

## ***IEICE Communications Society GLOBAL NEWSLETTER Vol. 38, No.4*** **Contents**

### ○ From CS Fellows

|                            |   |
|----------------------------|---|
| Bridging QoS and QoE ..... | 2 |
| Tatsuya Yamazaki           |   |

|   |   |
|---|---|
| History of Research and Development of Optical Fibers ..... | 5 |
| Masaharu Ohashi   |   |

### ○ From Laboratories

|   |   |
|---|---|
| Introduction to Mitsubishi Electric R&D Centre Europe ..... | 8 |
| Kazuo Seo   |   |

### ○ From Foreign Students/Members

|   |    |
|---|----|
| Pursuing a PhD in the Country That Made Me Love Engineering ..... | 10 |
| Filippos Balasis  |    |

### ○ IEICE-CS Activities Now

|  |    |
|--|----|
| Report on Communications Society Special Talk and Awards Ceremony at 2014 IEICE Society Conference ..... | 12 |
| Tadao Nakagawa, Kiyoshi Ueda   |    |

|   |    |
|---|----|
| IEICE Fellow Conferred on 11 IEICE-CS Members ..... | 14 |
| Takashi Dateki                                      |    |

|  |    |
|--|----|
| ASN Special Session in the 20 <sup>th</sup> Asia-Pacific Conference on Communications (APCC2014) ..... | 15 |
| Bing Zhang   |    |

|  |    |
|--|----|
| Report on ICM English Session at 2014 IEICE Society Conference<br>– BS-6. Network and Service Design, Control and Management – ..... | 16 |
| Kyoko Yamori   |    |

|   |    |
|---|----|
| Report on the 4 <sup>th</sup> International Symposium on Network Virtualization ..... | 18 |
| Takeshi Kinoshita, Masaki Fukushima, Masahiro Kiyokawa                                |    |

### ○ IEICE-CS Related Conference Reports

|   |    |
|---|----|
| Report on the 20 <sup>th</sup> Asia-Pacific Conference on Communications (APCC2014) ..... | 20 |
| Takashi Shimizu, Yoshihiro Ishikawa   |    |

|   |    |
|---|----|
| Report on 16 <sup>th</sup> Asia-Pacific Network Operations and Management Symposium (APNOMS 2014) ..... | 22 |
| Eiji Takahashi, Shingo Ata  |    |

|   |            |
|---|------------|
| Report of IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob 2014)<br>Arief Hamdani Gunawan   | 23         |
| Report on the 7 <sup>th</sup> International WDN Workshop on Cooperative and Heterogeneous Networks<br>(WDN-CN2014)<br>Gia Khanh Tran, Suguru Kameda | 24         |
| Report of the Fifth International Conference on Communications and Electronics 2014 (IEEE ICCE 2014)<br>in Da Nang, Vietnam<br>Makoto Ando          | 26         |
| 2014 Summer Topicals: Space Division Multiplexing Technologies for High Capacity Transmission<br>Shoichiro Matsuo                                   | 28         |
| ○ IEICE-CS Information  |            |
| IEICE-CS Related Conferences Calendar   | 30         |
| Special Section Calendar of IEICE Transactions on Communications  | 31         |
| CFPs for Special Sections on IEICE Transactions on Communications   | 32         |
| IEICE Overseas Membership Page  | 36         |
| IEICE Overseas Membership Application Form  | 37         |
| IEICE-CS Overseas Membership with Special Annual Fees for Sister Society Members  | 38         |
| IEICE Overseas Membership Application Form for IEICE-CS Sister Society Members  | 39         |
| IEICE-CS GLOBAL NEWSLETTER Submission Guideline   | 40         |
| From Editor's Desk  | 42         |
| ○ Photogravure  |            |
| IEICE General Conference in Ritsumeikan Univ.   | Back cover |

**\*Color Version Available!**

*The PDF (color version) of this issue can be downloaded from IEICE-CS*

*Web site below:*

[http://www.ieice.org/cs/pub/global\\_news.html](http://www.ieice.org/cs/pub/global_news.html)

# Bridging QoS and QoE

Tatsuya Yamazaki  
Niigata University



## 1. Introduction

Originally, the concept of quality of service (QoS) encompassed the total service quality of network services, which includes areas ranging from the physical level to the user level, and several layered QoS models have been proposed [1,2]. The QoS mapping methods, which translate the QoS expressions at each level, have also been extensively studied. Conventional QoS mapping methods are categorized into two classes. One is a table-based mapping class [3] and the other is a function-based mapping class [4,5].

Separating the user-side from the system-side and defining an interface between both these sides has been conceptualized. This idea is, in some sense, reasonable because the latter side can be easily modeled on the basis of an architectural framework, while the former side is often affected by several factors that result in continually changing service requirements. Moreover, at present, the view of separation is generalized; the system-side metric is referred to as QoS, while the user-side one is termed quality of experience (QoE). Therefore, while QoS is the ability to guarantee a certain level of performance to a data flow, QoE presents the degree of satisfaction of the user and can be often expressed by subjective evaluation such as the mean opinion score (MOS).

Since both QoS and QoE are necessary to provide a network service from one user(s) to the other(s), they should be seamless. QoE can be practically estimated by measuring low-level QoS parameters such as packet loss ratio and delay [6]. However, it is also true that modeling QoE is difficult in a realistic situation because it is subjectively evaluated and affected by several factors. Under these circumstances, it is important to bridge the QoS and QoE architectures.

In this letter, the histories of QoS and QoE are briefly reviewed to relate these two standardized concepts of service quality. Then the factors influencing QoE are analyzed. Finally, the importance of the modeling that bridges the QoS and QoE architectures is described.

## 2. Layered QoS Models

Before QoE is defined at the International Telecommunication Union Telecommunication Standardization Sector (ITU-T), only the concept of QoS has been used to manage the service quality of networking applications. Since the notion of QoS is sometimes elusive, confounding, and confusing, the QoS parameters are determined at each layer and layered QoS models are developed. One example of the layered QoS models is presented in Fig. 1.

The Resource QoS is defined as the resources to be allocated for a network flow or a media stream and can be separated into the Terminal Resource QoS and the

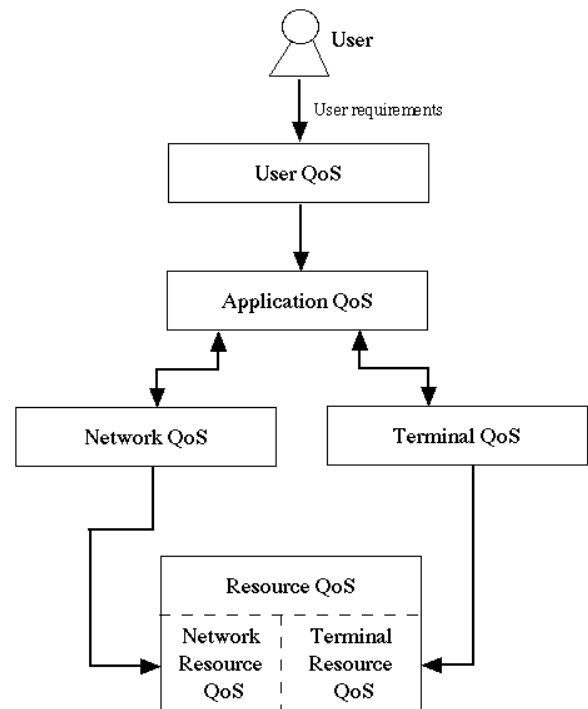


Fig. 1 A layered QoS model

Network Resource QoS. The Terminal Resource QoS includes CPU utilization and memory size, and the Network Resource QoS includes bandwidth and node buffer size.

The Network QoS is defined above the Resource QoS, which is the QoS required by the network for each media stream. This level of QoS is defined by network-level parameters such as throughput, delay, jitter, and loss rate.

The Terminal QoS is also defined by the parameters that operating systems deal with, such as a program thread scheduling period and a task processing time. The Terminal QoS is sometimes omitted and identified with the Terminal Resource QoS when the processing mechanism on the operating system is difficult to be managed at the level of the Terminal QoS.

At the application level, the Application QoS is specified for each media stream by the application-level parameters, e.g. the frame rate, frame size, quantization scale (if quantization is executed as a video compression coding), for video media.

Finally, at the user level, QoS is defined as the User QoS. The QoS viewed by the end-user is located at the top-level in the layered QoS model, because the degree of quality should be judged by the end-user ultimately.

As described above, the user satisfaction used to be regarded as a layer in the layered QoS models. The definition of QoE, however, is extended more widely to include the complete end-to-end system effects such as client, terminal, network and services infrastructure and may be influenced by user expectations and context [7] as shown in Fig.2. Compared with the User QoS in Fig. 1, QoE includes more environmental and personal factors and reflects the degree of each user satisfaction.

### 3. QoE Factors

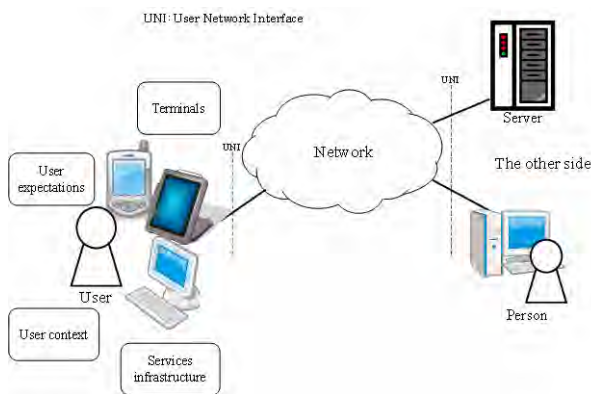


Fig. 2 The factors influencing QoE

In this letter, the factors that influence the end-user's service evaluation and do not belong to the system-side metric are collectively called QoE factors. General definition and categorization of the QoE factors are very difficult to be derived, because the service evaluation is possible to depend on individual expectations and context for the service utilization. Nevertheless, a few typical QoE factors are exemplified in the following.

#### 3.1 Service Type

Network services are categorized according to the type of content (information) delivered. At present, audio and video services are one of the most popular network services. In the future, additional services are expected to be developed; we need to consider the service quality criteria and control schemes for these services. One such network service deals with haptic media and assures educational or entertainment-related applications. Studies on haptic media are already underway along the viewpoints of sharing haptic feeling among network users, controlling QoE based on QoS parameters, and evaluation by the users [8].

Moreover, when the network service employs multiple transmission media to convey information to the users, it is preferable to consider the relationship and synchronization among different media that transfer service content. The compensational roles of audio and visual media and their effect on QoE have previously been studied [6]. Further, a total quality

evaluation function for audio and visual media has been proposed for IP-based TV conference services [9]. This function has been adopted by the telecommunication standardization sector (ITU-T) Recommendation G.1070.

#### 3.2 User Environment

Although it is controversial how to define the user environment, discussions on the user environment including the user terminal and the environmental physical situation (brightness, noise level, etc.) are important to provide an improved QoE. The definition for the user environment has not reached a consensus. However, it is important to discuss factors such as user environment, including the user terminal and the physical environmental parameters (brightness, noise level, etc.) to provide an improved QoE. We show one good instance for the user environmental condition, which was introduced as quality evaluation for IP telephony communication. It is the advantage factor, which consists of the R value calculated by the E-model in the ITU-T recommendation [10]. Although the advantage factor compensates the advantageous effect of communication mobility for subjective quality (satisfaction), there is no common standardized guide that defines the level of satisfaction. Therefore, the interpretation of the level of satisfaction with regard to mobility advantage must be investigated as a future QoE factor.

For the visual streaming service, in particular, QoE evaluation is another important factor considering the end-user. To explain this issue, Yamori et al. conducted subjective experimental evaluation in different environments by using portable user terminals [11]. In this study, they targeted the popularity of portable video players and portable receivers for one-segment broadcasting. Similarly, a new service is changing user domestic environments under the background of content delivery services via IP networks. Namely, these content delivery services including the IPTV service are becoming widespread for indoor and outdoor user environments. Therefore, accumulation of experimental data in various user environments is recommended for standardized QoE factors.

#### 3.3 Individual Adaptation

QoE standardization is discussed in ITU and models have been regularized for specific network services such as VoIP (Voice over IP) and IPTV. Because QoE evaluation is basically subjective, the methodology of subjective quality evaluation has also been studied with great enthusiasm. For example, with respect to the video service, which is one of the most popular network services, there are several established methods in ITU-R BT.500: double stimulus impairment scale (DSIS), double stimulus continuous quality scale (DSCQS), single stimulus continuous quality evaluation (SSCQE), and simultaneous double stimulus for continuous evaluation (SDSCE).

Such standardized models are useful, but just average. When more user-adaptive service and QoE

improvement are implemented, we have to include user situation into the models. For example, user requirement for the service quality depends on the psychological status of the user and situation such as in emergency or individual preference and habit; thus, individual adaptation is required to provide more adaptive service and improved service quality. In reality, it is very difficult to construct an adaptive user model that takes into account several factors about the user situation or preference. Interdisciplinary studies are necessary among fields such as engineering, psychology, and ethnology, to address this issue.

Marked user adaptation can be observed in the case of changing service content according to user ability. One instance is changing the reading speed. When an elderly person experiences difficulty in comprehending the voice content, the service provider should offer improved voice content with the same pitch and feature. As the result, the user can be provided with a satisfactory service. Another example is changing modality according to the ability of the user. In this service, a person with an impediment in some function, such as hearing or seeing, is provided the information converted into another form that can be comprehended by him/her. Because the information is easily accessible, it prevents deterioration of the service quality.

#### 4. A Challenge to bridge QoS and QoE

One purpose of constructing the QoE model is to manage and control the system-side resources to attain the user-side satisfaction as sufficiently as possible. Since there are several QoE factors that influence user satisfaction, it is quite hard to construct a bridging mechanism to relate the QoS parameters and the QoE factors. One solution for the difficulty is presented by Yamazaki et al. [12], where the QoE factors that have influence on user satisfaction are categorized. In addition, three psychological attributes of QoE were noted: end-user preference for the service content, time constraint and service cost.

Still, it is a challengeable issue to construct a model which bridges the QoS parameters and QoE factors.

#### 5. Conclusion

Recently, ideas such as user-centered design (UCD) are valued in various fields of research, development, education and so on. The approach based on QoE goes with the stream synchronizing the UCD.

It is desirable to realize personalized services where system resources are optimally allocated based on individual service requirements. The bridging mechanism is believed to relate the service requirements (the QoE factors) and the necessary resource amounts (the QoS parameters).

#### Acknowledgement

The author deeply appreciates the colleagues in Technical Committee on Communication Quality for their support and discussion.

#### Reference

- [1] Klara Nahrstedt and Ralf Steinmetz, "Resource Management in Multimedia Networked Systems, Handbook of Multimedia Networking," Jim Cavanagh (Ed), chapter 7.3, pp.153-162, LNCS 1209, Springer Verlag, Sept., 1997.
- [2] Shuji Tasaka and Yutaka Ishibashi, "A Performance Comparison of Single-Stream and Multi-Stream Approaches to Live Media Synchronization," *IEICE Trans. Commun.*, vol.E81-B, no.11, pp.1988-1997, Nov. 1998.
- [3] Kentarou Fukuda, Naoki Wakamiya, Masayuki Murata, and Hideo Miyahara, "Effective algorithms for multicast video transport to meet various QoS requirements," *IEICE Trans. Commun.*, vol.E81-B, no.8, pp.1599-1607, Aug. 1998.
- [4] Antony Richards, Mark Antoniadis, Varuni Witana, and Glynn Rogers, "Mapping user level QoS from a single parameter," *Proc. Second IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS'98)*, Versailles, Paris, Nov. 1998.
- [5] Jean-François Huard and Aurel A. Lazar, "On QoS mapping in multimedia networks," *Proc. 21<sup>th</sup> IEEE Annual International Computer Software and Application Conference (COMPSAC '97)*, Washington, D.C., Aug. 1997.
- [6] Shuji Tasaka, Jun Sako, and Yoshihiro Ito, "Enhancement of User-Level QoS in Audio-Video IP Transmission by Utilizing the Mutually Compensatory Property," *Proc. IEEE GLOBECOM 2006*, no.MMC02-1, San Francisco, CA, USA, Nov./Dec. 2006.
- [7] ITU-T Recommendation P.10/G.100 Amendment 1: New Appendix I – Definition of Quality of Experience (QoE), "Vocabulary for performance and quality of service," Jan. 2007.
- [8] Yutaka Ishibashi and Toshio Asano, "Media synchronization control with prediction in a remote haptic calligraphy system," *Proc. ACM SIGCHI ACE'07*, pp.79-86, June 2007.
- [9] Takanori Hayashi, Kazuhisa Yamagishi, Toshiko Tominaga, and Akira Takahashi, "Multimedia Quality Integration Function for Videophone Services," *Proc. IEEE GLOBECOM 2007*, PMQRS09-2, pp.2735-2739, Nov. 2007.
- [10] ITU-T Recommendation G.107, "The E-model, a computational model for use in transmission planning," March 2005.
- [11] Yohei Suda, Kyoko Yamori, and Yoshiaki Tanaka, "Content Clustering Based on Users' Subjective Evaluation," *Proc. 6<sup>th</sup> Asia-Pacific Symposium on Information and Telecommunication Technologies (APSITT 2005)*, no.A-4-2, Yangon, Myanmar, pp.177-182, Nov. 2005.
- [12] Tatsuya Yamazaki, Masato Eguchi, Takumi Miyoshi, and Kyoko Yamori, "A Service Quality Coordination Model Bridging QoS and QoE," *20<sup>th</sup> International Workshop on Quality of Service (IEEE/ACM IWQoS 2012)*, Coimbra, Portugal, June 2012.

# History of Research and Development of Optical Fibers

Masaharu Ohashi

Graduate School of Engineering, Osaka Prefecture University



## 1. Introduction

Since optical fiber with a loss of 20dB/km was achieved by Corning, 40 years have already passed [1]. Various optical fiber cable technologies such as the optical fiber fabrications, the optical fiber design and the measurements have been developed since then. Nowadays, optical fibers are mainly used for transmitting many different kinds of information. However, due to the various Internet services, the transmission capacity has been rapidly increased. Moreover, it is reported that the Internet traffic in Japan has increased with 20 % to 40 % in a year [2]. To break through the capacity crunch of the optical fiber network, space division multiplexing (SDM) has been proposed [3], [4]. Multi-core fibers (MCFs) and few-mode fibers (FMFs) which are the prominent candidates for SDM transmission with the ultra-high capacity have been investigated in the world.

This article describes history of the research and development regarding the optical fibers. Their standardization also reviewed. Moreover, the future perspectives of the optical fibers are presented from a viewpoint of ultra-high capacity transmission.

## 2. Optical fiber fabrication technologies and their loss reduction size

Briefly speaking, the history of the development of the optical fibers was a reduction of the transmission loss and an expansion of the transmission bandwidth. It can be said the research and development that aims at the transmission distance and the transmission capacity expansions [5].

Figure 1 shows the history of the optical fiber loss reduction. The optical fiber with a loss of 20 dB/km at 632.8 nm was realized by Kapron et al. [1] following Nishizawa's idea regarding optical waveguide and Kao's prediction [6]. Since then, optical loss reduction made progress rapidly and the ultimate loss of 0.20 dB/km was obtained within ten years.

The optical loss reduction originated from the improvements of the fabrication technologies such as the perform fabrication technology including OH-ion removal, the drawing technology and the design technology for the viscosity-matched fiber. The loss in the 1550 nm wavelength region was decreased to 0.148dB/km [7] near the theoretical loss limit as shown in Figure 1. On the other hand, the expansion of optical fiber bandwidth has been researched and developed as well as optical fiber loss reduction.

Figure 2 shows the important issues relevant to the

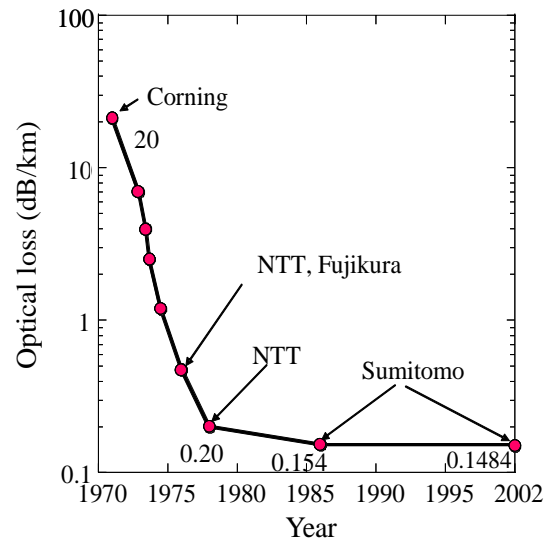


Fig. 1 History of optical loss reduction

optical fiber from 1960s to now. At first, multimode fibers with a step index profile were developed. Soon, the graded-index multimode fibers were developed owing to the fabrication improvement in controlling the technique of the index profile. In the meantime, the development of single-mode fibers (SMFs) were expected to expand the transmission capacity further because SMFs without modal dispersions have large bandwidths compared with multimode fibers. Much efforts were made to the fabrication techniques and splicing methods for SMFs. In 1983, NTT introduced commercially the optical transmission systems by using SMFs for the first time. Afterwards, it moved to the research and development of 1550 nm wavelength optical transmission system that can expand the transmission distance by applying the SM fiber to 1550 nm wavelength region where the optical loss is

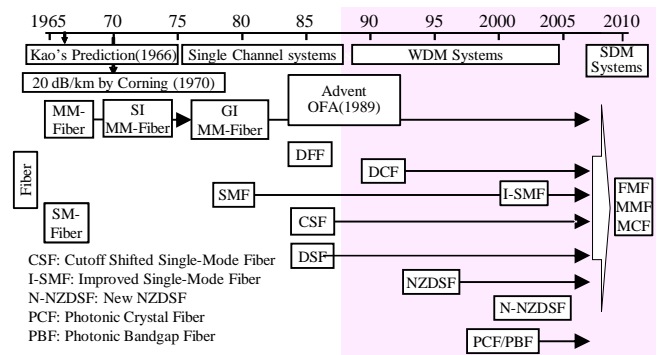


Fig. 2 Development of optical fiber



minimum. Dispersion compensating fiber (DCF) was developed, which compensates the chromatic dispersion of SM fiber at 1550 nm. Cutoff shifted optical fiber (CSF) whose cutoff wavelength is shifted to the longer wavelength for low macro-bending loss was also developed, and was introduced into the submarine cable systems to expand the transmission distance.

Dispersion-shift fibers (DSFs), which have low chromatic dispersions and low losses in the 1550 nm wavelength region, were developed at the same time for the same purpose. Figure 3 shows the history of the development of the DSFs. The study points of DSFs were as follows; 1) a low-loss at the steady state, 2) a

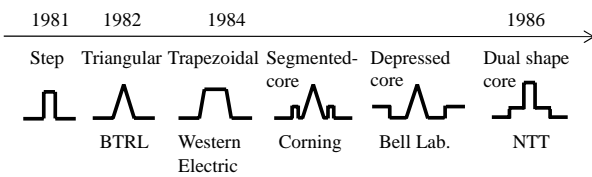


Fig. 3 History of development of DSFs

small macro-bending loss, 3) a low-splice loss (large mode field diameter (MFD)). In 1984, the segmented core DSF [8] whose index profile has a ring outside a single core was proposed by Corning. Segmented core DSF has the larger MFD and the lower bending loss by utilizing the mode coupling between a core and a ring. In 1986, NTT proposed a new DSF with a dual shape core (DSC: Dual Shape Core) [9] which is in no way inferior to the segmented core DSF. DSC DSF has the large MFD, low macro-bending loss and the good dispersion controllability. At present, the segment core and DSC DSFs are mainly used in the world. At that time, dispersion flattened fiber (DFF) with a low dispersion at the both 1300 and 1550 nm wavelengths was developed. However, DFFs were not introduced for a practical use.

Since 1989 the research and development of the WDM systems have been advanced due to an invention of an optical fiber amplifier [10]. The main problem in the WDM system was the nonlinear phenomenon, called four wave mixing (FWM). The FWM suppression methods are as follows; 1) low-power density of the signal, 2) appropriate value of chromatic dispersion in the operating wavelength. From a viewpoint of nonlinear effect suppression in WDM systems, the nonzero dispersion-shifted fiber (NZDSF)

was proposed by USA [11]. Large effective area fibers (LEAFs) were also proposed for the nonlinear effect suppression.

Figure 4 shows the refractive-index profiles of the optical fibers that have been developed so far. In 1995, Dr. Birk of Southernpton University proposed the application to the optical fiber of a photonic crystal. The fabricated photonic crystal fiber was reported in 1996 [12]. Since 1996, the photonic crystal optical fiber has been researched and developed in the world. There are two different kinds of photonic crystal fiber. One is an optical fiber called photonic crystal fiber (PCF) or holey fiber (HF) that confines light by total reflection as well as a conventional optical fiber. On the other hand, there is photonic band gap fiber (PBGF) that confines light in the core by utilizing the photonic band gap without using total reflection. Transmission properties of both photonic crystal fibers are different from those of conventional fibers. Because these optical fibers have an enough potential as the fiber type devices and the transmission lines, the research and development has been preceded.

**3. History of international standardization of optical fibers**

Since 1977, international standardization has been started by CCITT according to the development of optical fibers. Since then, many Recommendations relevant to the optical fibers have been published [13].

The research phase of the optical transmission systems started around 1975. The enormous progress realized over the 30-year period from 1975 can be grouped in several phases [14]. Table 1 lists the history of the international standardization regarding the optical transmission system from a viewpoint of Recommendations of optical fibers and optical systems. Over this time period the BL product (B is the bit rate and L is the repeater spacing) doubled every year. In each phase, BL increased initially but began to saturate as the technology matured. In each phase, optical fiber cable technologies have given the revolutionary and /or fundamental change to the optical transmission system and they are evolving now.

Recommendations relevant to the optical fibers describe the geometrical characteristics, the optical transmission characteristic, and the mechanical property of various types of the optical fiber. Recommendations G.650.1, G.650.2, and G.650.3 are dealing with definitions of technical terms and the test methods for measuring the transmission characteristics of the optical fibers.

Fiber Recommendations describe three categories for specifying a geometrical transmission characteristic and a mechanical parameter of the optical fiber and the optical fiber cable. That is, fiber Recommendation contains three attributes for the optical fiber, the optical fiber cable, and the optical fiber link.

In the characteristic of the optical fiber, the geometrical parameters such as MFD, cladding diameter, core concentricity error and the transmission parameters such as the cutoff wavelength, the

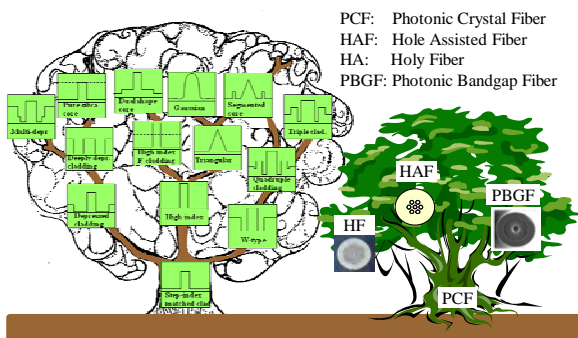


Fig. 4 Refractive-index of the fiber

macrobending loss, and the chromatic dispersion coefficient are specified in fiber Recommendations.

Table 1 History of the international standardization of the optical transmission systems

| Phase           | Developed systems  | Recommendation fibers and systems  |
|-----------------|--|--|
| 1 <sup>st</sup> | Light wave systems with MMFs.<br>- Repeater spacing : up to 10 km<br>- Bit rate: 34-45 Mbit/s<br>- Operating wavelength: 850 nm  | G.651<br>G.956<br>(now G.955)  |
| 2 <sup>nd</sup> | Light wave systems with SMFs.<br>- Repeater spacing: 40 km<br>- Bit rate : 100 Mbit/s<br>- Operating wavelength: 1300 nm   | G.652<br>G.957, G.956<br>(now G.955)   |
| 3 <sup>rd</sup> | 1550 nm wavelength light wave systems with SMFs.<br>- Repeater spacing: 120 km<br>- Bit rate: 2.5Gbit/s<br>- Operating wavelength: 1550 nm   | G.652,G.653,<br>G.654<br>G.955 (ex-G.956),<br>G.957, G.974                                     |
| 4 <sup>th</sup> | Light wave systems utilizing WDM and OAs<br>- Repeater spacing: 80 km<br>- Bit rate: 2.5Gbit/s<br>- Operating wavelength: C band   | G.655<br>G.694.1, G.694.2,<br>G.959.1, G.698.1,<br>G.698.2, G.696.1,<br>G.695, G.973,<br>G.977 |
| 5 <sup>th</sup> | Increase of the capacity transmitted on an optical fiber<br>- reducing the channel spacing<br>- expansion of operating wavelength range<br>- increase of the bit rate of each channel within the WDM signal<br>Optical fiber access systems for FTTH | G.656<br>G.959.1, G.680  |

As for the transmission characteristic of the optical fiber cable, the optical fiber loss and the polarization mode dispersion coefficient are specified as the optical fiber transmission characteristics influenced during the cable fabrication process. The optical fiber loss is specified by the maximum value by one or more of 1310 nm and 1550 nm wavelengths. The cabled fiber polarization mode dispersion coefficient is specified on a statistical basis, not on an individual fiber basis. Its specified parameter is defined as a link design value (PMD<sub>Q</sub>). The requirements pertain only to the aspect of the link calculated from cable information.

The link attributes of the optical fiber cables should consider not only the characteristic of the transmission parameter of individual length of the cable of the connected optical fiber cable but also a statistical effect of the splice. The characteristic of the link describes the calculation method of the loss of the link, the calculation method of the chromatic dispersion, maximum PMD<sub>Q</sub>, the link length, and maximum DGD and the transmission speed in the appendix as information.

#### 4. Future perspectives

As mentioned above, Internet traffic in Japan is increasing now. Since 2008, the study of new optical transmission technologies has been started taking account of the present situation for the traffic increase., 3M technologies [3], [4] such as SDM technology utilizing MCFs, mode division multiplexing (MDM)

technology by utilizing FMFs and multilevel modulation technology have been proposed to realize the optical transmission systems with ultra large capacity. New fiber design for SDM systems as shown in Table 1, new optical devices such as fan in and fan out devices and optical amplifiers, and measurement techniques for new fibers have been investigated. SDM systems including MDM with a capacity of P bit/s and or E bit/s will be realized owing to the research and development of 3M technologies in future.

#### 5. Conclusion

The history and future perspectives of the optical fibers were described. The existing optical fiber cables face the transmission limitation for an increase in the amount of traffic in the future. To break through the capacity crunch of the optical fiber network, SDM systems utilizing MCFs and FMFs has been developed. In future, SDM systems with a capacity of E bit/s will be realized with 3M technologies.

#### 6. References

- [1] F. P. Kapron, D.B. Keck and R.D. Maurer, "Radiation losses in glass optical waveguide," *Applied Physics Lett.*, vol. 17, pp. 423-425, 1970.
- [2] [http://www.soumu.go.jp/menu\\_news/s-news/25387.html](http://www.soumu.go.jp/menu_news/s-news/25387.html)
- [3] T. Morioka, "New generation optical infrastructure technologies: "EXAT initiative: towards 2020 and beyond," *OECC2009, FT4*, 2009.
- [4] M. Nakazawa, "Giant leaps in optical communication technologies towards 2030 and beyond," *ECOC2010, Plenary Talk*.
- [5] M. Ohashi, "Optical fibers: history and future perspectives," *OECC2010*, pp.34-36, 2010.
- [6] K. C. Kao and G. A. Hockman, "Dielectric fiber surface waveguides for optical frequencies," *IEE Proc. Optoelectron.*, vol. 133, pp. 1151-1158, 1966.
- [7] K. Nagayama, M. Kakui, et al., "Ultra-low-loss (0.1484 dB/km) pure silica core fibre and extension of transmission distance," *Electron. Lett.*, vol. 38, pp.1168-1169, 2002.
- [8] V. A. Bhagavatula, M. S. Spatz, and W. F. Love, "Dispersion-shifted segmented-core single-mode fibers," *Opt. Lett.*, vol. 9, pp. 186-188, 1984.
- [9] M. Ohashi, N. Kuwaki et. al., "Bend-optimised dispersion-shifted step-shaped-index (SSI) fibres," *Electron. Lett.*, vol. 22, pp. 1285-1286, 1986.
- [10] K. Hagimoto, M. Nakazawa, et. al., "A 212-km non-repeated transmission experiment at 1.8 Gb/s using LD pumped Er<sup>3+</sup>-doped fiber amplifiers in an IM/DD repeater systems," *OFC'89, PD 15*, 1989.
- [11] US Patent 5,327,516.
- [12] T. A. Birks, P. J. Roberts et. al., "Full 2-D photonic band gap in silica/air structures," *Electron. Lett.*, vol. 31, pp.1941-1942, 1995.
- [13] <http://www.itu.int/en/ITU-T/studygroups/2013-2016/15/Pages/default.aspx>
- [14] ITU-T Supplement G Sup.42.



# Introduction to Mitsubishi Electric R&D Centre Europe

Kazuo Seo, President  
Mitsubishi Electric R&D Centre Europe, B.V.



## 1. Introduction

Mitsubishi Electric R&D Centre Europe (MERCE) is the European R&D centre from the Corporate R&D organisation of Mitsubishi Electric Corporation (MELCO). The aim of our centre is to provide advanced R&D support to the Japanese R&D centres and to the business units of MELCO.

Situated at the heart of Europe's leading R&D community, MERCE has two entities MERCE-France and MERCE-UK, and conducts R&D into next generation communication system and recently technologies related to energy and environment.

Our industrial research aims at increasing reliability, efficiency and quality of the different solutions for higher profitability and growth of the company.

The industrial research laboratory was established in Europe on November 1995 and was named Information Technology Centre Europe (ITE).

On 1<sup>st</sup> October 2008, ITE officially changed its name to MERCE to act the new mission and strategy of our centre to contribute not only to communication but also to a brand new activity dedicated to energy and environment.

## 2. MERCE-France

MERCE-France is located in RENNES (Fig. 1), which is the capital of Bretagne. MERCE-France is developing innovative technologies for both communication systems and sustainable energy systems.



Fig. 1 MERCE-France in RENNES

As an open European centre, MERCE-France collaborates with other research organizations and puts lots of effort into joint research and development programs with other actors in the framework of French and European research projects.

### (1) Communication technologies

MELCO is a key player in the information and communication technologies (ICT) industry, providing both access and backbone systems for optical networks as well as a variety of offerings for satellite and

terrestrial communications systems. In order to meet the future demands of ICT-based consumer and professional applications, MERCE-France develops scalable communication technologies and reliable software methodologies. This involves the design of innovative wireless and wired communication components and architectures answering the needs of system efficiency and network resilience. This also implies the anticipation of disruptive software development processes and tools using formal methods to meet safety-critical system requirements.

In particular, we develop advanced physical layer technologies (modulation, coding, channel estimation, equalization) with the aim to provide high throughput with a strong robustness to the degradations occurring in a wireless propagation environment. We also design higher layer communication technologies, protocols and network architectures to answer the needs of system reliability, security and convergence in fully connected networks. On software methodologies, we use mathematics and formalisms to prove the software correctness through the whole development process, from the functional specification to the code generation.

Our activities range from the initial concept design to the demonstration of technologies in an integrated system. Our target applications cover four main areas: railway, satellite, automotive and access networks (Fig. 2).

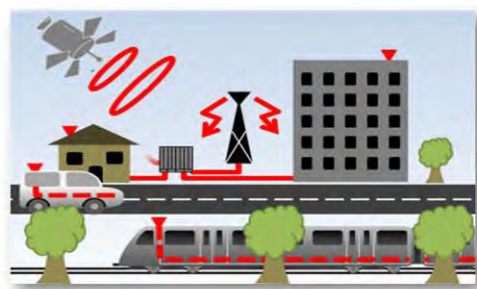


Fig. 2 Target applications

We are strongly connected to the international standardization organizations (e.g., IEC, DVB, ETSI, ITU-T, 3GPP) in order to contribute to the design of the future generations of products in a global market.

Believing in open innovation, we are continuously engaged in a number of bilateral and multilateral collaborations at national, European and international levels.

### (2) Power Electronics technologies

The expertise of our team lies in the area of system design applied to novel power electronic topologies

required to meet the demands of 3<sup>rd</sup> millennium sustainable energy era. This involves the design of new power converter topologies, using original architectures and integration means, but also smart control mechanisms to tackle complex systems such as photovoltaic farms, air conditioners in big buildings, heterogeneous power networks, etc. We are also active in the domain of power module reliability and robustness.

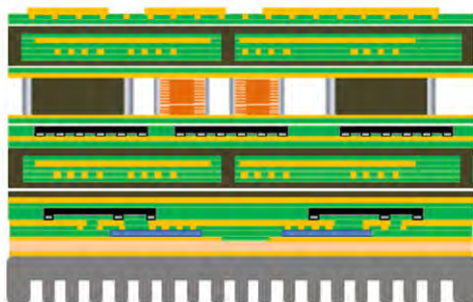


Fig. 3 Highly integrated converter

Our converter developments target applications ranging from Automotive to Power Transmission. We are continuously developing our capabilities for Multi-Domain Optimization of power conversion equipment. We are also looking into converter integration techniques (Fig. 3) that permit a very significant performance improvement in an environment where cost is of increasing importance. We are autonomous in the fast prototyping of power circuits, from simulation down to the design, making and testing prototypes in both open and closed loop.

We are developing technologies for enhanced power module reliability together with architectures and algorithms for extended power module robustness. Our Power Cycling platform has unique capabilities for power modules and permits us to produce high precision models for power assemblies that use advanced materials and constructions.

### 3. MERCE-UK

The company relocated the UK branch (MERCE-UK) in late 2011 from the south of England to the site of M-ACE (Mitsubishi Air Conditioning Systems Europe) in Livingston, Scotland (Fig. 4). M-ACE is the European factory for production of air-conditioning systems. The Scottish facility is the only MELCO site in the world to have the manufacturing and R&D functions operating side by side, and the firm is implementing plans for expansion in terms of research & development, design engineering and production.

MERCE-UK now performs product-focused research in the area of energy and environment, focusing on heating, ventilation and air-conditioning systems (HVACS). Specifically targeted are advances in air source heat pump renewable energy heating systems.

A new world-class research and development facility was officially opened in Livingston in July 2013. This R&D capability is known as the House-type HVACS Evaluation Facility and is being used for measuring the detailed environmental conditions of temperature and

humidity within actual domestic buildings and for in depth monitoring of the operation of the heating systems.



Fig. 4 MERCE-UK in Livingston

The Facility (Fig. 5) consists of two custom-built, two storey, three bedroom detached houses, along with a bespoke experimental control room. Each house is modified by the installation of a vast array of sensors, the total sensor suite encompasses approximately 1400 measurement locations across the two houses. The total capital investment for the buildings and equipment is 700,000 GBP.



Fig. 5 House-type HVACS Evaluation Facility

The presence of two houses allows for the direct comparison of different heating systems, examination of the effect of different control methods, as well as ensuring that results obtained are reliable, due to the presence of a reference building and an experimental building.

R&D activities at the Facility are being undertaken by MERCE-UK, in collaboration with the factory. This close co-operation between research and manufacturing speeds up the product development cycle.

MERCE-UK is also developing sophisticated numerical models of the components, heating systems and test buildings. These models are refined by use of experimental results. Simulations can then be used to predict performance for heating systems in other building types and for development of new components, heat pump products and heating systems.

As an R&D unit, the Livingston branch is engaged with key UK and European academic institutions, including Heriot-Watt University, in Edinburgh, and the University of Cambridge.

### 4. Reference

- [1] <http://www.mitsubishielectric-rce.eu>

# Pursuing a PhD in the Country That Made Me Love Engineering

Filippos Balasis  
Waseda University



## 1. Introduction

When I was asked to write an article for IEICE CS GLOBAL NEWSLETTER I felt excitement and a bit anxious at the same time because, apart from technical papers for conferences and journals, this was the first time I was requested to write something more personal, like my experience of making research in Japan, and then have it published.

But firstly, a short introduction of myself. My name is Filippos Balasis. I was born and lived in Athens, Greece, studied electrical engineering in National Technical University of Athens (NTUA) and after fulfilling my military service I worked as an engineer in OTE, which is the equivalent of the "Greek NTT". After getting the MEXT (Ministry of Education, Culture, Sports, Science, and Technology) scholarship I managed to come to Japan in April 2011. I entered Professor Yoshiaki Tanaka's laboratory in graduate school of GITS, Waseda University and I have been a member of this laboratory ever since. In September 2013 I graduated from the Master course of GITS and I am currently pursuing my PhD, focusing on design and control of heterogeneous and elastic optical networks. More than three and a half years have passed since I first landed in Japan. Time really flies.

## 2. Why and how I ended up in Japan

"Why are you here and what are you doing in Japan?". This is probably the most frequent question for any foreigner in Japan. In my case, I usually reply with "doing graduate studies" or "research" but honestly, these typical answers do not do justice to how much or how long I felt the urge to come to Japan. Perhaps my first exposure to Japanese culture was before I even learned to talk and you have guessed right what that might be; Japanese animation. Even though I did not know the word "Japan" at that time I could instantly feel that these animated series I was watching fascinated for hours in TV were different than the other shows. Their artistic style, their storytelling, the emotional expression of the characters, all of these indicated that these series were from somewhere...else. I am now convinced that the teenage version of myself who decided that wanted to become an engineer owes a lot to that kid that was thrilled watching aircrafts transforming into huge robots. After all, imagination is an essential feature of an engineer's way of thinking, especially if he or she is conducting research. As I grew up I got to know other aspects of Japan as well. Kurosawa, Takemitsu and Miyazaki are names that

have deep emotional impact on me. All the above combined with the exotic culture and history of Japan had made me determined to once visit this unique country.

However, admiration for a country's culture is not enough of a reason for me to pursue graduate studies. The determining factor that drove me to this decision is the obvious one, Japan is in the forefront of science and technology. In fact, the addition of this year's winners of Physics Nobel prize to the list of the Japanese Nobel laureates is just a drop in the bucket of how much Japan has contributed to the scientific world the last one hundred years. Innovation and cutting edge are words that first come to mind when someone thinks of Japanese companies and industry in general. This became more evident to me while I was writing my bachelor thesis concerning ultra fast photonics where I was astonished by how many Japanese names were in the references that I had cited. Therefore doing research in Japan became a goal of mine and getting the MEXT scholarship was an important step towards fulfilling it.

## 3. Japan from my perspective

I arrived to Japan about a month after the big earthquake of 2011. I remember at that time you could hardly spot a foreigner in the center of Tokyo mostly due to hysteria of the foreign media. However, the calmness, solidarity and strong spirit that the Japanese showed during this big catastrophe were deeply inspiring to me. Moreover, the politeness and friendliness of the people and the omnipresent feeling of safety were far beyond my expectations. It reminded me of Yakumo Koizumi's (aka Lafcadio Hearn) description of Japan as a "fairlyland populated with the most lovable people in the universe", the closest thing to an Utopian society [1]. This helped me a lot to adapt fast in the daily life and concentrate on my studies.

Japan is unique in so many ways and that was slowly unraveled to me through daily life. Based on my experiences in Japan, if I had to find a short phrase that conveys the essence of Japanese culture that would be perfection through simplicity. In Japan I learned that these two concepts are inherently tied, as if you cannot achieve one without the other. There is an imposing elegance and at the same time a minimalism in almost every element of modern Japan. In its cuisine, in the architecture and the interior of the houses, in the gardens, in the martial arts, even in calligraphy. There seems to be an underlying philosophy of pursuing the best possible result through minimum effort and the



perfect technique. From my point of view it is very similar to the case of mathematics where the simplest and shortest proof of a theorem is also considered as the most beautiful.

#### 4. Road to the doctorate and memorable moments

Before coming to Japan I was not completely sure which course was more suitable for me, master course or doctor course. Although the idea of conducting research in a PhD course was very appealing to me, I was not feeling confident of entering one because a high quality research output is never guaranteed and the risk of not graduating is quite high. On the other hand, I was not fond of studying in a typical master program where you get superficial knowledge in a variety of subjects. Fortunately my university was offering a two-year research oriented master program in my field where conference publications were the basic requirements for graduation. This program offered me the chance to test myself in research and see whether I was capable of entering the doctor course. Before even its completion I had made the decision to proceed to PhD. I had the feeling that if did not enter the PhD course my research would remain unfinished and my goal unfulfilled.

Does this mean that I regard the doctor course as a simple task? Definitely not. This path is full of disappointments whether it is the case of a rejected paper, unsatisfying results or seeing a new novel idea of yours being already published. No doubt that during these difficult situations any foreign PhD candidate will wonder whether he or she made the right choice by being in a laboratory room thousands kilometers away from family and friends instead of working and making some decent money. Nevertheless, these bitter moments can be outweighed by the sheer joy of every substantial step towards graduation.

Personally, I make use of the two most memorable moments of my stay in Japan in order to boost my confidence and keep my moral high. The first one is winning the IEICE Young Researcher's award for two papers published in 2013 IEICE General Conference and 2013 IEICE Society Conference [2][3]. Receiving this award was an encouraging sign that hard personal work combined with the wise guidance of my supervisor had started to bear fruit.

The second one is the climbing of Mount Fuji in the summer of 2013. But it wasn't the regular way of climbing that the majority do. It was a journey of almost 50 kilometers from the sea of Shizuoka Prefecture to the summit of Mount Fuji in about 22 hours. Me and a friend of mine followed the exact same route as in [4] but we did it by ourselves and not as participants in this yearly charity event. Honestly, I cannot remember if I had pushed myself to that extent before, physically as well as mentally. Before the trip's departure I had poor sleep for three consecutive days due to busy schedule and I remember my body telling me to quit from the first even hour of hiking. To make things even worse, heavy rain had started to fall shortly after our departure and wearing a rain coat did not do

much from getting completely soaked. However, I will never forget that exhilarating sense of accomplishment once I reached the summit. Overall it was an experience that I will remember for the rest of my life and I like to think it as a parallel to my current "journey" of PhD course.



Fig. 1 Ceremony of IEICE Young Researcher's Award in Niigata, 2014



Fig. 2 At the summit of Mount Fuji

#### 5. Conclusion

Closing, I would like to thank the editors of IEICE-CS GLOBAL NEWSLETTER for giving the chance to share my perspective of living and studying in Japan. I must say that I really enjoyed the process of writing this article as it made me relive some favorite personal moments and I hope the readers find it enjoyable as well.

#### 6. Reference

- [1] [http://www.nytimes.com/2007/02/20/world/asia/2-Omatsue.html?ref=world&\\_r=0](http://www.nytimes.com/2007/02/20/world/asia/2-Omatsue.html?ref=world&_r=0)
- [2] F.Balasis, X.Wang, S.Xu, and Y.Tanaka, "Offline Impairment-Aware RWA and Regenerator Placement in Optical Networks with Mixed Line Rates", 2013 IEICE General Conference, No.BS-1-47, pp.S-92-S-93, March 2013.
- [3] F.Balasis, X.Wang, S.Xu, and Y.Tanaka, "Traffic Grooming in Wavelength Switched Optical Networks with Mixed Line Rates", 2013 IEICE Communications Society Conference, September 2013.
- [4] <http://www.sea-to-summit.org/about-sea-to-summit>

# Report on Communications Society Special Talk and Awards Ceremony at 2014 IEICE Society Conference

Tadao Nakagawa Kiyoshi Ueda

Director of General Affairs, IEICE Communications Society



## 1. Introduction

This report gives an overview of the Communications Society Special Talk and Awards Ceremony, which was held on 24 September 2014 during the 2014 IEICE Society Conference at University of Tokushima, Tokushima, Japan.

During the awards ceremony, two awards were presented by Dr. Kou Miyake, President of the Communications Society: the Outstanding Contribution Award and the Distinguished Contribution Award.

The special talk for this year was “*Essentials of the Japanese Academic Backbone Network*” by Prof. Shigeo Urushidani, National Institute of Informatics, Tokyo.

Communications Society. Ninety eight members were awarded for their contributions prior to 2014.



Fig. 1 Participants in the Special Talk and Awards Ceremony at the 2014 IEICE Society Conference



Fig. 2 Opening remarks by Dr. Kou Miyake, President of the Communications Society

## 2. Awards Ceremony

The Outstanding Contribution Award was presented for the chairing technical committees and chief editor services on the Editorial Boards of *Transactions on Communications* and *Communications Society Magazine*. Eighteen members were awarded for their services prior to 2014. The Distinguished Contribution Award was presented for extraordinary planning activities and voluntary paper reviewing in the



Fig. 3 Distinguished Contribution Award presented by President Kou Miyake

### 3. Special Talk

A technical lecture was arranged for the special talk.

Prof. Urushidani's lecture was titled "*Essentials of the Japanese Academic Backbone Network*". He began by presenting features of the Japanese academic backbone network, which is called the Science Information Network (SINET). SINET provides a variety of network services with high data rate and high reliability to support research and education activities for more than 800 universities and research institutions. The maximum speed of the link in SINET is 40 Gbps. When the Great East Japan Earthquake occurred in 2011, SINET didn't stop working due to its highly reliable network architecture. Prof. Urushidani showed a wide range of examples of research activities that use SINET, including earthquake seismology, high-energy physics, nuclear fusion science, supercomputing projects, astronomy, and high-resolution video transmission. He concluded by describing the next-generation SINET, which is scheduled to go into service in 2016. It will employ 100-Gbps technology and dark fibers to enhance scalability. It will also utilize SDN technology to support flexible on-demand services.



Fig. 5 Closing remarks by Prof. Masahiro Umehira, President-Elect of Communications Society



Fig. 4 Special talk by Prof. Shigeo Urushidani, National Institute of Informatics

### 4. Conclusions

This report gave an overview of the Communications Society Special Talk and Awards Ceremony. The Communications Society supports members' activities in the field of communications by presenting awards for contributions.

The ceremony was concluded with closing remarks by Prof. Masahiro Umehira, President-Elect of the Communications Society.



# IEICE Fellow Conferred on 11 IEICE-CS Members

Takashi Dateki  
 Director of Planning and Member Activities,  
 IEICE Communications Society



## 1. Introduction

The title of IEICE Fellow is conferred on IEICE members who are recognized as having made a significant contribution to the institute in academic, technical or related fields. In 2014, IEICE Fellow is conferred on 28 IEICE members including 11 from Communications Society (CS) who are listed in Table 1.

## 2. The Conferment Ceremony

On 24<sup>th</sup> September during IEICE Society Conference 2014 in Tokushima, the 15<sup>th</sup> Fellow Conferment Ceremony was held (Fig.1). In the Ceremony, Dr. Yoshinori Sakai, the president of IEICE handed a fellow badge and a certification plate to each new Fellow.

## 3. Contribution to the GLOBAL NEWSLETTER

As a part of Fellows' continuing contribution to the IEICE, Prof. Ohashi and Prof. Yamazaki have already contributed their articles to IEICE-CS GLOBAL NEWSLETTER and I hope other fellows will follow.

Table 1 New IEICE Fellows from Communications Society

| Name           | Contribution contents   |
|----------------|---|
| Masazumi UEBA  | For Contributions to Research and Development of Multi-beam Forming and Allocation Technologies in Satellite Communications |
| Noboru EDAGAWA | For Contributions to Development of High-Capacity Optical Submarine Cable Systems Using Optical Amplifiers                  |

|                    |  |
|--------------------|--|
| Masaharu OHASHI    | For Contributions to Research and Development of Optical Fiber Design and Measurement Techniques, and International Standardization                |
| Toshiaki KOZU      | For Contributions to Research and Development of Spaceborne Radar Technologies for Remote Sensing of Rain and Other Natural Targets                |
| Takuro SATO        | For Contributions to Research and Development of Wideband CDMA and Its Global Standardization  |
| Masaharu TAKAHASHI | For Contributions to Research on Antennas for RFID and Body Centric Wireless Communications  |
| Tetsuo TSUJIOKA    | For Contributions to Development of Technical Committee Submission System and Its Operation  |
| Jiro HIROKAWA      | For Contributions to Research on Millimeter-wave High-gain High-efficiency Waveguide Planar Antennas   |
| Takashi MIZUOCHI   | For Contributions to Research and Development of Optical Communication Systems Employing Forward Error Correction and Its Practical Implementation |
| Hisashi MORISHITA  | For Contributions to Research on Practical Design Method of Small Antennas for Mobile Handsets   |
| Tatsuya YAMAZAKI   | For Contributions to Research and Development of Service Quality Control and Service Quality Management in Information Networks                    |

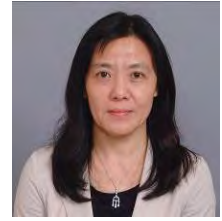


Fig. 1 Photo in the Fellow Conferment Ceremony with Dr. Y. Sakai, President of IEICE and Dr. K. Miyake, President of IEICE Communications Society

# ASN Special Session in the 20<sup>th</sup> Asia-Pacific Conference on Communications (APCC2014)

Bing Zhang

National Institute of Information and Communications Technology



## 1. Introduction

Technical Committee on Ambient Intelligence and Sensor Networks (ASN) aims at processing, analyzing, and applying sensing data for enhancement or assistance for human activities, which is called "Ambient Intelligence". Not only developments of technologies supporting the ambient intelligence such as sensor networks but also to look ahead to industry applications are important for ambient-intelligence contributions to social-infrastructure progressions.

From the above points of view, a special session on emerging technologies for next generation ambient intelligence and sensor networks was organized and chaired by ASN technical committee on 2 October, 2014 in the 20<sup>th</sup> Asia-Pacific Conference on Communications (APCC2014) [1,2]. This special session focused on gathering ambient information from peoples, products, and sensing devices for real space. Sensing data should be processed, analyzed, and applied for enhancement or assistance for human activities, which is called ambient intelligence. Ambient sensor networks (ASNs) are the sensor networks interactively cooperating with ambient intelligence. It is expected that gentle social environments such as efficient electric power usage in smart grids and effective transportation systems will be established through the ambient sensor networks. Applied researches have been promoted in the field of technologies supporting the ambient sensor networks. Toward future generation, it is important to support such progressing technologies and promote further collaboration with other fields.

## 2. ASN Special Session in APCC 2014

ASN special session was held on the second day of APCC2014, in which two sessions were organized from 13:00 to 16:40 on 2 October. In the first part of ASN special session, an invited talk was presented by Dr. Apichon Witayangkurn from Asian Institute of Technology. Dr. Witayangkurn gave an invited speech on cloud-based sensor web service with field server for environment and agriculture, which was interesting and deep concern to audiences. In the same session, four presenters also gave their presentations related to the ambient intelligence and sensor networks. In the second part of ASN special session, Prof. Jin Mitsugi from Keio University gave an invited speech on multiple subcarriers communications for battery-less health check of machinery. Similarly to the first part of ASN special session, four presenters also gave their

presentations on the ambient intelligence and sensor networks.



Fig. 1 Presentation in ASN special session



Fig. 2 A photo of ASN special session in APCC2014

## 3. Future plan

Through this successful experience organizing a special session in APCC, ASN technical committee is planning to organize another special session in the next APCC, held at Kyoto, Japan in 2015.

## 4. Reference

- [1] <http://www.apcc2014.org/content/sample/>
- [2] T. Shimizu and Y. Ishikawa, "Report on the 20<sup>th</sup> Asia-Pacific Conference on Communications (APCC2014)," IEICE Communications Society GLOBAL NEWSLETTER, Vol.38, No.4, pp.20-21, Dec. 2014.

# Report on ICM English Session at 2014 IEICE Society Conference



## – BS-6. Network and Service Design, Control and Management –

Kyoko Yamori  
Faculty of Business Administration, Asahi University

### 1. Introduction

The 2014 IEICE Society Conference was held at University of Tokushima in Tokushima, on September 23-26, 2014, where three Societies of Engineering Sciences Society (ESS), Communications Society (CS), and Electronics Society (ES) joined. 18 Symposium Sessions and 65 General Sessions were held. The number of registered participants reached about 4,300 in total.

In the Conference, the IEICE Technical Committee on “Information and Communication Management (ICM)[1]” hosted a full English Session entitled “Network and Service Design, Control and Management” as one of 18 Symposium Sessions which focused on special topics of advanced technologies.

### 2. Background of ICM English Session

ICM has been hosting English session every year since 2004. The purpose of this English session is to contribute to the globalization of IEICE by offering the chance of the presentation and discussion in English to “the foreign researchers / students in the living in Japan” and “the overseas researchers / students”.

Figure 1 shows the change in the number of contribution papers since 2004. When the session began in 2004, only 15 papers were submitted. The number of papers has gradually increased, and it reached 55 papers in last year. It reduced by 35% this year compared to last year. We need to clarify the cause of this. The holding period of the session in the 2004 was one and half days, and the holding period of the session in this year was 4 days which was the same as the period of the IEICE Society Conference.

### 3. Presentations in ICM English Session

The contribution papers were classified into 9 sub-sessions according to the topics and set up every day during the Society Conference. Various topics are discussed in each sub-session every year. Figure 2 shows the number of papers corresponding to their topics. 12 papers were especially concerning wireless systems / networks, MIMO, and access point control in this year. These topics stem from an explosive spread of a smart phone, and for the Great East Japan

Earthquake, etc. Some topics covering the application layer such as information centric networks, application & services and data centers were also discussed. Topics of optical networks, network management, and QoS also had a lot of discussions as in the ordinary year.

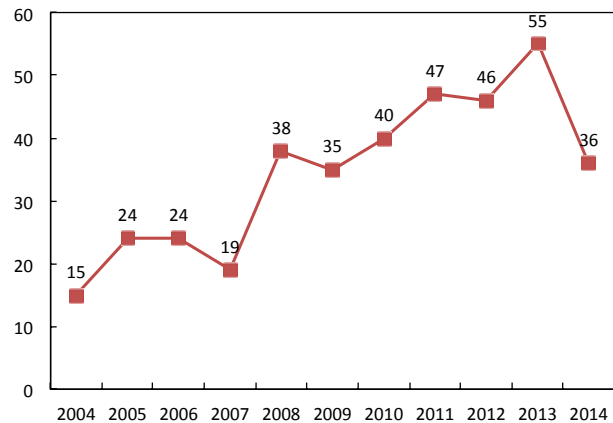


Fig. 1 The number of contribution papers since 2004

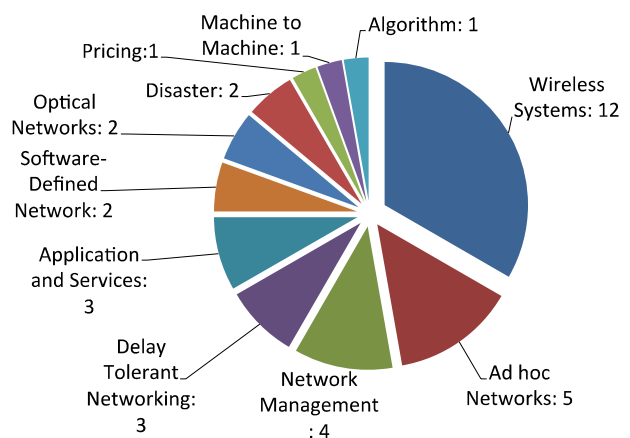


Fig. 2 The number of contribution papers corresponding to their topics



#### 4. Authors

Figure 3 shows the number of papers corresponding to the categorization of the presenter's affiliations. 78% of the presenters belonged to the university. 11% belongs to research institutes, and remained 11% belongs to the industries. The number of contribution papers from the industries decreased compared with last year. However the situation in which the contribution from the university occupied the majority did not change.

Although most of presenters were international students studying in Japan and foreign researchers working in Japanese industries, 5 presenters were Japanese students or researchers. In this symposium, ICM expects the open contribution from not only the university but also enterprise, and expects the various presenters from not only the international students and the foreign researchers but also Japanese students and researchers, too. And, there was one contribution from the outside of Japan this year. As the purpose of the English session is the contribution to the globalization of IEICE, ICM hopes that the papers from the outside of Japan will increase in next year.

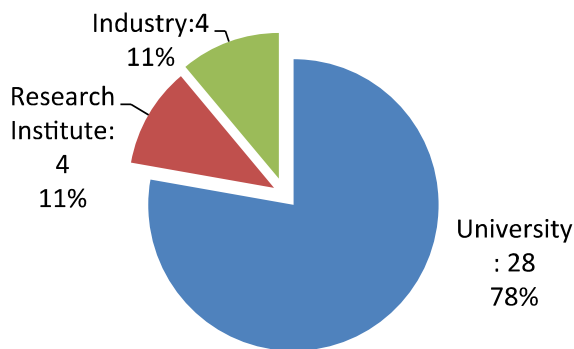


Fig. 3 The number of papers corresponding to the categorization of the presenter's affiliations

Every presenter and audience enthusiastically discussed the ideas and opinions in the time assigned for question and answer. Since the assigned time passed quickly, presenter and questioner continued their discussion here and there even into the break periods (Figure 4).

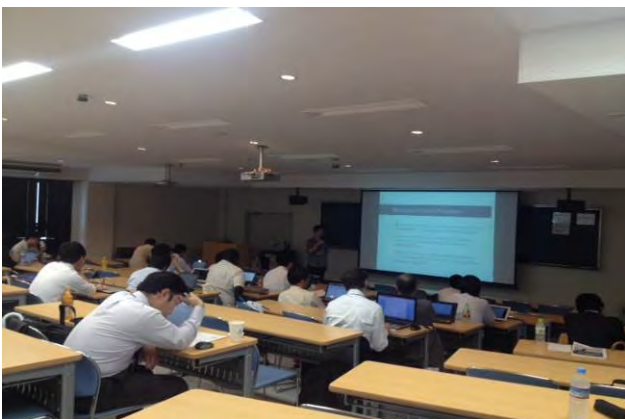


Fig. 4 ICM English session in 2014

#### 5. Award of ICM English Session

ICM will select the best papers and award a prize of the session in the near future to encourage their continuous activities. The best papers will be awarded in the upcoming ICM workshop in March 2015. ICM awarded the following papers [2,3] presented in the 2013 IEICE Society Conference in March this year.

Table 1 English Session Awardees of ICM Committee 2013

| Awardees   | Title   |
|--|---|
| Akihisa Matoba,<br>Takashi Sasagawa,<br>Masaki Hanada (Tokyo Univ.<br>of Information Sciences),<br>Hidehiro Kanemitsu<br>(Waseda Univ.),<br>Moo Wan Kim (Tokyo Univ.<br>of Information Sciences) | Asymmetric<br>RTS/CTS for Exposed<br>Node Reduction in<br>IEEE 802.11 Ad Hoc<br>Network                                 |
| Kenji Kanai,<br>Jiro Katto (Waseda Univ.),<br>Tutomu Murase (NEC)  | Performance Analysis<br>of Comfort Route<br>Navigation Providing<br>High Communication<br>Quality for Mobile<br>Devices |

#### 6. Conclusion

ICM English session in 2014 was a big success because a lot of papers were contributed and a very active discussion is done. I believe that this session became fruitful for all people, and was able to contribute to the globalization of IEICE. I wish that more papers will be contributed to the session in the next year.

#### 7. Acknowledgement

I, as the organizer of this ICM English session, would like to thank Prof. Yoshiaki Tanaka of Waseda University, who made a great contribution in soliciting papers, utilizing his nation-wide academic authority and human relations. I would also like to thank all the member of the ICM committee, the attendees and everyone who contributed to the discussions and supported the session.

#### 8. Reference

- [1] IEICE ICM Technical Committee web site, <http://www.ieice.org/~icm/eng/>
- [2] Akihisa Matoba, Takashi Sasagawa, Masaki Hanada, Hidehiro Kanemitsu, Moo Wan Kim, "Asymmetric RTS/CTS for Exposed Node Reduction in IEEE 802.11 Ad Hoc Network," 2013 IEICE Society conference, BS-7-13, Sept.2013.
- [3] Kenji Kanai, Jiro Katto, Tutomu Murase, "Performance Analysis of Comfort Route Navigation Providing High Communication Quality for Mobile Devices," 2013 IEICE Society Conference, BS-7-16, Sept. 2013.

# Report on the 4<sup>th</sup> International Symposium on Network Virtualization

Takeshi Kinoshita\*, Masaki Fukushima\*\*,  
and Masahiro Kiyokawa\*\*\*

\*NTT Network Innovation Laboratories

\*\*KDDI R&D Laboratories, Inc.

\*\*\*National Institute of Information  
and Communications Technology



## 1. Introduction

The 4<sup>th</sup> International Symposium on Network Virtualization was held on July 31, 2014, at the University of Tokyo. The symposium has been held annually since 2011 with the aim of promoting research and development of network virtualization, one of the core technologies for new-generation networks, and of accelerating broad deployment of new communications infrastructure using the technology while encouraging international collaboration among researchers.

## 2. Overview of this year's symposium

This year's symposium, with its theme "Application Driven Programmable Network and Beyond," introduced the latest research activities in the areas of Software Defined Networking (SDN), Network Functions Virtualization (NFV), and related technologies. In the symposium sessions, future directions of research on programmability in networks and their applications were discussed from the viewpoints of various stakeholders from academia and industries across the world. Participants also discussed what kinds of education were needed to improve literacy that the new technologies would entail.

The symposium was co-sponsored by the 4<sup>th</sup> Network Virtualization Symposium Steering Committee; IEICE Technical committee on Network Virtualization; Grad-



Fig. 1 Opening of the symposium

uate program for social ICT Global Creative Leaders, the University of Tokyo (GCL); National Institute of Information and Communications Technology (NICT); and Network Virtualization Working Group, JSPS 163<sup>rd</sup> Committee on Internet Technology (ITRC). Akihiro Nakao of the University of Tokyo chaired both the Steering Committee and the Program Committee.

About 100 people attended the meeting. It gathered a lot of positive feedback, representing a great success.



Fig. 2 Participants in the symposium

## 3. Program

After the greeting by Prof. Nakao, the first session of the symposium started with the opening speeches by three speakers: Tohru Asami of the University of Tokyo (GCL); Makoto Imase of NICT; and Hiroshi Mano (Koden Techno Info/ITRC). Following that, Natsuo Tai of the Ministry of Internal Affairs and Communications (MIC) of Japan made a keynote speech, in which he explained current projects and activities on the technology developments and how they would relate to the country's growth strategy in various aspects.

The following two sessions consisted of six invited speeches. Researchers from various organizations addressed the most recent issues on SDN, NFV, and their applications. The following list is the speakers in the order of appearance: Inder Monga of ESnet; Glenn Ricart of US Ignite; Hisashi Goto of Intel; Atsushi Ta-



Fig. 3 Speech by Mr. Tai



Fig. 4 Speech by Dr. Ricart



Fig. 5 Speech by Prof. Nakao

kahara of NTT; Akihiro Nakao of the University of Tokyo; and Antonio Manzalini of Telecom Italia. Dr. Monga and Dr. Manzalini participated from remote sites.

The final session was a panel session, which lasted for about one and a half hours. Besides the chairperson, Prof. Nakao, the following four people participated in the panel: Dr. Ricart, Prof. Asami, Dr. Takahara, and Prof. Tomonori Aoyama of Keio University. The discussions were all related to SDN and NFV technologies but covered many issues, reflecting ever increasing and widening interests in this field. Among the most intensely discussed were applications. Although SDN and NFV are both networking technologies in themselves, they can and should be closely related applications. The panelists recognized the importance of applications in developing new environments where users and network operators would enjoy benefits, which

might be cost reduction or ‘killer applications.’ Dr. Ricart emphasized the importance of guaranteed performance required by applications like 4K video streams from smartphones. Also discussed intensely were ecosystems. Like many other successful technologies or applications, SDN and NFV and their applications would bring about new ecosystems. Although not being very clear at this time, ideas of future ecosystems attracted much attention. Prof. Asami pointed out the necessity of programmable interfaces that enable researchers and students to easily develop new network applications. Participants, including many students, also seemed to have as much interests and opinions as the panelists. One of the interesting questions was posed by a student: Does the programmability of network result in layer violation? Dr. Takahara agreed that the current layering would be violated at a certain level, meanwhile, he suggested that the concept of layering itself would not disappear. Prof. Aoyama also pointed out the significance of cross-layer control. Finally, Prof. Nakao concluded the panel session by noting that application-driven research programs, like US Ignite, are also required in Japan.

Next to the conference room, there were 12 exhibition booths, which were set up along with the sessions. In each booth, researchers from universities, vendors, and carriers explained their newest activities using demonstrations and posters.

The additional information about the program is available at the symposium website [1].



Fig. 6 Exhibition

#### 4. Conclusion

Development of SDN and NFV technologies are progressing very quickly across industries and academia. They have come closer to be ready for commercial use. In this situation, applications exploiting the technologies will play ever greater roles. The symposium held in 2014 highlighted the importance of applications and showed research in this respect is also progressing very actively.

Following this successful symposium, we are planning to hold a follow-on symposium next year, which we hope will be an even more fruitful one.

#### 5. Reference

[1] <http://www.ieice.org/~nv/english/symposium1>



# Report on the 20<sup>th</sup> Asia-Pacific Conference on Communications (APCC2014)

Takashi Shimizu and Yoshihiro Ishikawa  
APCC Steering Committee



## 1. Introduction

The 20<sup>th</sup> Asia-Pacific Conference on Communications (APCC2014) was held in Pattaya City, Thailand from October 1 to October 3, 2014. With the theme “Intelligent Communications for Sustainable Development”, the conference program included three keynote addresses and 23 technical sessions, including 7 special sessions on new and emerging topics. It was technically co-sponsored by IEEE Thailand Section, IEEE Communications Society Thailand Chapter, IEEE MTT/AP/ED Thailand Chapter, IEEE Photonics Society Thailand Chapter, IEICE Communications Society (IEICE-CS), China Institute of Communications (CIC) and Korea Information and Communications Society (KICS). It was attended by 111 researchers and engineers mostly from Asia-Pacific region.

## 2. Opening Ceremony and Keynote Speeches

The conference was commenced by welcome addresses by General Co-Chair, Prof. Prayoot Akkarakthalin and Prof. Chuwong Phongcharoenpanich. After the opening, three high-profile speakers addressed the variety of topics on advanced radio technologies.

The first address was given by Prof. Ying-Cheng Liang, Principle Scientist at Institute for Infocomm Research, A\*STAR in Singapore. Entitled “the spectrum sharing technologies for 5G”, the latest developments of cognitive radio research were discussed, especially focusing on TV white space applications and spectrum refarming in cellular networks. After the energetic discussion on the first topic, followed the descent and inspiring talks.



Fig. 1 The keynote from Prof. Ying-Cheng Liang

Prof. Dr.-Ing Dirk Heberling, Director in Institute of High Frequency Technology of RWTH Aachen University, Germany, introduced antenna measurement research in Europe, and elaborated an initiative on standardizing common data exchange, not only to compare measurement results in different experiments, but also to reuse them for modeling large and complex systems.

Prof. Jun-ichi Takada, Graduate School of Science and Engineering of Tokyo Institute of Technology, Japan, demonstrated the study of microwave wideband MIMO channels toward 5G mobile systems. Showing the results of measurement in a couple of field experiments, the difference between simulation and field measurements were highlighted, and stimulated discussions on how to address those issues.

## 3. Technical Program

The Technical Program Committee received 152 paper submissions from 18 countries and regions, and selected 101 papers for presentation by careful peer-review process. The peer-review was completed by more than 120 professionals. Oral presentations were organized in 23 sessions for all papers. Each session was mostly well-attended and productive discussions were facilitated.



Fig. 2 Discussion at a technical session

## 4. Best Paper Award

Each year, Best Paper Awards were selected by the Award Committee established in APCC Steering Committee. The members of the committee made another peer-review of the top 9 high-score papers, considering not only technical aspects but also the possible impact of the paper in the relevant field. By

averaging the score of the committee and the original score, following three papers were selected.

1) “MPDF: Movement Predicted Data Forwarding Protocol for Underwater Acoustic Sensor Networks”

Authors:

Nusrat Nowsheen (Monash University)  
Gour Karmakar (Federation University)  
Joarder Kamruzzaman (Federation University)



Fig. 3 Recipient of the best paper: Dr. Gour Karmakar

2) “Performance Analysis for Mobile Relay Station with Beam Steerable Antenna”

Authors:

Bei Jia (Xi’an Communication Institute)  
Qiang Liu (Xi’an Communication Institute)  
Qianru Li (Xi’an Communication Institute)  
Wei Wang (Alcatel-Lucent Shanghai Bell Co., Ltd.)



Fig. 4 Recipients of the best paper

3) “Analytical and Experimental Investigation of Substrate Permittivity and Loss up to 67 GHz”

Authors:

Patrick Seiler  
Bernhard Klein  
Dirk Plettemeier  
(Technische Universität Dresden)



Fig. 5 Recipient of the best paper: M.Sc. Patrick Seiler

The certificate of the award was given to each author during the conference dinner on October 2, 2014. This award was sponsored by IEICE-CS, KICS, CIC and IEEE Communications Society Asia-Pacific Board.

## 5. Conclusion

Since 1993, APCC has been the forum for researchers and engineers in the Asia-Pacific region to present and discuss topics related to advanced information and communication technologies and services, while at the same time, opening the door to the world. APCC2014 successfully provided an excellent venue and facilitated the research collaboration in Asia-Pacific regions.

Next year, APCC2015 will be held in Kyoto, Japan on October 14-16, 2015.

# Report on 16<sup>th</sup> Asia-Pacific Network Operations and Management Symposium (APNOMS 2014)

Eiji Takahashi\* and Shingo Ata\*\*

\*Secretary of the conference, NEC

\*\*General Chair of the conference, Osaka City University



## 1. Overview of APNOMS 2014

The 16<sup>th</sup> Asia-Pacific Network Operations and Management Symposium was held from September 17<sup>th</sup> to 19<sup>th</sup>, 2014 in Taiwan [1]. APNOMS 2014 was organized by the IEICE ICM Committee, the Korean Information and Communications Society, Korean Network Operations and Management Committee (KICS KNOM), and National Chiao Tung University. It was technically cosponsored by IEEE ComSoc. Supporting organizations were IEEE CNOM, IEEE APB, TMF, IEEE Cloud Computing. APNOMS 2014 entitled “Integrated Management of Software Defined Infrastructure” consists of five keynote speeches, one DEP session, two special sessions, four tutorial sessions, ten technical sessions, three poster sessions, two innovation sessions and the exhibition program. 184 people from 6 countries participated in this conference.

## 2. Sessions and Activities

Five executives delivered keynote speeches. Dr. Takashi Ooi from NTT Communications gave a speech on “Transformation of Enterprise Network for Changing Business Environment - New era by Network Functions Virtualization (NFV)” (Fig.1). Dr. Joe Bester from Aerospace introduced a “Big Data on Clouds”. Mr. Kyung-Hyu Lee from ETRI showed “5G & Giga networking vision in Korea”. Dr. Yi-Bing Lin from MOST gave a speech on “Accelerating broadband wireless services and industrial development”. Dr. Nen-Fu Huang from National Tsing Hua University introduced “Flows/Applications classification and QoS management for Software Defined Network (SDN)”.

In the Distinguished Experts Panel session, a chair and four panelists, including Dr. Dai Kashiwa from NTT Communications, discussed various topics with the audience in relation to the theme of APNOMS 2014, for example, management issues of SDN (Fig.2).

In the tutorial sessions, the proactive network operation through network data analytics was presented by Dr. Keisuke Ishibashi from NTT. In the special sessions, Dr. Yasunori Owada from NICT introduced NerveNet which is a resilient service platform in disaster situation. Dr. Dai Kashiwa from NTT Communications and Dr. Masayoshi Kobayashi from NEC presented practical approaches for SDN/NFV management.



Fig. 1 Keynote Speech by Dr. Takashi Ooi



Fig. 2 Distinguished Experts Panel

A total of 140 papers, including 30 papers from Japan were submitted to APNOMS 2014 and of these 41 were presented in ten technical sessions. It includes 13 papers from Japan. In the poster session, 67 papers including 12 Japanese papers were delivered as poster-style presentations. These papers were published in IEICE I-Scover and IEEE Xplore. There were two innovation sessions that covered 8 topics. We have 5 topics from Japan. In the exhibition program, three organizations demonstrated four prototypes of their research results.

Lastly, the APNOMS 2014 organizing committee selected the top four papers with the highest overall (paper + presentation) scores from the technical session for “Best Paper Awards”. One of awardees is Mr. Masahiro Yoshida from NTT, who presented “MORSA: A Multi-objective Resource Scheduling Algorithm for NFV Infrastructure” and the others are a Korean, a Taiwanese, and a Chinese student.

## 3. Conclusion

On behalf of all organizing committee of APNOMS 2014, we would like to express our appreciations to all parties involved in this conference. The next APNOMS will be held in Busan, Korea, in August 2015.

## 4. Reference

[1] <http://www.apnoms.org/>, Home page of APNOMS.



# Report of IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob 2014)

Arief Hamdani Gunawan  
TELKOM INDONESIA



## 1. Introduction

It is our great pleasure for the 2014 International Conference on IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob 2014) to have a technical co-sponsorship support from IEICE Communications Society and to have support from 5G Technical Subcommittee IEEE Communications Society, IPv6 Forum, 3GPP and IEEE 802.15 Wireless Personal Area Network (WPAN).

## 2. Conference program and statistics

The conference held on 28<sup>th</sup>-30<sup>th</sup> August 2014, at Grand Inna Kuta Bali Indonesia. APWiMob 2014 proudly presented 68 accepted papers (55,3% accepted ratio). APWiMob 2014 would like to deliver a high appreciation to 321 authors around the world of submitted papers to APWiMob 2014. Top 5 countries of authors are: Malaysia (78 authors), India (58 authors), Japan (51 authors), P.R. China (20 authors), Indonesia (17 authors). Moreover top 5 of technical topics of the submitted papers were:

- wireless sensor networks (27 papers);
- antennas, beamforming, multi-antenna signal processing (13 papers);
- vehicular networks (13 papers);
- future wireless internet (12 papers);
- mesh, relay, sensor and ad hoc networks (11 papers).

The conference received 123 papers from 321 authors, through high qualification of reviewing process and tight registration process APWiMob 2014 published 68 high qualified papers.

APWiMob 2014 would like to express special appreciation for 336 technical program committee (TPC) who supported the review process. The top 5 demanding topics from background of reviewers' background were:

- wireless sensor networks (108 reviewers);
- future wireless internet (106 reviewers);
- internet of things (105 reviewers);
- green wireless networks (97 reviewers);
- capacity, throughput, outage, coverage (90 reviewers)

The APWiMob 2014 was also supported by industry and academia. APWiMob 2014 is very proud to have two distinguished lecturers from IEEE, one is from industry, Dr. Rath Vannithamby from Intel and one is from academia, Prof. Manos Tentzeris from Georgia Institute of Technology. We believe the collaboration between industry and academia provides strong



Fig. 1 The participant of APWiMob 2014



Fig. 2 Gala Dinner at APWiMob 2014

foundation for advancing technology for humanity. Moreover, the noteworthy on M2M presented by Dr. Rath Vannithamby and RFID by Prof. Manos Tentzeris from USA and Prof. Robin Doss from Deakin University, Australia contributed notable update for industrialists and academicians.

APWiMob 2014 shared important update from IEEE 5G Mobile Wireless Internet by Mr. Latif Ladid as well as from 3GPP that were represented by NTT Docomo as the leading operator presented by Mr. Satoshi Nagata and Huawei Technologies as the leading vendor presented by Dr. Philippe Reininger. The conference was also supported by Telkom Indonesia as the largest telecommunications services company in Indonesia presented by Mr Rizkan Chandra that provided update entitled Mobile & Wireless System Technology Business & Industry Highlights in Digital Business Era in the world.

## 3. Conclusion

As APWiMob 2014 provided fruitful discussions and exchange of ideas between researchers during conference, APWiMob 2015 do hope it will be better in providing yield new technological innovations in wireless and mobile for contributing to a better life for humans in the coming decades.

# Report on the 7<sup>th</sup> International WDN Workshop on Cooperative and Heterogeneous Networks (WDN-CN2014)

Gia Khanh Tran<sup>†</sup>, Suguru Kameda<sup>††</sup>

<sup>†</sup>Tokyo Institute of Technology <sup>††</sup>Tohoku University



## 1. Introduction

The 7<sup>th</sup> International Wireless Distributed Network (WDN) Workshop on Cooperative and Heterogeneous Networks (WDN-CN2014) in cooperation with IEICE-CS and IEEE ComSoc was held in conjunction with IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC2014) on 2<sup>nd</sup> September 2014 in Washington DC, USA [1]. This workshop is co-sponsored by IEEE ComSoc Japan Chapter and IEICE Communications Society. The previous WDN workshops were held in Cannes France in 2008, Tokyo Japan in 2009, Istanbul Turkey in 2010, Toronto Canada in 2011, Sydney Australia in 2012, and London England in 2013 [2] respectively. WDN-CN2014 is a full-day workshop at PIMRC2014 which attracts almost 50 audiences of the conference.

## 2. Workshop committee

1) General co-chairs: Dr. Emilio Calvanese Strinati from CEA-LETI (France), Prof. Mehdi Bennis from University of Oulu (Finland) and Prof. Kei Sakaguchi from Osaka University (Japan).

2) TPC co-chairs: Dr. Thomas Haustein from Fraunhofer HHI (Germany), Dr. Hadi Baligh from Huawei Technologies (Canada), and Prof. Suguru Kameda from Tohoku University (Japan).

## 3. Scope and Objectives

The enormous increase in the mobile connected equipment and mobile subscribers number, in addition to the emergence of data-centric standards such as 3GPP's LTE-A raises an urgent call to find sustainable solution that permits to fulfil data rate, spectrum, and coverage requirements. Data rate has been increasing exponentially over the last decade since mobile users want access to the internet and mobile services anytime anywhere. However, the resources are scarce and the frequency spectrum availability is limited. More challenges are imposed like the energy consumption of the network. Adding cellular macro base station to the existing cellular network is energy consuming and very expensive. Macro base stations are very high power nodes with high energy consumption. Deploying such base stations increases dramatically the CAPEX due to the installation costs, as well as the OPEX for the base stations maintenance and operations. This solution also suffers from the inevitable out-of-cell interference issues. Making matters worse, conventional macro cell transmissions suffer from poor indoor penetration and the presence of dead-spots particularly at higher carrier

frequencies, which results in drastically reduced indoor coverage and diminished user satisfaction. Mobile networks need a low cost, low power, energy efficient, and easy to deploy solution, which satisfies the ever-growing capacity demand. A promising approach to solving this problem is through the deployment of Heterogeneous and Small Cell Networks (HetNets), which represent a novel networking paradigm based on the idea of deploying low-power, and low-cost base stations operating in conjunction with the macro-cellular network infrastructure. HetNets is envisioned to enable next-generation networks to provide high data rates, offload traffic from the macro cell, minimize energy consumption and provide dedicated capacity to homes, enterprises, or urban hotspots. HetNets encompass a broad variety of cell types, such as micro-, pico-, femto-cells, as well as advanced wireless relays, and distributed antenna systems.

There are significant technical problems that need to be addressed for the successful deployment and operation of HetNets. In particular, due to lack of coordination with the rest of the network, time- and frequency domain interference management in dense HetNets is a fundamental issue. By exploiting ideas from traditional multi-cell power control, cognitive radio and dynamic spectrum access, HetNets should be designed to deal with peak data demands, and react based on interference/load/congestion levels, by adapting their transmission strategy and opportunistically accessing radio resources over licensed and unlicensed bands. Recently, in addition to the integration of cellular and WiFi that has emerged as a key component to tackle the capacity crunch problem and ease network congestion, new solutions has been proposed to increase network efficiency. C-RAN is a novel network architecture which is centralized, cooperative, and embraces cloud computing. This architecture can allow baseband sharing, reducing energy consumption, and improving network performance. Furthermore, recent advances in the understanding of interference channels, cooperative games and distributed optimization theory could be useful for novel designs of the next generation of HetNets. Small cell networks could benefit from CoMP transmission schemes wherein multiple base stations steer their beams through array processing to minimize interference. Interference coordination is also another solution to minimize interference and to improve the network performance. Coordination between small

cells is not restricted to resources management. Recently, base stations clustering and coordination have been studied as a mean for improving the network energy efficiency, users' QoE, and for delivering cloud services via cooperation and via pooling computational and communication resources. Base station should also cooperate for delivering cloud services. HetNet could also benefit from cloud cooperation and virtual operation implementation in order to operate efficiently. In addition, with the existence of several networks and the usage of different radio access technologies imposes overarching requirements for a multi-RAT architecture evolution. Finally, research on small cell networks also tackles several issues that contribute in making HetNet operate more efficiently via cloud cooperation such as mobility management, service centric scheduling, and U/C splitting.

Following the past events, WDN-CN2014 gathered participants from both academia and industry to offer a forum for spreading and sharing the latest results and understanding for making communication networks more spectral and energy efficient than they are today.

#### 4. Summary of WDN-CN2014

WDN-CN2014 was held at Capital Hilton, which is a hotel located in the heart of the US capital and serves as a convenient base for sightseeing in the historically rich city. The workshop was divided into four sessions including 7 accepted papers, 2 keynote speeches and finalized by a panel discussion. In the opening, Dr. Emilio Calvanese Strinati, one of the general co-chairs of the workshop, briefly explained the scope of WDN-CN2014, introduced the program, the panelist and also called for cooperation toward the proposal of the next workshop in conjunction with PIMRC2015 to be held in Hong Kong, China.

In the first invited talk, Mr. Satoshi Nagata from NTT DoCoMo (Japan), who is also the current chairman of 3GPP TSG-RAN WG1 gave a speech on "3GPP LTE Enhancements and 5G". The speaker first summarized about key features of 3GPP specification in enhancement releases of LTE e.g. carrier aggregation, advanced MIMO techniques, eICIC in Release 10; enhanced downlink control channel, CoMP transmission, advanced higher-layer techniques in Release 11; small cell enhancement, MIMO enhancement, network assisted interference cancellation, licensed assisted access (LAA) in Release 12. In the second half of the talk, the speaker explained the company's viewpoint on 5G, which must support for a thousand times of traffic explosion with massive device connectivity, reduced latency, and energy/cost efficiency. For that purpose, beside further enhancements of LTE, a novel RAT which considers new spectrum allocation of WRC-15 and beyond and does not compromise with backward compatibility must be developed.

In the second invited talk, Dr. Konstantinos Dimou from Intel Labs (USA) talked about "Multi-Radio Heterogeneous Networks Within 5G Communication Systems". The speaker first introduced the concept of



Fig. 1 The panelists (from left to right: Dr. Dimou, Dr. Strinati, Dr. Baligh, Mr. Nagata)

Multi-Radio Access Technology (RAT) and the evolution of multi-RAT HetNets in 3GPP LTE Release 8 to 11. For Release 12 and beyond, the novel RAT combining LTE and WLAN would work on even unlicensed bands to increase system capacity. In the latter part, the speaker presented Intel's vision on 5G, which must have a 1000x higher system capacity, 100x more connected devices, 10x QoE and longer battery life. The speaker pointed out that rather than air interface, network evolution e.g. cell densification, WLAN offloading, integrated multi-RAT is more important to realize 5G. The speaker also showed his view on 5G devices which should support multi-antenna system, multi-band RF front-end, multi-band transceiver and integrated baseband signal processing.

Finally, a panel discussion about 5G evolution was organized and moderated by Prof. Kei Sakaguchi. Beside two keynote speakers from NTT DoCoMo and Intel Labs, Dr. Emilio Calvanese Strinati (CEA-LETI) and Dr. Hadi Baligh (Huawei Technologies), two of the workshop committee members, also joined the panelist. Prof. Sakaguchi raised several Yes/No questions for the panelist (Fig. 1) e.g. involvement of mm-wave and LTE-U in 5G, realization of 5G until 2020 etc. From different aspects, the panelists responded to these questions based on both the company's viewpoints and personal opinions. Interestingly, the Yes/No tests came to a consensus that mm-wave is an essential technology for future cellular networks; however it is hard to meet the first deadline of 2020 to be integrated into the initial version of 5G. This version will support multi-RAT where unlicensed bands will be properly introduced.

The final question to the panelist was an invitation for their continuing contributions in the next-year's planned workshop. The organizers expressed gratitude to all the speakers and the audiences for fruitful discussion at the event, and closed the workshop. A warm petit party was held that night at a local bar close to the Kennedy center with the attendance of approximately 30 members including presenters and audiences.

#### 5. Reference

- [1] <http://www.icwdn.org/>  
(Slides of invited talks are available)
- [2] <http://www.icwdn.org/past>



# Report of the Fifth International Conference on Communications and Electronics 2014 (IEEE ICCE 2014) in Da Nang, Vietnam

Makoto Ando  
Tokyo Institute of Technology



## 1. Introduction

The fifth IEEE ICCE 2014 was held in Da Nang from July 30 – Aug 1, 2014, Vietnam. This covers wide topic areas in communications and electronics. Technical sessions consist of four main fields or tracks: Communication Networks and Systems, Signal Processing and Applications, Microwave Engineering, and Electronics Systems. The conference created an opportunity for local scientists and Vietnamese students to interact with top-level professors and research scientists within Vietnam and from other countries, to exchange ideas, and chance for local scientists and students to present their work in the professional academic atmosphere.

This report includes the summary and statistics of ICCE 2014. IEICE Members contributed the success of ICCE 2014 and continuing technical sponsorship from IEICE is of interest for the organizers.



Fig. 1 Venue Pullman Beach Resort Da Nang, Vietnam



Fig. 2 Beautiful Beach in front of the Venue Hotel

## 2. Basic Informations

### *Dates and Venue*

Conference dates: July 30 – Aug 1, 2014

Conference venue: Pullman Hotel

Conference City and Country: Da Nang, Vietnam

### *Technical Sponsors:*

IEEE Antenna and Propagation Society

IEEE Photonics Society

IEEE SSCS Vietnam Chapter

IEICE Communications Society

IEICE Electronics Society

Korea Information and Communications Society (KICS)

### *Financial Sponsors:*

IEEE Vietnam Section

National Foundation for Technology Development (NAFOSTED, Vietnam)

Office of Naval Research Global (ONRG, USA)

German Academic Exchange Services

(DAAD, Germany)

U.S. Army Research, Development and

Engineering Command (REDCOM)

Samsung

Other industrial organizations and Companies:

Agilent, Dolphin, An-Minh, FPT, DASAN Networks

### *Technical Program:*

ICCE 2014 covers wide topic areas in communications and electronics. It was a great success with participation of 166 registered researchers from 24 countries including Vietnam and 25 invited guests (93 foreigners and 69 Vietnamese). After the intensive review process in TPC, acceptance rate of ICCE 2014 was about 41%. There were 98 technical talks presented in 6 parallel technical sessions. Four key note speeches are;

“GENI – Global Environment for Network Innovations” by Dr. Chip Elliot, GENI Project Office and Raytheon BBN Technologies, USA

“The Origins of GENI: A Story of Sustained Research Community Engagement” by Prof. Peter A. Freeman, Georgia Tech. and formally NSF, USA

“5G: Era beyond Data Rate” by Dr. Chih-Lin I, China Mobile Chief Scientist of Wireless Technologies, China

“Magnetic Resonance Imaging: It’s just a Fourier Transform” by Prof. Gary Glover, Radiological Sciences Laboratory, University of Stanford, USA



Fig. 3 Opening Ceremony and key note speech about the project “GENI”

Number of papers in four categories is given below.

|                                     |    |
|-------------------------------------|----|
| Communication Networks and Systems, | 45 |
| Signal Processing and Applications, | 10 |
| Microwave Engineering,              | 11 |
| Electronics Systems.                | 18 |
| Special Sessions                    | 13 |

#### Best Student Paper Awards

Technical Program committee selected 3 student papers from three categories:

Tung Nguyen (Tokyo Institute of Technology, Japan)  
“Material Choices of Honeycomb Structures and their Effects in mm-Wave RLSAs”

Toan Nguyen (Ha Noi University of Science and Technology, Vietnam) “A High Power Conversion Efficiency Rectifier with New Internal VTh Cancellation Topology for RFID Applications”

Meisam Naderi (University of Agder, Norway)  
“A Geometry-Based Channel Model for Shallow Underwater Acoustic Channels Under Rough Surface and Bottom Scattering Conditions”



Fig. 4 Best Student Paper Awardees

### 3. Conference Organizations

ICCE 2014 is the 5<sup>th</sup> events in a series of conferences established in 2006 in Vietnam. As is usual the case with other Asian countries, conference covers general aspects of Electrical engineering and IEICE has been technical supporting through CS and ES. The author attended ICCE 2009 and 2014 and experienced the steady development in organization as well as the technical qualities. All the attendees of this series of ICCE conference enjoyed the technical discussions as well as the relaxed local atmosphere in the famous resort area. During the Banquet on July 31, after the performances of traditional and local dance and music instrument were conducted, the student best paper awards ceremony was held. One unique and promising feature is that it is organized by young generations who are expected to be the academic and industrial leaders in Vietnam. Fig.4 presents a photo of Prof. Nguyen Huu Thanh who serves as TPC members as well as the secretariat of the conference.



Fig. 5 Prof. Nguyen Huu Thanh in LOC and the author



Fig. 6 Traditional musical instrument in the Banquet

### 4. References

- [1] The proceedings are already available at:  
<http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=6908289>
- [2] The archives of series of ICCE are available at  
<http://www.hut-icce.org/2014/>.

# 2014 Summer Topicals: Space Division Multiplexing Technologies for High Capacity Transmission

Shoichiro Matsuo  
Fujikura Ltd.



## 1. Introduction

Summer Topicals is an annual meeting organized by the IEEE Photonics Society. The topical meetings of the Photonics Society are a premier conference series that encourage discussions on the exciting new areas in photonic science, technology, and applications; they provide an opportunity to learn about emerging fields and to interact with the research and technology leaders in an intimate environment. The topics of the Summer Topicals are typically selected on the basis of the currently emerging fields.

The 2014 Summer Topicals was held in Delta Montréal, Montréal, Québec, Canada from July 14<sup>th</sup> to 16<sup>th</sup>, 2014. This meeting was attended by 165 participants, and the following five topics were covered:

- Functional Meta- and Two-dimensional Materials (FMTM)
- Nanowire Materials and Integrated Photonics (NWIP)
- Midwave Infrared Integrated Photonics (MWIP)
- Nonlinear-Optical Signal Processing (NOSP)
- Space-Division Multiplexing Technologies for high capacity transmission (SDMT)

Space division multiplexing (SDM) was selected as one of the topics of the Summer Topicals for the third consecutive year, indicating that SDM has been a hot topic of research in the field of photonics in recent years.

SDMT were organized by Sebastian Randel (Alcatel-Lucent) from USA, Kunimasa Saitoh (Hokkaido University) from Japan, and Ton Koonen (Eindhoven University of Technology) from Europe. SDMT was technically co-sponsored by the Technical Committee on Extremely Advanced Optical Transmission Technologies (EXAT), IEICE, Japan, working for the multi-core, multi-mode, and multi-level (3-M) technology lead.

## 2. Scope of SDMT

The global Internet traffic increases by a factor of one hundred approximately every ten years. However, studies predict that the capacity of the existing fiber infrastructure is limited to approximately 100 Tb/s/fiber and that this capacity will be maximized within this

decade. SDM is a promising technology that provides a new dimension to the multiplexing approach for overcoming the capacity limitation.

The 2014 Summer Topicals meeting entitled “Space-Division Multiplexing Technologies for High Capacity Transmission” encourages discussions on technologies and concepts that potentially enable an increase in the efficiency of fiber transport infrastructures; the scope of this meeting goes beyond the simple deployment of parallel systems.

The agenda of this meeting is outlined in Table 1. This meeting broadly included three plenary talk sessions, which in turn included four plenary talks, one tutorial, 10 invited talks, and 14 contributed talks. It should be noted that each session on the SDMTs included 30–40 participants, and each presentation was followed by active discussions by the participants.

Table 1 Meeting agenda

| Date    | Session  |
|---------|--|
| 14 July | ME1: SDMT Plenary I<br>ME2: SDM Amplifiers<br>ME3: SDM Systems<br>ME4: Joint Session NOSP/SDMT Plenary |
| 15 July | TuE1: SDMT Plenary II<br>TuE2: Multicore Systems<br>TuE3: Multimode Propagation<br>TuE4: SDM Fibers    |
| 16 July | WE1: SDM Transmission<br>WE2: MIMO Systems   |

## 3. Plenary Talks

The plenary talks were conducted by four eminent speakers; provided below is a list of the names of the speakers and the topic that each one covered.

- “Prospective for Deployment of 3-M Technologies,” by Prof. Yuichi Matsushima, Waseda University, Tokyo, Japan.
- “Signal Processing beyond Conventional Limits” by Prof. Stojan Radic, University of California San Diego, CA, USA.
- “Making Spatial Multiplexing a Reality” by Dr. Peter Winzer, Alcatel-Lucent, NJ, USA
- “Progress on European Union Project MODEGAP” by Prof. David J. Richardson, University of Southampton, Southampton, UK.





Fig. 1 Prof. Yuichi Matsushima's plenary talk

The session on SDMT commenced with the plenary talk given by Prof. Yuichi Matsushima (Fig. 1), who is the committee chair of EXAT. He provided an introduction on the activity of EXAT, and also threw light on the current status of the national project in Japan, which is financially supported by NICT. To conclude, he presented directions on the deployment of SDM and stated that Datacom, which does not need an amplifier, could be a possible application of SDM.

A joint plenary session of NOSP and SDMT was held on July 14<sup>th</sup> in the evening. This session was conducted by Prof. Stojan Radic and Dr. Peter Winzer. Prof. Radic took over the rostrum as a speaker for NOSP and presented the future of optical signal processing. Dr. Winzer—the speaker for SDMTs—summarized the progress of SDM research. Further, he indicated that compatibility with the existing infrastructure was indispensable for the practical use of the SDM technology.

Prof. David J. Richardson from the University of Southampton summarized the progress of the European Union Project MODEGAP—an integrated project funded under the European Union Framework FP7 mechanism and positioned as a forward-looking, high-risk, high-reward project with a potential to deliver a 100-fold increase in the per-fiber capacity through the use of mode division multiplexing (MDM) in novel few-mode solid and hollow core photonic bandgap fibers (HC-PBGFs).

#### 4. Technical Sessions

Table 2 summarizes the number of papers from each region presented by the first author's organization. From Japan, two invited papers and seven contributed papers were presented. From Europe, three invited papers and six contributed papers were presented. The results indicate that Japan and Europe lead the research and development of SDM. From the USA, four invited papers were presented. Although eight papers were presented from the USA in the 2013 Summer Topicals, this year, no contributed paper was presented.

Three invited talks were conducted on a multicore fiber. Mr. Yusuke Sasaki from Fujikura Ltd. presented the design of a few-mode multicore fiber (FM-MCF) and demonstrated its possibility for highly dense space division multiplexing. Dr. Hirotaka Ono from NTT Photonics Laboratories presented recent work on the multicore amplification technology involving the use of

a discretely pumped single-cladding multicore Erbium-doped fiber (MC-EDF) and a cladding-pumped double-cladding MC-EDF. Dr. Victor J. F. Rancaño from the University of Southampton presented a new type of multicore fiber called a multi-element fiber (MEF). He stated that the MEF can be a cost-effective solution for SDM implementation in commercial optical networks.

The other invited talks were related to a few-mode fiber (FMF) and mode-division multiplexing over FMFs. Mr. Guillaume Le Cocq from Lille 1 University presented a few-mode  $\text{Er}^{3+}$ -doped fiber amplifier whose  $\text{Er}^{3+}$  profiles were optimized for mode-gain equalization by using a microstructured core. Further, two invited papers were presented on a few-mode fiber system. Dr. Roland Ryf from Alcatel-Lucent presented mode division multiplexed transmission techniques for an optical communication system, particularly based on differential group delay management and involving scaling to a large number of modes. Prof. Dan M. Marom presented wavelength-selective switches operating over SDM. Prof. Govind P. Agrawal from the University of Rochester conducted a talk on the nonlinear limits of SDM transmission in the form of a tutorial. Newly derived Manakov equations enable the efficient computing of the effects of birefringence and random linear coupling for both the multimode and the multicore fibers. Dr. Joel Carpenter from University of Sydney discussed methods for measuring the mode transfer matrix of multimode fibers. Dr. Ezra Ip from NEC Labs America presented technologies for SDM transmission using few-mode fibers including inline erbium-doped fiber amplifiers, wavelength-selective switches, and gain-flattening filters based on spatial light modulators. Mr. Sercan Ö. Ark reviewed an adaptive multi-input multi-output (MIMO) signal processing architecture for mode division multiplexing systems. Dr. Vincent A. J. M. Sleiffer summarized the results of the first field trial of mode division multiplexing. All the demonstrated scenarios confirm the possibility for a partial upgrade of legacy systems to the few-mode technology.

Table 2 Number of papers presented from each region

| Region | Plenary         | Invited         | Contributed | Total |
|--------|-----------------|-----------------|-------------|-------|
| Japan  | 1               | 2               | 7           | 10    |
| Europe | 1               | 3               | 6           | 10    |
| USA    | 2 <sup>1)</sup> | 4 <sup>2)</sup> | 0           | 6     |
| Others | 0               | 2               | 1           | 3     |
| Total  | 4               | 11              | 14          | 29    |

1) a speaker from NOSP in joint plenary included.

2) one tutorial included.

#### 5. Conclusion

The 2014 Summer Topicals on the space division multiplexing technology for high capacity transmission was successfully organized, and a total of 29 papers were presented. SDM has been a hot topic of research in the field of photonics. EXAT intends to organize an international symposium on SDM in Kyoto, Japan in July, 2015.

## IEICE-CS Related Conferences Calendar

| Date                      | Conference Name   | Location               | Note                                 |
|---------------------------|---|------------------------|--------------------------------------|
| 18 Oct. -<br>22 Oct. 2015 | 37 <sup>th</sup> IEEE International Telecommunication Energy Conference ( <b>INTELEC 2015</b> )   | Osaka, Japan           | Submission deadline:<br>20 Feb. 2015 |
| 14 Oct. -<br>16 Oct. 2015 | The 21 <sup>th</sup> Asia-Pacific Conference on Communications ( <b>APCC2015</b> )  | Kyoto, Japan           | Submission deadline:<br>20 Apr. 2015 |
| 4 Aug. -<br>7 Aug. 2015   | 10 <sup>th</sup> Asia-Pacific Symposium on Information and Telecommunication Technologies ( <b>APSITT2015</b> )                               | Colombo,<br>Sri Lanka  | Submission deadline:<br>26 Dec. 2014 |
| 28 Jun. -<br>2 Jul. 2015  | OptoElectronics and Communications Conference 2015 ( <b>OECC 2015</b> )   | Shanghai, China        | Submission deadline:<br>31 Jan. 2015 |
| 25 Mar -<br>27 Mar 2015   | The Twelfth International Symposium on Autonomous Decentralized Systems ( <b>ISADS2015</b> )  | Taichung, Taiwan       | Submission deadline:<br>Closed       |
| 24 Feb. -<br>6 Mar. 2015  | Asia Pacific Regional Internet Conference on Operational Technologies-Asia Pacific Advanced Network 2015 ( <b>APRICOT-APAN2015</b> )          | Fukuoka, Japan         | To be held <b>soon</b>               |
| 12 Jan. -<br>14 Jan. 2015 | The 29 <sup>th</sup> International Conference on Information Networking ( <b>ICOIN2015</b> )  | Siem Reap,<br>Cambodia | To be held <b>soon</b>               |
| 2 Dec -<br>5 Dec 2014     | 2014 International Symposium on Antennas and Propagation ( <b>ISAP2014</b> )  | Kaohsiung,<br>Taiwan   | To be held <b>soon</b>               |
| 4 Nov. -<br>6 Nov. 2014   | 2014 IEEE International Conference on Communication, Networks and Satellite ( <b>COMNETSAT 2014</b> )   | Jakarta, Indonesia     | Done                                 |
| 22 Oct. -<br>24 Oct. 2014 | International Conference on Information and Communication Technology Convergence 2014 ( <b>ICTC 2014</b> )                                    | Busan, Korea           | Done                                 |
| 20 Oct. -<br>23 Oct. 2014 | International Topical Meeting on Microwave Photonics /The 9 <sup>th</sup> Asia-Pacific Microwave Photonics Conference ( <b>MWP/APMP2014</b> ) | Sapporo, Japan         | Done                                 |
| 8 Oct. 2014               | Millimeter-wave for 5G in CEATEC2014 ( <b>MMW5G in CEATEC2014</b> )   | Chiba, Japan           | Done                                 |
| 1 Oct. -<br>3 Oct. 2014   | The 20 <sup>th</sup> Asia-Pacific Conference on Communications ( <b>APCC 2014</b> )   | Pattaya, Thailand      | <b>Reported</b><br>on this issue     |
| 17 Sep. -<br>19 Sep. 2014 | Asia-Pacific Network Operations and Management Symposium ( <b>APNOMS 2014</b> )   | Hsinchu, Taiwan        | <b>Reported</b><br>on this issue     |
| 2 Sept. 2014              | 7 <sup>th</sup> International WDN Workshop on Cooperative and Heterogeneous Cellular Networks ( <b>WDN-CN2014</b> )                           | Washington DC,<br>USA  | <b>Reported</b><br>on this issue     |
| 28 Aug. -<br>30 Aug. 2014 | Asia Pacific Conference on Wireless and Mobile ( <b>APWiMob</b> )   | Bali, Indonesia        | <b>Reported</b><br>on this issue     |
| 30 Jul. -<br>1 Aug. 2014  | The Fifth International Conference on Communications and Electronics ( <b>ICCE2014</b> )  | Da Nang, Vietnam       | <b>Reported</b><br>on this issue     |
| 14 Jul. -<br>16 Jul. 2014 | IEEE Photonics Society 2014 Summer Topicals Meeting Series ( <b>IEEE Summer Topicals 2014</b> )   | Montreal, Canada       | <b>Reported</b><br>on this issue     |

Please confirm with the following IEICE-CS web site for the latest information.  
<http://www.ieice.org/cs/conf/calendar.html>

## Special Section Calendar of IEICE Transactions on Communications

| Issue     | Special Section   | Note   |
|-----------|---|--|
| Jan. 2016 | Recent Progress in Antennas, Propagation and Wireless Systems Related to Topics in ISAP2014                           | Submission due:<br>6 April 2015<br><b>See page 32</b>    |
| Dec. 2015 | No special section in this issue  |  |
| Nov. 2015 | No special section in this issue  |  |
| Oct. 2015 | 5G Radio Access Networks [Part II] Multi-RAT Heterogeneous Networks and Smart Radio Technologies                      | Submission due:<br>19 January 2015<br><b>See page 33</b> |
| Sep. 2015 | Emerging Technologies on Ambient Sensor Networks toward Future Generation   | Submission due:<br>9 January 2015<br><b>See page 34</b>  |
| Aug. 2015 | 5G Radio Access Networks [Part I] Radio Access Technologies and System Design   | Submission due:<br>8 December 2014<br><b>See page 35</b> |
| Jul. 2015 | Electromagnetic Compatibility Technology in Conjunction with Main Topics of EMC'14/Tokyo                              | To be issued   |
| May 2015  | Recent Progress in Radio Propagation  | To be issued   |
| Apr. 2015 | No special section in this issue  |  |
| Mar. 2015 | Position Papers Exploring Innovative Intelligence and Technologies in Communications                                  | To be issued   |
| Feb. 2015 | Quality of Diversifying Communication Networks and Services   | To be issued <b>soon</b>                                 |
| Jan. 2015 | Position Papers Exploring Innovative Intelligence and Technologies in Communications                                  | To be issued <b>soon</b>                                 |
| Dec. 2014 | Technologies and Architectures for Improving Scalability, Reliability, and Robustness for Future Information Networks | Vol. E97-B, No.12  |
| Nov. 2014 | Network Virtualization, and Fusion Platform of Computing and Networking   | Vol. E97-B, No.11  |
| Oct. 2014 | Recent Progress in Measurement and Design Techniques on Antennas, Propagation and Wireless Systems                    | Vol. E97-B, No.10  |
| Sep. 2014 | Ambient Intelligence and Sensor Networks  | Vol. E97-B, No.9   |

Please confirm with the following IEICE web site for the latest CALL FOR PAPERS  
<http://www.ieice.org/event/ronbun-e.php?society=cs>



## Call for Papers

### ----- Special Section on Recent Progress in Antennas, Propagation and Wireless Systems Related to Topics in ISAP2014 -----

The IEICE Transactions on Communications announces that it will publish a special section entitled "Special Section on Recent Progress in Antennas, Propagation and Wireless Systems Related to Topics in ISAP2014" in the **January 2016** issue.

The 2014 International Symposium on Antennas and Propagation (ISAP2014) will be held in Kaohsiung, Taiwan during December 2-5, 2014, which aims at providing an international forum for exchanging information on the progress of research and development in antennas, propagation, electromagnetic wave theory, and the related fields. This symposium is the 19<sup>th</sup> ISAP, and the series of the symposia have gained high reputation for its excellent quality of the presented papers. By taking this opportunity, the special section has been planned to publish papers on advanced technologies in antennas, propagation and the related fields. The special section seeks for submission particularly from, but not limited to, the authors of ISAP2014.

#### 1. Scope

This special section aims at timely dissemination of research in these areas. Possible topics include, but are not limited to antennas and propagation technologies related to progressing technology for MU-MIMO, LTE, PAN/BAN, and wireless power transmission, so forth. The topics also include electromagnetic wave theory and its related topics including emerging topics for metamaterial and its antenna application.

#### 2. Submission Instructions

The standard number of pages is 8. The page charges are considerably higher for extra pages. Manuscripts should be prepared according to the guideline in the "Information for Authors." The latest version is available at the web site, [http://www.ieice.org/eng/shiori/mokuji\\_cs.html](http://www.ieice.org/eng/shiori/mokuji_cs.html). The period for revising the manuscript after acknowledgement of conditional acceptance for this special section could be shorter than that for regular issues (60 days) because of the tight review schedule.

This special section will accept only papers by electronic submission. Submit a manuscript and electronic source files (LaTeX/Word files, figures, authors' photos and biography) via the IEICE Web site [https://review.ieice.orgregist/regist\\_baseinfo\\_e.aspx](https://review.ieice.orgregist/regist_baseinfo_e.aspx) **by April 6th, 2015 (JST)**. Authors should choose the Recent Progress in Antennas, Propagation and Wireless Systems Related to Topics in ISAP2014 as a "Journal/Section" on the online screen. Do not choose [Regular-EB].

#### Contact point :

**Takeshi Fukusako**

**Graduate School of Science & Technology, Kumamoto University**

**Tel: +81-96-342-3839, Fax: +81-96-342-3600**

**Email: eb-isap2014ss@mail.ieice.org**

#### 3. Special Section Editorial Committee

**Guest Editor-in-Chief:** Wen-Shan Chen (Southern Taiwan Univ. of Science and Tech.)

**Deputy Editor-in-Chief:** Qiang Chen (Tohoku Univ.)

**Guest Editors:** Mitoshi Fujimoto (Fukui Univ.), Takeshi Fukusako (Kumamoto Univ.) and Takuji Arima (Tokyo Univ. of Agriculture & Tech.)

**Guest Associate Editors:** Tzyh-Ghuang Ma (National Taiwan Univ. of Science and Tech.), Jui-Han Lu (National Kaohsiung Marine Univ.), Nozomu Ishii (Niigata Univ.), Shinichi Ichitsubo (Kyushu Inst. of Tech.), Tetsuro Imai (NTT DOCOMO), Shinichiro Ohnuki (Nihon Univ.), Yuichi Kimura (Saitama Univ.), Masayuki Nakano (KDDI Lab.), Toru Fukasawa (Mitsubishi Electric), Naoki Honma (Iwate Univ.), Hiroyoshi Yamada (Niigata Univ.), Manabu Yamamoto (Hokkaido Univ.)

\* Authors must agree to the "Copyright Transfer and Page Charge Agreement" via electric submission.

\* Please note that if accepted, all authors, including authors of invited papers, are requested to pay for the page charges covering partial cost of publications.

\* At least one of the authors must be an IEICE member when the manuscript is submitted for review. Invited papers are an exception. We recommend that authors unaffiliated with IEICE apply for membership. For membership applications, please visit the web-page, <http://www.ieice.org/eng/member/OM-appli.html>.

## Call for Papers

# ----- Special Section on 5G Radio Access Networks – Part II: Multi-RAT Heterogeneous Networks and Smart Radio Technologies -----

The IEICE Transactions on Communications announces that it will publish a special section entitled "Special Section on 5G Radio Access Networks – Part II: Multi-RAT Heterogeneous Networks and Smart Radio Technologies " in the October 2015 issue.

As the fourth generation mobile communications system (4G), the Long Term Evolution (LTE) is being rolled out worldwide and preparations for LTE-Advanced deployment are being underway. Meanwhile, the fifth generation mobile communications system (5G) has been attracting more and more attention, with many organizations being established including "Future IMT Vision" study group by ITU-R WP5D, towards the identification of system requirements, novel system concepts and potential technologies for 2020 and beyond. Key issues for the 5G system is the support of the rapidly growing mobile traffic by exploration of higher frequency bands, high density cell deployment, and low-cost network operation. Integration of heterogeneous multiple radio access technologies (multi-RAT), e.g., cellular, WLAN, and short range communications in millimetre-wave bands, is expected as a practical solution to overcome these issues. Moreover, Smart Radio technologies are expected as promising enablers for the 5G system. In order to further promote 5G related research and development activities, particularly on multi-RAT heterogeneous networks and Smart Radio technologies, a special section is being planned (scheduled to appear in the October 2015 issue).

### 1. Scope

This special section aims at timely dissemination of research in these areas. Possible topics include, but are not limited to:

- Smart radio
- Heterogeneous radio access networks
- Cellular and WLAN interworking
- Multi-band/multi-mode radio systems
- Aggregation of fragmented spectrum bands
- Cognitive radio/cognitive networks
- Common control channel and cloud operation
- Dynamic spectrum access and spectrum management
- Shared use of spectrum/optimising unlicensed spectrum usage
- Radio resource and traffic management
- Network-oriented interference coordination
- Cross-layer optimisation
- Software defined radio and networking technologies
- Radio policy and regulatory issues.

### 2. Submission Instructions

The standard number of pages is 8. The page charges are considerably higher for extra pages. Manuscripts should be prepared according to the guideline in the "Information for Authors." The latest version is available at the web site, [http://www.ieice.org/eng/shiori/mokuji\\_cs.html](http://www.ieice.org/eng/shiori/mokuji_cs.html). The term for revising the manuscript after acknowledgement of conditional acceptance for this special section could be shorter than that for regular issues (60 days) because of the tight review schedule.

This special section will accept papers only by electronic submission. Submit a manuscript and electronic source files (LaTeX/Word files, figures, authors' photos and biographies) via the IEICE Web site [https://review.ieice.org/regist/regist\\_baseinfo\\_e.aspx](https://review.ieice.org/regist/regist_baseinfo_e.aspx) by **19th January 2015 (JST)**. Authors should choose the "5G Radio Access Networks – Part II: Multi-RAT Heterogeneous Networks and Smart Radio Technologies" as a "Journal/Section" on the online screen. Do not choose [Regular EB].

#### Contact point:

Masayuki Ariyoshi

Advanced Telecommunications Research Institute International

Tel: +81 774 95 1141 Fax: +81 774 95 1508

E-mail: [ieice2015\\_smartradio@atr.jp](mailto:ieice2015_smartradio@atr.jp)

### 3. Special Section Editorial Committee

**Guest Editor-in-Chief:** Seiichi Sampei (Osaka Univ)

**Guest Editors:** Masayuki Ariyoshi (ATR), Osamu Takyu (Shinshu Univ), Shigeru Tomisato (Okayama Univ)

**Guest Associate Editors:** Anass Benjebbour (NTT DoCoMo), Simon Fletcher (Telecom Modus), Yasuhiko Inoue (NTT), Koji Ishibashi (Univ Electro-Communications), Yoshikazu Kakura (NEC), Nobuhiko Miki (Kagawa Univ), Keiichi Mizutani (NICT), Dominique Nogueet (CEA), Masayoshi Ohashi (Fukuoka Univ), Stefan Parkvall (Ericsson), Mitsuru Uesugi (Panasonic System Networks), Akira Yamaguchi (KDDI Labs), Kazuto Yano (ATR)

\* Authors must agree to the "Copyright Transfer and Page Charge Agreement" via electronic submission.

\* Please note that if the submitted paper is accepted, all authors, including authors of invited papers, are requested to pay for the page charges covering partial cost of publications.

\* At least one of the authors must be an IEICE member when the manuscript is submitted for review. Invited papers are an exception. We recommend that authors unaffiliated with IEICE apply for membership. For membership applications, please visit <http://www.ieice.org/eng/member/OM-appli.html>

## Call for Papers

### --- Special Section on Emerging Technologies on Ambient Sensor Networks toward Future Generation ---

The IEICE Transactions on Communications announces that it will publish a special section entitled "Special Section on Emerging Technologies on Ambient Sensor Networks toward Future Generation" in **September 2015**.

Sensor networks enable gathering ambient information from peoples, products, and sensing devices for real space. Sensing data should be processed, analyzed, and applied for enhancement or assistance for human activities, which is called ambient intelligence. Ambient sensor networks (ASNs) are the sensor networks interactively cooperating with ambient intelligence. It is expected that gentle social environments such as efficient electric power usage in smart grids and effective transportation systems will be established through the ambient sensor networks. Applied researches have been promoted in the field of technologies supporting the ambient sensor networks. Toward future generation, it is important to support such progressing technologies and promote further collaboration with other fields. From the above points of view, the special section is planned (scheduled to appear in the September 2015 issue) to publish papers on the related fields.

#### 1. Scope

The scope of this special section includes not only information and communication research fields but also its multidisciplinary research with agriculture, forestry and fisheries industry fields, industry fields including incineration and power-generator plants, and service fields such as health-care, medical-care, and circulations because they are important and major applications for the ASNs. Possible topics include, but are not limited to:

a. Ubiquitous sensing and Actuation technologies

Space sensing, vital sensing, mobile sensing, ambient interface, device and appliance technologies, embedded software, sensing and control theory.

b. Ad-hoc, mesh, and sensor networks

MAC/routing protocols, QoS control, multi-hop and cooperative communication, security, cross layer design, energy harvesting, green wireless, communication and network theory.

c. Ambient intelligence

Sensor database, context extraction, mining, location-information technology, stream processing, privacy and security, big data, learning signal processing.

d. System basement

Large scale widening, dependability, IoT, M2M, cyber physical, operation management, autonomous distributed control.

e. Interdisciplinary system applications

Agriculture, forestry and fishery support systems, disaster prevention and mitigation system, smart space, medical and health systems, industrial support system, social infrastructure system, wide area sensing system

#### 2. Submission Instructions

The standard number of pages is 8. The page charges are considerably higher for extra pages. Manuscripts should be prepared according to the guideline in the "Information for Authors". The latest version is available at the web site, [http://www.ieice.org/eng/shiori/mokuji\\_cs.html](http://www.ieice.org/eng/shiori/mokuji_cs.html). The term for revising the manuscript after acknowledgement of conditional acceptance for this special section could be shorter than that for regular issues (60 days) because of the tight review schedule.

This special section will accept papers only by electronic submission. Submit a manuscript and electronic source files (TeX/Word files, figures, authors' photos and biographies) via the IEICE Web site [https://review.ieice.org/regist/regist\\_baseinfo\\_e.aspx](https://review.ieice.org/regist/regist_baseinfo_e.aspx) **by January 9, 2015 (JST)**. Authors should choose the Emerging Technologies on Ambient Sensor Networks toward Future Generation as a "Type of Section (Issue)" on the online screen. Do not choose [Regular-EB].

#### Contact point:

Satoshi Ohzahata

University of Electro-Communications

Tel/Fax: +81-42-443-5630, Email: [asn-ss-sec@mail.ieice.org](mailto:asn-ss-sec@mail.ieice.org)

#### 3. Special Section Editorial Committee

**Guest Editor-in-Chief:** Hidekazu Murata (Kyoto Univ.)

**Guest Editors:** Hideyuki Uehara (Toyohashi Univ. of Technology), Satoshi Ohzahata (Univ. of Electro-Communications)

**Guest Associate Editors:** Miyuki Imada (NTT), Hideyuki Kawashima (Univ. of Tsukuba), Narito Kurata (Tsukuba Univ. of Technology), Shigeki Shiokawa (Kanagawa Institute of Technology), Yasuo Tan (JAIST), Katsuhiro Naito (Aichi Institute of Technology), Jin Nakazawa (Keio Univ.), Kiyohito Yoshihara (KDDI R&D Lab.), Naoki Wakamiya (Osaka Univ.), Masahiro Watanabe (Mitsubishi Electric Corp.)

\* Authors must agree to the "Copyright Transfer and Page Charge Agreement" via electronic submission.

\* Please note that if the submitted paper is accepted, all authors, including authors of invited papers, are requested to pay for the page charges covering partial cost of publications.

\* At least one of the authors must be an IEICE member when the manuscript is submitted for review. Invited papers are an exception. We recommend that authors unaffiliated with IEICE apply for membership. For membership applications, please visit <http://www.ieice.org/eng/member/OM-appli.html>



## — Special Section on 5G Radio Access Networks – Part I: Radio Access Technologies and System Design —

IEICE Transactions on Communications announces that it will publish a special section entitled “Special Section on 5G Radio Access Networks – Part I: Radio Access Technologies and System Design” in the **August 2015 issue**.

As the fourth generation mobile communications system (4G), the Long Term Evolution (LTE) is being rolled out worldwide and preparations for LTE-Advanced deployment are being underway. Meanwhile, the fifth generation mobile communications system (5G) has been attracting more and more attention, with many organizations being established toward the identification of system requirements, novel system concepts and potential technologies for 2020 and beyond. Examples of 5G related activities include the establishment of “Future IMT Vision” study group by ITU-R WP5D, METIS project in Europe, IMT-2020 in China, 5G Forum in Korea and “2020 and Beyond Adhoc (20B AH)” by ARIB Japan. From radio access perspective, 5G is generally perceived as the combination of LTE-Advanced evolution in addition to novel radio access technology (RAT) as an enabler of more advanced capabilities such as the support of new scenarios and frequency bands. In order to further promote 5G related research and development activities, a special section on technologies for further LTE-Advanced evolution and novel radio access technologies, radio interface and system concept designs for 5G is being planned (scheduled to appear in the August 2015 issue).

### 1. Scope

Special section aims at timely dissemination of research in the following areas. Possible topics include, but are not limited to:

- 5G system concept
- Radio interface design
- New waveform design
- Massive MIMO techniques
- Small cell technologies
- Advanced modulation and coding schemes
- Advanced multiple access technologies
- Advanced interference coordination and mitigation techniques
- Advanced MIMO technologies
- Capacity/coverage split system design
- Energy-efficient radio access technologies
- Technologies for higher frequency bands
- Technologies for massive connectivity
- Technologies for small packet transmission
- Technologies for ultra-low latency
- Device to Device (D2D) communications
- Wireless backhauling and advanced relay

### 2. Submission Instructions

The standard number of pages is 8. The page charges are considerably higher for extra pages. Manuscripts should be prepared according to the guidelines in the “Information for Authors.” The latest version is available at the web site, [http://www.ieice.org/eng/shiori/mokuji\\_cs.html](http://www.ieice.org/eng/shiori/mokuji_cs.html). The term for revising the manuscript after acknowledgement of conditional acceptance for this special section could be shorter than that for regular issues (60 days) because of the tight review schedule.

This special section will accept papers only by electronic submission. Submit a manuscript and electronic source files (LaTeX/Word files, figures, authors’ photos and biographies) via the IEICE Web site [https://review.ieice.org/regist/regist\\_baseinfo\\_e.aspx](https://review.ieice.org/regist/regist_baseinfo_e.aspx) by **8th December 2014 (JST)**. Authors should choose the “5G Radio Access Networks – Part I: Radio Access Technologies and System Design” as a “Journal/Section” on the online screen. Do not choose [Regular EB].

#### Contact point:

Masayuki Hoshino

Panasonic, Inc., AVC Networks Company, AVC Technology Development Center

Tel: +81 45 938 3045 Fax: +81 45 938 1545

Email: [eb-5gsys@mail.ieice.org](mailto:eb-5gsys@mail.ieice.org)

### 3. Special Section Editorial Committee

Guest Editor-in-Chief: Seiichi Sampei (Osaka Univ.)

Guest Editors: Masayuki Hoshino (Panasonic), Shigeru Tomisato (Okayama Univ.), Hidekazu Murata (Kyoto Univ.)

Guest Associate Editors: Takahiro Asai (NTT DOCOMO), Yoshikazu Kakura (NEC), Katsutoshi Kusume (DOCOMO Eurolabs), Kazunori Hayashi (Kyoto Univ.), Masatsugu Higashinaka (Mitsubishi Electric), Shinsuke Ibi (Osaka Univ.), Manabu Mikami (Softbank Mobile, Inc.), Nobuhiko Miki (Kagawa Univ.), Toshihiko Nishimura (Hokkaido Univ.), Tetsu Sakata (NTT), Akinori Taira (Tohoku Univ.), Toshiaki Yamamoto (KDDI Labs), Chiharu Yamazaki (Kyocera Inc.)

\* Authors must agree to the “Copyright Transfer and Page Charge Agreement” via electronic submission.

\* Please note that if the submitted paper is accepted, all authors, including authors of invited papers, are requested to pay for the page charges covering partial cost of publications.

\* At least one of the authors must be an IEICE member when the manuscript is submitted for review. Invited papers are an exception. We recommend that authors unaffiliated with IEICE to apply for membership.

\* For membership applications, please visit <http://www.ieice.org/eng/member/OM-appli.html>



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

**OMDP (Overseas Membership Development Program):** OMDP is provided for candidates **from countries/areas in Asia (except Republic of Korea and Taiwan), 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.

● **IEICE Societies and Publications**

| Society   | Transactions                 | Editorial Subject Indexes  |
|---|------------------------------|--|
| <b>A</b><br>(Fundamentals of Electronics, Communications and Computer Sciences) | EA (English)<br>A (Japanese) | 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>B</b><br>(Communications)  | EB (English)<br>B (Japanese) | Fundamental Theories for Communications, Devices/Circuits for Communications, Transmission Systems and Transmission Equipment for Communications, Optical Fiber for Communications, Fiber-Optic Transmission for Communications, Switching for Communications, Switching for Mobile Communications, Network, Network Management/Operation, Internet, Wireless Communication Technologies, Terrestrial Radio Communications, Satellite Communications, Optical Wireless Communications, Antennas and Propagation, Electromagnetic Compatibility (EMC), Sensing, Navigation, Guidance and Control Systems, Energy in Electronics Communications, Terminals for Communications, Multimedia Systems for Communications, Broadcast Systems, Integrated Systems for Communications, Space Utilization Systems for Communications   |
| <b>C</b><br>(Electronics)   | EC (English)<br>C (Japanese) | 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   |
| <b>D</b><br>(Information and Systems)   | ED (English)<br>D (Japanese) | Computation and Computational Models, Automata and Formal Language Theory, Algorithm Theory, Complexity Theory, Computer Components, VLSI Systems, Computer Systems, Fundamentals of Software and Theory of Programs, System Programs, Software Engineering, Database, Contents Technology and Web Information Systems, Data Mining, Networks, Dependable Computing, Application Information Security, Distributed Cooperation and Agents, Artificial Intelligence and Cognitive Science, Human-computer Interaction, Office Information Systems, e-Business Modeling, Educational Technology, Rehabilitation Engineering and Assistive Technology, Pattern Recognition, Speech and Hearing, Image Processing and Video Processing, Image Recognition, Computer Vision, Computer Graphics, Multimedia Pattern Processing, Natural Language Processing, Biocybernetics, Neurocomputing, Biological Engineering, Music Information Processing, Kansei Information Processing, Affective Information Processing |
| <b>Journal of IEICE (written in Japanese only)</b>                              |                              |  |

● **Membership Charges (<http://www.ieice.org/eng/member/OM-appli.html#c>)**

Basic Membership Charge is as follows. It will change the term when you join IEICE. Please refer to the above website.

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

| Service coverage for overseas members | Admission charge | Online Version   |   | Paper Version (optional)      |
|---------------------------------------|------------------|--|---|-------------------------------|
|                                       |                  | Registration of the first society (includes its online version transactions) | Registration of additional societies (includes its online version transactions) | Journal (written in Japanese) |
| Member (overseas)                     | 1,400            | 7,000  | 3,500 / 1society  | 6,000                         |
| Member (overseas) with OMDP*          | 1,000            | 5,000  | 3,000 / 1society  | 6,000                         |
| Student member (overseas)             | -                | 2,000  | 2,000 / 1society  | 6,000                         |
| Student member (overseas) with OMDP*  | -                | 1,000  | 1,500 / 1society  | 6,000                         |

NOTE

- You need to choose one Society, and you can subscribe Transactions online of your registered society.  
Example: If you want to subscribe to Transaction of EA, please check Society Registration as "A", and your membership fee amounts to 7,000 yen / 5,000 yen.
- If you want to register other Societies and Transaction of web version, please check "Additional Society registration".  
Example: If you want to subscribe to Transaction of EA and EB, please check Society Registration as "A", Additional Society registration (optional) as "B". Your membership fee amounts to 7,000+3,500 yen / 5,000+3,000 yen.
- If you want to subscribe to one Transaction of paper version, please check "Additional Transaction subscription (published in paper)".  
Example: If you want to subscribe to Transaction of EC in paper version additionally, please check Society Registration as "A", and Additional Transaction subscription (in paper version) as "C" or as "EC". Your membership fee amounts to 7,000+4,000 yen / 5,000+4,500 yen.
- If you want to change membership from Member (In Japan) to Overseas Member, you don't need to pay an Entrance charge.

● **Optional Rapid Mailing Service**

Surface mail charge is included in the membership charge. 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 right table.

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

Please contact the IEICE Membership Section: E-mail: [member@ieice.org](mailto:member@ieice.org) FAX: +81 3 3433 6659 **Please fill out the application form printed on the opposite side of this page.**





**IEICE-CS Overseas Membership with Special Annual Fees for Sister Society Members**

To foster the cooperation between the Sister Society and the IEICE Communications Society (IEICE-CS), the Sister Society agreement enables members of each institution to become members of both societies by granting special annual fees.

A 10% - 20% discount\* of the annual fees will be granted to the sister society members to become the IEICE-CS overseas members. The discounted fees will be applied for the individual members when the new membership is starting or the current membership is renewing.

\* The discount does not apply to the optional items and services i.e. “Additional Society”, “Additional Transactions of paper version” and “Rapid Mailing Service”.

----- Please send the following Sister Society membership information, together with membership application form in the next page. -----

**Sister Society membership information**

*To apply discount rates for this IEICE-CS Sister Society member’s application, please indicate your Sister Society Membership number below, and attach a copy of your Sister Society Membership certificate or card to this form.*

Sister Society:     IEEE ComSoc         KICS         VDE-ITG

Membership number (Member): \_\_\_\_\_

Copy of Membership certificate or Membership card:

(Attached here)



# IEICE Communications Society - GLOBAL NEWSLETTER

## Submission Guideline

First version in only Japanese: May 30, 2008  
Second version in only Japanese: Feb. 13, 2009  
Third version in only Japanese: Jul. 22, 2010  
Forth version in English and Japanese: Mar. 8, 2011  
Ver 5.0 : August 10 2013

### 1. About GLOBAL NEWSLETTER

The Institute of Electronics, Information and Communication Engineers Communications Society (IEICE-CS) GLOBAL NEWSLETTER has been established since 2002. We quarterly publish an English newsletter every March, June, September, and December.

#### 1.1. Goal

Our goal is to share information between overseas/foreign members and other members in IEICE-CS as a global activity, and to show IEICE presence internationally.

#### 1.2 Category of Articles

- 1) Messages from President/Vice President
    - An inaugural message from CS President is published once per year in June. Message from CS Vice President is published properly.
  - 2) IEICE-CS Activities Now
    - IEICE General/Society Conference information/reports
    - Activities of Technical Committees
    - International activities of the society
  - 3) IEICE-CS Related Conferences Reports
    - Information/reports on IEICE-CS related conferences
    - IEICE-CS Conferences Calendar (\*)
  - 4) Others
    - Essays, Laboratory activity reports, Technology reports, Messages from overseas/foreign members, etc.
    - Information from Sister Societies
    - Special topics (\*)
  - 5) IEICE-CS Information
    - Call for papers
    - From editor's desk (\*)
- \*: planned / written by IEICE-CS Directors, Planning and Members Activities

### 2. Major notes for Contribution

Basically, IEICE-CS members and readers can contribute articles. IEICE-CS Directors, Planning and Members Activities may ask non-IEICE-CS members to contribute articles. The articles should be fruitful and profitable for IEICE-CS members, **NOT** for particular organization. IEICE-CS Directors, Planning and Members Activities may not accept an article for publication if it does not follow this guideline.

#### 2.1 Template and Language

Please use template downloadable at the URL:  
[http://www.ieice.org/cs/pub/global\\_howto.html](http://www.ieice.org/cs/pub/global_howto.html)  
Please use English for all articles.

#### 2.2 Number of pages

Two to four pages are preferable. One page article is also acceptable. The maximum number of pages is eight. When you try to entry a contribution with five to eight pages, you need to negotiate with IEICE-CS Directors, Planning and Members Activities.

### 3. Copyright

The copyrights of all articles in the GLOBAL NEWSLETTER should belong to the IEICE. However, the original authors retain the right to copy, translate or modify their own manuscripts. In cases when a manuscript is translated into another language or when any portion of the manuscript is to be submitted to another publication, authors



should register the action with the IEICE, and the original manuscript should be clearly cited in the publications. Please see a web site related to IEICE provisions on copyright.

<http://www.ieice.org/eng/about/copyright.html>

#### 4. Publication fee / Manuscript fee

No publication fee and no manuscript fee for all articles.

#### 5. Schedule

Standard editing schedule is as follows. Please note that the schedule may vary due to public holidays or other circumstances. The exact deadlines are indicated in call for newsletters.

|                                    |                            |                            |                            |                             |
|------------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|
| Publication date                   | 1 <sup>st</sup> , Mar.     | 1 <sup>st</sup> , Jun.     | 1 <sup>st</sup> , Sept.    | 1 <sup>st</sup> , Dec.      |
| Call for newsletters               | 1 <sup>st</sup> Mon., Dec. | 1 <sup>st</sup> Mon., Mar. | 1 <sup>st</sup> Mon., Jun. | 1 <sup>st</sup> Mon., Sept. |
| Contribution entry                 | 4 <sup>th</sup> Fri., Dec. | 4 <sup>th</sup> Fri., Mar. | 4 <sup>th</sup> Fri., Jun. | 4 <sup>th</sup> Fri., Sept. |
| Submission of Manuscript/Copyright | 3 <sup>rd</sup> Fri., Jan. | 3 <sup>rd</sup> Fri., Apr. | 3 <sup>rd</sup> Fri., Jul. | 3 <sup>rd</sup> Fri., Oct.  |

##### 5.1 Call for Newsletters

IEICE-CS Directors, Planning and Members Activities will give you the information on call for newsletters.

##### 5.2 Contribution Entry

You should send **information on title, summary(around 50 words or less) and number of page** to IEICE-CS Directors, Planning and Members Activities by e-mail.

E-mail: [cs-gnl@mail.ieice.org](mailto:cs-gnl@mail.ieice.org)

##### 5.3 Submission of Manuscript

You should send a manuscript both in word file and pdf file to IEICE-CS Directors, Planning and Members Activities by e-mail.

E-mail: [cs-gnl@mail.ieice.org](mailto:cs-gnl@mail.ieice.org)

##### 5.4 Submission of COPYRIGHT TRANSFER FORM

COPYRIGHT TRANSFER FORM can be downloaded at:

[http://www.ieice.org/cs/pub/global\\_howto.html](http://www.ieice.org/cs/pub/global_howto.html)

Signed **COPYRIGHT TRANSFER FORM** should be sent by one of the following ways:

- By email.
- By facsimile.

Address to send:

- In case of email: [cs-gnl@mail.ieice.org](mailto:cs-gnl@mail.ieice.org)
- In case of facsimile:

Name: Publications Department, IEICE

Facsimile: +81-3-3433-6616, Phone: +81-3-3433-6692

#### 6 Contact Point

IEICE-CS Directors, Planning and Members Activities in charge of IEICE-CS GLOBAL NEWSLETTER, [cs-gnl@mail.ieice.org](mailto:cs-gnl@mail.ieice.org)

## From Editor's Desk

I think everyone of IEICE members have had an exciting research activities in 2014. Now, it is December, 2014 ends in a little later, and 2015 will soon come. Illuminations will have been increasing in the city. We hope you enjoy your winter and/or New Year vacation and start your activities again.

By the way, IEICE General Conference 2015 will be held in March. Complete English Sessions will be scheduled in IEICE General Conference 2015 for the globalization of IEICE's academic activities. The conference is to be held in the Ritsumeikan University, Kusatsu-city, Shiga, for March 10-13, 2015. Kusatsu is located beside the lake Biwa, the biggest lake in Japan. Also, Kusatsu is very close to Kyoto. It is recommended that at the time of your visit for the conference, please take a time to look around the Kusatsu and Kyoto. After you enjoy winter vacation, we would like to remind readers to consider joining in the conference. Please check out the latest information on the IEICE web site at:

[http://www.toyoag.co.jp/ieice/E\\_G\\_top/e\\_g\\_top.html](http://www.toyoag.co.jp/ieice/E_G_top/e_g_top.html)

Happy new year!  
IEICE-CS GLOBAL NEWSLETTER Editorial Staff

### Editorial Staff of this issue

No special order is observed



**Fumio FUTAMI**

Tamagawa University  
Quantum ICT Research Institute  
*Director, Planning and Member Activities, IEICE Communications Society*



**Takashi DATEKI**

Fujitsu Laboratories, Ltd.  
Network Systems Laboratories  
*Director, Planning and Member Activities, IEICE Communications Society*



**Michiharu NAKAMURA**

Fujitsu Laboratories, Ltd.  
Network Systems Laboratories  
*Director, International Publication, IEICE Communications Society*

# APSITT 2015

Sponsored by Communications Society, IEICE



10th Asia-Pacific Symposium on Information and Telecommunication Technologies  
Aug. 4-7, 2015, Colombo, Democratic Socialist Republic of Sri Lanka



## APSITT 2015

10<sup>th</sup> Asia-Pacific  
Symposium on  
Information and  
Telecommunication  
Technologies

Colombo,  
Democratic Socialist  
Republic of Sri Lanka  
Aug 4-7, 2015



## Conference Objectives

The objective of the conference is to offer the opportunity to exchange opinions among different countries in a co-operative atmosphere in the rapid changing information and telecommunication field. We aim toward the prosperity of Asia-Pacific region by presenting the opportunities of academic forum for mutual understanding and friendship among researchers and leaders in this region.

## Schedules

Paper submission due: December 26, 2014

Notification of acceptance: March 13, 2015

## Technical Areas

The APSITT 2015 provides a forum for researchers and professionals to present their findings on the broad areas of information and telecommunications technologies. Technical papers are sought describing original works in the following but not limited to:

- Green ICT
- Ubiquitous Applications/Services
- Internet Applications/Services
- Mobile Applications/Services
- Multimedia Applications/Services
- IP Networks
- Wireless Networks
- Photonic/Optical Networks
- Network Architecture
- Network Management
- QoS Control and Management
- Traffic Control and Management
- Content Delivery
- Switching and Routing
- Fundamental Theories
- P2P communication
- Web based Applications/Services
- Policy and Planning
- Service Development Technologies
- Sustainability and Dependability
- Resilient Networks
- Ad-hoc Networks
- Scale free Networks
- Overlay Networks
- Network Security
- Network Analysis
- Next Generation Network
- Post IP technologies

## Paper Submission

The APSITT 2015 is soliciting paper submissions in the form of full-paper submission as follows.

- Prospective authors are requested to submit a paper of three (3) pages, IEEE compatible PDF, written in English. Accepted papers will be presented at technical sessions.
- All copyright of accepted papers, including rights for publishing in any media, are transferred to the IEICE.
- Authors of best papers will be recommended to submit an extended version of their papers in IEICE transactions on communications.
- The proceedings of accepted papers will be indexed on the IEICE knowledge Discovery (I-Scover). The proceedings will be submitted to some other major indexing services as well. The decision of indexing will be made by each indexing service provider after a review of the proceedings.

Detailed submission process using the EDAS can be found on the conference web page.

## Contact (Do Not Send Your Paper)

APSITT 2015 Program Committee: E-mail: [apsitt2015-submit@mail.ieice.org](mailto:apsitt2015-submit@mail.ieice.org)

Please visit the conference web site for details: <http://www.ieice.org/cs/in/APSITT/2015/>



© Osaka Government Tourism Bureau

# CALL FOR PAPERS: INTELEC 2015

## SMART GREEN ENERGY FOR FUTURE ICT

### Swissôtel Nankai Osaka

**INTELEC**<sup>®</sup>, International Telecommunications Energy Conference, is the annual world-class technical forum presenting the latest in communications power systems, energy storage and energy conversion. This year's exciting conference program will include key note and plenary sessions from today's industry leaders as well as technical presentations, continuing education tutorials and workshops and poster sessions. This leading conference will also include a comprehensive technical tour and social program for networking amongst industry peers.

#### SCOPE OF THE CONFERENCE

The scope of the conference will include but not limited to the following communications power and energy system topics:

##### Communications Power Systems

- Outside plant power systems (twisted pair, customer premises, etc.)
- Renewable energy generations (Wind, PV, Hybrid, etc.)
- Islanded and grid-connected autonomous power systems
- Power systems (High and/or low voltage DC; High and/or low voltage AC) for central offices/data centers
- Power distribution architectures for communications equipment
- Wireless power transfer for handheld communications devices

##### Energy Storage for Communications Systems

- Architectures for energy storage
- Battery technology (lead, zinc, lithium, sodium, etc.)
- Flow battery technology
- New fuel cell technology
- Energy management techniques
- Energy modeling and simulation

##### Power Conversion for Communications Equipment

- Circuit Topologies and control techniques for AC/DC, DC/DC and DC/AC power converters
- Utility interface inverters for energy generation and storage
- AC and DC UPS
- High efficiency and high density power supplies

##### Site Support Systems

- Disaster recovery and mitigation
- Engine generator technology
- Physical and thermal design
- Grounding and EMC
- Codes, standards, and specifications

#### IMPORTANT DATES (TENTATIVE)

|                               |               |
|-------------------------------|---------------|
| Abstract submission deadline: | Feb. 20, 2015 |
| Notification of acceptance:   | May 22, 2015  |
| Camera ready paper deadline:  | July 8, 2015  |

#### COMMITTEE MEMBERS

##### General Chair

Mr. Kiyoshi Tsutsui (President and CEO, NTT Facilities, Japan)

##### General Co-Chair

Dr. Tadahito Aoki (Senior Vice President, NTT Facilities, Japan)

##### Organizing Committee Chair

Prof. Fujio Kurokawa (Nagasaki Univ., Japan)

##### Organizing Committee Co-Chairs

Dr. John Hawkins (Telepower Australia Pty Ltd., Australia)

Prof. İlhami Colak (Gazi Univ., Turkey)

##### Technical Program Committee Chair

Prof. Masahito Shoyama (Kyushu Univ., Japan)

##### Technical Program Committee Co-Chairs

Dr. Keiichi Hirose (NTT Facilities, Japan)

Prof. Alexis Kwasinski (Univ. of Texas, USA)

##### Secretary

Prof. Tadashi Suetsugu (Fukuoka Univ., Japan)

#### SPONSOR

IEEE Power Electronics Society

#### TECHNICAL CO-SPONSORS

The Institute of Electronics, Information and Communication Engineers (IEICE) Communications Society

The Institute of Electrical Engineers of Japan (IEEJ) Industry Applications

The Illuminating Engineering Institute of Japan (IEI-J)

The Institute of Electrical Installation Engineers of Japan (IEIEJ)

IEEE PELS Japan Joint Chapter

IEEE PELS Fukuoka Chapter

For more details: <http://www.intelec2015.org>



2015

# The 20<sup>th</sup> OptoElectronics and Communications Conference

## OECC 2015

JUNE 28<sup>th</sup> - JULY 2<sup>nd</sup> 2015, SHANGHAI, CHINA

WWW.OECC2015.SJTU.EDU.CN

### Sponsors



上海交通大学  
SHANGHAI JIAO TONG UNIVERSITY

### Co-Sponsors



### Committee

#### General Co-Chairs

Jianping Chen, Shanghai JiaoTong Univ.

Yi Luo, Tsinghua Univ.

#### TPC Co-Chairs

Xinwan Li, Shanghai JiaoTong Univ.

Xinliang Zhang, Huazhong Univ. of Sci. & Tech.

Jian Wu, Beijing Univ. of Post and Telecom.

#### Track TPC Co-Chairs

**T1:Fan Zhang**, Peking Univ.

**Yan Li**, Beijing Univ. of Posts and Telecom.

**Takeshi Hoshida**, Fujitsu Limited

**T2:Christophe Peucheret**, Univ. of Rennes 1

**Lilin Yi**, Shanghai Jiao Tong Univ.

**Jiajia Chen**, Royal Inst. of Technology

**Jorg-Peter Elbers**, Adva Optical Net.

**T3:Aihua Yu**, O-Net Comm. Group Ltd

**Zehua Hong**, China Aerospace Science and Technology Corporation

**T4:Shilong Pan**, Nanjing University of Aeronautics and Astronautics

**Jungwon Kim**, Korea Advanced Institute of Science and Technology (KAIST)

**Weiwun Zou**, Shanghai Jiao Tong Univ.

**Yosuke Mizuno**, Tokyo Inst. of Technology

**T5:Shinji Yamashita**, Tokyo University

**E. Kelleher**, Imperial college

**Han Zhang**, Shenzhen University

**Kan Wu**, Shanghai Jiao Tong University

**T6:Andrew Poon**, the Hong Kong University of Science and Technology

**Laurent Vivien**, Université Paris-Sud XI

**Po Dong**, Bell Labs, Alcatel-Lucent

**Linjie Zhou**, Shanghai Jiaotong University

**T7:Chi-Kuang Sun**, National Taiwan Univ.

**Xueding Wang**, University of Michigan

**Sung-Liang Chen**, Shanghai Jiao Tong Univ.

**T8:Bin Cai**, Univ.of Shanghai for Sci. & Tech.

**Toshikuni Kaino**, Tohoku University

**Zhenquan Tan**, Dalian Univ.of Technology

**Xiaojun Guo**, Shanghai Jiao Tong Univ.

**W1:Guiling Wu**, Shanghai Jiao Tong University

**W2:Kan Wu**, Shanghai Jiao Tong University

#### Publication Chair

**Yueping Cai**, Chongqing University

#### Secretary Chair

**Kan Wu**, Shanghai Jiao Tong University

### Call for papers

OptoElectronics and Communications Conference (OECC) is one of the biggest international conferences on latest optical and photonic research. OECC2015 will be held at Shanghai Jiao Tong University, Shanghai, CHINA, from June 28<sup>th</sup> to July 2<sup>nd</sup> 2015. OECC2015 will feature a comprehensive technical program of 8 tracks and 2 workshops on emerging photonic research topics. Prospective authors are invited to submit original technical papers for presentation and publication. Please refer to the website of OECC2015 for details. We invited research papers on but not limited to the following tracks and topics:

#### Tracks

##### T1 Optical Transmission Systems and Subsystems

Optical communication technologies, transmission systems and subsystems, novel multiplexing technologies, etc.

##### T2 Optical Networking and Switching Technologies

Optical core networks, metro networks, access networks, optical wireless networks, fronthaul/backhaul for 5G, software-defined networks, datacenter networks, etc.

##### T3 Optical Fibers, Cables, Devices and Modules

Optical fiber design, functional fibers, few-mode fibers, fibers for long wavelength region, photonic crystal fibers, fiber based devices and modules, etc.

##### T4 Optical Fiber Sensors and Microwave Photonics

Optical fiber sensor; fiber-based biosensors; fiber-based chemical sensors; smart structures and smart materials; structural health monitoring; microwave photonic filter, etc.

##### T5 Laser Technologies and Applications

CW lasers, Q-switched lasers, mode-locked lasers, novel materials for laser operation, laser dynamics, nonlinear optics, laser based micromachining, laser based metrology, etc.

##### T6 Micro/Nano Photonic Devices and Integration

III-V devices, silicon photonics, fiber optic devices, plasmonic devices, microfluidics, optical transceivers, photonic integration, optical interconnects, etc.

##### T7 Biomedical Optics

Biomedical optics, diagnostics and therapeutics, biophotonics, new imaging modalities, photoacoustics, optical coherence tomography, neurophotonics, optogenetics, etc.

##### T8 Optoelectronics for Communications, Display and Energy

Nonlinear optical polymers, crystals; organic-inorganic hybrid composites, semiconductor optoelectronic materials, metamaterials, bio optoelectronic materials, THz materials, etc.

#### Workshops

##### W1 Optical Sampling and Photonic Analog-to-digital Converter

Novel optical sampling and quantization technologies, photonic ADC, time and frequency distribution, etc.

##### W2 Photonics of Two-dimensional Materials

Photonic properties and applications of novel 2D materials including but not limited to carbon nanotubes, graphene, graphene oxide, topological insulator, chalcogenides, etc.

#### Submissions

- Submit papers through EDAS system
- 35-word abstract with no more than 3-page paper in PDF
- All submissions MUST be IEEE Xplore compliant

**Important dates:** Submission deadline: 31 January 2015

Acceptance notifications: 31 March 2015