

# ***IEICE Communications Society* GLOBAL NEWSLETTER Vol. 24**

## **Contents**

○ Message from President

More Attractive, More Enjoyable, and More International .....2  
Kenichi Mase

○ IEICE Activities NOW

Special report: Panel discussions in 2008 IEICE General Conference.....3  
Masahiro Umehira, Fumiyuki Adachi, Takashi Taniguchi, Hiroaki Harai, Tomoyuki Ohya, Masakatsu Ogawa,  
Masaaki Katayama, Katsuya Yahata

Report on the 24th IN/NS Research Workshop ..... 11  
Takashi Miyamura, Ichiro Inoue, Hideki Tode, Miki Yamamoto, Kou Miyake, Kim Sun Yong, Motonori  
Nakamura, Manabu Isomura, Hiroyuki Morikawa, Hiroshi Saito

Technical Committee on Software Radio 3rd-year ..... 12  
Kenta Umabayashi, Seishi Hanaoka, Mitsuhiro Shimozawa, Masahiro Koya, Takeo Fujii, Jun-ichi Takada

Annual Report of Technical Committee on Information Networks..... 17  
Sun Yong Kim, Motonori Nakamura

Annual Report of Technical Committee on Mobile Multimedia Communications ..... 18  
Masakatsu Ogawa, Shigeaki Tagashira

○ IEICE Information

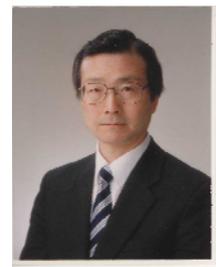
IEICE Overseas Membership Page.....20

IEICE Overseas Membership Application Form .....21

From Editor’s Desk.....22

# More Attractive, More Enjoyable, and More International

Kenichi Mase  
President, Communications Society



## 1. Introduction

The IEICE Communications Society (IEICE-CS) has more than 13,000 members including nearly 1,600 overseas members. The self-funded scheme of IEICE-CS has entered the third year, where we have become financially more independent of the IEICE Headquarters and enjoy more freedom in planning our activities. New services such as the publication of the IEICE-CS Magazine, the Laboratories homepage link service in the IEICE-CS homepage, and so on, have started under this scheme. The IEICE Transactions have been published electronically since 1996. Transaction online, although there are pros and cons, greatly reduces publishing cost and greatly contributes to improving the finance of the IEICE. Existing services are also constantly reviewed and improved. For example, the average review time to accept a paper for the IEICE-CS Transactions (English) has been 7.7, 7.4 and 6.2 months, for 2005, 2006 and 2007, respectively.

## 2. Conferences Activities

IEICE-CS sponsors more than ten International Conferences in various technical fields each year. We also hold two comprehensive conferences; the General Conference in March and the Society Conference in September in cooperation with other Societies and the Headquarters. The General Conference is jointly supported by all four IEICE Societies and one group (Engineering Science Society, Communications Society, Electronics Society, Information and Systems Society, and Human Communication Group), while the Society Conference is jointly supported by the first three Societies mentioned above. The conference program is composed of keynotes, invited-based tutorials and panels together with a number of sessions composed of open-call-based short presentations in each technical field of each Society. The attendance is around 5000 for General Conferences and 3000 for Society Conferences.

Conferences provide opportunities, where many researchers and engineers from various organizations and generations meet and talk frankly to each other regardless of differences of titles and barriers between organizations. In conferences, you may happen to meet old friends and/or acquire new friends, whereupon you may obtain valuable information unexpectedly. You may gain precious opportunities by remaining at the conference site after your presentation.

## 3. Potential New Trials in Conferences

Since many technical programs are held in many geographically separate rooms in parallel in the General Conference and Society Conference, you may meet your friend in different technical fields only by chance. If we could provide opportunities for informal communications in a more planned way, the attractiveness of these Conferences may increase. Here are some ideas:

- We may hold technical committee meetings regularly during conferences and encourage conference participants to attend these committee meetings. Such open committee meetings, where anyone can attend, may be good opportunities to learn the needs of IEICE members and activate committee discussions.

- General and Society Conferences have been a kind of national conference and traditionally, speakers in tutorial and panel sessions are mostly Japanese. We may make some of these tutorials or panels more international. For example, we may invite speakers in some of these tutorial or panel sessions from geographically close neighboring countries. English will of course be used as the official language in these sessions.

- It is also essential to increase the attractiveness of Conferences for industry members. We may organize more business and market-oriented sessions including standardization more regularly and strategically in Conferences.

## 4. Closing words

Last year we started to discuss how to improve the attractiveness of the Society Conference. We also conducted a survey of overseas members (including foreign members in Japan) last August to examine how to improve this Global Newsletter and our homepage services. We successfully received around 100 replies. Thank you for your cooperation. We have obtained precious information on how our services are felt by overseas members. For example, we learned that many members expect tutorial-type articles in the Global News Letter. We are investigating how to improve our service based on the feedback. I expect some actions will be taken within this year and in the near future. Your continuing interest and feedbacks on the current and future IEICE-CS activities would be very much appreciated.

## Special report: Panel discussions in 2008 IEICE General Conference

Masahiro Umehira (Graduate school of science and engineering, Ibaraki University)

Fumiyuki Adachi (Graduate School of Engineering, Tohoku University)

Takashi Taniguchi (Faculty of Informatics, Osaka Gakuin University)

Hiroaki Harai (National Institute of Information and Communications Technology)

Tomoyuki Ohya (NTT DoCoMo, Inc.), Masakatsu Ogawa (NTT Corp.)

Masaaki Katayama (Nagoya University)

Katsuya Yahata (Institute of Industrial Ecological Sciences University of Occupational and Environmental Health)

### Foreword from GNL Editors

This is a special report of seven panel discussions sponsored by Communications Society in 2008 IEICE General Conference held in Kitakyusyu-shi, Japan in this March.

Hot topics related to advanced communication technologies were extensively discussed by the experts together with the participants to explore not only the future of communications technologies but also the deployment of new systems and services.

The editors hope the GNL readers to enjoy this special report and to learn what were discussed in the panels in 2008 IEICE General Conference.

### 1.BP-1: Perspectives and issues for future deployment of satellite communications and its applications for public safety and security

This report describes the panel discussions entitled “Perspectives and issues for future deployment of satellite communications and its applications for public safety and security” organized by technical committee of satellite communications on 19<sup>th</sup> March during IEICE general conference 2008 held in Kitakyushu-shi, Japan. The organizer and moderator of the panel was **Prof. Masahiro Umehira** of Ibaraki University and six panelists were invited to present their views on the current status of satellite utilization in various application areas for discussions. After the presentations by the panelists, we enjoyed the discussions for about one hour together with the audience to explore how we can promote the satellite utilization for public safety and security.

#### 1.1 Presentations by panelists

Six invited panelists were invited and presented their perspectives on future deployment of satellite communications and its applications as shown below.

The first panelist, **Prof. Fumio Takahata** of Waseda University presented “On ICT Forum for Security and Safety,” where he introduced ICT forum for security and safety, and its history and activities. He pointed out it is very important to deliver disaster information to each individual for safety, as described in “Innovation

25” of Japan. In addition, due to the lack of frequency spectrum, frequency sharing between satellite and terrestrial systems is becoming more important.

**Dr. Takashi Moriyama** of JAXA (Japan Aerospace Exploration Agency) presented “Current Status and Future of Satellite Remote Sensing Application for Disaster Monitoring.” He introduced how land observation satellite “DAICHI (ALOS: Advanced Land Observing Satellite)” have been used for actual disaster cases. He stressed that real experience of satellite utilization will convince the people of the usefulness of the satellite, from his experiences.

**Dr. Masato Tanaka** of NICT (National Institute of Information and Communications Technology) presented the concept of “Terrestrial/Satellite-Shared Mobile Communication System for Nation's Security and Safety” using 30 to 50m diameter onboard antenna to make it possible to use handheld satellite terminal. He pointed out it is very important to use satellite not only for emergency communications but also for daily communications. Otherwise, satellite will not be useful for real emergency communications.

**Mr. Yoshitake Yamaguchi** of Mobile Broadcasting Corporation presented “S-band Satellite Digital Mobile Broadcasting as Disaster Prevention Media,” where he introduced new emergency notification services using mobile satellite broadcasting systems. He mentioned latency of the proposed service is less than 1 sec, which is very important requirement for the services.

**Mr. Kohei Ohata** from NTT Corporation presented the concept of satellite-based sensor network for small data gathering and the system requirements. He stressed that the requirements include low cost terminal and flexibility for the proposed system.

The last speaker, **Mr. Yoshitomo Sakato** of Mitsubishi Electric Corporation presented “Technology and Challenge of Satellite Communications for Safe Society,” where he described technical issues to realize satellite/terrestrial integrated mobile communication systems using large satellite antenna. He stressed that it is important to consider how to share not only system development cost but also system construction and

operation cost. In addition, he pointed out it is also important to use the system on non-disaster days.

### 1.2 Panel discussions

Extensive topics were discussed by the panelists, such as the requirements for the disaster satellite communications and broadcasting, and the roles of the satellite and terrestrial systems. All of the panelists agreed that both of satellite and terrestrial systems will be used to supplement each other, and it is very important to use the satellite on a daily basis. Otherwise, satellite will be never used even in the case of disasters. This is also important for remote sensing by satellite, as pointed out by Dr. Moriyama of JAXA. The audience and panelists seemed to reach a consensus that it is significantly important not only to develop new technologies but also to establish the system operation structure for daily and emergency operations.

### 1.3 Concluding remarks

About 40 people attended the panel and they enjoyed the panel discussion with six panelists. In the case of disasters, satellite is an indispensable communication system to secure communications services when terrestrial networks are damaged. The author feels that this panel discussion has revealed one of the ways for satellites to go.

The author would like to take this opportunity to express his sincere appreciation for the contributions of the six panelists as well as the participants.

## 2. BP-2: The Long-term Evolution of 3G: Evolved UTRA and UTRAN

In line with the recent explosive expansion of Internet traffic in the fixed networks, demand for a variety of broadband packed services has been becoming stronger even in cellular communication networks. The 3<sup>rd</sup> generation (3G) networks based on wideband direct-sequence code division multiple access (W-CDMA) technique [2-1] with much higher data rates up to 384kbps than the 2<sup>nd</sup> generation (2G) networks were introduced already in many countries and their deployment speed has since accelerated. High speed data services including e-mailing, Web browsing, and on-line services ranging from bank transactions to entertainment are now available over the 2G/3G networks. The 3G networks are continuously evolving with high speed downlink/uplink packet access (HSDPA/HSUPA) technique, multiple-input/multiple-output (MIMO) antenna technique, etc, for providing packet data services up to approximately 14Mbps as the mid-term evolution and 100Mbps as the long-term evolution (LTE) in the downlink.

The 3rd Generation Partnership Project (3GPP) has been working on the specification of the radio interface of the Evolved UMTS Terrestrial Radio Access (UTRA) and UMTS Terrestrial Radio Access Network (UTRAN) as the LTE of the 3G system. The standardization activity is now approaching its final phase. Evolved UTRA/UTRAN is an IP-based packet radio access with reduced latency, higher peak data rate,

and higher frequency efficiency comparing to the HSDPA/HSUPA. It can offer the unified packet data services from voice to high-speed data transmission with lower loss. In this panel, Evolved UTRA/UTRAN and radio access technologies for the Evolved UTRA as well as future IMT-Advanced will be discussed.

This panel session [2-2] was organized by **Prof. Adachi** with a generous help from Prof. Mamoru Sawahashi (Musashi Institute of Technology). In this panel session, five panelists who have been actively contributing to the evolution of radio technology were invited. Among the panelists were Dr. Sadayuki Abeta (NTT DoCoMo), Prof. Yasutaka Ogawa (Hokkaido University), Dr. Akihisa Ushirokawa (NEC Corporation), Dr. Katsuhiko Hiramatsu (Matsushita Electric Industrial Co.) and myself (Prof. Fumiyuki Adachi (Tohoku University)). More than 100 audiences participated from universities and wireless industry in this panel session.

### 2.1 Presentation and Discussion

First, five panelists presented their views on Evolved UTRA/UTRAN technologies. The first speaker was **Dr. Abeta**, who overviewed the specification of the Evolved UTRA/UTRAN which is optimized for low delay broadband packet services. In Evolved UTRA, different access techniques are adopted: orthogonal frequency division multiple access (OFDMA) for the downlink and single-carrier (SC)-FDMA using frequency-domain equalization (FDE) for the uplink. The target data rate is as high as 50Mbps (uplink) and 100Mbps (downlink) using 20MHz bandwidth allocated as the 3G spectrum. High user-throughput is achieved particularly at the cell edge. The delay requirement is much shorter than 3G networks and is 5ms one-way within RAN for the user plane (U-plane) and 100ms in the idle-to-active mode for the control plane (C-plane). Also he briefly introduced the radio access network architecture and protocols.

The next speaker was myself (**Prof. Adachi**) and introduced the fundamentals of OFDMA, SC-FDMA, FDE, hybrid ARQ, and packet scheduling, whose are designed for the LTE radio access technique. The LTE uses the 3G spectrum whose bandwidth is only 20MHz per system. One of most important radio techniques is MIMO space division multiplexing (SDM) to meet a challenging target of 100Mbps using 20MHz bandwidth. Prof. Ogawa was the third speaker who introduced the fundamentals of MIMO SDM based on precoding matrix selection. 2-by-2 and 4-by-4 MIMO SDMA can achieve 150Mbps and 300Mbps, which are higher than the LTE downlink target. Also important is MIMO antenna diversity to improve the communication quality. Prof. Ogawa also introduced the space-frequency block coding (SFBC) based on the famous Alamouti's space-time block coding (STBC).

**Dr. Ushirokawa** introduced the major requirement and configuration of the Evolved UTRAN. Important is to reduce the delay both in the U- and C-planes for providing user friendly/flexible broadband services. The delay requirement can be realized by reduced

packet frame size (1ms), simplified protocols, and placement of MAC, RLC, RRC and RRM functionalities at evolved Node-B (eNB). This placement allows a simple and flat RAN architecture with eNBs only, i.e. without Radio Network Controllers (RNCs) in Evolved UTRAN. Also presented by Dr. Ushirokawa was the Evolved Packet System structure, which allows a smooth migration from 3G UTRAN into Evolved UTRAN and further into the radio access network of IMT-Advanced called 4G networks.

Final speaker was **Dr. Hiramatsu**, who introduced the configurations of LTE base station (i.e., eNB) and user equipments (UEs) in detail and also foreseeable broadband services. A variety of services will be available by the LTE networks. Some example services are broadband Web browsing, File Transfer Protocol (FTP), video streaming, and Multimedia Broadcast and Multicast Service (MBMS).

After presentation by five panelists, panelists and participants discussed about how Evolved UTRA/UTRAN is different from other wireless networks: W-CDMA, HSDPA/HSUPA, and WiMAX, etc., from technology and services point of view.

## 2.2 Conclusion

In this panel session, the technologies of evolved 3G networks designed for optimizing packet data services using 3G spectrum were introduced and discussed. The capabilities of 3G networks will sooner or later be insufficient to cope with the increasing demands for broadband services. The evolved 3G networks will be followed by the development of 4G, i.e., IMT-Advanced networks, that support extremely broadband packet data services of e.g., 100M~1Gbps [2-3].

## 2.3 Reference for section 2

[2-1]F. Adachi, M. Sawahashi, and H. Suda, "Wideband DS-CDMA for next generation mobile communications systems," *IEEE Commun. Mag.*, vol. 36, no. 9, pp. 56-69, Sept. 1998.

[2-2]"The long-term evolution of 3G:Evolved UTRA and UTRAN," The 2008 IEICE General Conference, BP-2-1~5, Kitakyusyu Science and Research Park, 20 March, 2000.

[2-3]Y. Kim, et al., "Beyond 3G: vision, requirements, and enabling technologies," *IEEE Commun. Mag.*, Vol. 41, No. 3, pp.120-124, Mar. 2003.

## 3. BP-3: Beyond QoS/QoE -toward a prospective conceptual framework of communication quality

At the IEICE Society Conference, Kitakyushu Science and Research Park, 18-21/3/2008, the technical committee on CQ(Communication Quality) organized the panel session "BP-3 Beyond QoS/QoE -toward a prospective conceptual framework of communication quality-".

The purpose of this session is to discuss "quality" concepts from viewpoints standing on psychology or brain science. This session is organized in two parts, invited talks and panel discussion.

## 3.1 Background

QoS(Quality of Service: ITU-T E.800) of the network system including a part of the end is pursued for not only telecommunication, but also transmission and reproduction of music, images, movies, and so on. Recently, QoE(Quality of Experience) as a perceptual and subjective overall acceptability by the end-user is pursued (Appendix I to P.10/G.100, ITU-T SG12). However, the contribution of the improvement of the quality to the user satisfaction decreases rapidly compared with the increase of the development cost when the quality exceeds a constant level. There is a user when he or she certainly requests "High quality" from contents and service. However, it might be more important that an individual user acquire different, subjective, and positive inner value from those, for example, impression, comfort, relaxation, satisfaction, accomplishment, and so on.

In this session, we want to discuss the future frame of the quality concept by standing further on the user side, while basing QoS and QoE.

## 3.2 Invited Talks

The six invited panelists presented their papers in sequence in the first part. The presentation time was limited at 10 minutes a person, so questions and supplementary explanations were done later collectively, at the beginning of the second part of the session.

Firstly, two panelists presented their studies from the view point of temporal perception of speech (or music) and listener's satisfaction or appreciation.

BP-3-1 Suggestions from the Psychological Study of "Ma"

**Toshie Nakamura** (Osaka University)

BP-3-2 Suggestion from Speech Rate Conversion Researches

**Atsushi Imai** (NHK STRL)

Dr.Nakamura lectured about "Ma", which is the Japanese word about the temporal space of speech or musical performance. "Ma" means not only physical fixed time length but also psychological fluctuant margin, and it is very important for listeners to for appreciation, synchronization, comfort, and so on. Dr.Imai lectured about Speech Rate Conversion. This technology is developed to slow down rapid speech, especially for elderly listeners. Slowing down speech speed equally is not good enough by itself, but combination with optimized reducing pause interval is effective.

Secondly, two panelists presented studies about feelings of comfortable and harmony from the view points of daily life and audio-visual interaction.

BP-3-3 Suggestion from researches of comfortable/pleasant feelings

**Rie Monchi-Semba** (Kao Corporation)

BP-3-4 Role of Sounds in Visual Productions

**Shin-ichiro Iwamiya** (Kyushu University)

Dr. Monch-Semba introduced an idea of comfortable feelings in daily life and her work on development of inquiry scales including 16 of emotional factors. Dr. Iwamiya presented that audio-visual structural and semantic interaction resulted in various impressions: emphasis on or reduction in visual effects, increasing or decreasing a sense of harmonious or congruous, and so on.

Thirdly, two panelists gave presentations on brain scientific approach on "presence" (realistic sensation) and implicit brain function approach on communication.

BP-3-5 Perceptual and Cognitive Mechanisms and Evaluation Methods of "Presence"

**Hiroshi Ando** (NICT / ATR)

BP-3-6 From the Viewpoint of Implicit Brain Function

**Makio Kashino** (NTT / ERATO SHIMOJO Implicit Brain Function Project)

Dr. Ando lectured about the concept of "Presence", showed a psychophysical evaluation study on a texture of CG objects on 3D-display and an fMRI study on natural or unnatural images, and mentioned how we should develop on evaluation method for a sense of "presence". Dr. Kashino lectured the dynamic characteristics of our perception and preference, and showed some interesting studies; the information contradicted to prediction disturbs our perceptual completion, for example. He emphasized necessities of construction of computation model and measurement for implicit brain process of dynamic sensory-motor-emotional communication.

### 3.3 Panel Discussion

In the second part of our panel session, we wanted to discuss and search for the quality concept that should be considered next to QoS and QoE through the models, the findings, and the methodology in non-telecommunication fields presented in the previous part. The contents were as bellow;

- (1) Technical questions to each panel presentation.
- (2) Supplementary explanations by invited panelists.
- (3) Approaches to 'kansei' (sensitivity) and 'kando' (impression);
  - How and why do they cause in us?
  - How can we address them?
- (4) Progress or improvement of "quality";
  - Is it contributes user's happiness or welfare at any time?
  - How can we bring qualities and costs into balance?
- (5) Beyond QoS/QoE;
  - How should we consider the next concept of "quality" of telecommunication (or network)?

### 3.4 Conclusion

Each invited paper was interesting respectively as the different aspect related to essence of communication

and perceptual senses including "sixth sense" and any more sensibilities. We focused on experiences of user, especially inner value of what he/she accepts, not just perceptual physical quality, though we had insufficient time to deepen the discussion more among the panelists and the floor. Finally, the organizer figured the concept of "Beyond QoS/QoE" for a summary of the session as bellow, which might help us to get a well-focused and in-depth perspective on communication quality.

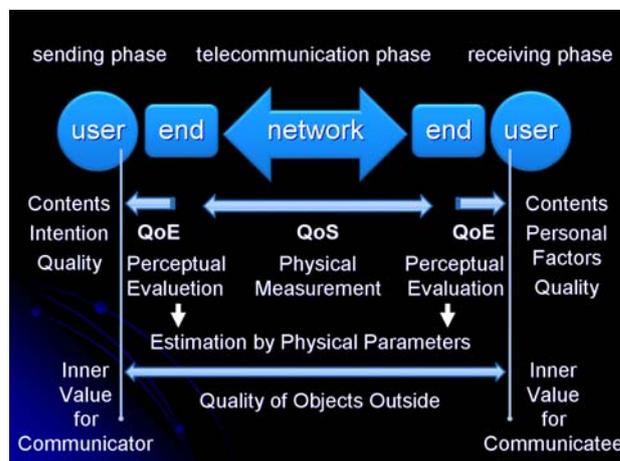


Fig. 3-1: The concept of "Beyond QoS/QoE"

### 4.BP-4: When Will All-Optical Networks Be Deployed?

3-hour panel session BP-4 "When Will All-Optical Networks Be Deployed?" was held at March 18, 2008 in the IEICE General Conference. The author (organizer/session chair) reports this panel session.

#### 4.1 Program Information

It has been told that all-optical networks will be deployed soon. WDM (wavelength division multiplex) links are deployed for transmission, ROADMs (reconfigurable optical add/drop multiplexers) compose a new type of ring networks, and FTTH (fiber to the home) subscribers are still increasing. However, deployment of "all-optical" technology is limited to such point-to-point transmissions, metro networks, and access areas. No optical connections over the fences/barriers are found.

The objectives of this panel session are as follows.

What optical network is ideal, all-optical or slight modification from networking using current all-optical technology?

What merits and effects do the carriers/networks provide and users have?

What technical solutions/innovations should be addressed?

We clarify issues addressed for deployment of the optical networks and discuss about optical network in 10-20 years.

The four distinguished experts were invited.

**Dr. Atsushi Sugitatsu** (OITDA/Mitsubishi Electric)

**Dr. Shoichi Ozawa** (Furukawa Electric)

**Prof. Takamasa Imai** (Kanagawa University)

**Dr. Tomohiro Otani** (KDDI R&D Labs.)

They were invited as panelists and made their presentation in sequence.

#### 4.2 Presentation Overview

Dr. Sugitatsu and Dr. Ozawa kindly provided topics from device side. Prof. Imai and Dr. Otani kindly provided topics from network side. The valuable talks are reported as follows.

**Dr. Sugitatsu talked about “wavelength conversion technology for optical node.”** WDM needs optical transceivers for each wavelength, which indicates increase in the power consumption. Power consumption of routers will reach 20 billion kWh/year in 2010 and 90 billion kWh/year in 2015, which is 9% of total power generation in Japan. Decreasing the power consumption is necessary and decreasing number of driver ICs and high-speed ICs leads to low energy consumption. All-optical wavelength conversion typically requires 5W while O/E/O wavelength conversion requires approx. 30W.

They develop SOA-MZI (semiconductor optical amplifier, mach-zehnder interferometer) type all-optical wavelength converter. This is bit-rate free up to 40Gbps and device size of this is 4.8 x 0.75 x 0.1 (mm). This can convert a wavelength to arbitrary one and has polarization free property. For optimization, higher optical confinement coefficient, thinner depth, narrower waveguide width, higher input power: optimum length of SOA is 2400  $\mu\text{m}$ .

He also introduced systems for OOK-BPSK (on-off keying; binary phase shift keying) format conversion and OOK-QPSK format conversion, which bypasses O/E/O in conversion.

**Dr. Ozawa talked about “some basic approaches for all optical signal processing in an attempt to apply optical functional modules”** He introduced several devices from diverse view of usage.

Ultra narrow pulse light-source toward ultra high-speed communication such as 100Gbps.

Athermal AWG (arrayed waveguide grating) for increasing number of wavelengths for bandwidth extension. For example, this will be useful for WDM-PON.

VOA (variable optical attenuator), optical amplifier and 1ch-optical amplifier are promising for optical power-level adjustment.

ROADM and WSS (wavelength selective switch) are emerging for switching optical signals in wavelength granularity.

40Gbps optical component, AWG, variable dispersion compensator, and PMD (polarization mode dispersion) compensator are available for transmission efficiency.

DPSK, DQPSK, and 8PSK for bandwidth efficiency (compression).

Raman amplifier for C and L band, TDFA/SOA for S band.

He strengthened the importance of integration, low power consumption, and low cost implementation.

**Prof. Imai talked about “prospect on optical access network.”** His talk began with a review that

optical access market is diffuse and still growing. Number of FTTH subscribers reached 10 million in Japan. Next step will be (distance) extension of the access and connection to metro area. Several tens of Gbps optical system may be needed in decade of 2010. 400km access may be possible by the use of high-power transmission, optical amplifier, dispersion compensation, and high-sensitive receiver. Decreasing delay at logical layer and adjusting to existing infrastructure are also important.

He suggested a possible scenario of combination of PON and WDM. Next progress will be found in 10Gbps-based TDMA but WDM and CDM are also expected when taking into account flexibility of channel additions.

His suggested open issues are as follows.

Miniaturization and economization of OLT

Wavelength-tunable transceivers

ROADM for OLT for seamless metro/access connection

Burst-tolerable optical amplifier for extension.

Fault identification and isolation

Improvement of allowable BER

He mentioned that progress of optical network brings following. For the carriers, cost reduction of optical components and related component, miniaturization, low power consumption, increasing capacity, and new services. Users can be given diverse services, high-quality services, and secure services.

**Dr. Otani talked about “GMPLS control plane for all-optical networking.”** He told that the key points of future deployment are high-speed transmission, cost reduction and high-reliability. He hopes that all-optical network, a new technology, will solve it. He reviewed historical overview of optical networks for past 20 years. From 2000, WDM and PXC (photonic cross connect) contributed for improvement of reliability and operation. However, network cost was not reduced due to any device cost reduction. From year 2005, ROADM and WSS are developed and deployed in part due to cost reduction.

- The open issues are as follows.

- Flexibility by using mesh-type topology

- High reliability/availability

- Control of wavelength switched optical networks

- Inter-operability among multi-vendor environment

- Accommodating colored interfaces at clients

- Standardization of optical signals

- Establishment of operation technique in real networks

He also introduced their IETF activity for wavelength label of GMPLS. Till now, labels have been defined for GMPLS but lambda or wavelength itself is not. In WSON (wavelength switched optical network), wavelength continuity should be taken into account. Such work is in progress at IETF CCAMP working group and a work-in-progress draft was introduced.

Finally, he addressed their developed PCE (path computation element) that is scalable to nation-wide scale. The PCE takes into account OSNR and PMD

factors of optical impairment as well as wavelength continuity.

#### 4.3 Panel Session and Conclusion

- All-optical networks based on 10G to 40Gbps will be deployed in core, metro, and access. However, we need a big challenge to 40Gbps.
- Optical access link will be extended.
- We have to think about scenario for concurrence of existing services and new optical services for deployment of all-optical networks.
- We have to show operators merit of all-optical network system. Or, new all-optical systems should provide similar interface to operators.
- All-optical networks make equipment cost (e.g. transponders) and running cost (e.g. power consumption) low.
- For deployment, it is necessary to try to produce large quantity of components and to decrease price of them. To this end, current scale of the market is bothersome and markets should be expanded.
- It is important to give extendable and sustainable properties to the all-optical networks. Need to show good prospect.

#### 4.4 Remarks

Panel on “When Will All-Optical Networks Be Deployed” was reported. Through the invited talks and the panel discussion, we can see the actual state of all-optical networks including control and devices. Furthermore, based on a perspective on the key technologies and functional requirements, this session provides a direction of the future all-optical networks.

Technical digest of invited panelists are available in part from proceedings of 2008 IEICE General Conference.

#### 4.5 Acknowledgment

This panel session had a great success with over 80 participants. The program was planned and supported by IEICE Technical Committee on Photonic Networks (PN). I would like to appreciate them and panelists.

### 5. BP-5: Vision for Future Mobile Multimedia - 10th Anniversary of the Technical Committee on MoMuC –

At the IEICE General Conference, Kitakyushu Science and Research Park, on 20<sup>th</sup> March, 2008, the technical committee on mobile multimedia (MoMuC) organized a panel discussion entitled “BP-5: Vision for Future Mobile Multimedia.”

The MoMuC committee was founded in May, 1997 as a local board of the international workshop on Mobile Multimedia Communications, and had the first workshop in March, 1998. As a memorial of the 10<sup>th</sup> anniversary of MoMuC, the panel session was planned as a good opportunity to look back the dawn of the mobile multimedia communications and to analyze how we had foreseen technology trends.

#### 5.1 Panelists

Six advisors of MoMuC, who had been engaged in steering the committee, were invited as the panelists and presented the history, the memorial events of MoMuC, and their views on the future of the mobile multimedia:

- **Prof. Hideyoshi Tominaga**, Waseda University, “Vision and challenge on broadband network convergence”
- **Prof. Yoshihiko Akaiwa**, Kyushu University, “Vision on digital wireless communications systems”
- **Prof. Takeshi Hattori**, Sophia University, “Lifestyle paradigm revolution: role and challenge of mobile multimedia”
- **Prof. Shozo Komaki**, Osaka University, “Mobile multimedia 10 years and future: from the point of open platform and competition policy”
- **Dr. Masami Yabusaki**, NTT DoCoMo, “Vision on mobile network technologies”
- **Prof. Wataru Kameyama**, Waseda University, “Vision on multimedia processing technologies”

#### 5.2 Program

For the efficient discussion within the limited time of the panel, we planned two trials for organizing the session:

- 1) Short presentation, long discussion

With the thought that the value for the audience is in the time of discussion, we asked each panelist to make presentation as short as possible (10 min. each), and reserved as much time for discussions for panelists and audience (100 min).

- 2) Agenda for discussion

Usually, the manuscripts prepared for the IEICE panel sessions are the compile of the presentation from each panelist, and liable to be just a bundle of different opinions. However, as the focus of the panel session is “discussion”, providing agenda for the discussion part seems to be more important. So, for this time, session chair and the panelists jointly prepared a manuscript presenting the agenda and the assumed discussions [5-1].



Fig.6-1: Opening address by session chair (Mr. Ohya)

### 5.3 Discussion

About 60 audiences joined the session, and had significant discussions with panelists. A brief report can be found in [5-2] (in Japanese). More detailed report will appear in journal of IEICE as a proposal toward the future of the mobile multimedia.

### 5.4 Reference for section 5

[5-1] ``Vision for Future Mobile Multimedia – 10<sup>th</sup> Anniversary of the Technical Committee on MoMuC –,’’ BP-5-1~6, Proceeding of the IEICE General Conference 2008.

[5-2] [http://www.ieice.org/~momuc/jpn/pages/momuc\\_0803\\_panel\\_report.pdf](http://www.ieice.org/~momuc/jpn/pages/momuc_0803_panel_report.pdf)

## 6.BP-6: Software Radios for New Generation Radio Communication

In the morning of March 21<sup>st</sup>, the panel session entitled “Software Radios for New Generation Radio Communication Systems” was held as a program of 2008 IEICE General Conference. This panel session, proposed and prepared by the technical committee on Software Radio, had five panelists from industry and academia. After their introductory talks of 15 minutes each, they exchanged ideas on various topics in the field of software radio and answered questions from the floor.

### 6.1 Introductory Talks

The chair of session, **Prof. Katayama**, introduced the five experts and they made short introductory talks on software radio and related technologies as follows.

**Dr. Kashiki** from KDDI Laboratories Inc. briefly reviewed the history of software radio, and explained cognitive radio (CR) as future wireless technology. He summarized necessary technical issues on software radio for CR.

**Dr. Murai** from Nippon Ericsson had presentation on implementation of software defined radio (SDR) in cellular radio base station.

**Mr. Ikekawa** from NEC introduced recent developments on LSI for base-band digital signal processing for flexible wireless infrastructures.

**Dr. Yoshida**’s talk was about SDR for multimode terminals. He mentioned that a multi-mode multi-band wireless terminal is required for future communication systems, and then presented technical issues necessary to be solved.

As the last speaker, **Prof. Sakaguchi** from Tokyo Institute of Technology talked about CR for future wireless network. He introduced CR as a technique that realizes cohabitation of a new radio system in the same frequency band of legacy systems by sensing wireless environment and adapting its radio specifications.

### 6.2 Discussion

Following the talks, the panelists had discussion stimulated by questions from the floor. Examples of the variety of (but not all of) topics discussed are as follows.

- Experiences or lessons learned on software radio. Especially knowledge on failures in Japan and other countries.

- What are special technical issues for realization of cognitive radio and system cohabitation?

- Where is an optimum balance between software and hardware, analog RF and high-speed digital, single multiband and multiple singleband in RF?

- Is technology the obstacle of software radio? In other words, regulatory/economy issues.

- Necessity of side-information, or assistance of wireless environment sensing.

### 6.3 Reference for section 6

[6-1] K. Kashiki, M. Nohara, K. Takeuchi, “Future Wireless Communication Systems and Role of Software Defined Radio,” BP-6-1, 2008 IEICE General Conference, March 2008.

[6-2] P. Olanders, H. Murai, “Application of Software Radio Technology to Cellular Radio Base Station,” BP-6-2, 2008 IEICE General Conference, March 2008.

[6-3] M. Ikekawa, “Digital Baseband Processing LSIs for Flexible Wireless Infrastructure Systems,” BP-6-3, 2008 IEICE General Conference, March 2008

[6-4] H. Yoshida, ”Software-Defined Radio for Multimode Terminals,” BP-6-4, 2008 IEICE General Conference, March 2008.

[6-5] K. Sakaguchi, ”Study on Cognitive Radio for Future Wireless Networks,” BP-6-5, 2008 IEICE General Conference, March 2008.

## 7.BP-7: Digital images and moving image technologies in Medicine, present state, problems and future

In this 30 years medical images developed with information technologies. And the advance of technology changed medical diagnosis and therapy dramatically.

In this seminar, we introduced and discussed about medical imaging technologies and their future.

### 7.1 Program

1. Digital image and movie technologies in Medicine, present state, problems and future

Katsuya Yahata, University of Occupational and Environmental Health, Japan

2. Medical imaging technologies in telemedicine, problems and future.

Norihiko Tateishi, Nagasaki prefectural University

3. Present state of moving image of cardia

Masaki Tamura, National disaster medical center

4. Future of ubiquitous medicine by BAN(Body area network)

Shinsuke Hara, Osaka City University

5. Image transmission, digitizing and processes in medicine

Atsushi Kioke, KDDI R&D Laboratories

## 7.2 Presentation

BP-7-1 Digital image and movie technologies in Medicine, present state, problems and future, **Katsuya Yahata**

In this program, Dr. Yahata introduced all speakers and present state of medical imaging technology.

- History of medical imaging and computer
- Ultrasonic echo
- Electronic endoscope
- Computed tomography
- Magnetic resonance imaging
- Computed radiography
- FPD (flat panel detector)
- PET (positron emission tomography)
- 3D volumerendering
- Digital angiography
- PACS (Picture archiving and communication system)
- DIOCM (Digital Imaging and COmmunication in Medicine)
- Radiotherapy

BP-7-2 Medical imaging technologies in telemedicine, problems and future, **Norihiko Tateishi**

Prof. Tateishi presented about telemedicine for island and remote areas, using moving images. He said 'Telemedicine is mandatory clause for remote areas which is poor in medical infrastructure.' And also he said 'its needs to political change to popularize telemedicine'.

BP-7-3 Present state of moving image of cardia, **Masaki Tamura**

Mr. Tamura presented most-advanced moving images technologies in cardiovascular organs. Using MDCT (Multi detector-row CT) can make cardiac image within 1 sec. then we could see cardia in statics and check small arteries

BP-7-4 Future of ubiquitous medicine by BAN (Body area network), **Shinsuke Hara**

Mr. Hara introduced BAN and usability in future. It doesn't need electrical connection and automatically has an information relationship.

BP-7-5 Image transmission, digitizing and processes in medicine, **Atsushi Kioke**

Mr. Koike explain medical information relationship using mobile phone. In Nagoya (the 3rd big city in Japan), they tested using there system. In the system members of doctor send medical image safety and have medical consultation in cerebrovascular disease. And he introduced capsule endoscopy and its image data transport.

## 7.3 Discussion

Participants asked some questions, especially about BAN and telemedicine.

BAN has highly possibilities. Although, there many social problems, privacy, security, or another.

Telemedicine is now narrow using in clinical medicine in Japan. Perhaps telemedicine will be popular in time.

## Organizer of the Panel



**BP-1: Prof. Masahiro UMEHIRA**  
Graduate school of science and engineering, Ibaraki University



**BP-2: Prof. Fumiyuki ADACHI**  
Graduate School of Engineering, Tohoku University



**BP-3: Prof. Takashi TANIGUCHI**  
Faculty of Informatics, Osaka Gakuin University



**BP-4: Dr. Hiroaki HARAI**  
National Institute of Information and Communications Technology



**BP-5: Mr. Tomoyuki OHYA**  
NTT DoCoMo, Inc.



**BP-6: Prof. Masaaki KATAYAMA**  
Nagoya University



**BP-7: Associate Prof. Katsuya YAHATA**  
Institute of Industrial Ecological Sciences University of Occupational and Environmental Health

## Report on the 24th IN/NS Research Workshop

Takashi Miyamura<sup>†</sup>, Ichiro Inoue<sup>†</sup>, Hideki Tode<sup>††</sup>,  
 Miki Yamamoto<sup>†††</sup>, Kou Miyake<sup>†</sup>  
 Kim Sun Yong<sup>†</sup>, Motonori Nakamura<sup>†</sup>, Manabu Isomura<sup>††††</sup>  
 Hiroyuki Morikawa<sup>†††††</sup>, and Hiroshi Saito<sup>†</sup>

<sup>†</sup>NTT Corp., <sup>††</sup>Osaka Prefecture Univ., <sup>†††</sup>Kansai Univ.,  
<sup>††††</sup>KDDI R&D Laboratories Inc., and <sup>†††††</sup>The Univ. of Tokyo

### 1. Introduction

The 24th IN/NS Research Workshop took place in Okinawa, Japan, March 5-6, 2008. The workshop was sponsored by the technical committees on IN (Information Networks) and NS (Network Systems) of the IEICE Communication Society, and aimed to discuss the technical direction and research topics for future networks. A record showing of 150 participants underscored the success of this workshop. The overall theme of the workshop was “The current trend and future directions of ultra-high-capacity network applications.” The workshop featured invited talks, and a panel discussion. In this article, we present an overview of the invited talks and the panel discussion.

### 2. Invited talks

The general chair of the workshop, Dr. Hiroshi Saito (NTT Corp.), invited five distinguished experts involved in leading-edge applications and networking technologies. The speakers addressed new challenges in ultra-high-capacity network applications and network services from various perspectives. Figure 1 shows photographs of the speakers.

- Mr. Keishi Kandori (Asahi Broadcasting Corp.) presented current market trends of digital broadcast media and also addressed some expectations on network services from the standpoint of a commercial broadcaster.
- Dr. Mamoru Sekido (NICT) presented the recent progress in VLBI (very long baseline interferometry) and recent research activity regarding the performance improvement of VLBI in conjunction with networking technologies.
- Prof. Yukio Karita (KEK) presented the latest trends in high energy physics and introduced some physical experiments that require ultra-high-capacity network and storage systems.
- Dr. Takashi Shimizu (NTT Corp.) introduced the latest high-end applications designed for scientists, and discussed requirements for future network services. He also outlined the terabit LAN initiative to develop enabling technologies for such high-end applications.
- Prof. Shigeo Urushidani (NII) introduced network architecture of the SINET3, which is an academic network infrastructure providing multilayer network services, and addressed the latest networking technologies used on the SINET3.

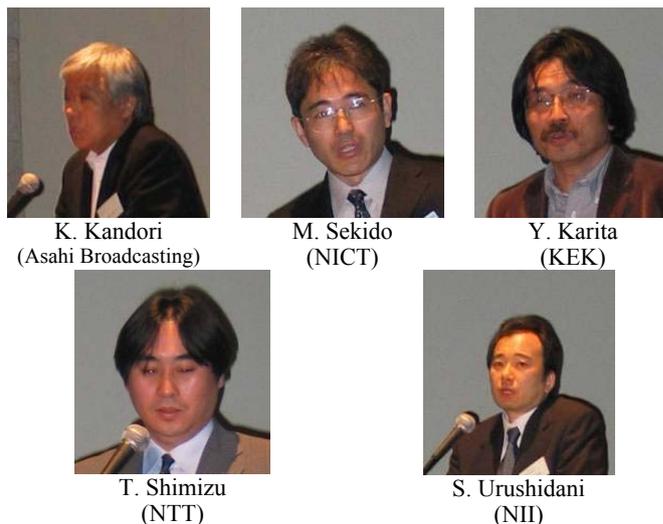


Fig. 1 Invited speakers.

### 3. Panel discussion

As the chairperson, Dr. Saito organized the panel discussion. Dr. Saito and the five invited speakers took their seats as panelists. The audience filled the hall.

Firstly, Dr. Saito gave the theme of the discussion to the panelists: “The current trend and future directions of ultra-high-capacity network applications.” The panelists then expressed their opinions from their own perspectives, and actively discussed the issues involved. In addition, they answered various questions from audience.

The discussion showed that there is increasing interest in the ultra-high-capacity network applications and related networking technologies.

### 4. Conclusion

This year’s workshop invited key persons to speak on ultra-high-capacity network applications. We believe that the presentations given by the invited speakers and the panel discussion provided fruitful hints for research and development by the participants.

The technical committee on NS and IN plan to hold next year’s workshop in March 2009. Finally, we would like to express our gratitude to the workshop committee members, and particularly, Mr. M. Taniguchi (OKI), Mr. T. Nishino (NEC), Mr. S. Tanaka (TOSHIBA), Mr. T. Sano (Fujitsu Laboratories), and Mr. M. Kashiwabara (HITACHI) who made this workshop possible.

## Technical Committee on Software Radio 3<sup>rd</sup>-year

Kenta Umebayashi, Seishi Hanaoka, Mitsuhiro Shimosawa, Masahiro Koya,  
Takeo Fujii, Jun-ichi Takada  
Technical Committee on Software Radio

### 1. Introduction

Technical Committee on Software Radio (TCSR) has promoted research on software radio, cognitive radio, and their related technologies since 1999. It was third year of TCSR since it was restructured to a permanent committee of IEICE in 2005. The steering committee members of TCSR in 2007 are shown below:

**Chair:** Jun-ichi Takada (Tokyo Inst. of Tech.)

**Vice Chair:** Kazuhiro Uehara (NTT),  
Yukitoshi Sanada (Keio Univ.)

**Secretary:** Kei Sakaguchi (Tokyo Inst. of Tech.)  
Takeo Fujii (Univ. of Electro-Commun.)

**Assistant:** Kenta Umebayashi (Tokyo Univ. of  
Agriculture and Tech.)  
Tsuguhide Aoki (Toshiba Corp.)

TCSR organized five technical conferences, and a special section on the Transactions in fiscal year of 2007. This article summarizes the latest activities of TCSR.

### 2. The 1st technical conference in May 2007 (Joint workshop with SDRF and panel discussion)

- ✓ Date : May 24-25, 2007
- ✓ Topics : Joint workshop with SDRF, Panel discussion
- ✓ Venue : The University of Electro-Communications
- ✓ Number of papers : 21 (Joint workshop 6, Panel discussion : 4, Regular: 11)
- ✓ Number of participants : 93

#### Introduction

The SR technical conference was held at The University of Electro-Communications from May 24th to 25th. There were a joint workshop with SDRF, a panel session and general sessions. This workshop was the last workshop for Dr. Harada (NICT) as the committee chairman.

#### Joint workshop with SDRF

The first SR technical committee invited Dr. John M. Chapin (VANU) and organized the joint workshop. At first, Dr. Chapin gave two presentations entitled “Commercialization of SDR in the USA –Vanu anywave cellular Basestation –” and “Activities and progress of the SDR Forum and related international

organizations”. In the first presentation, the SDR base station and the design architecture were introduced. In the second presentation, the activities of the SDR Forum were introduced. From TCSR side, there are four presentations as follows. At first, the committee chair, Dr. Harada, introduced the activities of TCSR. Prof. Sanada (Keio University) gave a presentation entitled “Sampling Rate Selection in Cognitive Radio” and presented sampling techniques in cognitive radio. Mr. Horiguchi (Toshiba) gave a presentation entitled “A Framework for Modem LSI Design Based on SDR Architecture”. Finally Dr. Yamaguchi (NTT) gave a presentation entitled “Recent Advances in RF Devices for Future Wireless Systems” and several research achievements regarding RF were introduced.

#### Panel Discussion

A panel discussion entitled, “Propagation and spectrum sharing in software radio and cognitive radio” was held. In the panel discussion Dr. Kashiki (KDDI) acted as a chairman and four panelists had presentation at first as follows. Prof. Takada (Tokyo Institute of Technology) had a presentation entitled “Propagation model for interference study”. He talked about the channel model for evaluation of interference at primary user side for cognitive radio. A difference between cognitive radio and UWB in the context of spectrum sharing was described. Dr. Fujii (Softbank) gave a presentation entitled “Time-spatial propagation model for wideband mobile radio”, which included the proposed channel model for the evaluation of IMT-Advanced in ITU-R. Prof. Sato (Tokyo University of Technology) presented about standardization activities of radio propagation in ITU-R and spectrum sharing. Finally, Dr. Taromaru (ATR) had a presentation entitled “Desired RF and Analog Device Technologies Required for Practicable Software Radios”. In the discussion, the following issue was discussed; which channel models are proper to evaluate cognitive radio techniques and what should be evaluated.

#### General Sessions

In the conference, there are totally 11 presentations in the general sessions. From Keio University, 5 presentation regarding sampling techniques for cognitive radio and software defined radio. In addition, there are several presentations about cognitive radio techniques.

## Award Presentation

TCSR has newly established the awards for the excellent presenters in TCSR Technical Conferences. The first awards are presented to the following researchers:

**Best Paper Award:** Makoto Ozone (SANYO), “Software Defined Radio with Reconfigurable Processor Based on ALU Array Architecture” (SR2006-38)

**Young Investigator Award:** Kei Sakaguchi (Tokyo Inst. of Tech.), “Cognitive MIMO Mesh Network” (SR2006-43)

**Special Technical Award:** Akihisa Yokoyama, Takashi Matsumura (Toyota ITC), and Hiroshi Harada (NICT), “Implementation of broadcasting receiver on our original signal processing platform for software defined radio” (SR2006-17)

## Conclusion

In the conference, there were joint workshop, panel discussion and general sessions. The conference got a lot of participant (93 participants and 21 presentations).

### 3. The 2nd technical conference in July 2007 (Technical Exhibition & Tutorial)

- ✓ Date : July 26-27, 2007
- ✓ Topics : Technical Exhibition, Tutorial
- ✓ Venue : Yokosuka Research Park
- ✓ Number of papers : 28 (Technical exhibition : 15, Tutorial : 2, Regular: 11)
- ✓ Number of participants : 193

## Introduction

The second SR technical conference was held at the Yokosuka Research Park (YRP) YRP Center No. 1 Building from July 26th to 27th. There were a technical exhibition, a tutorial presentations and general sessions. Before the technical exhibition, Prof. Sakaguchi (Tokyo Inst. of Tech.) interviewed presenters for introduction of individual exhibitions. There were prototypes and posters of SDR and cognitive radio.



Fig 1. Opening of technical exhibition

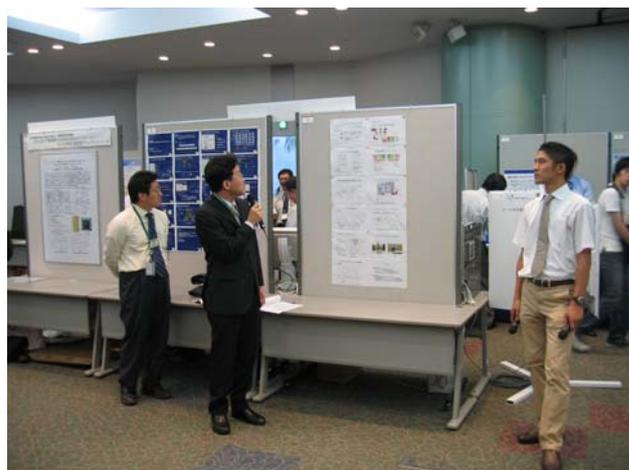


Fig 2. Interview in technical exhibition 2

## Technical Exhibition

There were 15 presentations and Figures 1–3 depict the technical exhibition, opening, interview and presentation. As shown the figs, there were not only presentations but also many discussions between presenters and audiences.

Four booths by KDDI, Mitsubishi, Hitachi and ATR exhibited the outcomes of the project on the integrative cognitive radio networks and the related techniques granted by MIC (Ministry of Internal Affairs and Communications of the Japanese Government). In their exhibitions, prototypes and hardware were shown. Mr. Akabane (NTT) gave a presentation entitled “Network System using Autonomous Adaptive Control Technology”. The prototype using several wireless network systems adaptively and autonomously was introduced.

There were 3 presentations related to MIMO technique as follows: RF-MEMS devices for MIMO system was presented by Fujitsu and MIMO channel measurement and fading simulator were presented by Tokyo University of Science.

There are 3 presentations regarding a RF component in SDR as follows: Mr. Moteki (Yokohama National Univ.) introduced a prototype of RF sampling receiver with FPGA was introduced. Mr. Fukuda (NTT Docomo) introduced a technique for multimode receiver. Mr. Kawai (NTT Docomo) introduced a tunable RF filter.

Various important techniques for cognitive radio and software radio were introduced as follows. A dynamic spectrum access control to utilize vacant spectrum was introduced by Prof. Sampei (Osaka Univ.). An energy based sensing system was introduced by Ms. Maharajan (Tokyo Inst. of Tech.). Mr. Takemoto (Univ. of Electro-Commun.) had a presentation entitled “Development of Total Recording System for Digital Terrestrial TV and Adaptive Array based on Radio Signal Processing”. A total recording system for ISDB-T was introduced where an effective diversity technique with the recoding method is used.



Fig. 3 Presentation in technical exhibition

Prof. Seungwon Choi (Hanyang University) gave a presentation entitled "Smart Antenna Radio Access System for WiBRO/WiMAX with Beamforming and MIMO Capability" and prototype of WiBro/WiMAX RAS (Radio Access Station) with smart antenna was introduced. There were many discussions among the presenters and audiences.

#### Invited Tutorial Presentations

In this session, Prof. Araki (Tokyo Inst. of Tech.) was acted as a chair man and there were two tutorial presentations. Prof. Okada (Tokyo Inst. of Tech.) gave a talk about RF CMOS. Dr. Fujiwara (ArrayComm) had a presentation about DSP and smart antenna technique.

#### General Sessions

There were 11 presentations. Several presentations about important technologies of software defined radio were introduced by Dr. Hamada (Mitsubishi) and Dr. Kishi (Samsung). Dr. Fujimoto (KDDI) gave a



Fig. 4 Workshop with E2R II

presentation entitled "A Propagation Status Monitoring using the Software Radio -- for Cognitive Radio --".

Mr. Sekiguchi (Tokyo Univ. of Agri. and Tech.) had a presentation entitled "A feasibility study of software

defined radio based on off-line multi-functional blind signal processing".

A technique of bandpass sampling in DS-UWB was presented by Mr. Muto (Niigata Univ.). Sensing techniques were introduced by Prof. Sasaki (Niigata University) and Mr. Po (Tokyo Inst. of Tech.). Dr. Harada (NICT) gave a presentation entitled "A feasibility Study on Software Defined Cognitive Radio Equipment".

#### Conclusion

In this conference, there are technical exhibition and invited tutorial presentations and general sessions. There are 28 presentations and 193 participants for 2 days.

#### 4. The 3rd technical conference in November 2007 (Joint workshop with E2RII)

- ✓ Date : Nov. 26-27, 2007
- ✓ Topics : Cognitive Radio, Panel Discussion, Technical Session
- ✓ Venue : Hiroshima International University
- ✓ Number of papers : 27 (Regular: 10, Poster: 7, Invited: 1, Special: 2, Joint workshop: 7)
- ✓ Number of participants : 96

#### Introduction

The 3rd SR technical conference was held at Hiroshima International University (Kure) from November 26th to 27th. In this conference, a joint workshop with E2R II was held on first day, and poster sessions were held on second day.

In the technical conference, total number of participants during two days was about 100.

#### Workshop with E2RII

TCSR organized "Joint E2R II and TCSR Workshop" with E2RII (End-to-End Reconfigurability phase II), an EU IST project.

From Japan, Prof. Takada (Tokyo Inst. of Tech.) introduced recent TCSR activities. After that, Mr. Hanaoka (Hitachi), Mr. Murakami (NICT) and Mr. Yamaguchi (ATR) presented their latest activities regarding cognitive radio. From E2RII, Dr. Moessner (Univ. Surrey) introduced E2R II programs towards cognitive radio systems and flexible spectrum management studied in E2RII. After that, Dr. Clemo (Toshiba Res. Europe) introduced reconfigurable equipment architecture.

TCSR decided to continue to promote their activities in cooperation with E2RII, and gave commemorative trophy to E2RII (Fig. 4).

#### Poster Session

In total, 7 poster presentations were made on second day. In the poster sessions, presentations on research efforts of universities were numerous, because this poster session was intended to encourage mainly students and freshmen to present their research efforts. This plan ended with success and many participants discussed their research efforts enthusiastically.

#### Special Invited Session

An invited lecture was given by Dr. Ishizu (NICT) and latest standardization status of IEEE P1900.4 and NICT's activities towards IEEE P1900.4 were introduced. IEEE P1900.4 scopes in heterogeneous wireless access network and will define the building blocks of network/device resource managers and information to be exchanged between building blocks.

And more, two special reports by attendees of major international conferences were given. One was of 2007 SDR Technical Conference, and the other was of PIMRC (The 2007 International Symposium on Personal, Indoor and Mobile Radio Communications).

#### Regular Sessions

In total, 10 regular presentations were made during two days conference. Presentations of research on cognitive radio were particularly numerous.

#### Conclusion

The 3rd conference was held at Hiroshima International University and the TCSR had a joint workshop with E2R II. In 2008, the TCSR will continue their activities to promote research on software defined radio, cognitive radio, and their related technologies in cooperation with E3, which is the follow up project of E2R II.

### 5. The 4th technical conference in January 2008

- ✓ Date: January 24-25, 2008
- ✓ Topics: Software Radio, Cognitive Radio, Panel Discussion, Technical Session
- ✓ Venue: Tateyama Prince Hotel (Omachi, Nagano)
- ✓ Number of papers: 20 (Invited: 3, Panel discussion:1, Regular: 16)
- ✓ Number of participants: 55

#### Introduction

The 4th SR technical conference was held at the Tateyama Prince Hotel near the North-Alpine, in Omachi city, Nagano, from January 24th to 25th. There were an invited session, a panel discussion, an evening session, and regular sessions in two-days conference. In the invited session and the panel discussion, two themes that are (1) cognitive radio viewed from application developers and users, and (2) cognitive radio in the community, were discussed. In the evening session,

broadband access in the rural area were discussed. In the regular sessions, 16 papers were presented during two day conference.

#### Invited session

Mr. Yomogida (Nikkei BP) presented the expectation toward cognitive radio. He also expressed concern about the negative attitude by Japanese telecommunications carriers and handset manufacturers for cognitive radio comparing to foreign companies, for example in the standardization activities.

Mr. Ushigoe, the mayor of Omachi city, introduced community information system and communication infrastructures in his city. He pointed out the problem about the regional imbalances, cost effectiveness, human resources in the information system.

Prof. Handa (Shinshu University) presented the ad-hoc network application for the security of the community using wireless system for the disaster prevention.

#### Panel discussion

The panelists were Mr. Yomogida and Prof. Handa, invited speakers, Prof. Araki (Tokyo Inst. of Tech.), and Prof. Takada (Tokyo Inst. of Tech., chair of TCSR). Based on the presentation by the Mr. Yomogida and Prof. Handa in the invited session, active discussions about (1) activity of telecommunications carriers and handset manufacturers for cognitive radio in Japan, and (2) cognitive radio for the community, were held including attendances. Standardization activities by companies in (1), and contribution of the SDR and cognitive radio for the community in (2) were debated, respectively.

#### Evening session

Almost all attendances to SR Technical Committee took part in the evening session. The session theme was "Broadband access in the rural area". Prof. Sanada (Keio University) showed that the wireless broadband access can be ready for use only in the urban area in Japan. Prof. Takada pointed out that there are many areas in foreign countries where even the fixed-line telephone is insufficiently supplied. The role of cognitive radio and SDR for the communication in the rural area was discussed.

#### Regular session

In the conference, 3 regular papers in the first day and 13 regular papers in the second day were presented. Many papers regarding H/W such as processors, devices, and prototypes of transceiver for cognitive radio and SDR were presented.

### 6. The 5th technical conference in March 2008 (Workshop on Mobile Communications cosponsored

**with TCs on AN, MoMuC, RCS, WBS)**

- ✓ Date : March 6-7, 2008
- ✓ Topics : Workshop on Mobile Communications
- ✓ Venue : Yokosuka Research Park
- ✓ Number of papers : 24 (Special : 4, Organized : 7, Regular:13)
- ✓ Number of participants : 215
- ✓ Number of exhibition : 17 (Technical: 4, Commercial:13)

The 5th SR technical conference was held at YRP (Yokosuka Research Park) from March 6th to 7th. This conference was a part of the Joint Workshop on Mobile Communications with technical committees on AN, RCS, MoMuC and WBS. This workshop has been held on every March for these 12 years. From two years ago, the TCSR involved to the workshop. This year, TCSR organized a special session on outcomes of R&D projects granted by MIC sourced from Spectrum User Fee, an organized session and regular sessions.

Special Session on Outcomes of R&D Projects sourced from Spectrum User Fee

TCSR organized a special session entitled “Outcomes of R&D projects granted by MIC sourced from Spectrum User Fee” which had continued for about two and a half years. Four special talks were presented by Dr. Hiroshi Harada (NICT), Dr. Makoto Taromaru (ATR) /Mr. Atsushi Ohta (NTT), Dr. Mitsuo Nohara (KDDI Lab) and Mr. Kazunori Yamanaka (Fujitsu).

Dr. Harada presented elemental technologies on cognitive radio equipments such as RF devices, H/W and S/W platform. Dr. Taromaru and Mr. Ohta talked about studies on efficient spectrum use in space domain such as SDM and Multi-user MIMO. Dr. Nohara presented their research results on cognitive radio networks such as radio resource management and routing control. Finally, Mr. Yamanaka talked about small-size superconducting tunable filter for microwave band.

#### Organized General Sessions

First, Dr. Yoshino (NTT Docomo) talked on report of ITU-R World Radiocommunication Conference (WRC-07) and new spectrum for IMT-Advanced. After Dr. Yoshino's talk, six key researchers presented on research topics which are closely related with SR technical committee. Dr. Homare Murakami (NICT), Dr. Seishi Hanaoka (Hitachi), Prof. Kenta Umebayashi (Tokyo Univ. of Agri. and Tech.), Prof. Hidekazu Murata (Kyoto Univ.), Prof. Kei Sakaguchi (Tokyo Inst. of Tech.) and Prof. Yukitoshi Sanada (Keio Univ.) presented recent research results including tutorial parts on cognitive radio(network, sensing, multihop corporation),base station corporation MIMO and signal processing for direct conversion receiver.

#### Exhibitions

Totally 17 organizations exhibited their research results and commercial products related to software radio and cognitive radio.

Exhibitions included software radio prototype, DSP/FPGA, software simulation tool, measurement equipment and so on. It was a good opportunity for mutual interactions between sales persons and engineers.

#### Regular Sessions

In total, 13 regular papers were presented during two day conference. Research topics were cognitive radio system such as dynamic spectrum access and radio resource control, RF devices and signal processing method for cognitive radio and so on.

### 7. Special Section of IEICE Transactions on Communications in January 2008

The Special Section on Cognitive Radio and Spectrum Sharing Technology has been published on January 2008 issue of IEICE Transactions on Communications. 45 papers and 4 letters have been submitted. After fair and square review, 2 invited papers related to IEEE P1900.4 and reconfigurable RF devices, 15 papers and 1 letters were accepted for publication. These papers cover topical subjects such as cognitive network, spectrum sharing, spectrum sensing, distributed optimization, and enabling technologies.

### 8. Conclusion

Technical committee on software radio (TCSR) held five conferences in fiscal year 2007. TCSR makes a strong effort to international collaboration with the research organization of software defined radio and cognitive radio fields all over the world. In this year, we had two joint workshops with international organizations. One was with SDR forum in May and the other one was with E2RII in November. We have aggressive discussion in these joint workshops. TCSR is also interested in a technical exhibition of SDR equipments for exchanging the related information of hardware. We have one Technical Exhibition in July. In FY 2008 we will plan five conferences as follows:

-May 2008: Yokohama National Univ.

-July 2008: NICT, Koganei (Triangle technical exhibition among TCSR SDR Forum and SCC-41).

-Oct. 2008: Okinawa (Joint Workshop on Wireless Distributed Networks cosponsored with TCs on AN, RCS, USN)

-Jan. 2009: Kyoto (Joint workshop with E3)

-March 2009: Yokosuka Research Park (Workshop on Mobile Communications cosponsored with TCs on AN, MoMuC, RCS).

TCSR welcomes contributions from newcomers. We are looking forward to meeting you at conferences.

# Annual Report of Technical Committee on Information Networks

Sun Yong Kim and Motonori Nakamura, NTT Corporation.

## 1. Introduction

The technical committee on Information Networks, IN for short, [1] is a technical committee of the Communications Society of the IEICE. The IN addresses a broad spectrum of issues associated with information networks and provides a forum for researchers and engineers to discuss research and development topics. The chairman is Dr. Hiroshi Saito of NTT Corporation. The vice chairman is Professor Hiroyuki Morikawa of the Univ. of Tokyo. The secretaries are Mr. Motonori Nakamura of NTT Corporation and Dr. Manabu Isomura of KDDI R&D Labs. Inc. The assistant secretary is Ms. Sun Yong Kim of NTT Corporation. This document presents the IN's annual report for activities from May 2007 to April 2008.

## 2. IN Activities

The IN holds ten two-day technical meetings and a workshop every year. Many researchers participate in the meetings and report their latest technical research and development results. The number of technical reports is the second largest among all technical committees of the Communications Society of the IEICE. Some meetings are co-organized with other technical committees. The venue and main topics of each meeting are shown in Table 1.

Each technical report is submitted in a paper and published as a Technical Report of the IEICE. Authors of selected papers have received Information Networks Research Awards, the ceremony of which is held in March every year. This year, the following 2 excellent papers were selected from 242 papers.

- Norihito Fujita, Takayuki Hama and Masahiro Jibiki, "Scalable QoS Routing Schemes for Overlay Networks."



Fig. 1 Winners of IN Research Award  
(from left to right) H. Saito (chairman), T. Hama, Y. Kubodera, H. Morikawa (vice chairman)

- Yuichi Kubodera, Tomonori Usaka, Shinsuke Kobayashi, Noboru Koshizuka and Ken Sakamura, "A Proposal and Implementation of Pedestrian Navigation Support System by Panoramic Photograph."

Figure 1 shows the winners of this year's award, together with the chairmen at the ceremony.

The IN also holds a biennial international conference called APSITT. 7<sup>th</sup> APSITT was held in the Maldives from April 22<sup>nd</sup> to April 24<sup>th</sup>, 2008.

The technical committee planned a special session for the IEICE Transactions on Communications B regarding network technologies for dependable networks. A wide variety of topics will be discussed from the viewpoint of network availability and stability. The feature edition will be published in January 2009.

## References

- [1] <http://www.ieice.org/cs/in/eng/>

| Date         | Venue                                     | Main topics   | Num. of reports | Num. of participants each day |
|--------------|---|---|-----------------|-------------------------------|
| May 17 - 18  | Kikai-Shinko-Kaikan Bldg. (Tokyo)         | Wireless network, Ad hoc network, Sensor network and Ubiquitous network                 | 10              | 36, 66                        |
| Jun. 21 - 22 | Future Univ.-Hakodate (Hakodate)          | NGN, VoIP, Contents Delivery Network, IPv6, Next Generation Network                     | 16              | 23, 29                        |
| Jul. 19 - 20 | Kobe Univ. (Kobe)                         | Network Control, QoS, Routing, Multicast  | 16              | 24, 36                        |
| Sep. 20 - 21 | Tohoku Univ. (Sendai)                     | Overlay networks, VPN, DDos, network security, p2p communications, network software     | 36              | 115, 80                       |
| Oct. 11 - 12 | NICT (Koganei)                            | IP Backbone Network, MPLS, GMPLS, Photonic Network (Lab. tour of NICT)                  | 9               | 69, 45                        |
| Nov. 15- 16  | Fukuoka Institute of Technology (Fukuoka) | Home information appliances network, NGN, FMC, multimedia commerce, multimedia security | 9               | 32, 32                        |
| Dec. 13 - 14 | Hiroshima City Univ. (Hiroshima)          | Internet Traffic, TCP/IP, Network Analysis/Evaluation, Network Model                    | 20              | 40, 40                        |
| Jan. 17 - 18 | Nagoya Institute of Technology (Nagoya)   | Mobile Network, Ubiquitous Network  | 23              | 43, 32                        |
| Feb. 14 - 15 | Kagawa Univ. (Takamatsu)                  | Home Network, Overlay Network, RFID   | 19              | 34, 35                        |
| Mar. 6 - 7   | Bankoku Shinryokan (Nago)                 | IN/NS technical meeting and workshop  | 84              | 214, 145                      |

Table 1: Technical meeting schedule

# Annual Report of Technical Committee on Mobile Multimedia Communications (MoMuC)

Masakatsu Ogawa (NTT Corp.)  
Shigeaki Tagashira (Kyushu University)



## 1. Introduction

The technical committee on Mobile Multimedia Communications (MoMuC) covers research fields associated with mobile multimedia communications, from mobile network technologies to multimedia services for mobile users.

The year 2007 was the 10<sup>th</sup> anniversary of the MoMuC committee, which was founded May 1997 as a local board of the international workshop on Mobile Multimedia Communications. We had six technical committee meetings and two organized sessions in Society and General Conferences during the fiscal year 2007, cooperating with other related technical committees of IEICE communications society and other institutes: Information Processing Society of Japan (IPSJ) and the Institute of Image Information and Television Engineering (ITE).



Fig.1: Demonstration Room.

## 2. "Demonstration Session"

The first trial of a demonstration session was held on January 25, 2008 at Actcity Hamamatsu, Japan. The session was cosponsored by the technical committee on Ubiquitous and Sensor Networks (USN), utilizing the special funds of IEICE communications society invigoration. One of the objectives of the session was to motivate attendee, especially young researchers, through interactive demonstrations instead of passively listening to the usual technical presentations.

About 60 people participated in this session (Fig. 1). The session consisted of 20 demonstrations from industry and academia (Fig. 2). During the 4.5 hours of the session, the participants were having heated technical discussions. The technical fields of demonstration are as follows:

- QoS control.
- Location detection.
- Radio on fiber.
- Fixed and mobile convergence.
- Ubiquitous service platform.
- Ad hoc / Sensor network.
- Home network.
- Audio codec.
- Multimedia mobile device.

The MoMuC committee has posted the detailed information on our web page.  
(<http://www.ieice.org/~momuc/jpn/pages/mmc-demo-200801/index.html>)



Fig.2: Demonstration.

In order to evaluate this demonstration session and improve the quality of the next trial, we conducted a questionnaire to the participants. Fig.3 shows the result of the survey. The number of respondents was 18. From the result, we can see that the session made a good impression on many respondents overall. In particular, most of the respondents answered that the demonstration session could help them to comprehend the present level of practical technologies and stimulate their interest in new research field. Therefore, we can highly appreciate the demonstration session as a meaningful activity. Several respondents however claimed the exhibition environment should be improved such as time schedule, capacity of the room, and its layout. For the next trial we would like to improve these issues.

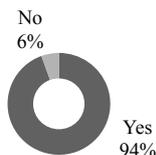
**(Q1) What was your impression of the demonstration session overall?**



**(Q2) Did the session help you to know the present level of practical technologies?**



**(Q3) Did the session promote your interest in new research field?**



**(Q4) What was your impression of the exhibition environment?**

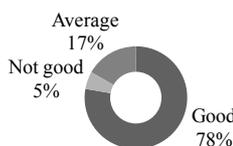


Fig3: Result of Questionnaire Survey

### 3. Award Winners of 2007

The MoMuC committee launched the MoMuC award program in 2006. The award winners of the year are listed below. We would like to applaud their efforts and encourage further developments of their studies. The awarding ceremony was held in the workshop in Okinawa, May 2008.

- Best-presentation award of 2007: Takeharu Kohri (Shizuoka Institute of Science and Technology Univ.), "A Location Estimation Method based on Viterbi Error Correction", MoMuC2007-68.
- Young-researcher award of 2007: Atsushi Kawamura, Ryoichi Shinkuma, Tatsuro Takahashi (Kyoto Univ.), "Routing Mechanism for High-Quality and Efficient Multicast in Mesh Networks," MoMuC2007-50.  
Hiroyuki Kubo, Atsushi Kawamura, Ryoichi Shinkuma, Tatsuro Takahashi (Kyoto Univ.), "A Loss Compensation Method using Packet Relay for Wireless Multicast," MoMuC2007-60.  
Daisuke Tamura, Yuta Otsuka, Susumu Ishihara (Shizuoka Univ.), "Using jitter for predictive rate control of DCCP sending rate on handover in wireless LANs," MoMuC2007-69.

Atsushi Yoshida, Takao Yamaguchi (Matsushita Electric Industrial Co., Ltd.), Naoki Wakamiya, Masayuki Murata (Osaka Univ.), "Proposal of Reaction-Diffusion based Congestion Control Method for Wireless Mesh Networks," MoMuC2007-101.

Takashi Nomura, Takaaki Umedu, Hirozumi Yamaguchi, Teruo Higashino (Osaka Univ.), "A Position Estimation Algorithm on MANET Using Trajectories of Neighbor Nodes," MoMuC2007-102.

### 4. Workshop Schedule

The MoMuC committee is going to have workshops every two months in 2008. We would like to encourage your participation and technical presentation to discuss the latest mobile multimedia technologies and to report your research results. Discussions and presentations in English are quite welcome.

Table 1. Workshop Schedule in 2008 \* Subject to change.

| Date        | Place    | Topic  | Dead-line | Co-host                 |
|-------------|----------|--|-----------|-------------------------|
| May 22-23   | Okinawa  | Mobile Computing, Mobile Applications, Ubiquitous Communication, Mobile Multimedia Communication | —         | MBL (IPSJ)              |
| July 23-24  | Tokyo    | Mobile Multimedia Application, Mobile P2P, Video Coding, Streaming Technology*                   | Mid-May   | AVM (IPSJ) CE, ME (ITE) |
| Sept. 25-26 | Miyagi   | Fusion of Mobile and Broadcasting, Mobile Contents, Video Streaming for Mobile Devices*          | Mid-July  | BCT, CE (ITE)           |
| Nov. 13-14  | Fukuoka  | FMC, Information Home Appliance Network, Mobile Security*  | Mid-Sept. | IN                      |
| Jan. 22-23  | T.B.D.   | Mobile Ubiquitous/Sensing Technology, Ad-hoc Network, RFID*                                      | Mid-Nov.  | USN                     |
| Mar. 4-6    | Kanagawa | Joint Work Shop on Mobile Communication  | Mid-Dec.  | RCS, AN, SR             |

### 5. Contact

Homepage: <http://www.ieice.org/~momuc/eng/>  
 Secretaries: Masakatsu Ogawa, NTT  
 Shigeaki Tagashira, Kyushu University  
 E-mail: [momuc-sec-contact@mail.ieice.org](mailto:momuc-sec-contact@mail.ieice.org)



● **Membership for Overseas Candidates:** Overseas Members may opt to join **one IEICE Society of their choice** and may request to **receive the IEICE Transactions of online version** of that Society. Furthermore, Overseas Members may request to receive the IEICE Journals and Transactions (published in paper) at an additional cost. Similar services are available to **Overseas Student Members**. Voting privileges in the IEICE election do not apply to Overseas Members. Note that the Overseas Membership applies only to candidates who reside outside of Japan and who have citizenship in countries other than Japan.

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● **IEICE Societies and Publications (<http://www.ieice.org/eng/books/trans.html>)**

The IEICE Transactions provide a forum where members can publicize results of their studies. There are four different series of Transactions, corresponding to the different Societies, and each series is published monthly.

★ **Communications (Communications Society)**

| Society                      | Transactions                         | Editorial Subject Indexes  |
|------------------------------|--------------------------------------|--|
| <b>B</b><br>(Communications) | B (Japanese Edition)<br>EB (English) | Fundamental Theories for Communications, Devices/Circuits for Communications, Transmission Systems and Transmission Equipment for Communications, Optical Fiber for Communications, Fiber-Optic Transmission for Communications, Switching for Communications, Switching for Mobile Communications, Network, Network Management/Operation, Internet, Wireless Communication Technologies, Terrestrial Radio Communications, Satellite Communications, Optical Wireless Communications, Antennas and Propagation, Electromagnetic Compatibility (EMC), Sensing, Navigation, Guidance and Control Systems, Energy in Electronics Communications, Terminals for Communications, Multimedia Systems for Communications, Broadcast Systems, Integrated Systems for Communications, Space Utilization Systems for Communications |

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For further information, please refer to the above website.

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**Basic Membership Charge (UNIT : Japanese YEN)**

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|---------------------------------------|-----------------|---|--|---|--|-------------|
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|                                       |                 |   |  |   | One  | Tow or more |
| Member (overseas)                     | 1,400           | 7,000   | 3,500(/1Society.)  | 6,000   | 4,000  | 10,000      |
| Member (overseas) with OMDP*          | 1,000           | 5,000   | 3,000(/1Society.)  | 5,000   |  |             |
| Student member (overseas)             | -               | 2,000   | 2,000 (/1Society.)   | 6,000   |  |             |
| Student member (overseas) with OMDP*  | -               | 1,000   | 1,500 (/1Society.)   | 5,000   |  |             |

**NOTE:**

1. You need to choose one Society, and you can subscribe Transactions online of your registered society.

Example: If you want to subscribe to Transaction of EA, please check **Society Registration** as "A", and your membership fee amounts to 7,000 yen / 5,000 yen.

2. If you want to register other Societies and Transaction of web version, please check "Additional Society registration".

Example: If you want to subscribe to Transaction of EA and EB, please check **Society Registration** as "A", **Additional Society registration (optional)** as "B".

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Example: If you want to subscribe to Transaction of EC in paper version additionally, please check **Society Registration** as "A", and **Additional Transaction subscription (in paper version)** as "C" or as "EC". Your membership fee amounts to 7,000+4,000 yen / 5,000+4,500 yen.

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| Areas  | Air Mail  | SAL mail |
|--|-----------|----------|
| Asia; Guam; Midway islands                                   | 5,600yen  | 3,200yen |
| Oceania; Near & Middle East; North & Central America; Europe | 7,800yen  | 4,400yen |
| Africa; South America  | 11,000yen | 5,600yen |

Please contact the IEICE Membership Activities Section: E-mail: [member@ieice.org](mailto:member@ieice.org) FAX: +81 3 3433 6659

## IEICE Overseas Membership Application Form

URL <http://www.ieice.org/eng/member/OM-appli.html> E-mail [member@ieice.org](mailto:member@ieice.org)

◆ **Please type or print in English.** The deadline for submitting application form is the 1<sup>st</sup> day of every month.

### Personal Information

**Full name:** \_\_\_\_\_ **Nationality:** \_\_\_\_\_  Male  
First name Middle name Last name  Female  
 Prof.  Dr.  Mr.  Ms. **Place of birth:** \_\_\_\_\_ **Date of birth:** \_\_\_\_\_  
Day Month Year

### Mailing Address

Home  Office

Name of Company/School/College \_\_\_\_\_ Department/Section \_\_\_\_\_  
 Street \_\_\_\_\_ City \_\_\_\_\_ State/Province \_\_\_\_\_  
 Postal code \_\_\_\_\_ Country \_\_\_\_\_  
 TEL \_\_\_\_\_ FAX \_\_\_\_\_ E-mail \_\_\_\_\_

### Academic Background

The highest academic degree:  Ph.D.  Masters  Bachelors  Others: \_\_\_\_\_

University/college/school of the highest academic degree \_\_\_\_\_ Month & year of graduation \_\_\_\_\_

**(For Student Member)** Academic degree which will be conferred on you. \_\_\_\_\_ Month & year when the degree will be conferred on you. \_\_\_\_\_

### Application Information

**Membership:** I want to apply for the following membership (check one item!)

- Member (Overseas)  Student Member (Overseas)  
 ◆ If you want to apply for OMDP, please check;  OMDP (Overseas Membership Development Program)

**Society registration (Membership fee includes one Society of Transaction of Online version.):**

- A: Engineering Sciences  B: Communications  C: Electronics  D: Information & Systems

**Additional Society (optional):**  A: Engineering Sciences  B: Communications  C: Electronics  D: Information & Systems

**Additional Transactions of paper version (optional):**

- EA: Fundamentals  EB: Communications  EC: Electronics  ED: Information & Systems  
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**Journal subscription (optional)**  (Japanese)

### Remittance

Remittance is available only in **Japanese yen** by a **credit card**

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 Annual charge..... \_\_\_\_\_ Mailing option:  Air mail..... \_\_\_\_\_  
 Additional Society (optional)..... \_\_\_\_\_  SAL mail..... \_\_\_\_\_  
 Additional Transactions (optional)..... \_\_\_\_\_ **Total remittance**..... \_\_\_\_\_

Credit Card:  MasterCard  VISA  American Express Card number: \_\_\_\_\_ Expiry date(Y/M) \_\_\_\_\_ / \_\_\_\_\_

Credit Card Holder: \_\_\_\_\_ Signature: \_\_\_\_\_

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Endorsements by two IEICE Regular Members for Regular/Affiliate Member application and by one Member for Student Member application is required. If it is difficult to find endorsers, please contact the IEICE Membership Activities Section by sending this sheet, and we will help you. I recommend this applicant for IEICE membership.

Endorser's name \_\_\_\_\_ Membership number \_\_\_\_\_ Endorser's signature \_\_\_\_\_ Date \_\_\_\_\_

Endorser's name \_\_\_\_\_ Membership number \_\_\_\_\_ Endorser's signature \_\_\_\_\_ Date \_\_\_\_\_

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## From Editor's Desk

### The beginning of the fiscal year

As you may know, the Japanese government's fiscal year is defined as a period of fiscal activity occurring from April through March 31 of the following year. In April 1, almost all corporations begin their fiscal year and the school begins on April in Japan. On first inspection, there are many countries that the government's financial year runs from April 1 to March 31 same as Japan.

As for IEICE Communications Society, it begins fiscal year in April and replaces its Board of Directors in May. At the moment, the new members of IEICE Communications Society start their activities from May. Please look forward to the new organization of Board of Directors, and also next GNL, with expectation!

IEICE Global News Letter Editorial Staff

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No special order is observed



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