IEICE Communications Society GLOBAL NEWSLETTER *Vol. 18*
Contents

Council of Technical Committee Representatives in New Structure of Communications Society

Shin Nomoto
Vice President, Chair of Council of Tech. Committee Representatives

1. Introduction

As explained in the message from the President Inoue in the previous issue [1], the Communications Society introduced a new operation and accounting scheme from this April. The main purpose of the new scheme is to enhance the overall service quality of the Society not only for active members but also for relatively inactive members.

On behalf of Chair of the Council of Technical Committee Representatives, it is my pleasure to provide this letter for further clarification of the scheme from the operational viewpoint of Technical Committees.

2. New Structure of the Communications Society

Figure 1 shows the new structure of the Society. After the reorganization, the Board of Directors, that is much smaller (only five voting members) than before, can focus on strategic issues of the Society, while it delegates the responsibility and authority for the operation of Technical Committees and Transactions to the respective teams, the Council of Technical Committee Representatives and the Editorial Board, respectively. Thus, the Society can provide high-quality services in a flexible and timely manner.

Nominally, the Board of Directors has face-to-face meetings five times a year. With the new scheme, the Board of Directors only decides the top-level policy or strategy for the operational issue of Technical Committees, for example, so that the Council of Technical Committees can discuss specific subjects in detail with less constraints from the Board both time-wise and finance-wise. The responsiveness of the Council has increased indeed, so has the motivation of the representatives.

3. Current Status and Main Issue of the Council of Technical Committee Representatives

The Society (and the Institute) owes a lot on the activities of the Technical Committees. Especially, monthly (or bi-monthly) meetings operated by each Committee have been developing a strong community among ICT engineers in Japan.

There are, in total, 26 Technical Committees in the Communications Society, including 9 "fixed-term" committees. As can be imagined, a wide variety of fields are covered by those committees [2]. However, the environment surrounding telecommunications is moving faster and faster towards further advanced stages. Therefore, there are a number of proposals for the creation of a new Technical Committee which may have to compete with other Committees in either a good sense or a bad sense. On the contrary, apart from the 9 "fixed-term" Committees, the 17 "standing" Committees have officially no closing date. Do they need to survive permanently? If yes, we may have quite a large number of Committees, some are starving, in future. If no, how to close the Committee is the next question, because it may cause service degradation to some members and may cause financial impact.

I hope the new scheme facilitates productive discussions among the Technical Committees and allows us global optimization for membership service enhancement.

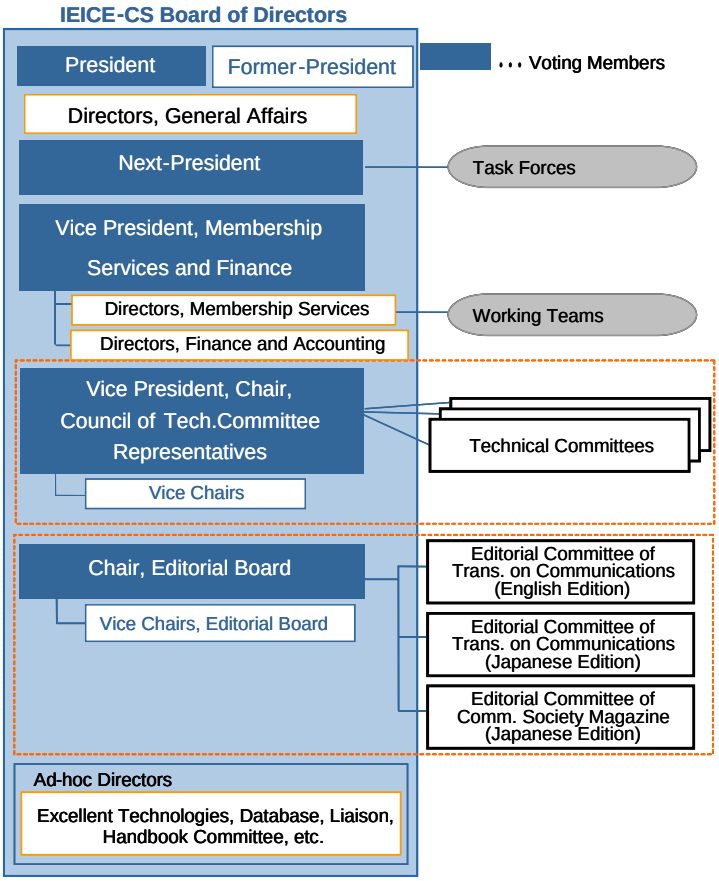

Fig. 1 New Structure of Communications Society.

4. Reference

[1] Yuji Inoue, “Enhancing services suitable for the members of the Communications Society,” IEICE Communications Society GLOBAL NEWSLETTER, Vol. 17, p.2, 2006.
[2] http://www.ieice.org/cs/techg/list.html

Sister Society Agreement between KEES and IEICE-CS

Hiroyuki Arai, Yokohama National University
Editor-in chief, IEICE Transactions on Communiactions

1. Introduction (Sub Title/10.5 pt, bold)

On September 23, 2006, the Communications Society of the IEICE has made a new Sister Society agreement with KEES, the Korea Electromagnetic Engineering Society. This is the 5th Sister Society agreement for IEICE-CS, following those with the Communications Society of the Institute of Electrical and Electronics Engineers (IEEE ComSoc), the Korean Institute of Communication Sciences (KICS), the Mongolian Communications Union (MCU) and the *Der Verband der Electrotechnik und Informationstechnik / Die Informatiostechnische Gesellschaft* (VDE/ITG).

Through this new agreement, both societies will cooperate towards the progress of the academic fields of mutual interest. And will implement programs to bring various benefits to their members.

2. KEES

KEES (Korea Electromagnetic Engineering Society) originally began with industries specifically related to EMI/EMC problems, and later expanded their research to all the other fields related to RF and microwave areas. KEES is one of the largest societies in Korea. Founded in 1989, it currently has over 4,100 members.

KEES consists of 15 technical groups, and deals with aspects of electromagnetic engineering, and its primary aims are to promote the scientific and technical development of electromagnetic engineering and wireless technologies. Through the conversation between KEES and IEICE-CS, it was obvious that both societies has a lot in common, and it was soon agreed that constructing a cooperative relationship would be mutually beneficial.

3. Sister Society Agreement

To confirm the cooperative relationship between KEES and IEICE-CS, an agreement was drawn to be signed by the presidents of both organizations.

The main article of this Sister Society Agreement states that both organizations will promote cooperation in academic fields of mutual interest, and to implement its details for items such as, but not limited to:

1. Encouragement and strongly support for the joint conferences and workshops between two Organizations.
2. Technical cooperation in the publication process of Journal of KEES and IEICE Transactions on Communications.
3. Privilege of either Organization upon submission of papers and meetings and conferences sponsored by the other Organization.
4. Privilege of Members of either Organization upon registration to meetings and the conferences sponsored by the other Organization.
5. Privilege of Members of either Organization upon subscription to the publications by the other Organization.
6. Promotion of the other Organization's activities through publications, web sites and mailing lists.

This Agreement is valid for the calendar years 2006-2009, and may be renewed for additional three year terms by mutual written consent of the Organizations by the last day of November of the third year of each term.

Prof. Noh-Hoon Myung signing the Sister Society Agreement
(All photos courtesy of
2006 Korea-Japan Joint Conference)

4. Agreement Ceremony

The Agreement was signed on September 23, 2006, at the banquet of 2006 Korea-Japan Joint Conference in Kanazawa, with the following delegates.

(1) Signers:
- Prof. Noh-Hoon Myung, President of KEES
- Dr. Yuji Inoue, President of IEICE-CS (signed on September 20, 2006 due to his schedule)

(2) Witnesses:
- Prof. Jung-Wong Ra, Invited speaker of 2006 KJJC, Former President of KAIST & GIST
- Prof. Dong-Chul Park, Past President of KEES
- Prof. Dong-Il Kim, Former President of KEES
- Prof. Young-KI Cho, Technical Program Committee of 2006 KJJC
- Prof. Se-Yun Kim, Technical Program Committee of 2006 KJJC
- Prof. Young Joong Yoon, Technical Program Committee of 2006 KJJC
- Prof. Kyeong-Sik Min, Secretary of 2006 KJJC
- Prof. Naohisa Goto, IEICE Fellow
- Prof. Tsuneki Yamazaki, Chair of 2006 KJJC, Chair of IEICE Technical Group on Electromagnetic Theory IEICE-ES
- Prof. Toshikazu Hori, Local Committee Chair of 2006 KJJC
- Prof. Ryuji Koga, Vice Chair of 2006 KJJC, Chair of IEICE Technical Group on Electromagnetic Compatibility
- Prof. Makoto Ando, Chair of IEICE Technical Group on Antennas and Propagation
- Prof. Yuji Kotsuka, Former Chair of IEICE Technical Group on Electromagnetic
- Prof. Toyohiko Ishihara, Technical Program Committee of 2006 KJJC
- Prof. Hiroyuki Arai, Secretary of 2006 KJJC, Editor-in chief, IEICE Transactions on Communiactions

With Prof. Arai presiding over the ceremony, the event went through with a warm and friendly atmosphere, affirming the future prosperity of the two societies. Prof. Ra and Prof. Koga gave congratulatory greeting, followed by cheerful toast by over 160 people attending the party.

Prof. Noh-Hoon Myung showing the Sister Society Agreement

5. In Conclusion

After the Agreement Ceremony, Prof. Yamazaki, Chair of 2006 KJJC, and Prof. Myung, President of KEES agreed to continue the Korea-Japan Joint Conference and to be held in Seoul, Korea in 2008. This is only the beginning of a long and promising future in the collaboration between KEES and IEICE-CS. Please look forward to the announcements of added IEICE-CS Membership benefits implemented based on this Sister Society Agreement.

From left to right in the front: Prof. Toyohiko Ishihara, Prof. Ryuji Koga, Prof. Jung-Wong Ra, Prof. Noh-Hoon Myung, Prof. Tsuneki Yamazaki, Prof. Yuji Kotsuka, Prof. Dong-Il Kim, Prof. Dong-Chul Park

Communications Society Excellent Paper Awards and The First Winners

Makoto Taromaru (ATR)
Editor, The IEICE Transactions on Communications

1. Introduction

The IEICE Communications Society has established new awards to honour excellent papers and letters published in The IEICE Transactions on Communications. On behalf of the editorial board and the editorial committees, the author would like to introduce the overview of Communications Society Excellent Paper Awards and the first winners.

The awards are annually given to authors of excellent papers or letters published both on the English edition (series EB) and the Japanese edition (series B) in the term from April of last year to March.

2. Awards and Categories

There are three and two awards respectively for English and Japanese editions as the followings. The total number of winning papers/letters should be at most 10, according to the regulation.

From The IEICE Transactions on Communications (Series EB):
- Best Paper Award
- Best Letter Award
- Best Tutorial Paper Award

From The IEICE Transactions on Communications (Japanese Edition, Series B):
- Best Paper Award
- Best Tutorial Paper Award

3. Process of Selection

The candidates are selected in accordance with recommendation from reviewers, associate editors, and editors including guest editors of special sections. The final winners are determined by the board of directors, Communications Society, in accordance with the selected papers/letters by the editorial board and each editorial committee, series B and EB.

It should be noted that these awards are inaugurated by our society and selected independently upon the Best Paper Award and the Inose Award which are given annually by IEICE headquarters/president. Therefore, a paper may receive awards both from the society and from the headquarters.

4. The First Winners

The papers shown below were selected among ones published from April 2005 to March 2006.

A ceremony presenting these awards was held at the General Meeting of Communication Society on 20 September, during 2006 IEICE Society Conference at Kanazawa University. The president of the society, Yuji INOUE presented the awardees with prizes: Plaques and Certificates (See photographs).

***From The IEICE Transactions on Communications* (*Series EB*)**

Best Paper Awards

were awarded to three papers,

"Series-Fed Beam-Scanning Antenna Employing Multi-Stage Configured Microstrip Antennas with Tunable Reactance Devices" (Vol. E88-B No.6） authored by **Naoki HONMA**, **Tomohiro SEKI**, **Kenjiro NISHIKAWA**, **Koichi TSUNEKAWA**, and **Kunio SAWAYA,**,

"Estimation of Radiated Power of Radio Transmitters Using a Reverberation Chamber"（Vol. E88-B No.8）authored by **Tsutomu SUGIYAMA**, **Takashi SHINOZUKA**, and **Ken IWASAKI**,
and
"Measuring the Perceived Importance of Speech Segments for Transmission over IP Networks" (Vol. E89-B No.2) authored by **Yusuke HIWASAKI**, **Toru MORINAGA**, **Jotaro IKEDO**, and **Akitoshi KATAOKA**.

Best Letter Award

was given to no letter this year.

Best Tutorial Paper Awards

were presented to two papers,

"Recent Progress in Forward Error Correction for Optical Communication Systems" (Vol. E88-B No.5) authored by **Takashi MIZUOCHI**

and

"Antennas and Propagation in the Presence of Metamaterials and Other Complex Media: Computational Electromagnetic Advances and



Photos Awarding ceremony held in Society Conference at Kanazawa University

Challenges" (Vol.E88-B No.6) authored by **Richard W. ZIOLKOWSKI**.

***From The IEICE Transactions on Communications* (*Japanese Edition*, *Series B*)**

Best Paper Awards

were given to three papers,

"The Performance Evaluation of a Distributed Data Driven Architecture and the Application Design Method" (Vol. J88-B No.7) authored by **Kazuhide TAKAHASHI**, **Takashi KON**, **Kazuyoshi AKI-YAMA**, and **Makoto JINGUJI**,

"Broadband Printed Dipole Antenna Employing Self-Complementary Radiating Element and Microstrip Line Feed" (Vol. J88-B No.9) authored by **Michitaka AMEYA**, **Manabu YAMAMOTO**, **Toshio NOJIMA**, and **Kiyohiko ITO**,

and

"Multiple Target Detection for Stepped Multiple Frequency Interrupted CW Radar (Vol. J89-B No.3) authored by **Takayuki INABA**.

Best Tutorial Paper Awards

were awarded to two papers,

"Quality Assessment Methodologies for IP-Telephony Services (Vol. J88-B No.5) authored by **Akira TAKAHASHI**, **Hideaki YOSHINO**, and **Nobuhiko KITAWAKI**

and

"Measurement, Analysis, and Modeling of MIMO Propagation Channel (Vol. J88-B No.9) authored by **Kei SAKAGUCHI** and **Jun-ichi TAKADA**

5.Notice to Authors of English Edition

Although all of these awards are considered, not all are awarded annually. As described above, Best Letter Award was not given this year. This result shows that we could not publish very good letters even though we received many, more and more submissions. A good letter is not a shortened paper proposing a slightly new methodology or showing results with a little new combined conditions, which give minor contributions below the average. Please be reminded that an excellent letter must be a prompt report of a remarkable, interesting and original proposal, design, or discovery before deep analysis, experiments with many conditions, or precise discussions..

6.Conclusions

Authors who submitted papers/letters to our two transactions had had less possibility before to get the paper awards issued by IEICE headquarters because we publish more papers and letters than the other societies. This is one reason of the inauguration of the awards. Therefore, the authors have got more chance to get paper awards in the field of communications since this year. The editorial board and the committees expect to encourage authors to submit good papers and letters, and hope to publish a lot of papers and letters of good quality.

Report on KJJC2006 in Kanazawa, JAPAN

Kunio Sakakibara (Nagoya Institute of Technology)
Takuichi Hirano (Tokyo Institute of Technology)

1. Conference and venue

The 2006 Korea-Japan Joint Conference on AP/EMCJ/EMT (KJJC-AP/EMCJ/EMT2006) was held on September 23-24, 2006 at Ishikawa Kouseinenkin Hall in Kanazawa, JAPAN, which is just in front of the famous Kenroku-en Park. The conference was organized by Technical Committees on Antennas and Propagation, Electromagnetic Compatibility of Communication Society, Electromagnetic Theory of Electronics Society of IEICE and The Korea Electromagnetic Engineering Society (KEES). This conference in 2006 was a fifth KJJC.

Fig. 1 Ishikawa Koseinenkin Hall (Conference hall)

2. Sessions, papers and participants

155 Korean and Japanese peoples are participated in this Korea-Japan Joint Conference including 61 Koreans. 110 papers are presented, which consists of 55 oral and 55 poster presentations including 4 plenary speeches.

Four technical and historical keynote speeches are presented in the plenary session, as shown in Fig. 2, from Prof. Makoto Ando (Tokyo Institute of Technology), Prof. Youji Kotsuka (Tokai Univ.), Prof. Dong-Chul Park (Chungnam National Univ.) and Jung-Woong Ra (Korea Advanced Institute of Science and Technology).

Fig. 2 Keynote Speech (Prof. Makoto Ando)

Fig. 3 Oral session (Prof. Min Kyong-sik)

Fig. 4 Poster session

Three oral sessions for AP, EMC and EMT technologies are organized in parallel during the two-day conference. 21, 15 and 15 papers are presented for the technologies, respectively, as is shown in Fig. 3.

35 (AP), 10 (EMC) and 10 (EMT) poster presentations are also organized in the afternoon on Saturday. All the attendees discussed actively in a friendly atmosphere as is shown in Fig. 4.

3. Banquet party

Banquet party is held in the evening on Saturday at Kaga room of Conference site Ishikawa Kouseinenkin Hall. At the beginning of the party, MOU is exchanged

Fig. 5 MOU is exchanged between KEES and Communication Society of IEICE.
(Prof. Noh-Hoon Myung)

Fig. 7 Cheers in the banquet party

Fig. 6 Duet of drum and flute (Iccho-Ikkan)

Fig. 8 Banquet party

for friendship between KEES and Communication Society of IEICE as is shown in Fig. 5. Peoples listened attentively the artistic and traditional attraction called Iccho-Ikkan which is a duet of Japanese drum and flute, as is shown in Fig. 6. All the attendees enjoyed talking and delicious dishes in the buffet style party, which began with cheers (Fig. 7 and 8).

4. Conclusion

Recent progress for representative researches in Korea and Japan is presented in the conference by young engineers. Discussions in the sessions, the banquet and other free meeting were very effective for international mutual understanding between Korea and Japan. Next KJJC was promised to be organized in 2007 for conclusion of this conference.

Fig. 9 KJJC2006 committee members

Report on the 1st Brain Communication Workshop

Kazuhiko SAGARA
Hitachi, Ltd., Central Research Laboratory

1. Technical Committee on Brain Communication

In June, 2006, the "Technical Committee on Brain Communication" was established to promote the interdisciplinary activities on Brain Science and Information Technologies. Our research fields include wide ranges of topics such as brain-function imitated devices, learning algorithms in cerebrum cortexes and human-oriented communication models. We are expecting our activities lead to the breakthrough for ubiquitous networks and cultivate the innovative brain-based scientific research in Japan.

2. Workshop for the 1st Brain Communication

The 1st workshop on Brain Communication was held at NICT (National Institute of Information and Communication Technology), Tokyo, Japan, in October 11, 2006. In the opening of the workshop, the welcome speech was addressed from Dr. Kazuhiko Sagara, the chair of the Technical Committee on Brain Communication (Fig.1). There were 10 presentations and about 50 attendees throughout the workshop. We had 2 invited speakers presenting "What is necessary information for brain communication? – Parasitic Humanoid and Interfaces using Illusions – " by Dr. Taro Maeda and "Points and Lines of Optical Topography – from brain science toward human science – " by Dr. Maki Atsushi (Fig.2). Although the program covers various areas concerning the Extraction of Neural States in Brain Cells, the Decoding of Neuroimaging Data and the Brain Machine Interface, we made beneficial discussions and technical exchange through the workshop and the party (Fig.3). On this occasion, we would like to appreciate all the local staffs successfully steering this workshop.

Schedule

- February 28, 2nd Workshop on Brain Communication, Osaka University
- March 20-23, Pane; Discussion on "Topics on Brain Functional Measurements and Application for Information Communication Technology", Meijo University

Call for Paper

We are soliciting the in-depth or experimental papers concerning "Signal Processing Technologies for Biological Data", "Human Communication" and/or "Sensor Network and its Fusion Technologies." The paper deadline is December 15, 2006. For more details, please visit our Web site (http://www.ieice.org/cs/brain/).

Fig.1 Opening

Fig.2 Invited Speak

Fig.3 Party at Guest House

Introduction of AWCC at UEC

Takeo Fujii, Yasushi Yamao, Nobuo Nakajima, Kazuhiko Honjo, Yoshio Karasawa
AWCC, The University of Electro-Communications

1.Overview of AWCC

1.1 Objective for establishment

Advanced Wireless Communication research Center (AWCC) at The University of Electro-Communications was established in April 2005. This center is a unique academic research center specialized for wireless communication. The objective of this center is "AWCC contributes to the creation of intelligent and flexible communication environments through a study of information and communication technologies (ICT), particularly focusing on wireless communication technologies, in which our university has traditional advantages."

Fig.1 AWCC.

1.2 Organization of AWCC

The director of AWCC is Prof. Karasawa. Members of AWCC are classified into three types. The first type is core members who are full time or concurrent professors working at AWCC. The second type is cooperative members who are professors in UEC. Cooperative members join research projects in AWCC by making use of their specialties. The last type is advisory members who are selected from leading companies and institutes as distinguished research fellows. In 2006, five core members, 16 cooperative members and seven advisory members join AWCC. In addition to these members, the graduate and undergraduate students study in each laboratory.

1.3 Overview of Research Targets in AWCC

The research targets in AWCC are summarized in Fig.2.

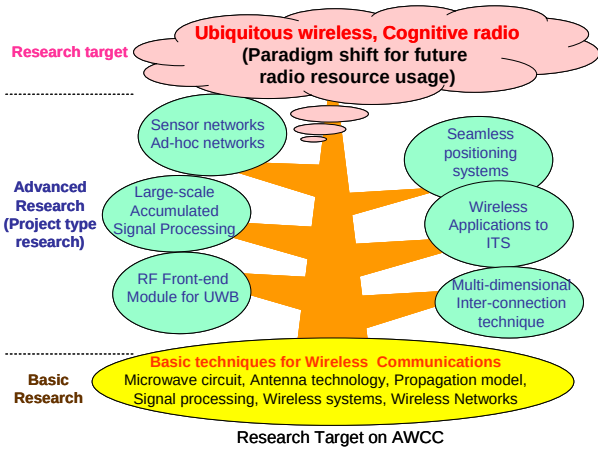

Fig.2 Summary of research targets in AWCC

The key research target of AWCC in the first phase from 2005 to 2010 is "Ubiquitous wireless and cognitive radio –paradigm shift for future radio resource usage–." For achieving this goal, the basic and advanced researches are ongoing. The examples of the research topics are shown below.

- Multi-dimensional Wireless Inter-connection Technologies
- Large-scale Accumulated Radio Signal Processing
- Non-linear System Design in Complex Wireless Systems
- Seamless Positioning System
- Wireless Applications to ITS
- QoS for All-IP Mobile Network
- Large-scale Wireless Sensor Network Technologies
- Signal Transmission Scheme for Ubiquitous Wireless Devices
- RF Front-end Module Development for UWB
- High-efficiency Wireless Transmission scheme
- Wireless Baseband Transmission Scheme
- Cognitive Radio (Target to future spectrum usage)

Some of them are cooperative research topics with industrial companies and some of them are funded by national projects. Some activities of them are shown in the next section.

2. Research Topics in AWCC

2.1 Radiowave Propagation

A member, Prof. karasawa, has a long historical background over a quarter of a century on radiowave propagation studies in the fields of multipath fading due to sea surface reflection, tropospheric and

ionospheric scintillations, and rain attenuation as well as radio-meteorology. Based on the background, studies on multipath propagation theory and modeling in wideband mobile wireless communications systems become main topics of AWCC. The book authored by Karasawa, "Radiowave Propagation Fundamentals for Digital Mobile Communications" published from Corona Ltd. is the one and only book in this topical area in Japan.

A highlight of recent propagation study is development of a channel model for evaluation of OFDM characteristics where the tail of delay profile exceeds guard interval. We call this model "Equivalent transmission-path model for OFDM (ETP-OFDM)". We will continue the study on channel modeling under extremely severe multipath environment having large delay spread and large Doppler spread. Bridging a gap between "Propagation" and "Systems" for future wireless systems designing would be our main concern.

2.2 MIMO

In recent years, using signal processing array antennas both at the access point (or base station) and user terminals, MIMO (multi-Input Multi-Output) has popular research field of next-generation mobile communication systems. The increase of system capacity without increasing the transmission power or frequency bandwidth has made the MIMO system unique and efficient in data transmission. In AWCC, we study antennas and propagation related MIMO technologies with application to various communication systems as shown in Fig. 3.

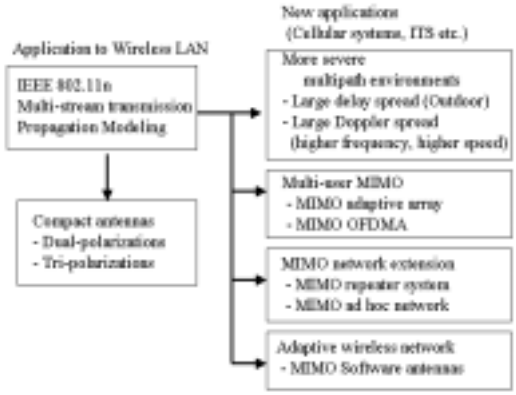

Fig.3 Antennas and propagation related MIMO research topics.

In topics given in Fig. 3, one topic, a tri-polarization antenna for MIMO, is introduced here. In order to realize a compact antenna for MIMO systems, we have proposed a triple-polarization antenna which is composed of a dual polarized (V, H) circular patch antenna and a monopole (Z) on the patch. Figure 4 shows the basic configuration of the antenna. Since this antenna has three branches (namely, V, H, and Z), it can be used as a 3x3 MIMO system where high capacity communication can be expected in the case of multipath-rich environment.

Fig.4 A compact MIMO antenna utilizing tri-polarizations.

2.3 Positioning

Positioning technology is being pursued for navigation and other applications in the indoor area where GPS can not be used. There exist several approaches for this purpose. However, the cost of the system becomes serious if all the indoor area will be covered.

Our approach is focused on the hybrid system. One is autonomous navigation system. Terrestrial magnetism sensor, gyro compass and step sensor are equipped to estimate differential position during walking. The other one is spot navigator which indicates the user location at certain intervals. Bluetooth and ZigBee equipment are considered for this purpose. Kalman filter combines the measured data obtained by these equipment and gives best estimation result for location.

Figure 5 shows estimated trajectory using Bluetooth triangulation method combined with the autonomous system.

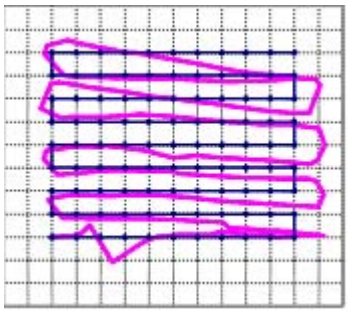

Fig.5 Estimated trajectory. (1 division = 2 m)

Figure 6 shows the experimental result carried out at the underground area in Shinjuku station Tokyo. Location error caused by the autonomous navigation system was corrected by the spot navigators. Only four spot navigators are necessary for covering 400m x 200m area.

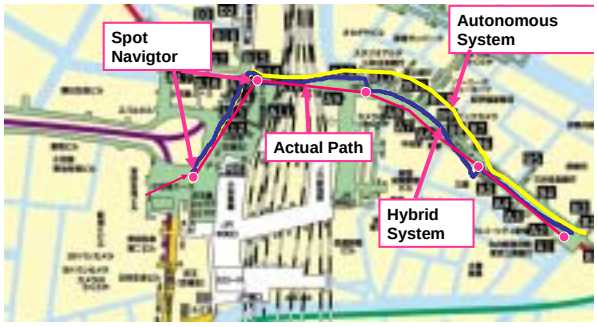

Fig.6 Hybrid navigation in Shinjuku underground area.

The advantage of this system is low infrastructure cost. Likewise car navigation, human navigation may be provided with low subscribing expense using this system. There will be many applications for this system

in the Ubiquitous era.

2.4 Device

For device development on the next generation radio systems, where high-efficiency / broad-band / super-linear characteristics are mandatory, fundamental microwave design technologies based on simultaneous simulation including electro-magnetic fields and semiconductor device physics have been being developed as described in Fig. 7.

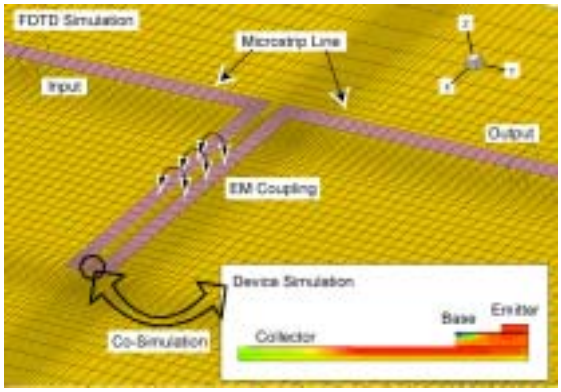

Fig.7 Electro magnetic fields/Semiconductor co-simulation using FDTD method.

Using the technology, complicated microwave nonlinear phenomena such as the long finger effects for microwave active devices and 3rd order inter-modulation distortion phenomena due to thermal memory effects have been successfully analyzed.

As an example of the advanced design method, an InGaP/GaAs HBT MMIC amplifier with an active balun for UWB systems has been developed (Fig. 8).

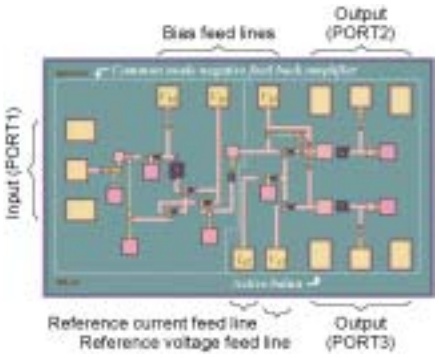

Fig.8 MMIC amplifier with active balun.

This MMIC is used to drive a self-complementary UWB antenna and a four coupled lines differential mode band pass filter (BPF) covering a 3.1-10.6GHz band, which have been developed also in AWCC.

A microwave class-F high efficiency amplifier with more than 80 % collector efficiency, considering up to 7th order of higher harmonic frequency has been proposed and developed. A new lumped element circuit topology for class F amplifier was also proposed in our laboratory.

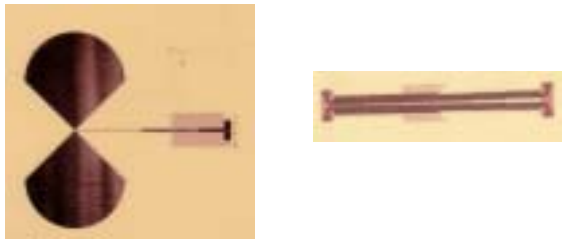

Fig.9 Planar self-complementary antenna (left) and differential mode BPF (right).

These technologies will be applied to new devices and new materials such as GaN devices and nano structure devices for microwave and millimeter wave applications.

2.5 Wireless Sensor Network

A large-scale sensor network is expected to be an indispensable infrastructure to support secure and safe society and life in the future. Since a large number of distributed wireless sensor devices communicate autonomously in ad hoc mode, the following issues should be investigated.

- Lossless multi-hop communication

  In multi-hop wireless communications, packet loss happens even if one of the links on a hop root fails to transmit the packet. They are temporally caused by radio environment change and mobility of devices. Therefore, a countermeasure is important to cover temporary link quality degradation. A path diversity technique using multiple routes and a fast path-repairing rooting technique are studied for this object.

- Multiple access method for ad-hoc networks

  A decentralized wireless resources (frequency, time, and /or code) sharing technique should be developed so that each device recognizes of local wireless environment and fully utilizes wireless resources available in the environment.

- Large-scale ad-hoc networking

  Since a large number of distributed wireless devices join a sensor network, a dynamic network formulation method is essential in order to adapt itself to frequent change of network elements. Also, rapid root discovery and root repairing methods are essential for devices to communicate within a reasonable delay.

- Low power operation of radio module

  Power consumption requirement for sensor devices are very severe. For low power operation, High efficiency RF circuits and antenna, state-of-the-art RF LSI process, low power transmission scheme, and MAC (Medium Access Control) protocol supporting high-rate sleep mode are key technologies.

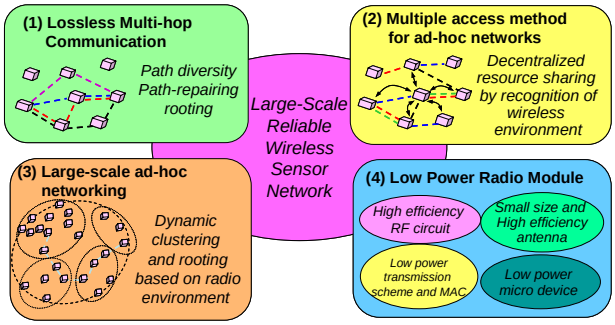

Fig.10 Research topics on wireless sensor networks.

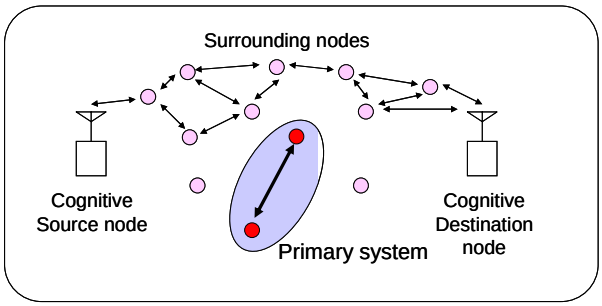

Fig.12 Ad-hoc cognitive radio.

2.6 Cognitive Radio

Cognitive radio is the intelligent radio system that can adaptively change the parameters by recognizing the surrounding radio environment. By using the recognition ability of the cognitive radio, the radio terminal can establish the communication in an unused frequency band adaptively. Therefore the cognitive radio is expected to be a solution for the shortage of the radio frequency resource. This is because the cognitive terminals can use the frequency bands which are assigned to the primary system, like TV band, cellular system, microwave relay system and others by avoiding interference toward the primary system. The image of the cognitive radio in which the secondary cognitive terminal finds the most suitable frequency for communication under the primary system is shown in Fig. 11.

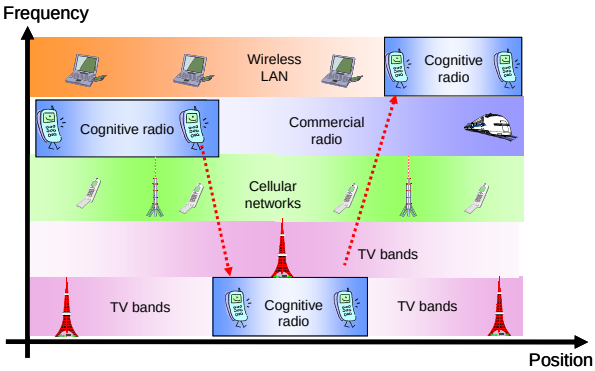

Fig.11 Image of cognitive radio under primary systems.

The researches for cognitive radio have been just started in the world and Japanese academic research is a very few. AWCC is targeted to be one of the key bases of the cognitive radio in Japan. In order to realize the cognitive radio, a lot of problems are still remained. How can we obtain the radio environment information? How can we find an unused band? How can we mitigate the interference toward the primary users? And so on. In AWCC, in order to solve the above problems, many kinds of researches for cognitive radio are discussed through the fundamental theory to the practical measurement and the practical devices.

In order to realize the cognitive radio without large interference toward the primary systems, we propose a concept of ad-hoc cognitive radio as shown in Fig. 12.

In ad-hoc cognitive radio, in order to establish the secondary radio networks under the existence of the primary systems, a small power multi-hop communication is used for secondary radio networks. The examples of ongoing our research topics related to cognitive radio are as follows.

- Routing method for ad-hoc cognitive radio
- Radio environment recognition method for cognitive radio
- Protocols for ad-hoc cognitive radio
- Signal processing for cognitive radio
- Frequency sharing method between primary and secondary systems

3. Future Direction of AWCC

AWCC promotes cooperative research projects such as;

- Industry-cooperative researches by AWCC members and Industry R&D members.
- Group researches by competitive research funds, scientific research fund, etc.

Cooperation with wireless research institutes of overseas is considered such as joint research and exchange of students and researchers.

AWCC welcomes Doctoral Course students from industries and overseas who will explore future wireless world with untiring zeal and excellent technical skills. Doctoral degrees can be obtained in one year minimum.

If you are interested in AWCC, please contact to us according to the following information.

Contact information:

AWCC
The University of Electro-Communications
1-5-1 Chofugaoka, Chofu-shi, Tokyo, 182-8585, JAPAN
E-mail: coremember@awcc.uec.ac.jp
Tel: +81-42-443-5860
Fax: +81-42-443-5860

Welcome to the IEICE Overseas Membership Page URL:http://www.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. For detailed information on eligibility requirements for each type of Membership, please refer to the IEICE web site (http://www.ieice.org/eng/member/OM-appli.html). Note that the Overseas Membership applies only to candidates who reside outside of Japan and who have citizenship in countries other than Japan.

IEICE Societies and Publications

Society	Transactions	Editorial Subject Indexes
A (Fundamentals of Electronics, Communications and Computer Sciences)	**A** (Japanese Edition) **EA** (English)	Engineering Acoustics, Noise and Vibration, Speech and Hearing, Ultrasonics, Digital Signal Processing, Analog Signal Processing, Systems and Control, Nonlinear Problems, Circuit Theory, VLSI Design Technology and CAD, Numerical Analysis and Optimization, Algorithms and Data Structures, Graphs and Networks, Reliability, Maintainability and Safety Analysis, Cryptography and Information Security, Information Theory, Coding Theory, Communication Theory and Signals, Spread Spectrum Technologies and Applications, Mobile Information Network and Personal Communications, Intelligent Transport System, Image, Vision, Computer Graphics, Language, Thought, Knowledge and Intelligence, Human Communications, Neural Networks and Bioengineering, Multimedia Environment Technology, Communication Environment and Ethics, Concurrent Systems, Measurement Technology, General Fundamentals and Boundaries
B (Communications)	**B** (Japanese Edition) **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
C (Electronics)	**C** (Japanese Edition) **EC** (English)	Electromagnetic Theory, Lasers, Quantum Electronics, Optoelectronics, Microwaves, Millimeter-Waves, Ultrasonic Electronics, Electronic Circuits, Electronic Materials, Organic Molecular Electronics, Electronic Components, Electromechanical Devices and Components, Semiconductor Materials and Devices, Integrated Electronics, Electron Tubes, Vacuum and Beam Technology, Electronic Displays, Superconducting Electronics, Storage Technology, Electronic Instrumentation and Control
D (Information and Systems)	**D** (Japanese Edition) **ED** (English)	Computation and Computational Models, Automata and Formal Language Theory, Algorithm Theory, Complexity Theory, Computer Components, VLSI Systems, Computer Systems, Fundamentals of Software and Theory of Programs, System Programs, Software Engineering, Database, Contents Technology and Web Information Systems, Data Mining, Networks, Dependable Computing, Application Information Security, Distributed Cooperation and Agents, Artificial Intelligence and Cognitive Science, Human-computer Interaction, Office Information Systems, e-Business Modeling, Educational Technology Rehabilitation Engineering and Assistive Technology, Pattern Recognition, Speech and Hearing, Image Processing and Video Processing, Image Recognition, Computer Vision, Computer Graphics, Multimedia Pattern Processing, Natural Language Processing, Biocybernetics, Neurocomputing, Biological Engineering, Music Information Processing, Kansei Information Processing, Affective Information Processing
Journal of IEICE (written in Japanese only)		

Membership Charges (UNIT : Japanese YEN)

Service coverage for overseas members	Entrance charge	Online Version: Registration of 1society and its transaction (Online version)	Online Version: Registration of additional society (Includes its transactions of Online version)	Paper version (optional): Journal (Written in Japanese, in paper version)	Paper version (optional): Transactions (Written in Japan or in English in paper version) One	Transactions 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". Your membership fee amounts to 7,000+3,500 yen / 5,000+3,000 yen.*

3. If you want to subscribe to one Transaction of paper version,, please check "Additional Transaction subscription (published in paper)".
*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.*

4. If you want to change membership from Member (In Japan) to Overseas Member, you don't need to pay an Entrance charge.

Further information; please contact the IEICE Membership Activities Section:
E-mail:member@ieice.org FAX: +81 3 3433 6659

IEICE Overseas Membership Application Form

◆ Please type or print in English. ◆ Please send the form by FAX or by e-mail.

◆ The deadline for submitting application form is the 1st day of every month.

Personal Information ☐Male ☐Female

Full name: ***Nationality:*** _____

First name Middle name Last name

☐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

☐A (Japanese) ☐B (Japanese) ☐C (Japanese) ☐D (Japanese)

Journal subscription (optional) ☐(Japanese)

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

Entrance charge……_____ Journal subscription (optional)……_____

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(YY/MM) ____/____ Credit Card Holder _____ Signature: _____

Endorsement *Endorsements by two IEICE Members for Member application and by one Member for Student Member application is required. If you have any questions or concerns, please ask member@ieice.org.*

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

From Editor's Desk

Gap Year

Do you know "Gap Year"? In US and Europe, students and graduates make trips or volunteer for a certain period (usually one year!) before entering employment. In1990s this system became common in England first. I think this system should not be occupied only by students. Many companies have paid holiday system, but I do not think we are using this system fully and effectively.

I fell sick this spring and took vacation for about four months (I warmly thank other GNL editors for working hard for these days). It was a kind of gap months for me. I could not making trips and conducting physical works, but could do any other thing especially for latter two months. It was the first ample rest for my mind and body in my 20 working years. I learned painting, calligraphy and enjoyed reading some books on electromagnetic theory. I actually felt my sensitivity changing back into fertile one of my school days. I strongly encourage you to take gap year (or gap months or weeks but not gap day nor hour) without sickness.

.

IEICE Global News Letter Editorial Staff

Editorial Staffs of this issue

No special order is observed

Jun OSAKI
Oki Electric Industry Co., Ltd.
Network Systems Company
Director, Membership services, IEICE Communications Society

Tomohiko TANIGUCHI
Fujitsu Laboratories Limited
Network Systems Laboratories
Director, Membership services, IEICE Communications Society

Shinji UEBAYASHI
NTT DoCoMo
Research Laboratories
Director, Membership services, IEICE Communications Society

Satoshi YOSHIZAWA
Hitachi
Central Research Laboratory
Director, Membership services, IEICE Communications Society