# *IEICE Communications Society* GLOBAL NEWSLETTER *Vol. 1*
# Contents

# What the Communications Society should do to drive an IT revolution

Shigehiko Suzuki
President, Communications Society

Energy and environmental technology, biotechnology, information communications technology (or IT), and nano-technology are now attracting our attention because they promise to support our everyday life in the 21st century. I consider that, among these four key technology areas, IT, the very technology the Communications Society addresses, is particularly important because it also supports the other technology areas, namely energy and environmental technology or biotechnology.

The history of science and technology of the 20th century is the history of pursuing material richness, convenience and efficiency, which has brought tremendous benefits to our life today. However, it can also be said to be the history of wreaking destruction. In other words, it can be said we have traded the environment for convenience and material rewards, resulting in the destruction of the global environment, because the military technology, which has provided the bases for many a technology we use today, has been the technology used for the destruction of human lives and the environment. If we are to regain what we have destroyed in the 20th century, these four technology areas are extremely important. In our efforts to make them bloom and flourish in the 21st century, the human race should be able to pursue a different and wiser path.

I understand that many Communications Society members are engaged in the research and development aimed at driving an IT revolution, and I expect that the Communications Society will serve as a cornerstone in creating a close alliance between industry, government and academia. However, we need more than these developments. In fact, there are non-technical issues we have to address in order to spur a proper IT revolution. They include technology's impact on society, legal systems, deregulation, human resource development, and information literacy, to name a few. Among these, I believe, the impact of technology on society is the subject to which the Communications Society will need to develop its own approach. As technology continues to change as drastically as it has, and as technology's impact on society keeps on growing, we researchers and engineers cannot be content with developing things and leaving their consequence to society. Thus, it is imperative that we, the bearers of science and technology, consider the social impact of what we are trying to develop far more seriously than we have ever done, and are prepared to change the direction of our endeavor as a result of feedback from society. One of the three recommendations the Institute of Electronics, Information and Communication Engineers, the Information Processing Society, and the Institute of Electrical Engineers jointly made to the national government's IT Strategy Headquarters on January 29, 2001 urges "strengthening the work addressing the social and technical problems that the rapidly developing IT revolution may cause to society." This recommendation points exactly to this issue that scientists and engineers face.

Information literacy is another important subject. Today, the need for information literacy is frequently raised within educational circles, but they only seem to be concerned about the ability of people to operate a terminal, that is, to use a personal computer skillfully. But that is far from sufficient. Being able to use a personal computer is, of course, necessary, but it is also necessary for people to acquire knowledge and wisdom so that they will not drown in the sea of information in which they are bound to swim. One example, for instance, is that networks can be used to persuade people to a certain opinion or to slander other people. This is actually causing problems today. Thus, people must learn to select and judge information appropriately from among an abundance of information. It is necessary to teach, even from the elementary school level, not only the beneficial aspects of information, but also the danger and threat that information potentially holds. In making a judgment, people should not be tempted by the typically Japanese attitude of following the crowd. This is a dangerous approach. It is necessary to educate children to be themselves and to help them develop their own identity, along with the teaching of the technical aspects of IT. Otherwise, children will not be able to develop the ability to make a proper selection and judgment when faced with a flood of information. When we talk of information literacy, our discussion should encompass this aspect as well. I will try to reflect on how the Communications Society, which is responsible for IT, can make a contribution in this respect.

I believe that, in the coming years when broadband services will be widely used, R&D will play an even greater role than today. The reasons behind my belief are not only that broadband services will demand the emergence of one new technology after another, not heard of in the age of telephony. I also believe that the competition in the fields of telecommunications and IT will shift from the competition in quantitative expansion to the competition in qualitative diversification. In the age of quantitative expansion, we have a price war, but in the age of the qualitative competition, we will have a "war in the value" of the services provided. To achieve differentiation in value, we must have technology ready to create value. The Communications Society covers the technical area that will be awash with this type of competition. Consequently, I expect that the members of the Communications Society will continue to submit excellent papers to further invigorate its research activity. In addition, I will consider how the Communications Society can contribute to developing a mechanism by which technology is assessed from the perspective of social and human science and the result is fed back to engineering. I look forward to the wisdom of the members of the Communications Society producing an insightful approach to this area.

Thank you.

# IT 革命推進に向けて
# 通信ソサイエティは何をすべきか

鈴木 滋彦
通信ソサイエティ会長

21 世紀を支える技術として、エネルギー・環境技術、バイオ技術、情報通信技術（ＩＴ）、ナノテクノロジーの４つが重点分野として注目されています。このうち、ＩＴはエネルギー・環境技術、あるいはバイオ技術を支える技術にもなるという意味で、通信ソサイエティが対象とする分野の重要性はきわめて大きいと認識しています。

20 世紀の科学技術の歴史は、物質的な豊かさ、便利さ、効率性を追及し、現在私たちはその恩恵を受けているわけですが、その一方で 20 世紀の科学技術は破壊の技術史とも言えます。すなわち、現在のかなりの部分で基になっている軍事技術は、人の生命や環境を破壊するための技術であったわけですから、我々は便利さ、物質的豊かさと引き換えに地球環境を破壊してきたとも言えます。このように 20 世紀に破壊し続けてきたものをもう一度取り戻すために、先に挙げた 4 つの分野の技術が非常に重要になってくるわけで、これらの技術が 21 世紀にうまく花開くことによって、われわれ人類はまた新しい展開ができるのだろうと思っています。

通信ソサイエティの会員諸兄の多くは、ＩＴ革命推進に向けての研究開発に関わっている方々だと思いますし、通信ソサイエティが、ＩＴの技術開発における産官学連携の要の役割を果たすことを期待していますが、ＩＴ革命を推進するためには技術以外の課題がいくつかあります。“技術と社会へのインパクト”、“法制度”、“規制緩和”、“人材育成”、“情報リテラシー”等々。この中でも特に“技術と社会へのインパクト”という問題については、通信ソサイエティとしても独自の取り組みを考えていく必要があると思っています。これだけ急激に技術が変わり、あるいは社会への影響力も大きくなってきた中で、モノだけを作って、あとは社会の方で決めてください、われわれ研究者、技術者にはわかりませんというわけにはいかないでしょう。科学技術を担う人たちは、今まで以上に社会的影響を考えながら研究開発を進めていく必要があるし、あるいは社会からのフィードバックによって方向を変えるといったことが必要になってきます。2001 年 1 月 29 日に、電子情報通信学会、情報処理学会、電気学会の 3 学会連名で政府のＩＴ戦略本部に対して行った 3 つの提言のひとつとして、「急速に進むＩＴ革命が人間社会にもたらす社会問題や技術的課題についての取り組みの強化」はまさにその点を突いた提言でした。

また“情報リテラシー”という問題も重要です。昨今教育の分野では情報リテラシーということが盛んに言われていますが、現状は端末の操作能力、単にパソコンが使える能力ということを指しているようです。しかし、それだけでは今後不十分だと思います。パソコンが使えるということはもちろん必要なことですが、これからは大量の情報洪水の中で生活していくことになるので、情報に飲み込まれない知恵が必要です。ネットワークを利用して世論誘導もできるし、誹謗中傷もできます。現に、今問題になっていることもたくさんあります。すなわち、大量の情報の中から的確な情報を選別・判断できる能力が必要なのです。情報の持つ便利さだけではなく、情報のもつ怖さ・恐ろしさをも初等教育から教える必要があると思います。そのときに、今の典型的な日本人の、「みんながやるから私もやる」という横並び中心の考え方では危険なのです。「私は私」という個を確立する教育をＩＴの進展と併せて進めていかないと、情報洪水の中で、自分で情報を選別・判断できる能力が育たないと思います。情報リテラシー教育というのはこのような観点まで含めた広義の議論をすべきだと思います。ＩＴを扱う通信ソサイエティとしても、このような点に関する何らかの貢献ができないものか、考えていきたいと思っています。

ブロードバンド時代において、研究開発は従来にもましてきわめて重要な役割を担うことになると認識しています。それは、単にこれまでの電話の時代とは違う新しい技術が次々に要求されるようになってくるというだけではなく、テレコム・ＩＴ分野の競争が、量的拡大から質的多様化の競争に移っていくであろうということがその背景にあります。量的拡大の時代は価格競争が中心ですが、質的競争はいわば提供するサービスの「価値の競争」です。価値の差異化を実現するには当然価値を生み出す技術がなければなりません。通信ソサイエティの対象とする技術分野はまさにこの分野であり、会員の積極的な論文投稿によって、この分野の研究活動が活発になることを期待したいと思いますが、併せて前述したように技術に対する社会科学・人文科学からのアセスメントと、その工学へのフィードバックを可能とするようなしくみ作りについて、通信ソサイエティとしても考えていきたいと思っています。会員諸兄の皆様の知恵に期待します。

# IEEE ComSoc and Sister Societies

**Alexander D. Gelman**,
IEEE ComSoc Vice-President -Society Relations
**Algirdas Pakstas**,
IEEE ComSoc Director - Sister Societies

Dear Friends and Colleagues:

On behalf of the IEEE Communications Society we would like to congratulate the IEICE leadership on the successful campaign to attract global members. We also congratulate the IEICE Communications Society membership on the launch of the *Global Newsletter*.

IEICE has come a long way since its creation in 1917. IEICE's sizable membership, which includes a significant student membership, a respectable number of honorary members and now a significant number of global members, demonstrates the recognition of the society by Japanese professionals as well as the international community.

In addition, the Transactions of IEICE has become a top quality archival publications in the communications field.

IEEE ComSoc and IEICE Communications Society enjoy a long and fruitful relationship. Through this relationship IEICE has been a member of a family of ComSoc's sister societies.

Currently IEEE ComSoc has cooperation agreements with the following societies:

- Brazil: Sociedade Brasileira de Telecomunicações (SBrT)
- China: China Institute of Communications (CIC) and The Chinese Institute of Electronics (CIE)
- France: Société de l'Electricité, de l'Electronique, et des Technologies de l'Information et de la Communication (SEE)
- Germany: Verband Der Elektrotechnik/Informations-Technische Gesellschaft (VDE/ITG)
- India: The Institute of Electronics and Telecommunications Engineers (IETE)
- Israel: Association of Engineers and Architects - Communications Group (AEAI)
- Italy: Associazione Elettrotecnica ed Elettronica Italiana (AEI)
- Japan: The Institute of Electronics, Information and Communication Engineers (IEICE)
- Korea: The Korean Institute of Communication Sciences (KICS)
- Latvia: Latvijas Informacijas Tehnologiju un Telekomunikaciju Asociacija (LITTA)
- Russia: The Russian Popov Society for Radio Engineering, Electronics, and Communications (RPS)
- Taiwan: Chinese Institute of Electrical Engineering (CIEE)
- Vietnam: The Radio & Electronics Association of Vietnam (REV)

IEEE ComSoc's technical scope covers broad areas in communications and networking. Its function is to serve the needs of its membership and the membership of sister societies by packaging and providing access to technical information as well as operating and maintaining human networks of professionals throughout the world.

IEEE ComSoc's definition of a "sister society" is national or international society whose charter is similar to IEEE ComSoc's charter. The objective of sister society relations is to extend the society's reach to professionals around the world, expose our colleagues globally to the society's products and services and to support global human inter-networking, thus increasing the virtual mass of the professional community.

In addition to reciprocity in promotion of each other activities sister societies grant each other benefits often equal to the ones enjoyed by their own members. Among these benefits are subscription and conference registration discounts, opportunities to participate in technical activities and even rights to take on leading positions in various society committees. For example, recently the IEEE ComSoc Board of Governors passed a motion that grants members of sister societies rights to join and even chair a technical committee.

The best way to reinforce friendships among people is though personal contacts. The appropriate mechanisms for this are technical conferences where professionals meet and exchange technical ideas and face-to-face meetings of society leaders in the form of "sister society summits."

Sister society summits serve as forums for information exchange about the societies and about the memberships' aspirations and needs. They help to compare notes on hot technical issues and on emerging technologies, and facilitate discussions of issues that

concern communications and networking professionals in different industry segments and in different countries.

In 2000 a sister societies summit was held in Yokohama and in Singapore. It brought together IEEE ComSoc and its Asian sister societies (picture below).

The summit was hosted by IEICE and all Asia-based sister societies were invited to participate in the summit (CIC, CIE, CIEE, IETE, KICS and REV).

At this summit, the IEEE ComSoc and IEICE Communications Society extended the sister societies agreement, which was signed by the two society presidents: Roberto De Marca and Tomonori Aoyama (picture below).


In addition, an agreement was signed between the IEICE Communications Society and the Korean Institute of Communications Sciences, KICS (picture below).

The next Asian Sister Societies Summit will be held in November 2002 in conjunction with GLOBECOM'2002 in Taipei. We look forward to the opportunity to discuss important technical and society issues as well as reconfirm our collegial relations and personal friendships.

Once again on behalf of the IEEE Communications Society we congratulate all our colleagues and friends, members of the IEICE Communications Society on the remarkable achievements. We wish you all health, personal happiness and professional success.

# Expecting the members of the world become closer and closer…

Kye Suk Jun
President, KICS, Korea

As a president of KICS(Korea Institute of Communication and Sciences), first of all, I'd like to deliver a congratulatory message to IEICE-CS for opening a new publication, Global News Letter.

It's becoming more important to have a common place to share, communicate and discuss ideas, news, and technologies among members as the world is becoming a big one society with the development and integration of Internet, Broadcast, and Mobile Communication. As a foreign member of IEICE-CS, I'm very delighted to hear the publication of Global News Letter because I firmly believe that the Global News Letter will provide the right place to share, communicate and discuss among members.

After the mutual cooperation agreement signed in 22$^{nd}$ December, 1999, we have tried to share and exchange technical ideas through JCN(Journal of Communication Network) and IEICE Transactions on Communications. Now, we have another media, the Global News Letter, to communicate not only the technical ideas but also to share member's news, which can explore recent industrial trend, standards activities, political strategies of technologies of many countries.

All the members of KICS including me congratulate again for the publication of Global News Letter and expect the world become closer and closer with the Global News Letter.

# Message of Congratulation for the Global Newsletter

Hiromasa IKEDA
Tokyo University of Information Sciences

## Introduction

Congratulations to the publication of the "Global Newsletter" of the IEICE Communication. It is my great pleasure to know that society activity is very active and expanded to global level. Moreover, the member is steadily increasing, and the number of overseas member reaches 1000 (nearly 10 %). On this occasion, I would like to extend a message of thanks for the continued efforts toward the globalization to many society executives who have elaborated on them.

## Organizational Development

I was Chairman of the Steering Committee of Communications Group during 1992 through 1993. We discussed reorganization toward society system, and globalization of the group. The former item turned out as the present society system, started with 10 technical committees in April 1995, and currently increased to 16 committees. And concerning the latter item, several events have extensively and successively achieved; for example, co-operation with the Korean Institute of Communication Sciences, which has developed to the APCC (Asian Pacific Communication Conference) as a more global body; the IEICE Transactions publication by each society, which is started from April 1992, and special issues frequently published; establishment of Director, International Affairs. Also, I am much impressed with the report of the recent global promotion activities, which started in GLOBECOM 2000, in the Journal of IEICE, Vol. 85, No. 7. I would like to extend highly appreciation for these society activities, the efforts and leadership of successive 8 Presidents, the first President Professor H. Tominaga through the current President Dr. S. Suzuki.

## Technology Paradigm Shift

In early 90's, the Japanese telephone network digitalization was rapidly extended in co-operation with optical transmission systems and digital switching systems enabling nationwide ISDN services. This effort led to the fully nationwide integrated digital network (STM-IDN) in 1997. In addition to the digitalization, high speed ATM (asynchronous transfer mode) technology has been introduced in order to provide multimedia digital services efficiently. Toward these network needs, I had engaged in R&D activities, especially for digital switching systems and digital networking. Also, I was Chairperson of technical group on switching engineering from 1986 through 1988. As these achievements were evaluated, it is my great honor that I was given the Fellow grade from IEICE and IEEE, respectively.

However, extraordinary paradigm changes occurred in the network environments in late 90's. They are rapid growth of mobile communication, and the Internet. Fixed line telephone subscribers turned to decrease since 1996, as mobile telephones grow. Especially since the mobile internet service called "i-mode" was started, mobile telephone set has been indispensable for young people in daily life. Moreover IMT-2000, 3 rd generation mobile service initiated in October 2001 toward broadband mobile era.

Everybody knows that the Internet services have been rapidly increased since the network permitted to utilize in public and commercial fields. Digital data flow has been increased in incredibly rapid pace, and total data flow exceeded total telephone (voice service) traffic in 2001 in Japan, whose tendency had been observed in mid 80's in USA. Recently, broadband access services are very popular to support high throughput netsurfing, by applying ADSL, cable MODEM, wireless LAN, FTTx. Moreover, IP applications are indispensable for various business fields, e-commerce, IP-VPN, video streaming, etc. In order to support these services in good quality of service, backbone networks should be highly upgraded toward Peta bit/s network by applying powerful photonic network technologies, DWDM, photonic switching, etc.

The communications society started in the turning point of the paradigm change, and has been playing a key role to conduct research and development activities in advance in various fields described above.

## Services for Overseas Members

It is a matter for congratulation that IEICE activities are recently recognized worldwide, and overseas members are increasing steadily. However, most publications are written in Japanese. Efforts have been paid to communicate efficiently with overseas members. We discussed to include some introduction, written in English, of the contents of the Journal, but various difficulties prevented from its realization.

Today, this "Global Newsletter" is believed to be new powerful media for overseas members to transfer much information on the IEICE and the society.

Thanking the vigorous activities of the editorial boards, I believe the prosperous future of the "Newsletter".

# The Age of Sapientia Sophia

Takeshi Ozeki
Department of Electrical and Electronics Engineering, Faculty of Science and Technology, Sophia University, Tokyo, Japan
t-ozeki@gentei.ee.sophia.ac.jp

## 1. The Birth of The New Media

IEICE Communications Society launches a new media: The Global Newsletter is expected to play an important role to joint peoples in the communication world. It is my great honor to submit a report for the first issue of The Global Newsletters.

The most topical issue of today is what will be the world of 21-th century. In the last'80s Japan was said to be the winner by the industrial technologies based on microelectronics and micro-mechanics. After only 10 years, USA was said to be the winner of the '90s by the Information Technologies. It is said today, as one of the extreme evaluation, these prosperities were so called "bubbles", mainly due to moral decline. To say something for the future to overcome this disappointment, I would like to check the history of the new media. This discussion is based on my lecture note of "the history of light" in Sophia University.

## 2. The New Media for Brahe and Kepler

Tycho Brahe was a young Swedish noble with ambition for a politician. However, he changed his mind when he encountered with a Cassiopeia supernova. He devoted his ambition to continuous observation of the supernova for 18 months. His observation had the king of Denmark establish an astronomical observatory on a small island. Brahe was appointed as a governor of the island with the observatory and continued the observation for more than 25 years. Brahe designed the astronomical observatory, which was illustrated in figure1 as his self-portrait. It is a surprise to find a printing shop among astronomical instruments in his observatory, where many assistants more than 50 were working under his direction. This period was the time of Luther's religious reformation. Gutenberg established a printing technique about a century before. The natural scientists in those days used their new media aggressively so that they enjoyed plenty of printed copies of ancient books, instead of handwritten copies, which were extremely expensive and included plenty of mistakes in rewriting.

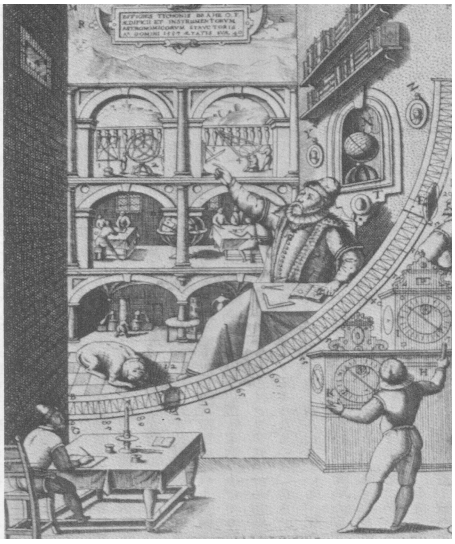


Fig.1 The Brahe Self-portrait. Brahe was proud of his largest observatory with printing shops adding to many

After 25 years observation, Brahe was invited by Rudolf the second, Emperor of the Holy Roman Empire and reconstructed his observatory in Playa in 1600, where Kepler was hired as his assistant. Kepler succeeded Brahe's observation data and analyzed them to discover his famous three laws of planetary motion. He published "The New Astronomy …,Heidelberg 1609" with a very long title which meant a new astronomy based on planetary physics or causal laws derived from the consideration of Mars motion analyzing Brahe observation data. This long title was necessary to guess the content correctly only from the title lists of new publications in those days.

Kepler printed an estimated time of the Mercury crossing the surface of the Sun on handbills, which were sent to European astronomers to request simultaneous observation of the Mercury. As the result of simultaneous observations the European astronomers confirmed the accuracy of Kepler's methods of estimating planetary motions.

It is said that the new media of printing technologies established a network collaborating European researchers to develop new sciences more rapidly. Kepler might also sigh over flooding of poor sort of books, just like we sigh over flooding of poor sort of Webs in the Internet today.

Galileo was said that, when he was accused, he devoted himself to write a manuscript, which was carried out from his confinement by a brave Danish diplomat to publish it in Leiden in the Netherlands. The book is known as a famous "Discourses on two new sciences", which was a best seller because it was listed on the forbidden books.

Technical journal was also established as a media for researchers in the British Royal Society in London. The society transaction was used as a standard to confirm the priority of the paper published on it with the date and signature. It is well known that the long-standing feud between Newton and Hooke for the priority of universal gravitation triggered the launching their transactions.

It is impressive that, in those periods, the general rules for the priorities and patents have been already established in the European society. The basic media to support the researcher's activities has been journals and letters, almost by the end of 20th centuries. Conferences were added as their media after the railway networks were constructed.

## 3. The New Media of 21-th Centuries

The dramatic revolution of information and communication changes the basic media for research. The efficiency of research works is improved almost 10 times by the use of personal computers and the Internet from my opinion. When making reference paper copies in an old fashion library required almost a half of a day, we can do it within a half of an hour by using a virtual journal for the Quantum Information in PSA electronic journals, for example. The advance in science and technologies will be extremely accelerated in speed by non-linear inter-action due to higher density of accumulated knowledge and of collaborating researchers on the Internet, compared with previous centuries.

It should be noted that optical fiber communication networks, which support the IT revolution, are at a turning point, because the total information capacity is limited by fiber bandwidth and optical nonlinear cross-talk. The total power in the fiber is more than 2 watts, which might cause a fire and hazards in maintenance. One of the most important issues of optical network is the improvement of frequency usage efficiency. In practical near future systems the spatial multiplexing will be a countermeasure against WDM network bubble. For further advance of human being, photon correlation should be used to improve frequency usage efficiency. A new paradigm of quantum information is expected as quantum new media for communication, computation and measurement. Professor Osamu Hirota, of Tamagawa Univ. and the organizer of QCMC, triggered my interest in quantum information through his stimulative lectures in a committee of JSPS, about 5 years ago. Professor Shigeo Tujii, professor emeritus of TIT, and professor Yasuharu Suematsu, previous president of TIT, chaired the committee discussing on the future of optical information networks. It was my understanding this committee has been working for the renewal of communication researchers to meet the conceptual requests for science and technology of 21-th century in advance." World Conference on Science" held in Budapest in 1999 declared "Science and technology should be for human society and our planet"[2]. This concept means the target of education is bringing up "Sapientia Sophia": proficiency in science with wisdom.

We, young professors, were strongly impressed to see their sincere enthusiasm for the social welfare through the network technologies. In 2001, a new committee in JSPS for optical network systems was established to succeed their enthusiasm. In Sophia University, in order to transfer their idea to young students, a lecture titled "Multi-media Information sociology" was organized. Variety of speakers from both human science and natural science are invited for the lecture to analyze IT society and to realize "harmonized world".

In the lecture, Takeshi Yamaguchi, the chief editor of Nikkei BP, forecasted the future of IT technology: the personal computer was replaced by The Internet as the industrial driving force in 1998. The Internet will reach at its peak in 2012, and the key technology of the successor will appear before 5 years of the Internet peak. The succeeding key be energy revolution. This wish arises from the severe conditions of global environment. It is regrettable to hear the desert reached to 25% of the main China and the Yellow River suffers from water shortage. Yoshinori Yasuda, a pollen archaeologist, reported the ruin of the Ancient Greek was coincident with the collapse of the forest. He also referred the forest disappearance of 80% in U.S.A. from 1620's (upper left) to 1920's (lower left) illustrated in Fig.2. He wishes guiding culture should be the symbiosis between human and the nature. He also recommends food-culture based on rice and seafoods, because it has three times lighter environment load to the earth than that of bread-meat culture.

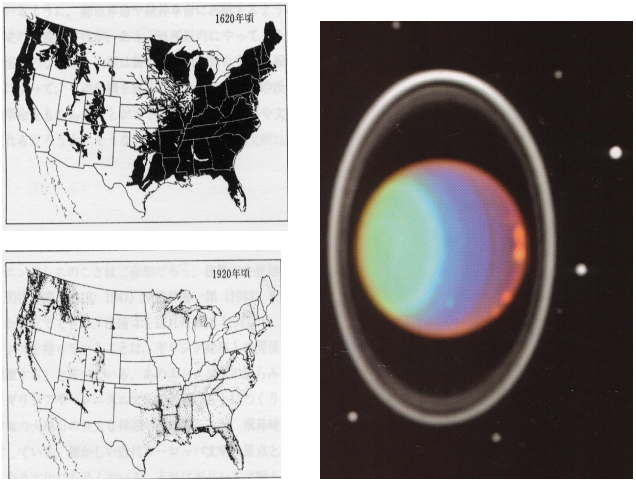



Figure 2. Forest Distribution of the U.S.A. illustrated in 1620's (upper left) and 1920's(lower left)[3]. On the right, Fantastic Uranus shows an imposing appearance observed NASA Orbit Satellite Telescope HST [4].

## 4. Conclusion

The final comment for the future is that there is a lot of chance to realize harmonious world as symbiosis between the benevolence and technologies. We encourage ourselves by looking the imposing appearance of Uranus observed by HST (Fig.2 right).

## 5. Reference

[1] E. L. Eisenstein, "The Printing Revolution in Early Modern Europe", Cambridge University, 1990

[2] http://www.unesco.org/general/eng/programmes/ science /wcs/index.htm

[3] Yoshinori Yasuda, "Japan, be an environment nation with forest " Chuoukouron Shinsya (2002) in Japanese.

[4] http:/opposite.stsci.edu/pubinf/PR/1998/35/inex.html

# Welcome to

# IEICE Communications Society Technical Committees

The IEICE Communications Society has 27 Technical Committees as below, the purpose of which is to promote and disseminate current and new technologies as well as to exchange novel ideas in the specified areas among researchers of the technical fields. Each committee actively holds several technical meetings per year and also coordinates joint meetings with other technical committees and even with other societies from abroad. Each committee consists of a chair, secretaries and committee members.

***Technical Committees***

- *Antennas and Propagation* ***(AP)***
- *Space, Aeronautical and Navigational Electronics* ***(SANE)***
- *Satellite Telecommunications* ***(SAT)***
- *Electromagnetic Compatibility* ***(EMCJ)***
- *Network Systems* ***(NS)***
- *Information Networks* ***(IN)***
- *Communication Systems* ***(CS)***
- *Energy Engineering in Electronics and Communications* ***(EE)***
- *Optical Communication Systems* ***(OCS)***
- *Radio Communication Systems* ***(RCS)***
- *Communication Quality* ***(CQ)***
- *Photonics in Switching* ***(PS)***
- *Optical Fiber Technologies****(OFT)***
- *Telecommunication Management* ***(TM)***
- *Mobile Multimedia Communications* ***(MoMuC)***
- *Internet Architecture* ***(IA)***

***Technical Committees (term-limited)***

- *Software Radio****(SR)***
- *Next-generation Network Middleware and Distributed Computing* ***(NGN)***
- *Next-generation Network Software****(NSWJ)***
- *Community Network****(CNJ)***
- *Photonic-Network based Next Generation Internet* ***(PNI)***
- *Information Communication Service****(ICS)***
- *Network Society and Lifestyle****(NTSL)***
- *Inter-university Exchange Program in Information and Telecommunication Fields* ***(UNI)***
- *Active Network Technologies and Applications* ***(ANTA)***
- *Solar Power Station****(SPS)***
- *Human Phantoms for Electromagnetics* ***(HPEM)***

# Optical Communication Systems (OCS) Technical Committee

Committee Chair ; Kazuo Hagimoto, NTT
Secretariat; Masafumi Koga and Kuniharu Himeno
(NTT and Fujikura)
*Contact e-mail: koga@exa.onlab.ntt.co.jp*

***Kazuo Hagimoto, Chair***

## 1. Outline

The research interests of the Optical Communication Systems Committee (OCS) lie in various technical fields associated with optical communication systems. They range from component technologies to network systems. The OCS Committee holds technical meetings regularly 7 or 8 times per year. More than 100 papers are annually presented in the meetings and more than 400 people attend every year.

The OCS Committee meetings are often organized in cooperation with other related technical committees, such as the Communication Systems Committee (CS), the Optoelectronics Committee (OPE), the Lasers and Quantum Electronics Committee (LQE), Network Systems Committee (NS), or Wireless and Optical Transmissions Committee of the Institute of Image Information and Television Engineers.

In addition to existing research fields such as optical link or transmission technologies for backbone and/or access networks, the OCS Committee is now covering novel research fields such as optical network architectures and operation techniques, targeting an optical network solution as a social infrastructure that will support the forthcoming multimedia society.

## 2. Scope

The following is a list of research fields covered by the OCS Committee.

*Optical network architectures*

*Optical network operation*

*Optical communication systems (incl. backbone systems, access systems, WAN/LAN, and home systems)*

*Optical communication theory*

*Optical communication devices, optical circuits*

*Optical fibers, cables, and links*

*Optical interconnections, optical amplification*

*Optical measurement, applied optics, optical free space transmission*

*Optical signal processing*

*Photonic networks, MP-Lambda-S*

*Lightwave systems, quantum communications*

(including WDM, OFDM, optical coherent communication, light modulation, ultra-short optical pulse transmission, nonlinear optical transmission, optical solitons, OTDM)

## Major Activities

① Technical meetings

One or two day technical meetings are held 7 or 8 times a year. The last meeting in June focused on Photonic Crystals, Photonic Crystal Fiber, and fiber technologies. We invited Professor Kawakami to introduce recent activities in Photonic Crystals. The cutting edge Photonic Crystal Fiber was presented by NTT. Sumitomo's world leading utra-low loss fiber was introduced in an impressive speech.

Main Issues to be discussed in each meeting this year are listed in Table I of OCS Home Page; http://www.ieice.or.jp/cs/ocs/EGL.
Calls for papers are also listed on the HP.

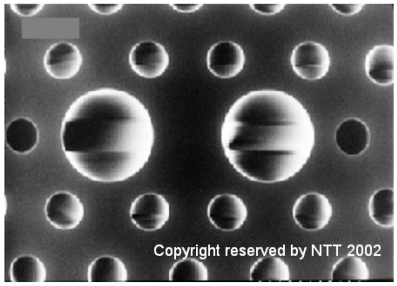



***Figure 1 Selection from the submitted technical paper -Activity on Photonic Crystal Fiber-***

② Special Session on 40Gbit/s Transmission Technology

This session is held once a year. The 6th special session was held in June 20, at NICHe, Tohoku University. 16 excellent papers were submitted and about 80 experts got together to discuss 40-Gbit/s transmission technologies. Fujitsu's remarkable achievement of 0.9V LN driving voltage attracted much attention. Please see the OCS HP for more detail.

③ OCS Symposium

The OCS Symposium is annually held every December with several invited speakers. About 300 experts got together and discussed research and development activities on optical communication technologies over the last year at the 15th OCS Symposium.

We invited Dr. Shimada, the pioneer of optical communication systems, as the keynote speaker to learn from the history of R&D activities in the 20th century and predict the 21st century trends.

We also invited Professor Kawakami, the pioneer of the Photonic Crystal, to foresee the future from his speech.

16th OCS Symposium is scheduled for December 12 to13 in 2002 at Hakone, Japan.

***Figure 3 Appearance of the 15th OCS Symposium, about 300 people got together for an enthusiastic discussion.***

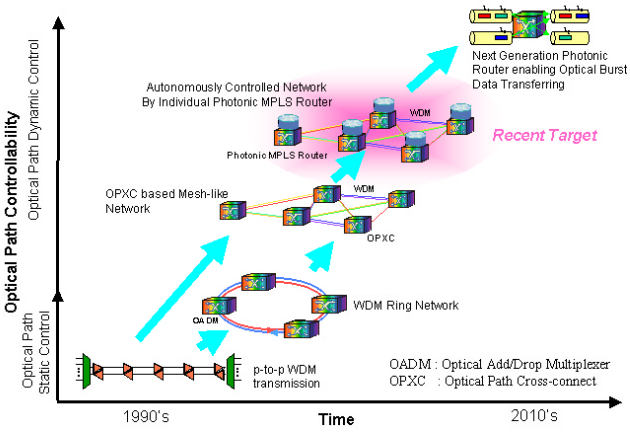





***Figure 2 One of the OCS Symposium Activities on Photonic Network in Workshop 3.***

# Technical Committee on Photonics in Switching (PS) in IEICE

Koso Murakami
Osaka University, Japan

## 1.Introduction

The exponential increment of the Internet traffic in recent years is driving the requirement of high capacity of information network and high capacity fiber transmission systems is widely introduced into the entire network. Hereafter, in order to economically implement high speed and broadband services, optical technologies for switching and signal functions are requested to be urgently developed.

The Technical Committee on Photonics in Switching is established to aim at further progress concerning photonic switching to realize high speed and broadband network which includes an all-optical network, and to offer the place where the researchers in the both field of system and device can build up implication or more and an active discussion can be done. “Photonic in Switching” reflects wider scope of interests in addition to the more traditional interest in “Photonic Switching”.

## 2.Area of interest

The technical committee on photonics in Switching includes all aspects of research on optical switching and relevant areas of applications, networks, systems, devices and materials. Subjects to be covered includes, but are not restricted to:

- Devices and phenomena for switching applications,
- Optically, electrically, or mechanically activated photonic switches
- Photonic interconnect
- Integration and arrays of photonic devices for switching
- Optical circuit, packet or burst switching technologies
- Optical switching based on GMPLS and advanced photonic routers
- Optical buffering and optical synchronization
- Internet protocol over photonics
- Switching systems and network architectures utilizing photonics
- All-optical networks and optical crossconnect/ ADM
- Novel systems applications/services that may favor or require the use of photonic switching technologies

## 3. Domestic conference and workshop

Ten times domestic conference and workshop were held last year in many places of country wide in Japan. Board members organize several working groups which investigate the attractive topic and speakers to activate the debates from the audience. Also, working members uses their brain to select the conference site out of the nationwide scenic areas, which is one of key roles to call for many participants.

## 4. Joint conference

Among ten domestic conferences, four times were jointly held with other technical committees such as those of Network Systems (NS), optical Communications Systems (OCS), Optical Fiber Technologies (OFT), Laser Quantum Electronics (LQE), and Opto Electronics (OPE). These have aimed to reflect the trend of related areas in the research and to promote technical interchange between different fields. The exchange with wider groups including computer and application field is planned in future.

## 5. International conference (COIN+PS2002 in Korea)

Since 1987, the International Topical Meeting on Photonics in Switching were held every two years in the beginning but recently every year, usually in the USA. Outside the USA, PS90 and PS96 were held in Kobe and in Sendai, respectively, of Japan. This year, PS2002 was jointly organized by both Japan and Korea in the same manner of the FIFA World Cup. PS2002 was also jointly held with the international conference of Optical Internet in 21-25 July 2002 in Ceju island, Korea. Please see ***http://www.coin-ps2002.org/*** .

## 6. Frontier project

Frontier project is one of the major activity in our committee. The project proposed by NTT Laboratories has developed WDM photonic packet switching systems. It has demonstrated the prototype switch having 32-channel 10-Gbit/s inputs and outputs and thus, having a maximum throughput of 320 Gbit/s. The project has reported the WDM star-based broadcast-and-select output-buffer-type switch architecture and prototype switch configurations. An electrical control circuit layer, as well as a broadband optical WDM layer, was implemented in the prototype. The ability to process the address information contained in the high-

speed packet required development of LSIs having 10-Gbit/s serial I/Os. Some optical component modules, such as the 32-channel wavelength channel selector, were developed to reduce the size of the WDM layer. It has also reviewed experiments that demonstrated that the switch can perform practical self-routing system operations, such as address extraction, optical buffering, and filtering for packet speeds of up to 10 Gbit/s.

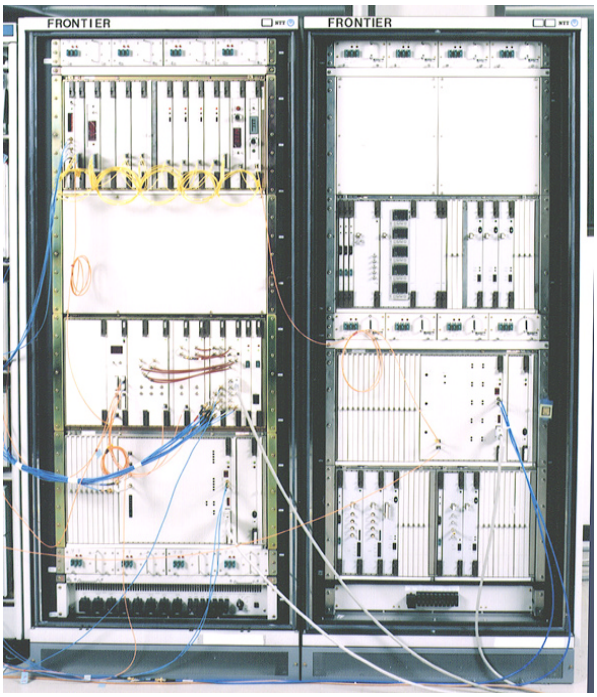



Fig. 1 Frontier System

## 7. Photonic label switch

Photonic packet switching system called optical code based label switching node (OC-LSN) developed by Communications Research Laboratory of Japan is also one of most interesting activities in PS committee. This is a desired system to build ultra high-speed packet switching. The OC-LSN analyzes the label all-optically. The photonic packet switching can be achieved with a help of optical packet with an optical code label. Different from an optical cross-connect (OXC) in a wavelength routing network, the OC-LSN inherently has fine granularity. The OC-LSN consists of photonic forwarding (label lookup), photonic switching, electronic scheduling, and photonic buffering. We have reported demonstrations of photonic packet routing using the forwarding and the photonic switching in the OC-LSN. Recently, we have also reported developments in the photonic packet routing based on multi-wavelength label switch (M$\lambda$-LS). All-optical functions, variable data rate switching, variable length packet switching, label swapping, and label merge (replacing multiple labels by a single label) are demonstrated. We have described multi-stage fiber delay line buffer architecture to compensate for gap between electronic scheduling speed and optical data rate.

## 8. Board members

The board of the technical group PS are composed of both the system and device people who share a common interest in exploring innovative applications of photonics in switching. There are twenty-four researchers coming from universities, network carriers, manufacturing companies for communication systems and devices. Several members from foreign country will be welcomed as invited speakers outside Japan and English based sessions are increasingly planned.

Fig. 2 Photonic label switch system

## 9. Profile of Chairperson

Prof. Koso Murakami has long experience on the research and development of broadband switching systems and technologies. Especially, an asynchronous transfer mode switching architecture he invented in his manufacturing company days enabled the development of ATM switching system product, Fujitsu's FETEX 150, which played a significant role in the success of the North America Information Highway projects. His research interests extend to ultra high speed switching technologies and multimedia information networking architecture. Prof. Murakami currently serves as Director of the Collaborative Research Center of Advanced Science and Technology in Osaka University. He actively promotes collaboration, technology liaison and technology transfer between industry and academia, aiming at leading the new age of photonic broadband switching network.

## 10.Call for Presentation and Participation

Paper submission and participation to the conferences from the oversea are welcomed. All the event schedules are published on the web-site:
***http://www.ieice.org/cs/ps/jpn/***

# Technical Committee on Active Network Technologies and Applications

Hiroshi Yasuda*, University of Tokyo
Fumito Kubota**, CRL, Naoki Wakamiya**, Osaka University
Terumasa Aoki***, University of Tokyo, Yoshiaki Kiriha***, NEC,
Hideki Otsuki***, CRL
*Chair, **Vice Chairs, ***Secretaries

**Scope and Objectives**

The research community of DAPRA put forward the concept of Active network in 1994 and 1995, and research for the Active network has been done centred around the United States.

The DARPA project, which is related to more than 50 Active Networks in total, operates ABONE, which is a shared virtual test bed, in order to promote a number of researches. Also, dispersed projects in the United States carry out research and development to compete with these results under a common protocol called ANEP (Active Network Encapsulation Protocol). In Europe, more than 2 projects related to active networks has started in under IST (Information Society Technologies), which is the fifth R & D strategy undertaken in 1999, whereby it seems as though Europe was trying to compete in R & D with the United States. The FAIN (Future Active IP Network) project was planned especially from the beginning to construct a test bed and to have international interconnection, and it seems that they will move on to the standardisation of these if the project goes well.

In 1999, an international conference called IWAN (International Working Conference on Active Networks) was put forward against the background mentioned earlier, and three conferences were held in different countries: the first conference in Berlin in 1999, the second one in Tokyo in 2000 and the third one in Philadelphia in 2001; this conference is likely to be an essential place for international exchanges. The IWAN conference is planned to be held once a year in Europe, the United States and Asia, and it is going to be held in Asia again in 2003.

However, research on Active network in Japan is not done as much as in Europe and America, although research is carried out by network associations, industries and national institutions. It is highly alarming that academics' participation in research is rare in Japan. A lack of national projects clearly shows the huge difference between Japan and Europe and the United States. Also, academic activities on Active Networks, including conferences, are still missing at present.

Consequently, the aim for activating research in this technological field will be achieved through forming a temporary committee of experts at a conference, rallying experts of different backgrounds in industry and exchanging views regarding technologies and applications of Active Network, and also proceeding to a discussion which includes suggestions for a framework for future R & D. To activate international research exchange, it is planned initially to start by having a joint international conference with IWAN at this technical committee.

Active network technologies have been paid much attention to as a new network architecture that accelerates introduction of new services without spending time on standardization. Multicast, multimedia, CDN, web cashing, on-line auction, information filtering, authentication, mobile computing, encryption, and accounting are candidates that benefit form the active networks. The active network technologies are also useful in network management and control such as, self-managed networking, end-to-end QoS control , fault management and congestion control, traffic measurement and load balancing, and traffic shaping. Moreover, active firewall filter, proxy and active monitoring against attack can be considered for improving security.

Another target of our research is to solve new problems when the new architecture is introduced. One example of such problems is that highly functional and useful Active Network architecture owes much to node processing capability and might cause significant performance degradation. Further secure mechanisms must be developed to establish a sound control from outside of the node. Furthermore, solving inconsistency and guaranteeing fairness among requests are vital in active nodes since many users demand various services.

We will expand research in this area and specify issues to solve by carrying out comprehensive research into these various problems.

**Research Areas**

Our research areas are as follows.

1. Active network architecture
2. Active node technologies
3. Network control by active network technologies
4. Traffic engineering by Active network technologies
5. Applied service technologies by Active network
6. Active network and mobile technologies
7. Security of Active network

8. Accounting by Active network
9. Common technologies with IP network, migration
10. R & D test bed
11. Issues on global development of R & D project
12. Active network technologies and standardisation

**Activities**

We are planning to hold 4-6 times workshops and 6-8 times committee meetings a year. The first workshop "ANTA2002" was held in last march. (fig.1)

ANTA2002 is planned by the technical committee, and its scope is to assess the state of the art technologies and applications of active and programmable networks. It was planned to have invited talks, and panel discussion by international leaders on this research area. Furthermore, 4 technical sessions are planned to discuss the specific topics, such as Architecture, Service Creation / Deployment / Management, Applications, Mobile Networking. Ultimately, a research agenda for future research in this area should be one important outcome of ANTA2002.

Researchers and engineers who have gained experience in different aspects of active and programmable networks are discussed together. Furthermore, we encouraged to join many participants who are not familiar with active networks, in order to activate research, development, and deployment more than current situations.

We are planning next workshop in October 8 at Hokkaido. The information will be present at http://www.ieice.org/~an/.


Fig. 1 ANTA2002

# HPSR2002

Naoaki Yamanaka
TPC Co-chair, NTT Network Innovation Laboratories

## Introduction

The Workshop on High-performance Switching and Routing was held from May 26 to 29, 2002 in Kobe, Japan. The workshop title was Merging Optical and IP Technology. The 8th international workshop on HPSR was successfully closed with a new record for the number of attendees.

This workshop is one of the largest and best established workshops in the area of high speed communications. This year is the eighth anniversary since 1995, and the 3rd workshop after its name was changed from ATM to High Performance Switching and Routing. The workshop has been alternating among North America, Europe, and Asia.

Name: HPSR2002
Sponsor: IEICE Communications Society
Technical Co-sponsor: IEEE Communications Society

Workshop Hotel (Portpia Hotel)

## Statistics

| | | |
|---|---|---|
| Papers submitted | 111 | |
| Papers accepted | 59 | (45 orals, 14 posters) |
| Interactive demo sessions | 14 | |
| Number of attendees: total | 204 | |


Interactive Demo Booth, Vitesse Corp.

* Full registration = 194
* Interactive domo only ticket = 5
* Tutorial only ticket = 5

We have been delighted by the overwhelming response, especially since we were initially worried about the influence of the current economic downturn as well as the effects of the September 11th attack on the participation in international conferences. Despite all that, over 110 contributions were submitted for the Technical Sessions from 20 countries. After more than 300 individual reviews performed by the TPC members

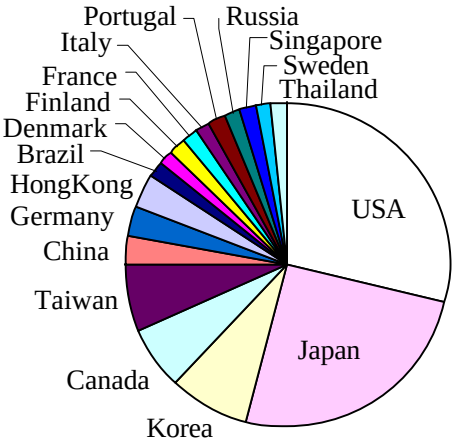



Fig. 1 Distribution of Accepted Papers by Country

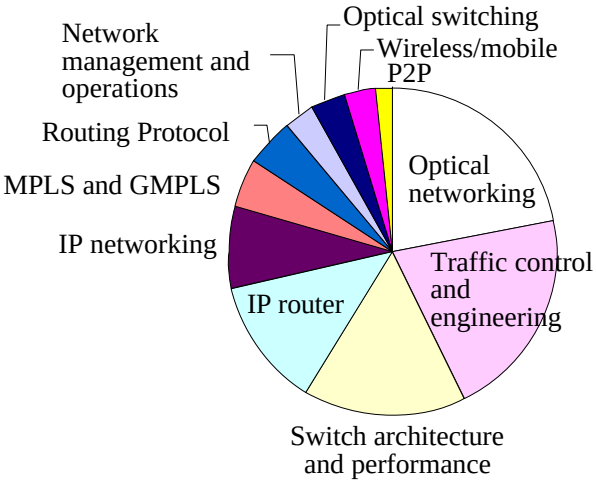



Fig. 2 Distribution of Accepted Papers by Subject

and other experts, 59 submissions were accepted for presentation at the conference. The 59 papers consist of 45 regular presentations and 14 poster presentations. In addition the program includes 4 half-day tutorials, 1 keynote speech, and 2 invited talks. As shown in Fig. 1, an almost equal number of contributions has been accepted from North America, Europe, and Asia. One notable trend in the program is, that, whereas until four years ago there were many performance evaluation papers, we now see more papers on optical networking and technologies such as IP and MPLS as shown in Fig. 2. However, as in the past, many high quality papers on performance evaluation and traffic control are also included in the program. Furthermore, we have grouped 14 papers that will stimulate face-to-face discussions into a special poster session and 14 interactive demo session. These poster and demo sessions have been provided with sufficient time so that your questions, comments and suggestions, can be raised.

**Program overview**

- 26th Sunday
  - Tutorial 1: "Scheduling algorithms for input-queue IP routers" Marco Ajmone Marsan (Politecnico di Torino), Paolo Giaccone
  - Tutorial 2: "Peer-to-peer communications" Takashige Hoshiai (NTT)
  - Tutorial 3: "Mobile Internet and Next Generation Wireless Networks" Abbas Jamalipour (U. of Sydney)
  - Tutorial 4: "IP over WDM", 20Hussein T. Mouftah (Queen's Univ)
- 27th Monday
  - Opening, Chair: Prof. Kenichi Kitami, Tokyo University of Technology, Japan, Organizing Committee Chair
  - Welcome Remarks: Prof. Tomonori Aoyama, University of Tokyo, The General Chair of the HPSR2002
  - Program overview: Dr. Naoaki Yamanaka, NTT Network Innovation Laboratories, NTT Corporation, Technical Program Committee Co-Chair
  - Keynote, Building a Reliable and Scalable Internet: Applications, Equipment, and Technology Dr. Christopher Gunner, Senior Vice-President Research and Development, Avici Systems, USA
  - Hot Topics Session
  - Session 1A IP Routing and Traffic Control
  - Session 1B Switch Architecture/Scheduling I
  - Session 2A Optical Protection/ Routing
  - Session 2B IP Table Lookup
  - The ATM Forum
  - Reception(Portopia Hotel)
- 28th Tuesday
  - Invited Speech I, Chair: Prof. Tatsuro Takahashi, Kyoto University, Japan
    - "Making Light Work of the Future IP Network" Dr. Ken-ichi Sato, Executive Manager, NTT Network Innovation Laboratories, NTT Corporation, Japan
  - Invited Speech II, Chair: Prof. Tatsuro Takahashi, Kyoto University, Japan
    - "Internet Routers and Optical Technology" Professor Nick McKeown, Stanford University, USA
  - Session 3A Optical Internet/GMPLS
  - Session 3B Switch Router Architecture
  - Panel Discussion "Next Generation Mobile Internet Technology
- Interactive Demo
  - Agilent Technologies, RouterTester 900/Distributed Network Analyzer VQT/Multi-rate 10 G Tester
    - Anritsu Corporation, IP Traffic Performance Test for Video System/43.5 Gbps BERT System
    - Association of Super-Advanced Electronics Technologies (ASET), Opto-electronics Packaging Technology for the last 1 m
    - Erlang Technology, Erlang 40 Gb/s Full-duplex Multi-services Router Reference System
    - Fujitsu Laboratories LTD., Acousto-Optic Tunable Filter (AOTF)
    - Hitachi, Ltd., RHiNET-3/SW: High Performance Optical Network Switch for Parallel Computing Environment
    - Japan Aviation Electronics Industry, Limited, Small 4 Channel 2 x 2 MEMS Optical Switch
    - NEC Networks, High Performance Demonstration in Optical-IP Merged Network
    - NTT Access Network Service Systems Laboratories, NTT Corp., IEEE 802.11a-Compliant High-Speed Wireless LAN
    - NTT Electronics Corporation, Reliable PLC Thermo-Optic Switches for Optical Network Systems
    - NTT Network Service Systems Laboratories, NTT Corp., High-speed core router, Type-X
    - OKI Electric Industry Co., Ltd., xDSL on Fiber system (Art Fiber system)
    - Spirent/TOYO/NTT-AT, Performance evaluation of Layer 3 switch using SmartBits and evaluation of router's convergence using AX/4000
    - VITESSE, PaceMaker™: OC-48 Traffic Management Engine Demo
  - Poster Session
- 29th Wednesday
  - Session 4A Diffserv/IP QoS
  - Session 4B Optical Switch
  - Session 5A TCP/IP Flow Control
  - Session 5B Switch Architecture/Scheduling II
  - Closing
  - Technical Visit


Keynote (Dr. Christopher Gunner)

This HPSR was the 8th such meeting, and topics moved from ATM performance to IP and photonics networks. The workshop is one of the largest and best established workshops in the communication area.

I'd like to thank all of you including the participants, paper authors, demo presenters, invited speakers, Key note speakers, and committee members, HPSR 2002 has been a great success.

*Presentation materials Proceedings CD are available at <http://www.ieice.org/hpsr2002/>.

# The CS English Sessions at the 2002 IEICE Society Conference

10-13 September 2002,
Miyazaki University, Miyazaki, Japan

**1. Introduction**

With a view to actively support globalization of research and development activities, the Communications Society of IEICE will hold "English Sessions" at the 2002 Societies Conference. The English sessions are organized in the form of an open symposium with submitted papers, 2 pages in length and oral presentations in English to foster vigorous participation of researchers, engineers and students from abroad and promote discussions on hot topics and latest research results. You are all kindly encouraged to contribute to and take part in the English sessions.

**2. Session**

**SB-12. Multiple Access and Signal Transmission Techniques for Next Generation Mobile Communications**

The portable voice telephone has been a major service in the cellular mobile communication systems. Recently, the services are gradually expanding to involve the internet access for various purposes such as the mail service, browsing or query of homepages, distributing contents of movies and music, and stream services. Commercial service of the third generation mobile communication system (IMT-2000) which was designed to be suitable for the mobile multimedia services has already been inaugurated. The research and development for more reliable and much higher data-speed technologies will be carried out for the future systems. The purpose of this session is to present the recent advances of Multiple Access and Signal Transmission Techniques for Next Generation Mobile Communications.

**SB-13. Traffic Engineering in IP-based Network**

The amount of traffic carried in the Internet is still growing rapidly and various new applications have different characteristics and requirements. Traffic control and network provisioning to meet their requirements are becoming important issues. In this session, we would like to gather new traffic engineering papers in the IP-based networks such as QoS control to stimulate cooperation's among researchers in this field, so that we can clarify our problems and their solutions.

**3. Official Language**

The official language for the sessions will be English. It will be used in all materials and during all presentations and discussions.

**4. Qualification for Applicants**

Domestic speakers must be members of one of the following societies: IEICE Institute of Electrical Engineers of Japan, the Illuminating Engineering Institute, the Institute of Image Information and Television Engineers of Japan, Information Processing Society of Japan, overseas associations membership of the Institute of Electronics Engineers of Korea, IEEE Com. Soc. IEEE / LEOS IEEE / EDS. Although domestic speakers must be members of one of the organizations above, non-members may be included as co-authors. In addition, non-member speakers from abroad will be accepted.

**5. Instructions for Oral Presentations**

The working language of the Sessions is English. Visual Equipment Each session room is provided with one overhead projector for viewgraphs. Each paper is allotted 20 minutes for presentation and 5 minutes for discussion.

*The registration fee for the 2002 IEICE Societies Conference is 9,000 yen (student 4,500 yen). *Deadline for payment is 30 July, 2002. *If a paper is not accepted, the fee will be returned. However, it will not be returned if an applicant cancels his or her participation after applying. Please refer to "Payment method" in "Advance Registration Form".

**6. Conference Program**

Each speaker will be sent a participation badge and a CD-ROM containing Conference program and PDF files prepared by the authors before two weeks for the Conference.

***Welcome to Miyazaki!***

2001 IEICE Communications Society General Conference Young Investigators Award paper

# Simple Cell Scheduling for Application Layer Level Jitter Reduction over ATM-ABR service

Naotoshi ADACHI*, Shoji KASAHARA* and Yutaka TAKAHASHI**
*Nara Institute of Science and Technology **Kyoto University

## 1 Introduction

The characteristic of ABR service class is that it guarantees only the cell loss ratio (CLR) and does not provide any other QoS guarantees such as the cell transmission delay (CTD) and cell delay variation (CDV). The mechanism for supporting CLR in ABR service category is based on the feedback control where the allowed cell rate (ACR) of source node is dynamically adjusted according to the congestion state of ATM network. With this mechanism, ABR achieves higher bandwidth utilization of link capacity than CBR and VBR service classes.

On the other hand, [1, 2] proposed the design method of the queue control function which guarantees not only CLR but also the CTD. By using this queue control function, ABR service category can support multimedia communication with small delay. However, the CDV, or equivalently, the jitter is not taken into consideration in their algorithm. The jitter is also important factor for the real-time video transmission where the jitter affects the quality of decoded video at destination node.

In this paper, we propose a scheduling scheme at source node to reduce the jitter at application level under the ATM-ABR service class. In our proposed scheme, we focus on the departure points of the end part of data packet. Throughout the paper, we call this end part of packet the critical cell. In our scheme, the critical cell is intentionally delayed until next data packet generation and transmitted at the beginning of the next cycle of packet generation. The departure points of critical cells at source node are like CBR traffic and therefore the reduction of jitter at application level is expected by our scheme. Since the points of sending critical cells are intentionally delayed, we call our proposed scheme intentionally delayed transmission (IDT). We verify the effectiveness of our proposed method by simulation.

## 2 IDT Scheme

First we suppose that the application layer generates data packets and that the interarrival time of consecutive packets is constant equal to $T$ (Figure 1). The period $T$ is regarded as a cycle of packet generation. In addition, we assume that the application program generates at least one cell during each period $T$.

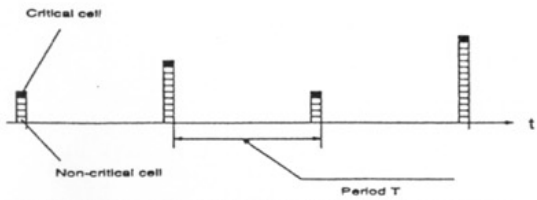



Figure 1: Departure Process at Source Node

In the case without IDT, the source node sends cells as fast as possible according to the ACR. Since the packet size at application level is variable, the interdeparture time of critical cells varies depending on the packet size. In our proposed method, the critical cell is delayed at source node until the next data packet generation and transmitted at the beginning of the next cycle of packet generation. Therefore the interdeparture time of critical cells is constant with period $T$ and it is expected that the resulting interarrival time of critical cells at destination node varies less than that of ordinary ABR service (Figure 2). Here the jitter at application level is defined as the variance of interarrival time of critical cells at destination.

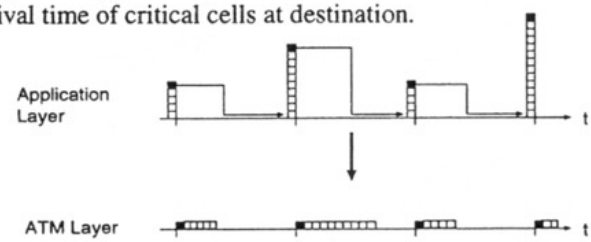



Figure 2: IDT Scheme

## 3 Performance Evaluation of IDT

### 3.1 Simulation Model

In our simulation model, the capacity of all links is equal to 155 Mbps and all connections belong to ABR service category. We assume that the time between the consecutive points of packet generation is 1/30 sec. We also assume that the bitrate of application data is 7.2Mbps and the number of cells for background traffic generated within a slot is distributed according to the geometric distribution.

In order to investigate the characteristics of IDT scheme, we consider the following two cases in simulation.

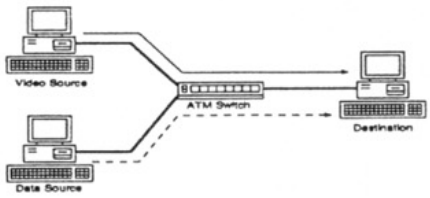



Figure 3: Simulation Model for Single Node Case

1. Case of Single Node
   The critical and non-critical cells are generated at the Video Source as shown in Figure 1 and are transmitted to the Destination. The background traffic cells are generated at Data Source and transmitted to the same destination. The IDT scheme is implemented at Video Source.

2. Case of Multiple Nodes
   In this case, Data Source 1-3 generate the background traffic and Data Destination 1-3 are the corresponding destinations, respectively. The Destination 3 is the destination for Video Source and Data Source 3.

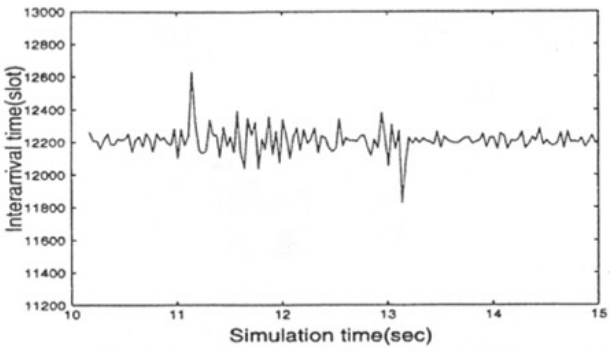



Figure 4(a): Single Node Case without IDT

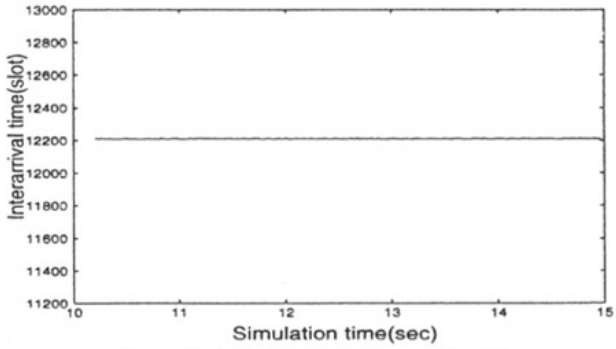



Figure 4(b): Single Node Case with IDT

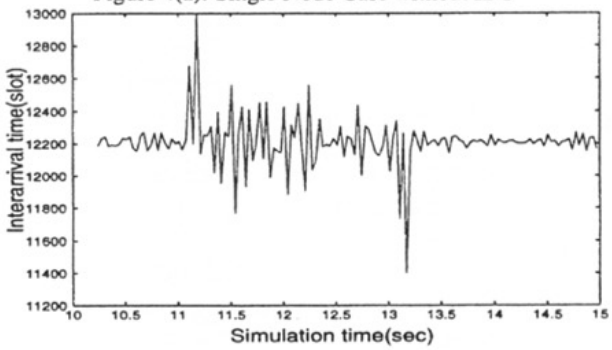



Figure 4(c): Multiple Nodes Case without IDT

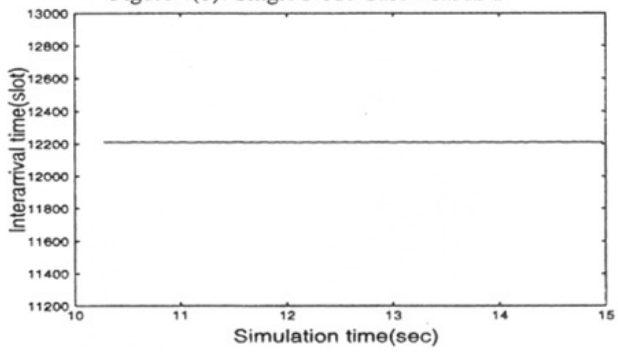



Figure 4(d): Multiple Nodes Case with IDT

Figure 4: Interarrival Time of Critical Cells

In order to investigate the robustness of IDT scheme against the background traffic, we focus on the dynamics of the interarrival time of critical cells at destination. We consider the following situation: The video traffic is transmitted to the destination during the simulation time from 10 to 15, and the data source nodes start to transmission of 100 Mbps background traffic at 11 and end at 13.

### 3.2 Simulation Results

Figures 4(a) to 4(d) show the simulation results with and without IDT scheme in single and multiple nodes cases. In these figures, the horizontal axis represents the simulation time and the vertical axis means the interarrival time of critical cells at destination. Figures 4(a) and 4(b) are the single node case while Figures 4(c) and 4(d) are the multiple nodes case where the number of ATM switches is three.

From Figure 4(a), we observe that the interarrival times vary largely when the background traffic is multiplexed and the interarrival times still vary even when there is no background traffic. On the other hand, from 4(b), we find that the interarrival time with IDT is almost constant even when the background traffic interrupts and the IDT is effective for reducing the application level jitter.

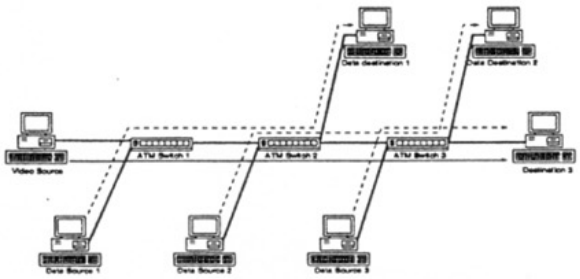


Figure 5: Simulation Model for Multiple Nodes Case

Figure 4(c) shows the simulation result of the multiple nodes case without IDT scheme, and we find the same tendency as Figure 4(a). Figure 4(d) is the case with IDT. We observe that the interarrival time is almost constant insensitive to the background traffic and IDT is also effective for reducing the in multiple nodes cases. From these results, we observe that the IDT scheme also shows good performance for the robustness against the impact of background traffic.

## 4 Conclusion

In this paper, we focused our attention on the departure point of the last cell for the packet and proposed IDT scheme to reduce the application level jitter. We investigated the jitter process with IDT scheme and the robustness of IDT scheme against the interruption of the background traffic by simulation. We also compared the IDT scheme with the original ABR system.

As we see in the simulation results, the variation of the interdeparture time of the tagged node causes the further variation of the interdeparture time of the next node. Therefore it is important for the source node to make the departure process of critical cells less variable. From this point, the IDT scheme is quite efficient.

## References

[1] B. Vandalore, et al., "QoS and Multipoint Support for Multimedia Applications over the ATM ABR Service," *IEEE Communications Magazine*, pp. 53-57, Jan. 1999.

[2] B. Vandalore, et al., "Design and Analysis of Queue Control Functions for Explicit Rate Switch Schemes," *Proc. IEEE ICNP*, pp. 780-786, Oct. 1998.

# International activities on the IEICE Communications Society

Takashige Hoshiai/Hidenori INOUCHI
NTT/HITACHI

## Introduction

We introduce international activities on the IEICE Communications Society (IEICE-CS) from the viewpoints of glocalization, i.e., fusion of globalization and localization, and close relationship with other societies.

## Sister Society

Since the IEICE-CS concluded the sister society agreements with IEEE Computer Society (IEEE-ComSoc) and Korean Institute of Communication Sciences (KICS) in 1999, they have exchanged opinions, information, each activity plan one another through society summits, and Web pages.

In the future, the IEICE-CS has so good relationships because of the societies full of activity.

## Dual membership

The IEICE-CS concluded dual membership agreements with IEEE-ComSoc and KICS based on sister society agreements. They support that members of IEICE-CS are able to gain same member services as members of KICS in the case of submission of a paper, or participation of a conference. The number of dual membership members increase favorably as indicated in a figure. It would raise the status of dual membership members.

## Promotion campaign

After doing the free signing up campaign to be burdened with the enrollment fee / year membership fee, APCC (Asia-Pacific Conference on Communications) 2001 which was sponsored last year by IEICE-CS got 40 new members by making use of the international exchange utilization fund.

## Future activities

The IEICE-CS is focusing on not only industrial, academic and official world, but also such glocal world as net-communities. It would push forward with the close relationships with glocal world from the viewpoints of IEICE-CS full of activity.

## International exchange taking charge secretary

There are three pieces of following work when dividing the routine work of the international exchange taking charge secretary mainly.

(1) The approval of the sponsorship of the international conference / the co-hosting

Communications society is accountable for the finance about the sponsorship, the cooperation sponsorship and the deliberation, and the communications society management committee does the approval.

Every year, it is doing the sponsorship, the cooperation sponsorship of about 10 international conferences.

(2) The operation management of the international exchange utilization fund

It applies for the international exchange utilization fund use for the international exchange taking charge secretary from the communications society management committee member of the committee.

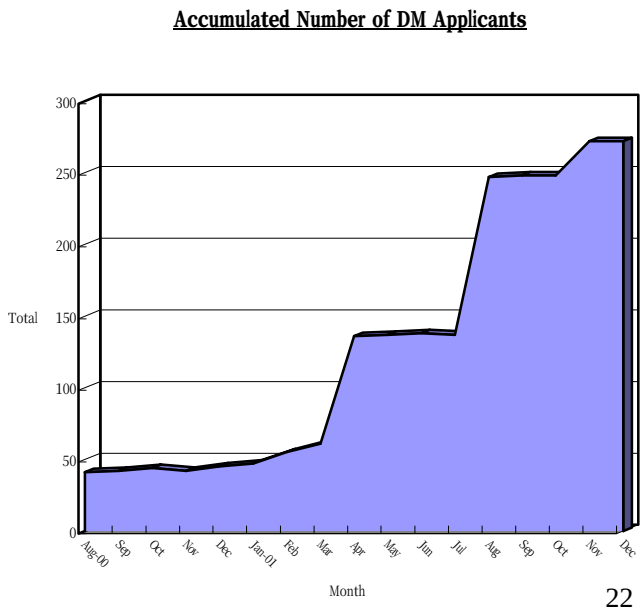
When there is use application of the international exchange activity fund, based on the operation regulation, it deliberates e-mail in the international exchange committee.

(3) The management of the communications society international exchange committee

An international exchange committee is established for the deliberation processing of the international matters of communications society.

The international taking charge vice-president fixes a member and the international exchange taking charge secretary becomes a secretariat.

The present main deliberation contents are the deliberation of the arrangement matters of the use right or wrong with international exchange activity fund and the arrangement matters among the societies and so on.

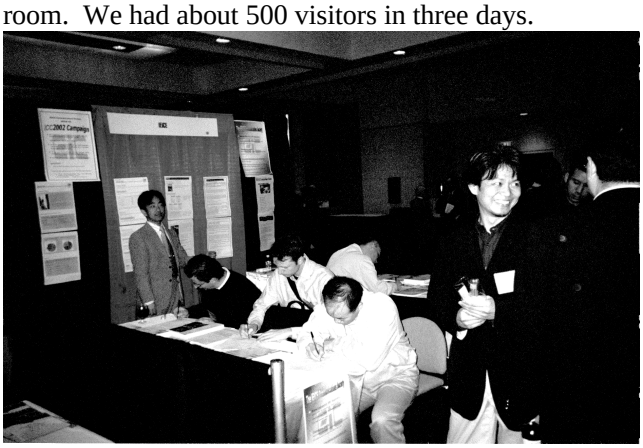


# IEICE Promotion in ICC2002

Hidenori Nakazato
Waseda University

## Introduction

To promote IEICE and its journals, we set up a booth in ICC2002 held in New York City from April 28 to May 2, 2002. ICC is the largest conference organized by IEEE ComSoc. We used one of the 18 booths with 10m$^2$ space in the exhibition room in New York Marriot Marquis Hotel where the conference is held. Internet cafe was also located in the same exhibition room. We had about 500 visitors in three days.



## Promotion Activities

The followings were the promotion activities we had:

- Invitation to our Dual Membership
- Introduction to IEICE and to its Transactions.
- Display of All IEICE Transactions.
- Display and distribution of free back numbers of IEICE Transactions on Communication.
- Display and distribution of Transactions CD-ROM.
- Distribution of promotion goods (Japanese chopsticks accompanied with origami paper folding)

## Promotion Results

All the back numbers and CDs had been distributed by the morning of the third day of the conference. For our primary objective, raising Dual Members, we accepted applications of 120 new overseas members which are the record in the four promotions we have done so far.

Details of the new members home countries are shown in Table 1.

As stated in the Comments from the Visitors section below, recognition of the name IEICE is constantly improving. There were many occasions that we happened to invite the current member to the membership. However, since we still could acquire this many new members, we are goint to continue the promotion in conferences.

Table 1 Countries of New Members (on mail address)

| | ICC2002 (New York) | | | Previous Results | | | Total |
|---|---|---|---|---|---|---|---|
| | Assoc | Student | Total | Gcom01 (Texas) | ICC01 (Helsinki) | Gcom00 (S. F.) | |
| U.S.A. | 38 | 18 | **56** | 33 | 11 | 30 | 130 |
| Canada | 9 | 3 | **12** | 7 | 13 | 4 | 36 |
| Italy | 5 | 1 | **6** | 2 | 3 | 3 | 14 |
| Korea | 4 | 1 | **5** | 1 | 14 | 5 | 25 |
| UK | 4 | 1 | **5** | | 3 | 1 | 9 |
| Hong Kong | 1 | 4 | **5** | 1 | 3 | 3 | 12 |
| Ireland | 4 | | **4** | | | | 4 |
| China | 3 | 1 | **4** | | 4 | 2 | 10 |
| Taiwan | 2 | 2 | **4** | 4 | 2 | 4 | 14 |
| Singapore | 2 | | **2** | 4 | 8 | | 14 |
| Israel | 2 | | **2** | 3 | 4 | 2 | 11 |
| Australia | 2 | | **2** | 1 | 2 | 5 | 10 |
| France | 1 | 1 | **2** | 3 | | 1 | 6 |
| Greece | 1 | 1 | **2** | | | | 2 |
| Brazil | 1 | 1 | **2** | | | | 2 |
| Turkey | 1 | | **1** | | | | 1 |
| New Zealand | 1 | | **1** | | | | 1 |
| Norway | 1 | | **1** | | | | 1 |
| Japan | 1 | | **1** | | | | 1 |
| Finland | | 1 | **1** | 2 | 10 | 1 | 14 |
| Germany | | 1 | **1** | | 2 | 2 | 5 |
| Malaysia | | 1 | **1** | | | | 1 |
| India | | | | 3 | 4 | 2 | 9 |
| Sweden | | | | | 6 | | 6 |
| Iran | | | | | 4 | | 4 |
| Spain | | | | 1 | 2 | 1 | 4 |
| Netherlands | | | | 1 | 1 | | 2 |
| Thailand | | | | 1 | 1 | | 2 |
| Colombia | | | | 1 | | | 1 |
| Slovakia | | | | 1 | | | 1 |
| Bahamas | | | | 1 | | | 1 |
| Romania | | | | 1 | | | 1 |
| Others | | | | | 13 | 6 | 19 |
| Total | 83 | 37 | **120** | 71 | 110 | 72 | 373 |

## Questions and Comments from Visitors

We received the following questions and comments from our visitors.

- How much is the publication fee for a paper?
- It is amazing to have all IEICE Transactions viewable on line for free.

- What can I do to become an Associated Editor of the Transactions.
- Is there no free copy of the Transactions CD-ROM? (The free copy was gone at the very beginning of the conference.)
- I access the online journal. (Many comments)
- I know IEICE.(Many comments)

We must actively globalize our editorial committee with our subscribers almost equal in Japan and overseas. We are going to contact the person who showed interest in becoming an Associated Editor.

**Transition in the Number of Overseas Subscribers**

Fig. 1 shows the number of the subscribers of Transactions on Communications. If we can maintain this trend of growth, we can achieve 1000 overseas subscribers which are our initial goal of the promotion in the very near future. This year we plan to undertake promotion activities in mobile and photonic related conferences in addition to ICC and GLOBECOM. We aim to achieve our goal within this year. As shown in Fig. 2, the number of Korean subscribers takes the first place in the number of subscribers abroad and the U.S. subscribers come next. However the difference is getting narrower as the number of U.S. subscribers is steadily increasing as shown in Table. 1. Although our Communications Society puts emphasis on Asia in our globalization activity, we acquired more members from the U.S. since our promotion so far is often held in the U.S. We expect to have more new members from Asia in the coming GLOBECOM to be held in Taiwan.

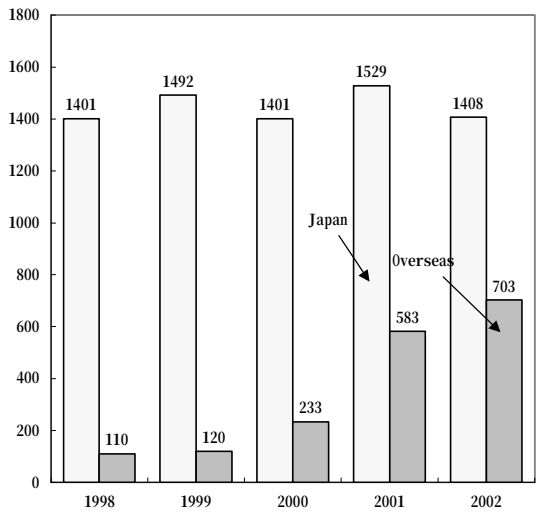



Fig. **1** Transition of Circulation

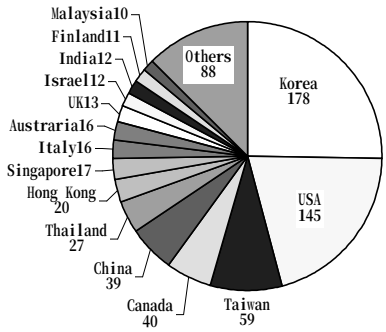



Fig. **2** Countries of Subscribers (except Japan)

**Miscellaneous**

We saved our expense by hiring a Japanese living in New York City instead of sending a person from Japan in this promotion. However, after this promotion, IEICE office is going to offer the service of organizing promotions in conferences since effectiveness of the promotion becomes well known by other IEICE Societies and they also started similar promotion activities.

# Advanced Network Architecture Laboratory at Osaka University

Masayuki Murata (murata@anarg.jp)
Graduate School of Information Science and Technology, Osaka University

## Mission

The Advanced Network Architecture (ANA) Laboratory at Osaka University is dedicated to advancing computer networking architecture and related technology. The lab is one of five labs in the Department of Information Networking of the Graduate School of Information Science and Technology (IST), a graduate school established this April [1]. The lab's research spans a broad range of networking areas, from network architecture to application-related issues, and is based on a complementary mixture of theoretical and experimental approaches.

## Who Are We?

The lab is led by Prof. Masayuki Murata, who is formally head of the Advanced Network Environment (ANE) Research Division of the Cybermedia Center. The Cybermedia Center was established in April 2000 with a mandate to act as the strategic center of information-related technology and to support research and educational activities carried out at Osaka University [1]. ANE is responsible for the operation and maintenance of the Osaka University campus network, which is called ODINS (Osaka Daigaku Information Network System). Professor Murata is also a faculty member of the Graduate School of IST. After graduating from Osaka University in 1984, he joined Tokyo Research Laboratory, IBM Japan, as a researcher. He returned to Osaka University in 1987. From April 1999, he has been a Professor at Osaka University. Professor Murata was selected as one of the most influential researchers in the information network field in Japan in the forthcoming book published by Kawai-Juku. Our department at Osaka University is also selected as a one of the most distinguished research units in Japan in this field.

Fig.1. Prof. Murata

The lab staff includes Associate Prof. Go Hasegawa and Research Associate Shin'ichi Arakawa. The lab is a rather small unit relative to the Japanese University's structure, but our staff includes several researchers from other IST laboratories, other graduate schools of Osaka University, and other universities. They are Associate Profs. Masashi Sugano, Ken'ichi Baba, Naoki Wakamiya and Hiroyuki Ohsaki. The staff also includes Assistant Prof. Shingo Ata, with whom we are forming the ANA Research Group (ANARG) which is performing research regarding various aspects of networking.

Other research group members include three doctoral course students, 18 master's students (including three students one each from Taiwan, Vietnam, and Thailand), six undergraduate students, and two visiting researchers from related industries, all of whom specialize in network research.

Fig.2. Laboratory Room

Our laboratory is engaged in many areas of collaborative research with Japanese companies. Thus, with students of many sorts and highly competent staff from various organizations and countries, we are confident that our laboratory provides a very open and fertile environment, leading to a great deal of meaningful research.

## What Do We Do?

Much of the lab research is motivated by the high-speed network technology with rich functionality that is currently emerging. The ultimate goal is to develop an architecture that provides the most appropriate means of realizing a high-quality network that meets the diverse requirements of end-users.

We believe that the keywords regarding the next generation of challenges in network research are *adaptability*, *scalability*, and *fairness*. Always keeping these characteristics in mind, we are now conducting research through the ten projects explained below. Our views concerning the next generation of challenges in network research have also been discussed in [2].

### Multimedia QoS Architecture

The implementation of reservation-based networks (such as IntServ) has proven to be impossible.

Mapping end-to-end application requirements to priorities (such as in DiffServ) is also difficult and perhaps impossible (in our opinion). What can we do next? Providing an adaptation capability for multimedia applications at end-hosts is probably the most critical goal. Support by the network – e.g., through proxy servers – is another important issue regarding improved QoS for end-user applications. Measurement during multimedia sessions is also important to establish fairness between UDP-based real-time applications and TCP-based data applications. We are now developing a proxy service mechanism for real-time streaming services that will be capable of TCP-friendly congestion control, in cooperation with a major producer of Web-related service and equipment [3].

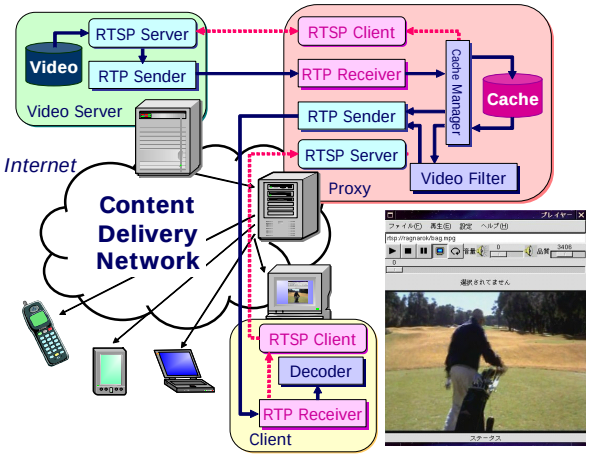



Fig.3. Structure of proxy caching system for streaming media [3].

## Exploring Network Feedback Mechanisms

An effective congestion control mechanism is essential to establish high-speed networks. Today's Internet uses TCP (Transmission Control Protocol) as the transport-layer protocol, which is responsible for congestion control. Since TCP is based on a feedback mechanism, traditional fundamental theories, such as traffic theory for telephone networks and queueing theory for packet-switched networks are useless (in our opinion) for achieving the desired level of the Internet congestion control. We are now developing a new analytical approach in which we apply control theory to adequately treat the system feedback mechanism [4]. One important achievement in our recent work has been to realize an adequate packet-dropping function for RED (Random Early Detect) routers.

## High-speed Transport Architecture

The explosive expansion of network bandwidth is shifting the bottleneck of data communication from the network to end systems. Furthermore, the fairness problem is becoming more pressing as commercial use of the network grows. To resolve these problems, we need to consider both the congestion control mechanism of the transport-layer protocol and the processing overhead at the end hosts in an integrated manner. We are now establishing an integrated transport architecture that will provide fair service through the Internet. The aim of our current research is to realize high-performance Web and Proxy servers by taking into account the effective and fair allocation of socket buffers [5].

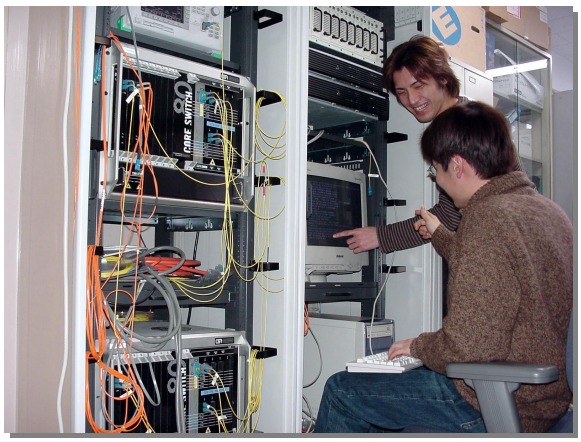


Fig.4. Experiments on high-performance Web/Proxy servers.

## High-speed Packet Switching Architecture

A network performance bottleneck also exists at the network routers, and the expansion of network bandwidth has made this a more serious concern. This problem will grow in severity as layer-four or upper-layer protocol processing is introduced in the router to support various kinds of network services. In a preliminary study, we have established a performance prediction method that can be applied to routers based on a statistical analysis of the measurement data obtained at the gateway of Osaka University that was done in cooperation with a major producer of high-speed routers. Our results can be used to identify any performance bottleneck at the routers. We are now studying a high-speed packet scheduling technique to support fair service among connections.

## Analysis of Internet Traffic Characteristics and its Application

We have been engaged in the traffic measurement and its statistical analysis for performance modeling and designing Web servers and routers (as described above). More fundamentally, traffic measurement is a key to understanding the network behavior. As its application, we have proposed a new playout buffer algorithm that considers the user's perceived quality for real-time streaming media, based on the statistical analysis of the end-to-end network delay. More specifically, the end-to-end delay is measured while downloading the streaming media and it is used to dynamically estimate the tail-distribution of the network delay, and determine playout delays [6].

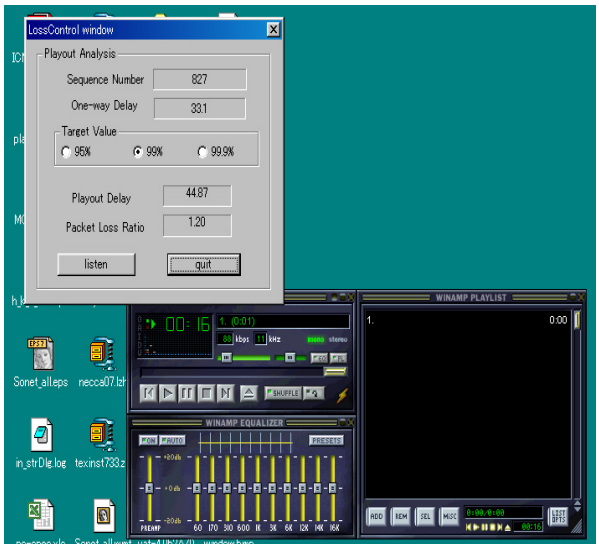



Fig.5. Snapshot of a client window with our playout buffer mechanism that is based on the online measurement and statistical analysis of the Internet delays [6].

Another research in this aspect is related to network dimensioning method that is necessary to provide a stable QoS to customers. Unfortunately, existing approaches, including the well-established method used for the telephone network, require that the traffic demand be known *a priori*, and this cannot be assumed for the Internet traffic which varies dramatically and frequently. We are now working to establish a new network dimensioning paradigm for the Internet communication based on the measurement and statistical analysis of network traffic. Specifically, we are developing an incremental network provisioning approach with regard to the WDM (Wavelength Division Multiplexing)-based photonic network as an example network [7]. (See also the next research topic as a related issue).

**Photonic Networking Architecture**

The application of WDM technology is rapidly increasing network link bandwidth. However, optical transmission technology and networking technology have distinct development histories, and an effective means of applying the optical transmission mechanism to the Internet traffic has yet to be reported. We have developed a design method for high-performance lightpath networks. The techniques need to build highly reliable photonic networks by utilizing the reliability mechanisms of the WDM network (i.e., link/path protection mechanisms) are also being developed.

**Photonic Switching Architecture**

As recent progress in WDM technology has significantly increased point-to-point link capacity, the ease of providing scalable bandwidth to meet rapidly growing the Internet traffic demands has grown. However, this capacity increase has also shifted the network bottleneck from the link to the node because of the rather slow packet processing in the electronic layer at the node. We therefore need a photonic network that can incorporate functions such multiplexing, de-multiplexing, switching, and routing in an optical domain, through which electronic control can be minimized. With regard to this research topic, we have developed a photonic packet-switching architecture to enable photonic-based high-speed packet switching/forwarding by focusing on the effective application of fiber delay-line buffers [8, 9].

**Integrated Wired/Wireless Network Architecture**

Traditionally, wireless and wired network technologies have been developed separately. However, the seamless connection of wired and wireless networks is becoming necessary because of the growing demand for the Internet access using wireless devices – what we call ubiquitous access. We have thus proposed a method of improving the performance of TCP-based data transmission. Integrated high-performance data transmission in ad hoc networks through the routing mechanism is another promising research area that we are now tackling in cooperation with a major producer of the wireless ad hoc system.

**Design and Implementation of IPv6-based Routing Protocol**

An interesting feature of IPv6 is anycast, which supports service-oriented address assignments in IPv6 networks. However, there are several technical issues that must be resolved with respect to the current anycast definitions. We are now studying design issues regarding anycast communication for each application so that we will be able to utilize it without any modification of the respective programs. We have designed and implemented an architecture on a UNIX-based operating system, and have verified that our proposed anycast communication mechanism can work well by considering a new load balancing model for multiple servers in a LAN environment. We are now studying a wide-area routing protocol to support anycast communication.

**Interaction between Overlay Networks and Underlying Networks**

The overlay network is another emerging technology. A popular example is peer-to-peer (P2P) networks, which are now widely used for information sharing and exchanging. However, in the current implementation, the physical structure of the underlying network is not considered when building an overlay network. Another example of this is found in CDN (the Content Distribution Network). Our research focus in this new area is to identify the interaction between overlay (logical) networks and the underlying (physical) networks. Note that in the WDM-based lightpath networks discussed above, the overlay network (the

lightpath network) can be controlled by taking into account the underlying physical WDM network. Our concern is somewhat different in that we want to learn how to build an efficient overlay network by utilizing the measurement information obtained from the underlying network (when necessary).

**Projects Supported by Governments**

We are currently participating in the following inter-organizational projects financially supported by the Japanese government.

- "Informatics Studies for the Foundation of IT Evolution," supported by MEXT (The Japanese Ministry of Education, Culture, Sports, Science and Technology).
- "Program of Talent Training for Secure Networking," supported by MEXT.
- "Flexible Network Infrastructure–Establishing a New Network Dimensioning Approach for the Photonic Internet," supported by MEXT.
- "Establishing P2P-based Information Infrastructure for Mobile Environments," supported by MEXT.
- "R&D of Photonic Network Technology using Optical Burst Switching," supported by TAO (Telecommunications Advancement Organization of Japan).
- "R&D of a Photonic Router for a High-Speed, High-Quality and High-Functional Internet," supported by TAO.
- "Virtual Private Network for Realizing the Cyber Society," supported by MEXT.

**Educational Activities**

We participate in the educational activities at IST, and give two courses, "The Gigabit Network" and "Organization of a High-Speed Network System." Also, since 2001, Prof. Murata has led the PBL (Problem-Based Learning) sub-committee. The PBL program is a fairly new educational course for undergraduate students in the Department of Information and Computer Sciences that is aimed at developing each student's problem-solving ability. The sub-committee is responsible for designing and managing the PBL course.

In several research projects, we use the Intel IXP 1200 network processor that was donated by Intel Corporation to help us build our experimental systems. The objective here has been two-fold. First, we can verify the feasibility of our proposed system by building the experimental system. More importantly, though, students can gain experience in the design of an actual system as is actually done by system vendors.

**Get in Touch with Us!**

Please visit our website at http://www.anarg.jp/ for more information regarding the activities of our laboratory. If you would like to do research with us, check http://www.anarg.jp/~murata/e/contents/contact.htm, to learn more about entering Osaka University. We welcome students from other Japanese universities and from other countries. We also offer postdoctoral fellowships depending on the available openings.

**References: Selected Recent Journal and Conference Publications**

In 1999, 2000, and 2001, we published 11, 11, and 9 journal papers, respectively. Also, we presented 16, 19, and 29 international conference papers. In 2002, we presented 19 conference papers and will present 11 papers at forthcoming conferences. Below are several of our recently published papers.

[1] M. Murata and S. Nishio, "New organizations for IT-related R&D at Osaka University," *Proc. of 4th AEARU Workshop on Computer Science*, (Kyoto), Dec. 2001. Also available at http://www.anarg.jp/achievements/web2001/papers/Murata01aearu-it.pdf

[2] M. Murata, "Challenges for the next generation Internet and the role of IP over photonic networks," *IEICE Trans. on Communications*, Vol.E83-B, No. 10, pp. 2153-2165, Oct. 2000.

[3] N. Wakamiya, M. Murata and H. Miyahara, "Video streaming systems with cooperative caching mechanisms," to be presented at *SPIE International Symposium ITCom*, (Boston), July-Aug. 2002.

[4] M. Morita, H. Ohsaki and M. Murata, "Designing a delay-based adaptive congestion control mechanism using control theory and system identification for TCP/IP networks," to be presented at *ITCom 2002*, (Boston), July-Aug. 2002.

[5] G. Hasegawa, T. Terai, T. Okamoto and M. Murata, "Scalable socket buffer tuning for high-performance Web servers," *Proc. of IEEE ICNP 2001*, pp. 281-289, Nov. 2001.

[6] K. Fujimoto, S. Ata, and M. Murata, "Adaptive playout buffer algorithm for enhancing perceived quality of streaming applications," to be presented at *Internet Performance Symposium (IPS 2002)*, Nov. 2002.

[7] S. Arakawa and M. Murata, "Lightpath management of logical topology with incremental traffic changes for reliable IP over WDM networks," *Optical Networks Magazine*, April 2002.

[8] M. Murata and K. Kitayama, "A perspective on photonic multi-protocol label switching," *IEEE Network Magazine*, Vol. 15, No. 4, pp. 56-63, July/Aug. 2001.

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# IEICE Overseas Membership Page

The Institute of Electronics, Information and Communication Engineers

Membership for Overseas Candidates: **You can join one of the IEICE Societies and subscribe to IEICE Transaction (in English) of the registered Society as** IEICE Overseas Regular Member, Overseas Student member, or Overseas Affiliate Member **without voting right at the Institute's election. Still more, you can receive Journal and Japanese Transactions by paying an additional charge.** OMDP **(Overseas Membership development program) is provided for candidates from** countries/areas in Asia, Africa, Central America, and South America. **This program is designed so that IEICE can contribute to and support the progress of science and technology throughout the world. Scientists and engineers in these countries/areas are encouraged to apply to the program.**

◆Please be noticed that Overseas Membership applies only to candidates who reside outside of Japan and who have non-Japanese citizenship.

IEICE Societies and Publications:

| Societies | Transactions | Topical areas covered |
|---|---|---|
| **A. Engineering Sciences** | EA:Trans. on Electronics | 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** | EB:Trans. on Commun. | Fundamental Theories, Communication Devices / Circuits, Transmission Systems and Transmission Equipment, Optical Fiber, Fiber-Optic Transmission, Wireless Communication Technology, Terrestrial Radio Communications, Satellite and Space Communications, Optical Wireless Communications, Switching, Wireless Communication Switching, Network, Network Management / Operation, Software Platform, Internet, Antenna and Propagation, Electromagnetic Compatibility (EMC), Sensing, Navigation, Guidance and Control Systems, Energy in Electronics Communications, Terminals, Multimedia Systems, Broadcast Systems, Integrated Systems, Media Compound Method |
| **C. Electronics** | EC:Trans. on electron. | 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** | ED:Trans. on Inf. & Syst. | Theory/Models of Computation, Theory of Automata, Formal Language Theory, Algorithms, Computational Complexity Theory, Computer System Element, VLSI Systems,Computer Systems, Theory and Models of Software, Software Systems, Software Engineering, Databases, Network, Fault Tolerance, Applications of Information Security Techniques, Cooperation in Distributed Systems and Agents, Artificial Intelligence, Cognitive Science, Man-Machine Systems, Multimedia Processing, Educational Technology, Welfare Engineering, Pattern Recognition, Speech and Hearing, Image Processing, Image Pattern Recognition, Computer Graphics, Multimedia Pattern Processing, Natural Language Processing, Biocybernetics, Neurocomputing, Medical Engineering |

Membership Charges (UNIT: YEN):

| **Membership grades** | **Entrance Charge** | **Annual Membership Fee** | **Additional Society Registration** | **Additional Transaction Subscription** | **Journal Subscription** |
|---|---|---|---|---|---|
| **Service coverage for overseas members** | ——— | Included one Society and its Transaction | Registration of one more Society and its Transaction | Subscription to an additional Transaction of registered Society | (Written in Japanese only) |
| **Regular Member (overseas)** | 1,400 | 7,000 | 3,500( /1 Trans.) | 3,000( /1 Trans.) | 6,000 |
| **Regular Member (overseas) with OMDP*** | 1,000 | 5,000 | 3,000( /1 Trans.) | 2,500( /1 Trans.) | 5,000 |
| Regular Member (in Japan) | 2,600 | 13,000 | 3,500( /1 Trans.) | 3,000( /1 Trans.) | - |
| **Student Member (overseas)** | 0 | 2,000 | 2,000( /1 Trans.) | 1,500( /1 Trans.) | 6,000 |
| **Student Member (overseas) with OMDP*** | 0 | 1,000 | 1,500( /1 Trans.) | 1,000( /1 Trans.) | 5,000 |
| Student Member (in Japan) | 0 | 4,500 | 2,000( /1 Trans.) | 1,500( /1 Trans.) | - |
| **Affiliate Member★ (overseas)** | 800 | 4,000 | 3,000( /1 Trans.) | 2,500( /1 Trans.) | 6,000 |
| **Affiliate Member★ (overseas) with OMDP*** | 400 | 2,000 | 2,500( /1 Trans.) | 2,000( /1 Trans.) | 5,000 |
| Associate Member★ (in Japan) | 1,800 | 9,000 | 3,000( /1 Trans.) | 2,500( /1 Trans.) | - |

***OMDP** is to support members from countries/areas of Asia, Africa, Central America, & South America.

★**Affiliate Member** is a person who is not a specialist of fields which IEICE subject to and who have an interest to our fields. And when you want to
join IEICE as an Affiliate Member, you need recommendation of the society which you want to belong to.

## Notice

**1.** Annual Membership Fee includes one Society and one Transaction which you choose.

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, 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",
and **Additional Transaction subscription (optional)** as "EB". Your membership fee amounts to 7,000+3,500 yen / 5,000+3,000 yen.

**3.** If you want to subscribe to more than one Transaction in the same society which you register, please check "Additional Transaction subscription".

Example : If you want to subscribe to Transaction of EA and A, please check **Society Registration** as "A", and **Additional Transaction subscription (optional)** as "A". Your membership fee amounts to 7,000+3,000 yen / 5,000+2,500 yen.

**4.** If you want to change membership from "Regular Member" to "Overseas Member", you don't need to pay an Entrance Charge.

**Optional Rapid Mailing Service:** Surface mail charge is included in the Annual Membership Fee. Optional rapid mailing service is available by air mail or surface air lifted (SAL) mail. The additional charge per year periodical depends on the mailing address, as shown in the following table.

| Zones | Areas | Air mail | SAL mail |
|---|---|---|---|
| 1st | Asia; Guam; Midway islands | 5,600 yen | 3,200 yen |
| 2nd | Oceania; Near & Middle East; North & Central America; Europe | 7,800 yen | 4,400 yen |
| 3rd | Africa; South America | 11,000 yen | 5,600 yen |

**Further information:** Please contact **IEICE Membership Activities Section;**
**IEICE Headquarters Office, Kikai-Shinko-Kaikan Bldg., 5-8, Shibakoen 3 chome, Minato-ku, Tokyo**
**105-0011 JAPAN**
Fax +81 3 3433 6659 E-mail: member@ieice.org URL: http://www.ieice.org/

# IEICE Overseas Membership Application Form

The Institute of Electronics, Information and Communication Engineers

**URL** http://www.ieice.org/eng/member/OM-appli.html **E-mail** member@ieice.org

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

**Personal Information**

***Full name:*** _____ ***Nationality:*** _____ ☐Male ☐Female

First name Middle name Last name

☐Prof. ☐Dr. ☐Mr. ☐Mrs. ☐Ms. ☐Miss ***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** I want to enter the IEICE from ☐April ☐October year: ____

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

☐Regular Member (Overseas) ☐Student Member (Overseas) ☐Associate Member (Overseas)

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

***Society registration (It includes one Transaction in English):***

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

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

Additional Transaction subscription (optional): ☐EA: Fundamentals ☐EB: Communications ☐EC: Electronics ☐ED: Information & Systems

☐A (Japanese) ☐B (Japanese) ☐C (Japanese) ☐DI (Japanese) ☐DII (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 Transaction (optional)……..…_____ ☐SAL mail……\ _____

Total remittance……\ _____

Credit Card: ☐MasterCard ☐VISA ☐American Express Card number:_____Expiry date(Y/M)____/

Credit Card Holder:_____ Signature:

**Endorsement** *Endorsements by two IEICE Regular Members for Regular/Affiliate Member application and by one Regular 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

**Send this form to:** **The Membership Activities Section,**

IEICE Headquarters Office, Kikai-Shinko-Kaikan Bldg., 5-8, Shibakoen 3 chome, Minato-ku, Tokyo 105-0011 JAPAN

# From Editor's Room

**Messages from**

The IEICE Communications Society has set the year 2002 to start accelerating the globalization of the Society. The GLOBAL NEWSLETTER will be the major force to drive the task in disseminating various information from the Society, ranging from the latest Technical Committees' activities, conference reports and calendars to the most exciting news from the research institutions around the globe and even messages from the Society fellows. The GLOBAL NEWSLETTER will be published quarterly with its WEB distribution planned in the near future. The Society members are most welcome to contribute articles to share the information in the international arena- the GLOBAL NEWSLETTER. See http://www.ieice.or.jp/cs/ for electronic version of the GLOBAL NEWSLETTER and templates for contribution.

The Communications Society has been promoting increasing members from outside Japan with a milestone number of *one thousand* by the end of this fiscal year. The GLOBAL NEWSLETTER just meets the needs of the members around the globe. In addition to the GLOBAL NEWSLETTER, the rapidly-growing *IEICE Transactions on Communications* are the core body in the Society for sharing the most advanced technical developments and results in the Communications community, with more than 2000 total pages per year and their submitted number of papers increasing by 30% each year.

This GLOBAL NEWSLETTER vol. 1 came into existence within only two months after the first proposal of its publication. This is in line with the rapid growth and developments of the present Information, Communications Technologies. "To move forward" would be the key word in promoting the progress, and we believe that the GLOBAL NEWSLETTER should be the first step in that direction. The IEICE Communications Society is determined to keep going and we most welcome your active participation in this fast-moving, but exciting Society.

All of IEICE Communications Society GLOBAL NEWSLETTER Editorial Staffs

**Editorial Staffs of this issue**

No special order is observed.

**Naoaki YAMANAKA**

NTT

Network Innovation Labs.

*Director, Publications, IEICE Communications Society*

**Toshio MORIOKA**

NTT

Network Innovation Labs.

*Editor, IEICE Transactions on Communications*

**Katsunori YAMAOKA**

Tokyo Institute of Technology

Global Scientific Information and Computing Center

*Director, Newsletter Publications, IEICE Communications Society*