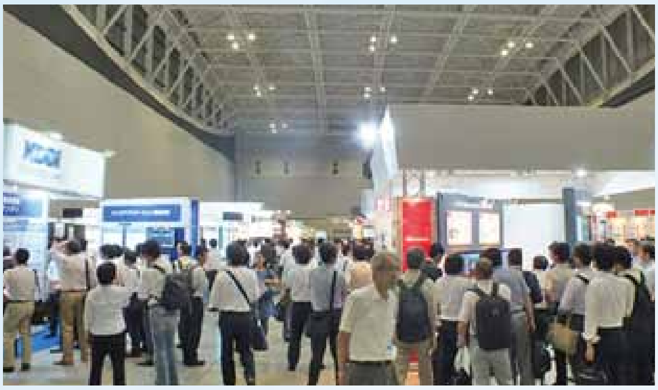
Crowded booth with visitors taking interest in TV White Space Communications

An NICT researcher (center) introducing the system to a visitor

Event Information
“Wireless Technology Park (WTP) 2013”

In collaboration with the YRP R&D Promotion Committee and YRP Academia Collaboration Network, NICT will hold Wireless Technology Park 2013 (WTP2013).

WTP2013 consists of technical seminars specializing in the latest wireless communications technology with great potential for business generation, its research/development, and also an exhibition and academia programs. We are also planning a special exhibit/lecture titled as, “Wireless Technology that Contributes to Build a Dependable Social Infrastructure.” We welcome your visit and look forward to seeing you at the venue.



Scene of Wireless Technology Park 2012

Date: Wed, May 29–Fri, May 31, 2013
Venue: Tokyo Big Sight West Hall 3 / Conference Tower
(WTP2013 is held concurrently with Wireless Japan 2013 and Transport System EXPO.)

Please visit the following address for details.
URL: http://www.wt-park.com/eng/index.html

Exhibition Announcement
“Interop Tokyo 2013”

NICT will be running a booth at the specialized Internet and digital media event, Interop Tokyo 2013.

Under the theme, “New-Generation Networks for Realizing a Bright Future,” we will introduce new-generation network technology, network/security technology, and advanced test bed technology primarily using dynamic displays.

We look forward to seeing many visitors at the NICT booth (5N21, Hall 5).

Date: Wed, June 12–Fri, June 14, 2013
Venue: Makuhari Messe

NICT booth at Interop Tokyo 2012

Information for Readers

The next issue will feature research activities aimed at innovating optical communication infrastructure and research and development of next-generation wind profilers.

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