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# Contents

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# Torn Between Simplicity and Complexity: A Short Story of My Performance Modeling Work

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## 1. Introduction

Almost three decades have passed since I was concerned with the research area of queueing theory and its applications to computer/communication systems. The queueing theory is an applied probability theory based on Markov chain, and it is useful for quantitatively analyzing congestion phenomena in service facilities such as waiting lines at restaurants and shops, buffering of communication switches and routers, and job processing in computer systems.

A queueing model consists of server(s) (e.g., communication link and CPU), waiting room (e.g., buffer and memory), and service discipline (e.g., FIFO and LIFO). Assuming that arrival and service processes of the queueing model follow some stochastic processes such as Poisson process and independently and identically distributed (i.i.d.) exponential time, we analyze performance measures like queue length, throughput, and packet-loss probability.

Generally speaking, queueing models are too simple to represent complex processing mechanism such as communication protocol and computer-job scheduling. Therefore, "modeling" plays a crucial role for high-performance and cost-effective design of computer/communication systems.

In this short article, I overview my research work, particularly describing how I struggled among ideal world of queueing theory and real world of computer/communication systems from a modeling perspective.

## 2. The First Struggle: Self-Similar Process

I started my research career in the middle of 1990's. In that era, ATM (Asynchronous Transfer Mode) technology attracted considerable attention, and one of important topics for ATM networking was traffic modeling.

It was reported that the network traffic such as packet streams in local area networks and cell streams in ATM networks exhibits self-similar nature [1]. The self-similar traffic is characterized by that the correlation never vanishes in a large time-scale, and this long-range correlation makes packet traffic bursty. It is well known that the queueing performance deteriorates with the self-similar traffic with long-range dependency (LRD). Hence it is important to predict the queueing behavior under the self-similar traffic with LRD.

I was interested in the self-similar nature of multimedia communication traffic, and considered how to develop a traffic model with which we can analyze the multiplexer performance under queueing theory. Finally, I came to the idea of applying Markov-Modulated Poisson Processes (MMPPs) to imitating the self-similar process. The MMPP is a Markovian arrival process in which the arrival process is governed by an underlying Markov chain, and packets arrives at the system according to a Poisson process with the rate depending on the state of the underlying Markov chain.

A key idea for imitating the self-similar process by MMPP was that we construct an MMPP as the superposition of two-state MMPPs whose parameters are determined so as to match the variance function over several time-scales [2]. Numerical examples showed that the variance function of the self-similar process can be well represented by the resulting MMPP over the specified time-scales. In terms of the predictability of queueing performance, our proposed method can predict the packet-loss probability well even when the intensity of self-similarity (i.e., Hurst parameter) is large (Fig. 1).

However, we also found that our scheme fails in constructing MMPP when traffic data exhibit strong correlation nature. That is, our scheme covers limited class of traffic pattern, and I became aware that it is difficult to mimic statistical characteristics of real traffic by Markovian processes.
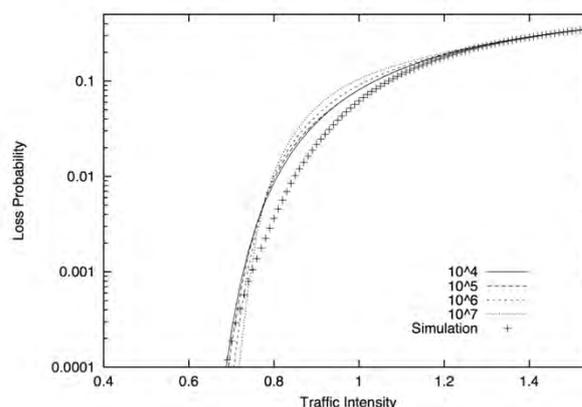


Fig. 1  The packet-loss probability.
(Hurst parameter = 0.8, System size 100) [3]

## 3. Markovian Modeling Becoming Less Popular

In the end of work of [2] and [3], I came to realize the limitation of the applicability of Markovian arrival processes to modeling real packet traffic. So I shifted my research interest to the development of QoS guaranteed network technologies, information services

over the Internet, and its performance evaluation: TCP over wired-wireless networks [4], game theoretical analysis of Internet pricing [5], QoS-guaranteed burst assembly for optical burst switching (OBS) networks [6], TCP performance for overlay networks [7], and FEC performance for video streaming over wired-wireless networks [8].

In the study of [8], we considered the application-level QoS of video streaming over wired-wireless networks. We focused on a wireless access point, at which video packet flow competes with the other packet traffic. We considered a two-input queueing model, in which video packet arrivals follow an i.i.d. distribution, while the other packets arrive at the system according to a Poisson process.

We submitted a paper of a preliminary result to some prestigious international conference. Fortunately, our paper was accepted. Our paper was evaluated by three reviewers. The two reviewers gave positive comments, however, one reviewer strongly criticized our queueing model, saying "Poisson packet arrivals are unrealistic assumption and NOT acceptable…" Since then, we have had many criticisms for Markovian assumptions of arrival and service processes even when we carefully developed the queueing models which capture the nature of the real system as much as possible. I came to realize that Markovian modeling was over…

## 4. Cloud Computing and Extreme-Value Theory

Recently, cloud computing has emerged as a new paradigm for information processing of big data analysis. An important application in cloud computing is large-scale parallel-distributed computing such as MapReduce and Hadoop, in which a large-sized job task is split into a large number of subtasks, and those are processed independently by a cluster of computing servers referred to as workers. The task completes when all the subtasks have finished.

In this framework, the task-processing time is governed by the longest subtask-processing time of a worker machine with the slowest processing speed (the issue of stragglers). From the performance point of view, it is important to study how the computing performance is affected by slow worker machines and how we can avoid significant performance degradation even when there exist low-performance worker nodes.

Note here that the longest subtask-processing time among worker machines determines the overall task-processing time. This maximum-affecting event can be analyzed by the extreme-value theory. The extreme value theory is a statistical theory for extreme values such as the maximum (or minimum) of a group of random variables and the peak over threshold. A simple and interesting result of the extreme-value theory is that under some condition, the limiting distributions of maximum (or minimum) of random samples are obtained.

One of approaches to alleviate the performance degradation due to the issue of stragglers is backup execution, in which a master node schedules the remaining in-progress subtasks when the whole task operation is close to completion. In [9], we studied the effect of backup tasks on the task-level throughput, applying the extreme value theory to modeling the subtask-processing mechanism. In particular, we investigated how the backup initiation time affects the task-level throughput and resource consumption. Through this work, I got insights of the importance of generalized extreme-value distribution and the applicability of the extreme value theory to large-scale distributed information systems.

## 5. Blockchain and Exponential Mining Time

In 2014, a student joining my laboratory asked me "I want to study Bitcoin." At this time, I knew the name of Bitcoin, however, I didn't know its technical details. We started collecting technical information of Bitcoin and studying how the Bitcoin system works. We became aware that the fundamental technology of Bitcoin is blockchain, and that blockchain is a distributed ledger combining not only information security and P2P networking technologies, but also human incentive to earn money in order to support a digital currency over the Internet with many unreliable nodes.
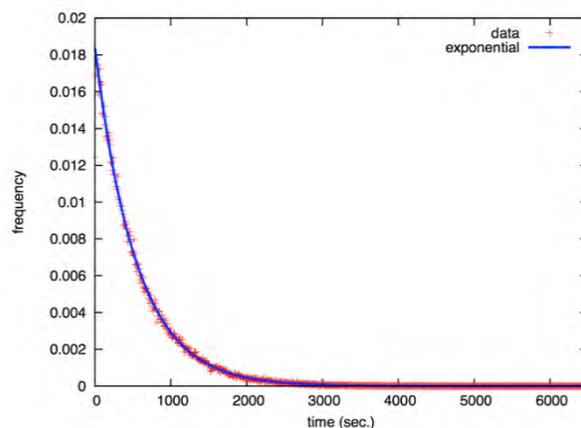


Fig. 2    The relative frequency and exponential probability density function of block-generation time. [10]

In a blockchain-based virtual currency system, every transaction issued by a user is stored into a block by a volunteer node, called miner. The block is confirmed by a miner node which firstly solves a puzzle-like problem based on a cryptographic hash algorithm. This problem consists of calculating a hash of the block being formed and adjusting a nonce word such that the resulting hash value is smaller than or equal to a targeted value called difficulty. A miner node that firstly finds the nonce satisfying the condition adds the block to the top of the blockchain, getting reward. In the Bitcoin system, the average time interval of consecutive block generations is adjusted to be around 10 minutes.

In order to understand the quantitative nature of Bitcoin, we first collected the block data from a Bitcoin information site, and analyzed fundamental statistics

such as block size, the number of transactions in a block, block-generation interval, and transaction-confirmation time. We found surprisingly that the block-generation time follows an exponential distribution (Fig. 2).

We considered the following simple model for the exponential block-generation time [10,11]. When a mining race ends at the detection of a nonce by a miner node, a new mining race starts. Noting that the nonce-word space is huge but limited, we can assume the number of nonce words is finite. When a miner tries one nonce word and finds it incorrect, the miner immediately tries another word and never tries the same nonce again.

We can model the mining process of a miner node as a simple urn model without replacement. That is, we have an urn containing balls, of which one is red and the others are white. The red ball is a winner. One ball is withdrawn from the urn at a time, and then it is removed from the urn without replacement. In this setting, the probability of the number of trials needed for drawing the red ball follows a discrete-uniform distribution.

In the mining race, there exist a large number of miner nodes, e.g., about 9,000 nodes for Bitcoin in 2018. Note that the block-generation time is determined by the minimum time for detecting a winning nonce among those miner nodes. This indicates that the block-generation time can be modeled by the minimum of nonce-detection times of the miner nodes.

When I considered a probability model for the block-generation time, I came to realize that we can apply the extreme value theory to this minimum problem. Indeed, assuming that the nonce-detection time follows a continuous-uniform distribution, we can prove the convergence of a linear normalization of the minimum of nonce-detection times, showing that the block-generation time is well approximated by an exponential distribution when the number of miner nodes is large.

Using this exponential block-generation time, we analyzed the effect of fee-based priority mechanism on the transaction-confirmation time in [11]. Comparing the analytical result with measurement, we found that the confirmation time for transactions with low fees are significantly larger than that predicted by the analysis. This suggests that some miner nodes intentionally exclude transactions with low fees.

## 6. Conclusion

In this article, I reviewed my 30-year research work. During this time, my interests of fundamental theories for performance evaluation of computer/communication systems changed from Markov chain to large deviation, network calculus, game theory, and extreme value theory. Those theories were sometimes useful, and sometimes useless for my resesearch work.

One of my most favorite papers is the performance evaluation of an ATM multiplexer with many on-off input sources regulated by leaky-bucket shapers [12].

Here, I considered an input-source model and an ATM multiplexer model independently, and applied large deviation theory to deriving the cell-loss probability. I succeeded in characterizing the impact of leaky-bucket traffic shaper on the network performance. However, the model was very complex and numerical results didn't show interesting insights, resulting that this paper was not cited at all.

From my research experience, I feel that complex models which capturing the nature of targeted system are not acceptable in mature research area. If a target is new and nothing is known, we have a great chance to develop a simple model for it. I strongly confirmed this belief from recent studies of Bitcoin blockchain.

In this ending, I'm still wanting to study theories and applying those to new applications. What is the next?

## 7. References

[1] V. Paxson and S. Floyd, "Wide Area Traffic: The Failure of Poisson Modeling," IEEE/ACM Transactions on Networking, vol. 3, no. 3, pp. 226-244, 1995.

[2] Yoshihara et al., "Practical Time-Scale Fitting of Self-Similar Traffic with Markov-Modulated Poisson Process," Telecommunication Systems, vol. 17, nos. 1-2, pp. 185-211, 2001.

[3] S. Kasahara, "Internet Traffic Modeling: Markovian Approach to Self-Similar Traffic and Prediction of Loss Probability for Finite Queues," IEICE Transactions on Communications, vol. E84-B, no. 8, pp. 2134-2141, August 2001.

[4] N. Itaya, and S. Kasahara, "Dynamic Parameter Adjustment for Available-Bandwidth Estimation of TCP in Wired-Wireless Networks," Computer Communications, vol. 27, pp. 976-988, 2004.

[5] Sakurai et al., "Internet Pricing and User Opt-Out Strategy under Two ISPs Competition," INOC 2003, pp. 495-500, 2003.

[6] T. Tachibana, and S. Kasahara, "Performance Analysis of Timer-Based Burst Assembly with Slotted Scheduling for Optical Burst Switching Networks," Performance Evaluation, vol. 63, nos. 9-10, pp. 1016-1031, October 2006.

[7] Tamura et al., "Inconsistency of Logical and Physical Topologies for Overlay Networks and Its Effect on File Transfer Delay," Performance Evaluation, vol. 65, no. 10, pp. 725-741, 2008.

[8] Muraoka et al., "FEC Recovery Performance for Video Streaming Services over Wired-Wireless Networks," Performance Evaluation, vol. 66, no. 6, pp. 327-342, 2009.

[9] Hashimoto et al., "Performance Analysis of Backup-Task Scheduling with Deadline Time in Cloud Computing," Journal of Industrial and Management Optimization, vol. 11, no. 3, pp. 867-886, July 2015.

[10] S. Kasahara, "Extreme Value Theory and Its Application to Performance Evaluation of Information Systems," J. IEICE, vol. 100, no. 4, pp. 266-272, 2017. (in Japanese)

[11] S. Kasahara and J. Kawahara, "Effect of Bitcoin Fee on Transaction-Confirmation Process," Journal of Industrial and Management Optimization, vol. 15, no. 1, pp. 365-386, January 2019.

[12] S. Kasahara and T. Hasegawa, "Approximation of Loss Probability for Multiplexing System with Large Number of On-Off Sources Regulated by Leaky Bucket," Journal of the Operations Research Society of Japan, vol. 41, no. 1, pp. 21-34, 1998.

# Valuable Experiences and Self-growth Obtained from Challenging Research Activities

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## 1. Introduction

It is a great honor for me to have been awarded the IEICE Fellow for my contribution to research and development on optical fiber strain measurement technologies and their practical application. Many of the results were obtained via joint research and development conducted with many researchers and engineers inside and outside NTT, for which I worked previously. I express my deepest thanks for their cooperation. The research I have performed spans three fields, and I would like to describe my valuable experiences and self-growth from the perspective of each research position.

## 2. Outline of My Work and Valuable Experiences

My first encounter with research was my capstone research at university, like almost all students. I specialized in mechanical engineering and conducted research on a method for measuring rolling friction as well as on the life of a ball bearing, in university and graduate school, respectively [1]. When experimental equipment that I designed myself was delivered to me, I was simultaneously impressed by it and deeply attached to it. Through consistent trial and error in experiments, I knew that the research was both challenging and interesting. Because of this experience, I came to hope that I would continue to be engaged in research and development in the future.

After finishing graduate school, I worked in NTT Laboratories. First, I investigated various methods for extracting features of objects in images and measuring three-dimensional positions with high accuracy using digital image processing [2-4]. Next, I developed two kinds of prototype systems to inspect outdoor facilities for telecommunication efficiently without exposing workers to danger. One such prototype was a system for inspecting the inside of manhole facilities and measuring the inside dimensions by analyzing images taken by a camera attached to the tip of a manipulator; the other was a system for measuring positions of telegraph poles by analyzing stereo image pairs taken by multiple viewpoints [5,6]. The technical knowledge I acquired through this research and development formed the basis of my later research activities. In addition, my ability to think logically and flexibly was fostered by these experiences. Fortunately, I received a doctoral degree for my work.

Two years after receiving my doctorate, I worked on supporting the introduction of optical systems to access networks and technological investigation of an asymmetrical digital subscriber line system to judge the possibility of introduction for accessing networks at headquarters. Though it was the only work that I was directly involved in regarding telecommunication during the 21 years I worked for NTT, my knowledge and experience obtained through this job enriches the lectures I give my students now.

When I stared working in the Laboratories again, by the instruction from my direct supervisor, I was jumped in a research of a strain measurement system using an optical fiber as a sensor. A Brillouin optical time domain reflectometer (BOTDR) which was the core of the system was an innovative measuring device, which had enabled long-distance and distributed strain measurement of the optical fiber. The development was originally started at the late 1980s with the aim of detecting the extent and location of the damage of optical fibers installed in telecommunication networks. I was requested that the optical fiber strain sensing system was put into practical use in new fields different from telecommunication with 10 group members. This was because the strain measurement performance of the BOTDR had been enhanced to the level that it could be applied to various fields such as structure monitoring. Though the optical fiber strain sensing was an entirely new and unknown research area for me, I was interested in it which has relation with electronics and mechanical engineering and information science. For the practical use of the system, we jointly developed an economical and highly reliable BOTDR first [7]. The appearance is shown in Fig. 1. We next developed a high-sensitivity and high-strength optical fiber senor, which can be embedded in and attached to a concrete structure by joint development [8]. The structure of the
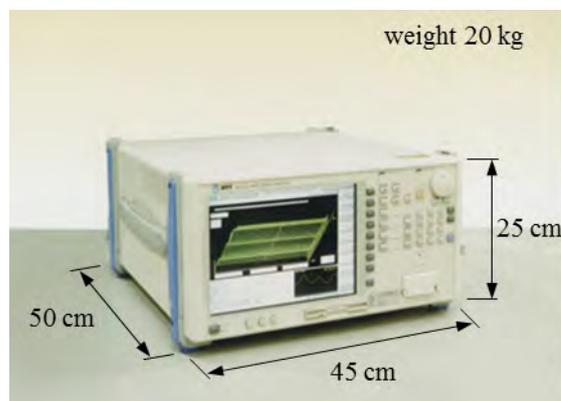


Fig. 1  Appearance of developed BOTDR.
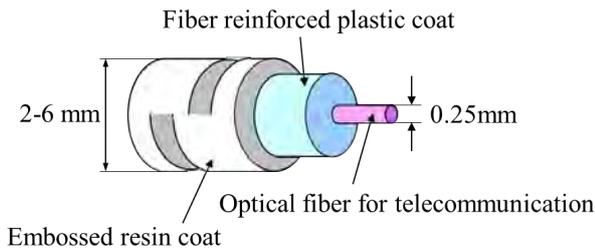
Fig. 2 High-sensitivity and high-strength optical fiber sensor.
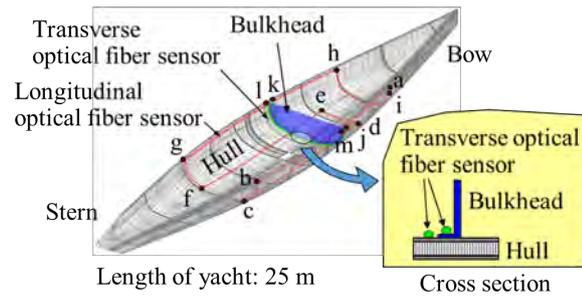


Fig. 3 Optical fiber sensors installed in yacht.



Fig. 4 A vertical section of a part of the underground mine.

developed sensor is displayed in Fig. 2. While developing these sensors, we carried out many field experiments to demonstrate the applicability of the optical fiber strain sensing system for monitoring various structures and to clarify the problems that must be solved in cooperation with many companies, research institutes, and universities. Our experiments included the following schemes:

(1) Collapse detection of river levee slope face [9].
(2) Circumferential strain measurement of large-diameter concrete pipe [10].
(3) Monitoring of steel support stress and upper soil movement of an underground railway tunnel under construction [8].
(4) Axial strain measurement of cast-in-place concrete pile under load testing [11].
(5) Damage detection for international America's cup class yachts [12]. (Fig. 3 shows the optical fiber sensors attached to the hull.)
(6) Telecommunications tunnel monitoring [13].
(7) Monitoring of changes in the state of an underground mine [14]. (Fig. 4 exhibits a vertical section of a part of the underground mine. Two lines of optical fibers were installed in the ceiling and side wall of the ventilation tunnel.)

We presented that the optical fiber strain sensing system can be applied to monitoring of a variety of structures by publishing results obtained through the above experiments in scientific journals and at international conferences. I would be grateful if I could contribute to the global development and spread of the optical fiber sensing system and the creation of new business areas. Through conducting the above works as project leader on the NTT side, I could have a chance
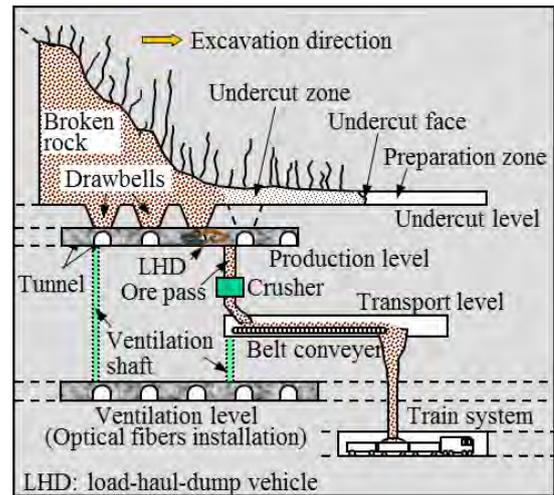
to learn how to proceed with research as a team as well as enjoy challenging joint research to the fullest.

Even now as I work at Mie University, I have been continuing research about the optical fiber strain sensing toward the realization of our safe environment and society. I constructed a model for the deformed shape of the Brillouin gain spectrum (BGS) produced in the optical fiber under nonuniform strain by investigating their relationship theoretically. The BGS deformation resulting from the nonuniform strain is an important problem to be investigated because it causes systematic strain measurement error. In addition, I confirmed the validity of the model experimentally and analyzed the strain measurement error [15-20]. Recently, I have been developing a circumferential strain measurement method using ring-shaped structures based on the above analysis with students [21,22]. I feel delighted to see that students grow rapidly through these research activities.

### 3. Conclusion

Looking back my work and research up to now, I have described what I felt in each work stage. My research gave me not only a sense of satisfaction and worth, but also a good opportunity for self-growth. I would be grateful if students reading this article would understand that research is a challenging and rewarding job, and I hope this article motivates them to pursue new research fields.

### 4. References

[1] J. Okamoto, T. Ohmori, K. Inoue, and H. Naruse, "On the rolling friction by pendulum method," Journal of Japanese society of tribologists, vol. 33, no. 6, pp. 467-473, 1988. (in Japanese)

[2] Y. Nomura, H. Naruse, and T. Morimitsu, "High accuracy slit-ray position measurement," Trans. ASME Journal of Engineering for Industry, vol. 110, pp. 92-94, 1988.

[3] H. Naruse, A. Ide, and M. Tateda, "Model-based edge position and orientation measurement using neural networks," Intelligent Robots and

Computer Vision X: Neural, Biological and 3-D Methods, SPIE 1608, pp. 480-489, 1991.

[4] H. Naruse, A. Nobiki, T. Yabuta, and M. Tateda, "High-accuracy multiviewpoint stereo measurement using the maximum-likelihood method," IEEE Trans. Industrial Electronics, vol. 44, no. 4, pp. 571-578, 1997.

[5] Y. Nomura, H. Naruse, A. Ide, and M. Sagara, "Visual inspection system for manhole facilities," IEEE International Workshop on Intelligent Robots and Systems, Towards a New Frontier of Applications, pp. 449-453, 1990.

[6] A. Nobiki, H. Naruse, M. Tateda, and T. Yabuta, "Outdoor facility measurement system using multiviewpoint stereo measurement," IEEJ Transactions on Electrical and Electronic Engineering, vol. 128, no. 2, pp. 24-35, 1999. (Translated from Denki Gakkai Ronbunshi vol. 117-C, no. 10, pp. 1425-1433, 1997.

[7] H. Ohno, H. Naruse, N. Yasue, Y. Miyajima, H. Uchiyama, Y. Sakairi, and Z. X. Li, "Development of highly stable BOTDR strain sensor employing microwave heterodyne detection and tunable electric oscillator," Advanced Photonics sensors and applications II, SPIE 4596, pp. 74-85, 2001.

[8] K. Shiba, H. Kumagai, K. Watanabe, H. Naruse, and H. Ohno, "Fiber optic distributed sensor for monitoring of concrete structures," 3th International Workshop on Structure Health Monitoring, pp. 459-468, 2001.

[9] H. Naruse, Y. Uchiyama, T. Kurashima, and S. Unno, "River levee change detection using distributed fiber optic strain sensor," IEICE Trans. Electronics, vol. E83-C, no. 3, pp. 462-467, 2000.

[10] N. Yasue, H. Naruse, J. Masuda, H. Kino, T. Nakamura, and T. Yamaura, "Concrete pipe strain measurement using optical fiber sensor," IEICE Trans. Electronics, vol. E83-C, no. 3, pp. 468-474, 2000.

[11] H. Ohno, H. Naruse, T. Kurashima, A. Nobiki, Y. Uchiyama, and Y. Kusakabe, "Application of Brillouin scattering-based distributed optical fiber strain sensor to actual concrete piles," IEICE Trans. Electronics, vol. E85-C, no. 4, pp. 945-951, 2002.

[12] A. Shimada, H. Naruse, K. Uzawa, G. Kimura, H. Murayama, and K. Kageyama, "Damage detection for international America's cup class yachts using a fiber optic distributed strain sensor," IEICE Trans. Electronics, vol. E86-C, no. 2, pp. 218-223, 2003.

[13] H. Naruse, K. Komatsu, K. Fujihashi, and M. Okutsu, "Telecommunications tunnel monitoring system based on distributed optical fiber strain measurement," 17th International Conference on Optical Fiber Sensors, SPIE vol. 5855, pp. 168-171, 2005.

[14] H. Naruse, H. Uehara, T. Deguchi, K. Fujihashi, M. Onishi, R. Espinoza, C. Guzman, C. Pardo, C. Ortega, and M. Pinto, "Application of distributed fiber optic strain sensing system to monitoring of changes in underground mine's state," Measurement Science and Technology, vol. 18, pp. 3202-3210, 2007.

[15] H. Naruse, M. Tateda, H. Ohno, and A. Shimada, "Dependence of the Brillouin gain spectrum on linear strain distribution for optical time-domain reflectometer-type strain sensors," Applied Optics, vol. 41, no. 34, pp. 7212-7217, 2002.

[16] H. Naruse, M. Tateda, H. Ohno, and A. Shimada, "Deformation of the Brillouin gain spectrum caused by parabolic strain distribution and resulting measurement error in BOTDR strain measurement system," IEICE Trans. Electronics, vol. E86-C, no. 10, pp. 2111-2121, 2003.

[17] K. Yasuda, H. Naruse, L. C. Hsien, and M. Tateda, "Deformation of Brillouin scattered light power spectrum shape by linear strain distribution," 20th International Conference on Optical Fibre Sensors (OFS-20), SPIE vol. 7503, p. 75036H, 2009.

[18] Y. Hayase and H. Naruse, "Shape variation of Brillouin gain spectrum caused by sinusoidal-like strain distribution," 2013 Conference on Lasers and Electro-Optics Pacific Rim (CLEOPR), Kyoto, Japan, p. WPF-19, 2013.

[19] H. Naruse, A. Komatsu, and M. Tateda, "Deformation of Brillouin gain spectrum shape caused by strain varying linearly with respect to time," 24th International Conference on Optical Fibre Sensors (OFS-24), SPIE vol. 9634, p. 96344W, 2015.

[20] H. Naruse and A. Komatsu, "Deformation of the Brillouin gain spectrum under spatially and temporally nonuniform strain," 26th International Conference on Optical Fiber Sensors (OFS-26), p. TuE96, September 2018.

[21] H. Naruse, T. Ogawa, and T. Nishino, "Ring Circumferential Strain Measurement Based on a Model of Brillouin Gain Spectrum Shape," 6th Asia Pacific Optical Sensors Conference (APOS2016), p. Th1A, 2016.

[22] K. Nishimura and H. Naruse, "Analysis of BGS observation condition dependence of ring circumferential strain measurement error," 7th Asia Pacific Optical Sensors Conference (APOS2018), p. Tue_P14, 2018.

# Annual Report of Technical Committee on Network Systems

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## 1. Introduction

This report covers the annual activities of the IEICE Technical Committee on Network Systems (NS). It describes activities at the monthly technical meetings, recent research topics of the committee, and the research awards for 2018.

## 2. Technical Meetings

The schedule from April 2018 to March 2019 consists of 10 NS technical meetings, one workshop [1], and additionally, 3 technical meetings of Network Software (NWS) sub-committee (as shown in Table 1). Several meetings are co-located with the ICN (Information-Centric Networking), OCS (Optical Communication Systems), PN (Photonic Network), ASN (Ambient intelligence and Sensor Networks), RCS (Radio Communication Systems), SR (Smart Radio), RCC (Reliable Communication and Control), IN (Information Networks), CS (Communication Systems), NV (Network Virtualization), CQ (Communication Quality), or ICM (Information and Communication Management) technical committees. In addition, the technical meeting in October was co-located with the Study Group of "Thinking Network" led by Prof. Akihiro Nakao, the Univ. of Tokyo. This co-location was newly started from 2018.

Recently presented papers mainly focus on technologies that support new generation networks, wireless and mobile networks, IoT, applications, security issues, network virtualization, SDN/NFV, cloud computing, Mobile Edge Computing (MEC), ICN/CCN, blockchain, and Quality of Service/Experience (QoS/QoE). In addition, the number of presented papers related to AI and machine learning is increasing rapidly in recent years.

At each technical meeting, we host lectures by invited speakers who are experts in their research fields. During this fiscal year, we have had invited lectures on network operation, network design, network architecture, SDN, IoT, and other topics. In fiscal 2018, we had 217 presentations from academia and 82 from industry in the NS technical meetings.

Since June 2003, we foster the works of young

Table 1: Technical meeting schedule for fiscal 2018. (Gray cells indicate technical meetings of NWS sub-committee)

| Date | Location | Theme | Co-location with |
|---|---|---|---|
| April 19–20 | Fukuoka Univ. (Fukuoka) | Traffic, Network Evaluation, Performance, Resource Management/Control, Traffic Engineering, Reliability, Resiliency | |
| May 17–18 | Yokohama City Kyoiku Kaikan (Kanagawa) | Advanced Protocol and Network Control, Network System Architecture | ICN |
| June 7–8 | Osaka YMCA Kaikan (Osaka) | Network Service, Network Software, Software Technology | |
| June 14–15 | Koriyama Chamber of Commerce and Industry (Fukushima) | Core/Metro System, Photonic Network System, Optical Network Design, Traffic Engineering, Signaling, GMPLS, etc | OCS, PN |
| July 11–13 | Hakodate Arena (Hokkaido) | Wireless Distributed Network, M2M: Machine-to-Machine, D2D: Device-to-Device, etc. | ASN, RCS, SR, RCC |
| September 6–7 | Tohoku Univ. (Miyagi) | Next Generation Network, Cloud/Data Center Network, SDN・NFV, Application of AI to Networks, etc. | IN, CS, NV |
| October 18–19 | Takamatsu Shoko Kaigisho (Kagawa) | Network Architecture, Network Software, Software Technology. | |
| October 18–19 | Kyoto Kyoiku Bunka Center (Kyoto) | Network Architecture (Overlay, P2P, Ubiquitous Network, Active Network, NGN, New Generation Network), Grid, etc | The Study Group of "Thinking Network" |
| November 15–16 | Kanazawa Institute of Technology (Ishikawa) | Network Quality, Network Measurement and Management, Network Virtualization, Network Service | CQ, ICM, NV |
| December 20–21 | Onomichi Shimin Kaikan (Hiroshima) | Multi-hop/Relay/Collaboration, Sensor/Mesh, Mobile Ad-hoc Network, D2D/M2M, Wireless Network Coding, etc. | RCS |
| January 17–18 | Nagasaki Prefectural Art Museum (Nagasaki) | Network Software, Network Application, SOA/SDP, NGN/IMS/API, Distributed Control/Dynamic Routing, etc. | |
| January 17–18 | Nagasaki Prefectural Art Museum (Nagasaki) | Network Software for Next Generation Network Service Provisioning | |
| March 4–5 | Okinawa Convention Center (Okinawa) | General, IN/NS Workshop (March 4) | IN |

researchers who have presented papers at NS technical meetings by inviting them to give a follow-up talk some months later. We call these the "encouragement talk." We invited 16 young researchers to give such talks in the past year. We will continue this activity.

Moreover, the 4th night session was held to provide an opportunity for an exchange of views on a given topic in January 2019. In this year, issues on the reform of working practices were discussed among all the participants enthusiastically.

In addition, as a global activity, the Technical Committee supported the hosting of CloudNet 2018, which was held at the University of Tokyo on 22-24th in October, with IEEE ComSoc.

## 3. Research Awards 2018

The Technical Committee selected the recipients of Network System Research Award from among 208 regular papers that had been presented at monthly NS technical meetings from January to December in 2018. The award is given to each of the authors of the three or four best papers of each year. The 2018 recipients attended the award ceremony at the NS/IN Workshop (Fig. 1) held in Okinawa in March 2019. The abstracts of the four papers that won the award in 2018 are as follows.

**Yasin Oge, Yuta Kobayashi, Takahiro Yamaura, and Tomonori Maegawa: "Implementation and Evaluation of a Time-aware Shaper for IEEE 802.1Qbv using Time-based Transmission Scheme," [2]**

There has been an increasing interest in use of Ethernet-based networks for real-time constrained applications in recent years. Industrial automation and in-vehicle networks are typical examples of applications that require real-time communication. These applications demand hard real-time capabilities for deterministic behavior. More specifically, they require a reliable (i.e., minimum or zero packet loss), low-latency and minimal jitter solution.

In order to meet the diverse real-time requirements, Time-Sensitive Networking (TSN) standards are being developed by the IEEE 802.1 TSN task group. In the paper, we focus on one of the key features of TSN that is a new traffic shaping mechanism called time-aware shaper. While custom hardware (i.e., ASICs or FPGAs) could be used to implement a time-aware shaper for IEEE 802.1Qbv, a custom hardware design generally results in lower flexibility and a higher design and implementation cost. To avoid the flexibility and cost issues, we particularly focus on a software-based approach without using a dedicated custom logic such as ASIC and FPGA.

The main contribution of the paper is to present an implementation and evaluation of a traffic-shaping method, specifically designed for time-sensitive networks, by using a time-based transmission scheme. The proposed method prefetches scheduling information, and determines a launch time for each frame according to the prefetched information. The

scheduling information used in this work is a gate control list specified in the IEEE 802.1Qbv standard. Results indicate that the proposed method achieves accurate timing control for transmission of time-sensitive streams while handling another best-effort stream with a throughput of over 820 Mbps. In particular, the peak-to-peak jitter of the frame interval of the time-sensitive stream is much less than a microsecond, which is three-orders-of-magnitude better than a baseline case. One direction for future work is to evaluate the proposed method with a real-time operating system (RTOS) to enhance real-time response.

**Anan Sawabe, Takanori Iwai, and Kozo Satoda: "Real-time Estimating Application Flow from Encrypted Traffic," [3]**

With spreading IoT devices, the requirement of wireless network users has shifted from quality of service in communication layer (QoS) to quality of service in application layer such as quality of experience (QoE). In order to control traffic for satisfying such quality of services, network operators need to identify applications accurately in real time. They commonly use deep packet inspection (DPI) that inspects packet header and payload in upper layer (e.g., HTTP). However, with the increase of encrypted traffic for privacy protection, DPI method cannot work well for identify applications.

Recently, machine learning (ML) techniques are used for identifying applications from encrypted traffic by analyzing statistics of traffic. In conventional methods, traffic statistics are calculated from several packets stored in a sliding window with fixed window size. In this method, estimation accuracy will decrease when the window size is not appropriate. For example, when window size is small, statistics of sampled packets in the window can highly fluctuate with communication quality changes. On the other hand, packets from some applications may be aggregated in a same window when window size is large.

In order to estimate applications accurately in real time, the authors constructed 2-layered probabilistic state transition model and its system architecture. The analysis model automatically trains traffic patterns in each application from time-series traffic features on the basis of an unsupervised learning algorithm, and the model is updated regularly. In addition, the authors proposed a parallel system architecture for real time estimation. In the system architecture, online estimation based on the model works in parallel with regular model updating. Through experiments that we estimate applications running on a smartphone by analyzing smartphone traffic, proposed method achieved 84.9% accuracy in about 50 ms on average.

**Takahiro Iwanaga and Akihiro Nakao: "Proposal of Automatic Data Collection and Repository Generation for Statistical Analysis and Visualization of Dark Web Markets," [4]**

In recent years, cyber attack tools and attack agency services are traded in markets called "Dark Web

Markets" developed in the dark web. Through dark web markets, it becomes possible for anyone to launch sophisticated attacks. However, few studies focus on the analysis and the utilization of dark web markets.

In this research, we focus on Botnet and DDoS attack agency services in dark web markets and investigate, analyze, and discuss the types of services, price quotes, market size, and the impact of transactions on the real world. We also monitor the dark web market and discuss whether it can be applied to prediction and prevention of attacks. Furthermore, in order to alleviate the limit of manual information collection, we are developing a scraping tool that automatically collects information on the dark web market. In this research, we show the countermeasures of the dark web market side, which was discovered by running the scraping tool for statistical analysis of the dark web market.

There are three novelty of this research. The first is to develop a tool that can scrape the dark web market and to conduct surveys on actual operation. The second is to clarify that the dark web market side notices and responds to mechanical access focusing on information gathering only. Third, even if the dark web market side has taken measures against scraping, it shows that scraping can be continued by modifying the proposed method of this research.

**Ikuo Otani, Fumihiko Sawazaki, and Noritaka Horikome: "Research on Acceleration of DPDK Application by Utilizing FPGA," [5]**

There are a lot of efforts for accelerating network application using software library like DPDK (Data Plane Development Kit). SPP (Soft Patch Panel) is such a technology developed in DPDK community to connect VMs (Virtual Machines) and VMs, or VMs and physical NICs. However it is necessary for SPP to be accelerated to avoid bottleneck when dealing with 40G or 100G NIC. So the purpose of this paper is to establish the way to accelerate SPP and get some insights to accelerate DPDK application.

In this paper, first, the architecture is described. To accelerate SPP by scaling-out, it is important to avoid the bottleneck at Load Balancer (LB). So we decided to apply FPGA (Field Programmable Gate Array), which is good at simple packet processing, to SPP. The RING interface looks appropriate because which affects the SPP native cord little. As a LB logic, we applied hash function for Layer-2 destination information considering simplicity and effectiveness.

Second, the detail of FPGA implementation is described. We implemented Intel FPGA utilizing high-level synthesis tool. To estimate the performance, we examined implemented FPGA with stub software substituting SPP. From the result, over 40 Gbps throughput at 64 byte packet size is achieved.

Third, the way and the result of integration test are described. To assume the scalability of the system, two packet modes are prepared: one is to burden 4 SPP processes, and the other is to burden 1 SPP process for comparison. From the result, over 40 Gbps throughput at 256 byte or bigger packet size is achieved. Also, the

comparison of the 2 modes revealed performance improvement by 4 times at 256 byte or smaller.

From this research, we assume that FPGA utilization to accelerate DPDK application is suitable in use cases like NFV (Network Function Virtualization).



Fig. 1  NS research award recipients with chair Okazaki.

## 4. Future Plans

The Technical Committee will have 10 NS technical meetings in this fiscal year, and also organize open Symposia in the IEICE Conferences, one of which will be on "In-Network Intelligence for Design, Management, and Control of Future Networks and Services" at the IEICE General Conference in March 2020.

(For more information, please see our home page.
URL: http://www.ieice.org/cs/ns/eng/index.html)

## 5. References

[1] Yosuke Tanigawa, Kenichi Kashibuchi, and Kenichi Matsui: "Fiscal 2018 Report of Research Trends in Technical Committee on Network Systems," *IEICE Tech. Rep.*, NS2019-31, May 2019.

[2] Yasin Oge, Yuta Kobayashi, Takahiro Yamaura, and Tomonori Maegawa: "Implementation and Evaluation of a Time-aware Shaper for IEEE 802.1Qbv using Time-based Transmission Scheme," *IEICE Tech. Rep.*, NS2018-25, May 2018.

[3] Anan Sawabe, Takanori Iwai, and Kozo Satoda: "Real-time Estimating Application Flow from Encrypted Traffic," *IEICE Tech. Rep.*, NS2018-33, June 2018.

[4] Takahiro Iwanaga and Akihiro Nakao: "Proposal of Automatic Data Collection and Repository Generation for Statistical Analysis and Visualization of Dark Web Markets," *IEICE Tech. Rep.*, NS2018-41, July 2018.

[5] Ikuo Otani, Fumihiko Sawazaki, and Noritaka Horikome: "Research on Acceleration of DPDK Application by Utilizing FPGA," *IEICE Tech. Rep.*, NS2018-106, October 2018.

# 2018 Activity Report of Technical Committee on Communication Systems

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## 1. Introduction

Technical Committee on Communication Systems (CS) is one of origins of technical committee in IEICE Communications Society and has a long history. The technical interests include wide topics in wireless/wired communication systems from Physical layer to Application layer. In particular, our topics of interest include (but are not limited to) the following:

✓ Network control
✓ Transport
✓ Modulation, coding and signal processing
✓ Network architecture and implementation
✓ Network application

In this report, we summarize the 2018 activities of CS technical committee. In FY2018, we actively held totally seven technical conferences, two annual conference (IEICE Society Conference and IEICE General Conference), one technical workshop (Communication Systems Workshop (CSWS)) and co-sponsored one international conference (Japan-Africa Conference on Electronics, Communications, and Computers 2017 (JAC-ECC2017). In addition, we introduce the winners of 2018 CS Technical Committee's Prizes in the report. It should be noted that the latest information, including the technical conference schedule and members of CS committee, are shown on our web site (http://www.ieice.org/cs/cs/), and we are welcome your any contributions to our activities.

## 2. Summary of CS Technical Committee in FY2018

In Table 1, we summarize the annual activities of CS Technical Committee in FY2016, FY2017 and FY2018. As shown in the table, in FY2018, more than 100 papers were presented in the technical and annual conferences. Not only the regular papers, but also invited papers were also presented in every technical conference. In particular, in IEICE Society and General conferences, we held the special sessions related to the hot topics of ICT, such as 2020 Olympic Games (Sport), IoT and 5G, and these special sessions were very well attended.

Table 1  Summary of CS Technical Committee annual activities.

| | Number of presented papers | | Special session on IEICE Society Conference (Number of participants) | Special session on IEICE General Conference (Number of participants) | Number of participants of CSWS |
|---|---|---|---|---|---|
| | Technical Conferences | IEICE Society/General Conferences | | | |
| FY2016 | 97 | 52/72 (124) | Cooperation of edge computing and access network for IoT (62) | - Network Technologies toward IoT (101) <br> - Toward Future Network Innovation in IEICE Communications Society (46) | 36 |
| FY2017 | 114 | 29/55 (84) | Promotion of research and development toward future ICT (60) | - History and Challenge in optical access network (54) <br> - IoT over All (56) | 28 |
| FY2018 | 113 | 32/44 (76) | ICT x SPORTS : Applications and Technologies (27) | - Innovative evolution of network technologies for efficient radio resource utilization in 5G and IoT(32) <br> - Applications of communication technologies in various areas (47) | 33 |

Fig. 1  Prof. Tetsuya Yokotani gives an invited talk at CS technical conference in Kumejima Island on 12th July 2018.



Fig. 2  Prof. Masayuki Tanimoto giving an invited talk at CS technical conference in Tokushima Univ. on 29th November 2018.

Because we had many interesting special invited talks by outstanding speakers in every conference, we highlight some talks in this section. One of the most impressive talks was presented by Prof. Tetsuya Yokotani, Kanazawa Institute of Technology University, on 12th July 2018 in Kumejima Island (Fig. 1). He is a former chair of CS committee and gave us a talk about "R&D activities and International Standardization [1]". On November, Prof. Masayuki Tanimoto, Nagoya Industrial Science Research Institute, talked about "6DoF-FTV [2]" and clearly described an overview and challenges of 360 degree's video and virtual reality (Fig. 2).

Through the FY2018, we had totally 21 valuable special invited talks, including CSWS. To refer them, please visit our archive web page (https://www.ieice.org/cs/cs/special2018-e.html).

In addition to the domestic conferences, we organized the special invited session in JAC-ECC2018 on December 16th – 18th, 2018 at Egypt. JAC-ECC2018 is a venue for extending collaboration among prominent Japanese, African and International researchers from academy and industry in the fields of electronics, communications, and computer engineering [3]. We invited five outstanding Japanese researchers who are members of IEICE and experts in ICT, including vice-chair of Radio Communication System (RCS) committee, Prof. Fumiaki Maehara (Fig.3(a)), and chair of CS committee, Prof. Hidenori Nakazato (Fig.3 (b)). They gave tutorial talks about "R&D Activities for 5G in IEICE Technical Committee on Radio Communication Systems in FY2017" and "IoT Networks and Their Federation," respectively. In addition, we promoted IEICE Communication Society (Fig.3 (c)).

Table 2  Technical conference schedule, July 2019 - April 2020.

| Date | Venue | Joint committee | Topics |
|---|---|---|---|
| Jul. 11th – 13th | Amamioshima island, Kagoshima | – | Next Generation Networks, Access Network, Broadband Access System, Power-Line Communications, Wireless Communication Systems, Coding System, etc. |
| Sep. 5th – 6th | Sendai, Miyagi | NS, IN, NV | Post IP networking, Next Generation Network (NGN)/New Generation Network (NWGN), Contingency Plan/BCP, Network Coding/Network Algorithms, Session Management (SIP/IMS), Internetworking/Standardization, Network configuration, etc. |
| Oct. 31st – Nov. 1st | Kirishima, Kagoshima | CSWS | Broadband Access Systems, Home Networks, Network Services, Applications for Communications, etc. |
| Dec. 5th – 6th | Iwate, Iwate | IPSJ-AVM, IE, ITE-BCT | Image coding, Communications and streaming technologies, etc. |
| Jan. (TBA) | TBA | OCS | Network Core/Metro Systems, Submarine Transmission Systems, Optical Access Systems/Next Generation PON, Ethernet, Optical Transport Network (OTN), Transmission Monitoring and Supervisory Control, Optical Transmission System Design/Tools, Mobile Optical Network |
| Mar. (TBA) | TBA | CAS | Network Processor, Signal Processing Circuits for Communication, Wireless LAN/PAN, etc. |
| Apr. (TBA) | TBA | CQ | Optical/Wireless Access and Their Integration, QoS and QoE, Assessment/Measurement/Control/Optimization of Communication Quality, Network Services, etc. |

Fig. 3  Snapshots of JAC-ECC2018.

Table 3  CS committee's prizes.

| Chairman's prize | Summary: The aim of the chairman's prize to the superior papers is activating investigations on communication systems engineering. |
| --- | --- |
| | Candidates: The paper must be submitted to the IEICE committee on communication systems. |
| Encouraging prize | Summary: The aim of the encouraging prize to the excellent speakers is encouraging young researchers who are engaged in communication systems engineering. |
| | Candidates: The speaker must be less than 33 years of age at the time of the workshop in which the speaker made a presentation. His/her paper must be submitted to the IEICE committee on communication systems. |

## 3. Future Activities of CS Technical Committee in FY2019

### 3.1 Technical Conferences

In FY2019, FY2018, we have a plan to hold seven technical conferences, two annual conferences and one technical workshop as well as FY 2018 (and summarized on Table 2). On July, we plan to hold a technical conference at Amamioshima, one of attractive islands in Japan, and will invite two unique guests as a special invited speakers. They will give presentations about IoT for agriculture. In this conference, we will have the awards ceremony of CS prizes for FY2018. Winners are shown in Section 3.4.

### 3.2 Special Sessions on IEICE Society and General Conferences

In the next annual conference, we will organize one special session and one panel session. The annual conference will be held in Osaka University on September $10^{th} – 13^{th}$. In 2020, we are also planning to have a highly motivated symposium session.

### 3.3 CS Workshop

CS Workshop in 2019 will be held in Kagoshima on the end of October. Mr. Jun Terada, general chair of the workshop and vice chair of CS committee, has invited several impressive researchers to provide invited talks about various research areas. Please visit to the web site for more information:
(http://www.ieice.org/cs/cs/jpn/csws/index.html).

### 3.4 CS Prizes

Finally, we introduce 2018 CS Technical Committee Prizes. The prizes are provided to authors or speakers who made good presentations and excellent papers every year. The detailed information on the committee's prizes is summarized in Table 3.

The winners of the chairman's prize in 2018 are the authors of three papers [4-6]. The speakers of the papers are Prof. Takefumi Hiraguri [4], Mr. Takuya Kanai [5] and Prof. Daisuke Umehara [6].

The winners of the encouraging prize in 2018 are the speakers of three papers [7-9], Mr. Hiroaki Yoshii [7], Mr. Yu Tsukamoto [8] and Mr. Takumi Harada [9].

The above 6 papers are remarkably contributed to the promotion of the promising ICN technologies, and we, CS committee, decided to give the 2018 CS Technical Committee Prizes.

## 4. Conclusion

In the report, we summarized 2018 activities of Technical Committee on Communication Systems. Any comments and feedbacks are appreciated to improve our activities. We wish your contributions to IEICE Communication Society and CS Technical Committee. (http://www.ieice.org/cs/cs/).

## 5. References

[1] T. Yokotani, "R&D activities and International Standardization," IEICE Tech. Rep., vol. 118, no. 128, CS2018-33, pp. 107-108, July 2018. (in Japanese)

[2] S. Kibe, K. Kamakura, and T. Yamazato, "N-Stream Superimposed System with m-point DFT for Visible Light Communication," IEICE Tech. Rep., CS2017-58, pp. 21-26, Nov. 2017.

[3] JAC-ECC 2018 [online]: https://sites.google.com/a/ejust.kyushu-u.ac.jp/jac-ecc-2018/

[4] T. Hiraguri, et al., "Proposal of drones formation flight suitable for wireless mesh networks," IEICE Tech. Rep., vol. 118, no. 128, CS2018-15, pp. 19-24, July 2018.

[5] T. Kanai, et al., "Novel Carrier Frequency Offset Compensation for Upstream Signals Based on Directly Modulated Laser of TDM-based Digital

Coherent PON," IEICE Tech. Rep., vol. 118, no. 393, CS2018-88, pp. 7-12, Jan. 2019.

[6] D. Umehara, "Success Prioritized Busy Doubled Backoff Algorithm for Non-persistent CSMA," IEICE Tech. Rep., vol. 118, no. 489, CS2018-120, pp. 75-79, March 2019.

[7] H. Yoshii, et al., "Implementation of Function Chaining in NDN," IEICE Tech. Rep., vol. 118, no. 128, CS2018-39, pp. 133-138, July 2018.

[8] Y. Tsukamoto, et al., "Novel RAN Slicing Architecture Considering Multiple Functional Split Options and Placement for 5G Services," IEICE Tech. Rep., vol. 118, no. 208, CS2018-53, pp. 69-74, Sept. 2018.

[9] T. Harada, "Implementation and basic evaluation of in-service software updating on prototype optical access equipment," IEICE Tech. Rep., vol. 118, no. 208, CS2018-54, pp. 75-80, Sept. 2018.

# The Technical Committee on Smart Radio: FY2018 Activities and Invitation to SmartCom2019

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IEICE Technical Committee on Smart Radio

## 1. Introduction

The Technical Committee on "Smart Radio" (TCSR) discusses advanced wireless communications technologies including software radio, cognitive radio, wireless distributed network, and wireless transceiver implementation. The TCSR also focuses on an application of other technologies such as machine learning into wireless communications. The TCSR annually organizes five technical meetings, and one of them is held as an international workshop named SmartCom. This report overviews activities of the TCSR in FY2018 and calls for papers for SmartCom 2019.

## 2. Activity Summary

In FY2018, TCSR organized five technical meetings including a special international workshop, SmartCom. Some of them were co-organized with the other technical committees in IEICE: RCS, ASN, NS, RCC, SRW. A number of researchers not only from academia but industry participated our technical meetings and had fruitful discussions. Venues and topics of each meeting is listed in Table 1. Clearly, TCSR is significantly active as a technical committee in responsible for research and development of wireless communications. Besides regular technical meetings, TCSR held panel discussions at Society Conference and at General Conference which will be reported in Section 4.

In FY2018, TCSR selected 1 excellent paper as the Best Paper Award, 3 young researchers as the Young Researcher of the Year Award, and 1 paper as the Special Technical Award.

- Best Paper Award: T. Osamu, K. Shirai, M. Ohta, and T. Fujii, "Measurement Method of Channel Occupancy Rate for Channel Assignment in Physical Wireless Parameter Conversion Sensor Networks"
- Young Researcher of the Year Award: Y. Aoki, M. Itoh, and R. Ouyang

- Special Technical Award: T. Kawaguchi, R. Tanabe, and K. Ishibashi, "Batteryless Wireless Sensor Networks based on Energy-Neutral Receiver-Initiated (ENRI) MAC Protocol"

## 3. SmartCom 2018



Fig. 1  Participants and Committee Members.

- Date: October 30th − October 31st, 2018
- Venue: Bangkok (Thailand)
- Joint TC: RCS
- Topics: Cognitive radio, Heterogeneous Network, AI technologies for Wireless communications, etc.

SmartCom is the international workshop jointly organized by several IEICE Technical Committees and technical key players outside Japan. This was the 5th SmartCom in its history and hosted in collaboration with academia in Thailand. The workshop targeted on smart wireless communications, and provided a great opportunity to realize better and smarter wirelessly-connected world in the future.

The number of participants of the first day was 54, and that of the second day was 42. The poster sessions had lively and an exciting discussion with many participants and presenters.

SmartCom selected two papers as the Best Paper Awards and one paper as the Best Student Paper Award. As obvious, SmartCom 2019 will provide you this opportunity to be selected as the best paper and hope many students and researchers will join SmartCom 2019 to take this great opportunity.

Fig. 2  Poster session in SmartCom 2018.

## 4. Other Remarkable Activities

### 4.1 Society Conference

A session entitled "Smart Radio in Water and Seawater" was organized by TCSR during 2018 Society Conference held in Kanazawa University. At present, wireless communication technology is utilized in various fields. Communication and power transmission by electromagnetic waves are also planned to be used in water and seawater. In this session, four researchers engaged in communication technology and power transmission in water and seawater discussed the current research trends. We also discussed future possibilities and deepened our understanding of applications for his technology. There were many questions from the audience, and it was a great success.

### 4.2 General Conference

Single panel discussion was organized by TCSR during 2019 General Conference held in Waseda University. The panel discussion entitled "Smart Radio Innovation" had four panelists. They introduced the concept of Smart Spectrum and the future of the spectrum usage for wireless communication, wireless infrastructure remote monitoring system using LoRaWAN, the analysis of city events by environmental sensing using vehicle-mounted sensors, the R&D activities of V2X millimeter wave technologies. After the talks, the on-going changes in the society driving the expansion of wireless technologies, the essential needs for wireless technologies in each field, the issues for future developments, and the possible values created by smart radio technologies were discussed.

## 5. SmartCom 2019 - Call for Papers

In FY2019, we will hold SmartCom 2019 at Rutgers University in NJ, USA, which is the international workshop jointly organized by several IEICE Technical Committees and technical key players outside Japan. This is the 6th SmartCom in its history, and hosted in collaboration with academia in the United States. The workshop targets on smart wireless communications, and provides a great opportunity for discussing smarter wireless world in future. Details are as follows:

- Date: November 4th − November 5th, 2019
- Venue: Rutgers, The State University of New Jersey, USA
- Topics: Cognitive radio, Heterogeneous Network, AI technologies for Wireless communications, etc.
- Important Dates:
  Registration of paper submission: early Sept.
  Camera-ready paper submission: late Sept.
  Participant registration: late Sept.
  Registration fee payment deadline: late Sept.

## 6. Reference

[1]  Website of the technical committee on Smart Radio: http://www.ieice.org/cs/sr/eng/

Table 1  Summary of Smart Radio Activities in FY2018.

| Category | Date | Venue | Topics | Num. of Participants |
|---|---|---|---|---|
| Regular | 24th – 25th May 2018 | Tokyo Big Sight | Machine Learning, Technical Exhibition, General Topics | 36 (only countable in 24th) |
| Regular | 11th – 13th July 2018 | Hakodate Arena | Wireless Distributed Network, IoT, General Topics (with ASN, NS, RCC, RCS) | 72 |
| Society Conference | 12th – 15th Sept. 2018 | Kanazawa Univ. | - | - |
| International Workshop | 30th – 31st Oct. 2018 | Bangkok, Thai | SmartCom 2018 | 96 |
| Regular | 24th – 25th Jan. 2019 | Corasse Fukushima | General Topics | 51 |
| Regular | 6th – 8th Mar. 2019 | YRP | Mobile Communications Workshop (with RCS and SRW) | 63 |
| General Conference | 20th – 23rd Mar. 2019 | Waseda Univ. | - | - |

# Our Work and Experience on the Development of IEICE Shanghai Section

Jie Zhu[1] and Zhixian Ma[2]

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## 1. Introduction

Shanghai section, as one of the regional parts of the IEICE, was directed by Prof. Jie Zhu from June 2015 to June 2019. As the same as the IEICE-CS, Shanghai section is devoting in terms of inviting new members, promoting paper submission to IEICE-CS journals, organizing regional conferences and activities, cooperating with company and sister sections (e.g., IEICE Beijing Section and Tokyo Section). In this report, we would like to introduce our work in both academy and industry, and share our achievements with the IEICE-CS.

## 2. Development of Membership in Academy

There are more than ten international top universities and institutes in Shanghai and its neighbored regions, e.g., Shanghai Jiao Tong University (SJTU), Fudan University, Shanghai University and etc. For all of them, ICT (Internet and Communication Technology) is a major research area, whose development depends highly on communication and sharing of new trend with members in the ICT societies. For the graduate students, in addition to the communication with scholars and researchers, submissions of their works to global journals and conferences are also required, which could even be a key to their graduation (e.g., a PhD candidate should have more than two papers before applying his/her degree in SJTU).

IEICE-CS covers a wide range of majors in the ICT area and has three peer-reviewed monthly journals [1], which provides students with opportunities for publishing their works and contributions. Also, the editors and reviewers of IEICE-CS journals are responsible and with rigorous attitude. The comments of them are usually objective and comprehensive, which have obtained positive feedback among our students and researchers.

Since that, we are delightful to introduce the IEICE-CS and make promotion of its journals in the Shanghai region through different ways, e.g., at the school's academic activities, departmental meetings and tutorials. Our work has obtained positive results. More and more student members were absorbed in SJTU each year (see Fig. 1) and paper submissions and acceptances were increased quickly as well (see Fig. 2).
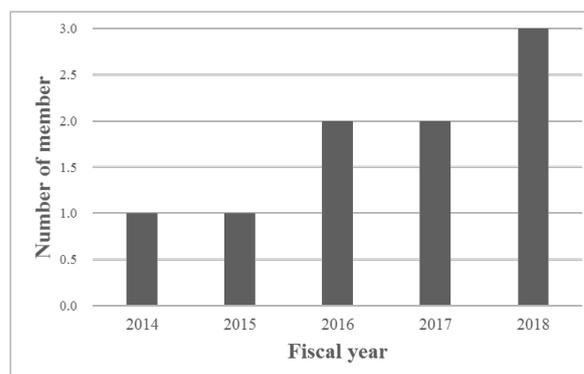


Fig. 1  New student member admissions of SJTU in recent five years.
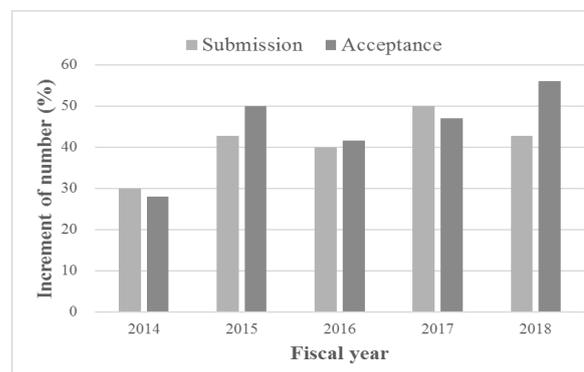


Fig. 2  Increment of submitted and accepted papers of SJTU by IEICE-CS in recent five years.

## 3. Cooperation with Industry

As the economic and technology centers of China, Shanghai provides rich soil and atmosphere to boil the ICT industry. Many companies construct their regional headquarters in Shanghai region, which attract a large number of R&D (Research and Development) engineers and researchers. As we know, in the process of R&D, papers hosting cutting-edge technologies and trend in related fields are highly required, and relevant scientific research results may also be submitted to relevant journals of IEICE. Since that, the ICT society could play as a bridge of the communication between the academy and the industry.

In the Shanghai region, our members in academy have cooperated with the industry in many research projects. As a professor in SJTU, Director Zhu has also led such
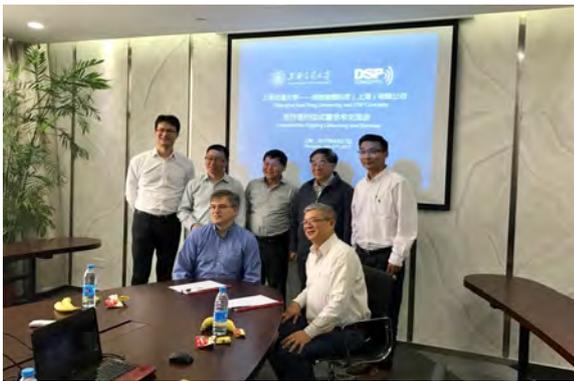
Fig. 3  The signing ceremony between DSP Concept Ltd., and SJTU.



Fig. 4  Group photo of the 33$^{rd}$ Eastern China Teaching Seminar on Electronic Circuits.

kind of projects, e.g., cooperation with the DSP Concept Ltd. for auto-speech recognition [2] (see Fig. 3), development of optic-fiber fence intrusion recognition systems [3] with Brighterfiber, and design of LTE network with Shanghai Huawei Technologies CO. In those projects, we have referred to the papers from IEICE-CS journals and our works have been submitted to the IEICE transactions as well.

In addition to that, as an IEICE student member, Dr. Zhixian Ma is now a researcher in the Shanghai Huawei Technologies CO., China. He will retain his membership and help us to promote the IEICE-CS society in Huawei, which could attract potential member applications and excellent researches in the ICT area.

## 4. Conferences and Activities

Another way for the development of Shanghai section is to organize or participate in conferences and activities. In recent years, we have organized tutorials and seminars for paper preparation, membership application and publication ethics of IEICE. These have attracted vision of potential student members in our department. For instance, a professor in magnetic-wave has inquired Dr. Ma for the membership rule before submitting his work to the IEICE Transactions on Information and Systems.

We have also participated in many international conferences, during which we made posters to promote the IEICE societies and journals to our peers. As the president of China Eastern Teaching Council on Electronic Circuit, Prof, Jie Zhu gives key speeches in annual conferences and has invited many scholars to submit their works to the IEICE-CS journals (see Fig. 4).

## 5. Conclusion and Outlooks

After years of development, the IEICE Shanghai Section has made certain achievements in terms of absorbing members, industry cooperation and organizing of conferences and activities. Although IEICE may be a relatively regional organization at present, we are very confident that its reputation will be expanded with efforts of our members and staffs in the future.

Some suggestion may worth trying for the development of the society as well as the Shanghai Section:
- Invite distinguished scholars to give talks on their research;
- Organize conferences at Shanghai and some famous regions in China.
- Organize writing tutorials to attract potential student members and to contribute their works.

## 6. Acknowledgements

## 7. References

[1]  T. Ohtsuki, "Greetings from the new President," IEICE Global News Letter, vol. 43, no. 2, pp. 2, Jun. 2019.

[2]  L. Wang and J. Zhu, "A Novel speech Enhancement System Based on the Coherence-Based Algorithm and the Differential Beamforming," IEICE Transactions on Information and Systems, vol. 101, no. 12, pp. 3253-3257, Dec. 2018.

[3]  Z. Ma, Y, Liang and J. Zhu, "An Optic-fiber Fence Intrusion Recognition System using Mixture Gaussian Hidden Markov Models," IEICE Electronics Express, vol. 14, no. 5, pp. 20170023, Mar. 2017.

# Report on the 2019 Asian Workshop on Antennas and Propagation (AWAP2019)

## Kunio Sakakibara
## Nagoya Institute of Technology

### 1. History of AWAP

The Asian Workshop on Antennas and Propagation (AWAP) has been organized in three countries of Japan, Korea, and Thailand every year since 2014 to provide an international forum for the exchange of information on the progress of research and development in antennas, propagation, and related fields continuing from KJAPs and KJJCs with technical committees of EMT and EMC. It is also an important objective of this meeting to promote mutual interaction among participants. The history of AWAP is as follows after KJJCs and KJAPs.

➢ AWAP2014:May 14th -16th, 2014, Kanazawa, Japan
➢ AWAP2015:Jun. 17th -18th, 2015, Bangkok, Thailand
➢ AWAP2016:Jan. 27th -29th, 2016, Busan, Korea
➢ AWAP2017:Jun. 28th -30th, 2017, Hokkaido, Japan
➢ AWAP2018:Jul. 25th -27th, 2018, Pattaya, Thailand

The workshop has been managed by Technical Committee on Antennas and Propagation (TCAP) of the Institute of Electronics, Information and Communication Engineers (IEICE), Technical Group on Antennas and Propagation of the Korean Institute of Electromagnetic Engineering and Science (KIEES), and Electromagnetic Group of the Electrical Engineering/ Electronics, Computer, Telecommunications and Information Technology Association (ECTI), Thailand.

### 2. Report on AWAP2019

This year 2019, the workshop was organized and hosted by KIEES Korea and technically co-sponsored by IEICE and ECTI. It was held from April 24th to 26th at Shilla Stay Seocho Hotel, Seoul, Korea. The workshop program is as follows.

**Wednesday, April 24th**
➢ International Steering Committee Meeting
➢ Welcome Reception

**Thursday, April 25th**
➢ Opening Ceremony
➢ Plenary Talks
  ➢ Design of Wideband Spiral Antenna Array (Y. Yoon: Yonsei Univ.)
  ➢ Antennas for Radio Wave Propagation in Seawater (Q. Chen: Tohoku Univ.)
  ➢ Irregular Metasurfaces for Mid-Range Wireless Power Transfer Systems (S. Chaimool: Khon Kaen Univ.)
➢ Oral Sessions
➢ Closing Ceremony
➢ Banquet Party

**Friday, April 26th**
➢ Technical Discussion

After the opening ceremony, three plenary talks were provided from each country. 19 regular talks were presented in the following oral sessions. The number of participants was 37 (Korea: 22, Japan: 12, Thailand: 3). The participants exchanged their research activities eagerly and enjoyed the discussion in the sessions as shown in Fig. 1.



Fig. 1  Oral sessions.

## 3. Banquet Party

A banquet party was held in the reception room of the same hotel after the whole day sessions. The participants from each country introduced their traditional liquors of their countries to express their welcoming from the host country and their gratitude to the hospitality from the guest countries each other. They compete the strength of their own liquors. Consequently, too much bottles were arranged on the tables for the total participants. A beautiful string trio was invited and entertained to popular music in the party. The participants enjoyed the music, delicious dishes, a variety of tasty liquors, and friendly conversation as shown in Fig. 2.

## 4. Discussion for future AWAPs in ISC Meeting

In the first day, the international steering committee (ISC) meeting was held and the steering committee members from three countries discussed about the future AWAPs. The AWAPs are rotating to be held in three countries in order as mentioned in Sec. 1. The next AWAP2020 was planned in turn for Japan. However, to prevent conflicting with the ISAP2020 in Osaka, Japan, the AWAP2020 is decided to be held in Hanoi, Vietnam at the end of May as a joint workshop with the VJISAP2020. We wish extending a variety of researchers in Asian countries and enlarging the friendship of the antennas and propagation research society. See you in Hanoi!



Fig. 2  Banquet party.



Fig. 3  Group photo of all participants.

# Report on the 12th International Workshop on Evolutional Technologies & Ecosystems for Beyond 5G (WDN-5G WCNC2019)

Gia Khanh Tran
Tokyo Institute of Technology, Japan

## 1. Introduction

Following the successful events of the International Wireless Distributed Network (WDN) workshop on Cooperative and Heterogeneous Networks held annually since 2008, the 12th workshop [1] focusing on Beyond 5G topics e.g. evolutional technologies and ecosystems for beyond 5G was held in conjunction with IEEE WCNC2019 on 15 April 2019 in Marrakech, Morocco. The workshop was technically co-sponsored by IEICE Communications Society and 5G-MiEdge consortium [2], co-placed with Workshop on Economics and Adoption of Millimeter Wave Technology in Future Networks co-sponsored by 5Genesis [3] and ULTRAWAVE [4]. This report summarizes the workshop activity, especially focusing on discussion topics on beyond 5G technologies and ecosystems in the workshop.

## 2. Workshop Committee & Scope

General co-chairs:
+ Prof. Kei Sakaguchi (Tokyo Tech., Japan)
+ Dr. Emilio Calvanese Strinati (CEA-LETI, France)
+ Dr. Thomas Haustein (Fraunhofer HHI, Germany)
TPC co-chairs:
+ Dr. Gia Khanh Tran (Tokyo Tech., Japan)
+ Prof. Sergio Barbarossa (University of Rome, Italy)
+ Dr. Antonio de Domenico, (CEA-LETI, France)
+ Dr. Ali Sadri (Intel Corporations, USA)
Publicity chair:
+ Dr. Markus Dominik Mueck (Intel, Germany)
+ Dr. Mauro Boldi Renato (Telecom Italia, Italy)
+ Dr. Kentaro Ishidu (NICT, Japan)
+ Dr. Marco Mezzavilla (NYU, USA)
+ Prof. Yonghui Li (Sydney University, Australia)
+ Prof. Seong-Lyun Kim (Yonsei University, Korea)

Governments and policy makers have recognised the economic and societal importance of future digital services. Forecasts predict that the huge increase in consumer demand for data services driven by access to ever smarter and powerful devices is expected to continue beyond 2020. Accordingly, many academic, industrial and policy initiatives have been working on the development of 5G mobile networks and the capabilities they will require to meet the future demands e.g. higher data rates, widespread connectivity, flexible service creation and low latency. 5G will be the integration of multiple networks serving diverse sectors, domains and applications, such as multimedia, virtual reality (VR) / augmented reality (AR), Machine-to-Machine (M2M) / Internet of Things (IoT), automotive, Smart City etc.

Current research efforts on 5G Radio Access Networks (RAN) strongly focus on millimeter-wave (mmWave) access for addressing a critical weakness of deployed cellular systems, i.e. the capacity to realize enhanced mobile broadband (eMBB) services, as discussed at the World Radio-communication Conference 2015 (WRC-2015). Foreseeing a new market, the FCC in US also opened up in total nearly 11 GHz of spectrum above 27.5 GHz to 5G, including unlicensed spectrum at 64-71 GHz. Aside, mmWave technologies have reached a significant degree of maturity and their state-of-the-art products, operated in the 60 GHz unlicensed band, are already in the market. Wireless engineers and business planners now consider how to efficiently introduce and operate mmWave in 5G and beyond, where the answers to the question depend on scenarios/use cases/services to be deployed. For example, the forthcoming 5G Phase II, taken care by the planned 3GPP Release 16, is particularly interested to a new class of services called ultra High Speed Low Latency Communications (uHSLLC) e.g. mmWave V2X. To realize such requirements, it is essential to combine mmWave with Mobile Edge Computing (MEC), a technology allocating storage and computation resources at the edge of the network to reduce latency. However, how to combine them effectively has not been fully discussed, especially for critical applications of strict latency constraints foreseen in 5G networks. Another critical issue in terms of cost is how to backhauling the mmWave smallcell networks, knowing that it is impossible to provide Gigabit Ethernet backhaul everywhere. One of the solution is to introduce self- backhauling technique using mmWave in combination with Software Defined Network (SDN) technology to reduce OPEX/CAPEX. However, detailed discussions e.g. interference management or implementation issues should be investigated thoroughly in practice.

The main objective of the workshop is to offer an opportunity for academic and industrial researchers to discuss on evolutional technologies and killer ecosystems for the realization of 5G Phase II and beyond, taking into account the combination of mmWave and MEC, under the support of MEC/SDN technologies.

## 3. Summary of WDN-5G WCNC2019

WDN-5G was held at Ryad Mogador Hotel & Palais des Congrès, on the first day of WCNC2019, one of the flagship conferences of IEEE ComSoc. This half-day workshop was organized in the afternoon with one keynote speech, 7 accepted papers after rigorous review from experts of the field and a panel discussion. The program of the workshop is presented in Table 1.

In the opening, the organizing chair of the workshop briefly explained the scope of WDN-5G and introduced the workshop's program. After the introduction, the keynote speech with title "Millimeter-Wave Phased-Array Transceiver Design for 5G New Radio" was delivered by Prof. Kenichi Okada, who is a professor at the Department of Electrical and Electronic Engineering, Tokyo Institute of Technology (Japan). He has authored or co-authored more than 400 journal and conference papers. His current research interests include millimeter-wave CMOS wireless transceivers for 20/28/39/60/77/79/100/300 GHz for WiGig, 5G, satellite and future wireless system, digital PLL, synthesizable PLL, atomic clock, and ultra-low-power wireless transceivers for Bluetooth Low-Energy, and Sub-GHz applications. In the invited talk, the keynote speaker argued that the wireless communication is one of the key technologies for realizing the future smart society. The conventional omni-directional wireless communication using microwave has been studied so far, and now the directional wireless communication using millimeter-wave (30-300 GHz) is opening a new technology field of communication. The directional wireless communication using the millimeter-wave spectrum can accept spatial co-existence and multiplexing as well as use of wide frequency bandwidth. In the presentation, Prof. Okada explained the overview of phased-array transceiver design using CMOS device, as well as several surrounded issues such as IC cost, test cost, PCB design, antenna integration, power consumption, PA performance, etc. He also presented his laboratory's fabricated world-record low-power chip devices.

Table 1  The program of WDN-5G 2019.

| 14:00 -14:05 | Opening |
|---|---|
| 14:05 -14:45 | Keynote (Prof. Kenichi Okada) |
| 14:45 -16:30 | Oral session (7 accepted papers) |
| 16:30 -17:15 | Panel discussion |

For the general oral session, seven papers were accepted to be presented. The list of the papers in this session is summarized below:

(1) A Low-complexity Beam Searching Method for Fast Handover in MmWave Vehicular Networks (Beijing University of Posts and Telecommunications)

(2) Recharging of Flying Base Stations using Airborne RF Energy Sources (UNSW Sydney, Central Queensland University)

(3) An Opportunistic Cooperative Packet Transmission Scheme in Wireless Multi-hop Networks (Beijing University of Posts and Telecommunications)

(4) Risk assessment in 5G infrastructure deployment: an aid tool for estimating spectrum auction prices (Stockholm University, Portuguese Catholic University)

(5) Joint Resource Allocation for Latency-Constrained Dynamic Computation Offloading with MEC (Sapienza University of Rome, Intel Germany)

(6) Backhaul Bandwidth Consideration for Workload Placement in Hierarchical Edge Cloud Architecture (KDDI Research)

(7) Outdoor Experiment of mmWave Meshed Backhaul for Realtime Edge Content Delivery (Tokyo Institute of Technology, Karlstad University, Fraunhofer HHI)

After the oral session, a panel discussion was led by Dr. Valerio Frascolla (Intel Germany) between audiences and presenters of the workshop, including the keynote speaker. The following questions were discussed during this session i.e. prediction of world-wide penetration of 5G services including pre-service ones, global impact of mmWave/MEC/SDN technologies via international standardization activities. The attendees came to the conclusion that it is necessary to have tight coordination among different standardization bodies e.g. interworking taskforces and timeline synchronization to really penetrate mmWave/MEC/SDN technologies into beyond 5G.



Fig. 1  The keynote speaker shows recent trend of wireless devices.

## 4. References

[1]  https://www.sakaguchi-lab.net/workshop/wdn2019/

[2]  http://5g-miedge.eu/

[3]  https://5genesis.eu/

[4]  http://ultrawave2020.eu/

# Report on International Workshop on Technology Trials and Proof-of-Concept Activities for 5G and Beyond Industry and Academic Panel 2019 (TPoC5G Panel 2019)

Yukitoshi Sanada
Keio University

## 1. Introduction

International Workshop on Technology Trials and Proof-of-Concept Activities for 5G and Beyond Industry and Academic Panel 2019 (TPoC5G Panel 2019) was organized in conjunction with IEEE Vehicular Technology Conference (VTC) 2019 Spring, which was held in Kuala Lumper, Singapore, on April 28th- May 1st, 2019. TPoC5G Panel 2019 is technically cosponsored by IEEE VTS Tokyo Chapter and IEICE Communication Society. TPoc5G workshops were held at IEEE VTC 2017 Spring and 2018 Spring. Thus, it was the third time to be held. The workshop focused on the latest trials and evaluation results for 5G and the proof-of-concept activities for beyond 5G.

## 2. Conference Program

The workshop was held in the afternoon on April 28th for a half day. There were 8 presentations including keynote presentation and 4 invited talks. The keynote presentation was provided by Dr. F. Adachi from Tohoku University. His keynote presentation was titled "Evolution into 5G and The Next." His talk was about the research results regarding distributed MIMO radio access network for 5G and technical issues for further evolution of 5G.



Fig. 1  Keynote presentation by Dr. Adachi.

## 3. Invited Talks

There were 4 invited talks. The first one was given by Dr. Okumura from NTT DOCOMO. The title of his talk was "5G R&D Achievements for High-Data-Rate and Low-Power-Consumption Radio Access Technologies with Higher-Frequency-Band and Wider-Bandwidth Massive MIMO (Invited Talk)." The second one was given by Dr. Seki from Fujitsu Limited. His talk was titled "5G R&D Activities for High Capacity Technologies with Ultra High-Density Multi-Band and Multi-Access Layered Cells (Invited Talk)." These two talks were about the research results of 5G R&D projects funded by The Ministry of Internal Affairs and Communications (MIC), Japan. The third one was given by Dr. Xu from Huawei Technologies. The title of his talk was "5G Networking Forward for Enhanced Vertical Support (Invited Talk)." His talk was about the research direction of 5G beyond in Europe. The last invited talk was given by Dr. Zhang. His talk was titled "Towards Smart and Reconfigurable Environment: Intelligent Reflecting Surface Aided Wireless Networks (Invited Talk)." Hit talk was about passive reconfigurable reflecting surface to control wireless environments intelligently.

There were many participants and the room was assigned full of audience. Even though the time schedule was tight, many discussions were held throughout the workshop.



Fig. 2  Invited talk by Dr. Okumura.

## 4. Acknowledgements

The TPoC5G Panel 2019 committee members would like to give thanks to authors, speakers, participants, and staffs.

# Report on the 6th IEEE International Conference on Smart Grid (icSmartGrid2018)

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## 1. Introduction

The 6th IEEE International Conference on Smart Grid (icSmartGrid2018) was held 4-6 December 2018 at Nagasaki Prefectural Art Museum, Nagasaki, Japan. Nagasaki prefecture is located in the west of Kyusyu, the southernmost of the four major Japanese islands, about 1.3 million people live in Nagasaki. Nagasaki is famous for its local noodles. Especially, Champon noodles and Sara-Udon noodles are well known as specialties of Nagasaki. Huis Ten Bosch is a theme park in Sasebo, Nagasaki. It is one of the most popular theme park in Nagasaki. Also, in Nagasaki, the last city in the world is experienced nuclear attacks by atomic bomb. The truth is that we wish for peace we must never forget. IcSmartGrid is the annual world-class technical forum presenting the latest research topics in the smart grid, renewable energy technologies and their applications.

The diamond sponsors of icSmartGrid2018 are NTT Facilities and Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC), Nishimura Syokai is bronze sponsor. The icSmartGrid2018 is organized the International Journal of Renewable Energy (IJRER) and International Journal of Smart Grid (ijSmartGrid). IEEE Industrial Electronics Society (IES) and IEEE Industry Applications Society (IAS) has joined as one of the technical co-sponsors, the Institute of Electrical Engineers of Japan (IEEJ) and the Institute of Electronics, Information and Communication Engineers (IEICE) support the conference in cooperation. It is also supported by Nagasaki Institute of Applied Science, Nagasaki University, Japan, Gazi University and Nisantasi University, Turkey.

## 2. Opening Ceremony and Keynote Speeches

The conference program consisted of 4 keynote addresses, 12 technical sessions, 1 special lecture and corporate exhibition.

On Tuesday morning, the first day of the conference, the opening ceremony was held by General Chair, Prof. Nobumasa Matsui, General co-chairs, Prof. Ilhami Colak and Prof. Fujio Kurokawa. After the opening ceremony, two high-profile keynote speakers, Mr. Naoto Hirakata, NTT Facilities and Prof. Ramazan Bayindir gave keynote speeches. Firstly, Mr. Naoto Hirakata have presented about the emerging tasks, possible approaches and future prospects of Smart Grid technologies from energy generators' and consumers' perspectives. In secondary keynote speech, an overall description and typical distributed generation technology including a comprehensive study on microgrid have presented by Prof. Ramazan Bayindir.


Fig. 2  Opening ceremony.


Fig. 1  Conference venue near the harbor.


Fig. 3  Keynote speech, Mr. Naoto Hirakata.

On Wednesday morning, the second day of the conference, in the special lecture, the history of Nagasaki was presented on the theme "Nagasaki: Port at the Crossroads of East and West" by Prof. Brian Burke-Gaffney, Nagasaki Institute of Applied Science.

After the special lecture, two high-profile keynote speakers, Dr. Noriko Kawakami, TMEIC and Dr. Hitoshi Hayashiya, JR East gave keynote speeches. Firstly, Dr. Noriko Kawakami have introduced the concept of "Power Electronics in Everything", that is expected to integrate with communication technology and create new value to society. In secondary keynote speech, improvement of power supply efficiency in railway power supply system by applying smart grid technologies and its future prospects including other practical examples related to renewable energy, energy storage and power conversion technologies have presented by Dr. Hitoshi Hayashiya.


Fig. 4  Special lecture, Prof. Brian Burke-Gaffney.


Fig. 5  Keynote speech, Dr. Hitoshi Hayashiya.


Fig. 6  Keynote speech, Dr. Noriko Kawakami.

## 3. Technical Program and Exhibitions

There were total 91 submissions are given a distributed power energy systems and source, renewable energy, conventional power sources, new trends and technologies for smart grid and so on from 23 countries. 41 oral presentations papers were accepted for presentation by careful peer review process. The technical program was scheduled through Tuesday afternoon and Thursday morning. Each session was kept the schedule, and attendances discussed about the interesting subjects, advances and developments in smart grid technologies and their applications. The four best papers selected from a conference proceeding. Corporate exhibitions were held for the three days. Active discussions were discussed on practical a product technology.


Fig. 7  Technical program.


Fig. 8  Exhibitions.

## 4. Conclusions

After the successes of the previous editions of Smart Grids Workshops on behalf of European Commission Joint Research Centre in Antalya in 2013 and 2014, and in February and April 2015, and with technical co-sponsorship of IEEE IES in March 2016 in Istanbul, we are now organizing International Conference on Smart Grid will continue promoting and disseminating the knowledge concerning several topics and technologies related to smart energy systems and sources.

IcSmartGrid2019 will be held in Newcastle, Australia on 9-11 December 2019. (https://www.icsmartgrid.org)

# Report on the 3rd IEEE International Conference on DC Microgrids (ICDCM2019)

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Aichi Institute of Technology

## 1. Introduction

The 3rd IEEE International Conference on DC Microgrids (ICDCM2019) was held 20-23 May 2019 at Matsue, Japan. Matsue is the capital city of Shimane Prefecture, in Southwest Japan. Matsue and its surrounding areas are rich in cultural assets and historical sites, and many of Japan's most ancient legends are set in the area. ICDCM is the world-class technical forum presenting the latest research topics in the DC micrigrids. The main sponsors of ICDCM 2019 are IEEE and IEEE Power Electronics Society (PELS). PELS has joined as the main sponsors of ICDCM since 2015. The Institute of Electrical Engineers of Japan (IEEJ), the Institute of Electronics, Information and Communication Engineers (IEICE) and the Institute of Electrical Installation Engineers of Japan (IEIEJ) support the conference as a technical co-sponsor.

It is also supported by the research foundation for the electro-technology of Chubu and the electrical technology research foundation of Chugoku.

## 2. Conference Overview and Tutorials

The conference program consisted of 3 keynote addresses, 14 technical sessions, 1 special session and 5 tutorials. On Monday, the first day of the conference, 5 tutorials, a workshop and a panel discussion were offered. The tutorials were about DC microgrids, Modeling, modulation, circulating current and ZVS-on of a dual active bridge DC/DC converter, a model predictive control of a DAB converter in DC microgrids on naval vessels and more electric aircraft, supercapacitor techniques for DC microgrid applications, further, extremely high safety and long cycle life energy storage system (ESS), respectively. The workshop was the introduction to hardware in the loop simulation. The panel discussion was the DC power applications by block chain.

## 3. Opening Ceremony and Keynote Speeches

On Tuesday morning, the second day of the conference, the opening ceremony was held by General Chair Dr. Keiichi Hirose, President of IEEE power electronics society, Prof. Frede Blaabjerg, Technical Program chair, Prof. Masanobu Matsui, etc. After the opening ceremony, two high-profile plenary speakers, Mr. Kunihiro Tanaka and Dr. Chris Marnay gave plenary speeches about the DC powered data center-perfect performance during Hokkaido blackout and its expansion to DC smart community and heterogeneous power quality in microgrids, respectively.

## 4. Technical Program

There were a lot of submissions are given a DC microgrid research and their applications from 30 countries. 126 papers (70 oral presentations and 56 poster presentations) were accepted for presentation by careful peer review process. The technical program was scheduled through Tuesday afternoon and Thursday evening. Each session was kept the schedule, and attendances discussed about the interesting subjects, advances and developments in DC microgrids research and their applications.

## 5. Conclusions

ICDCM has been the international conference for researchers and engineers in DC microgrids since 2015 at Atlanta, USA. In 2017, the second was held in Nuremberg, Germany. The third was held in Matsue, Japan. ICDCM2019 successfully provided an excellent venue and facilitated the research collaboration in DC microgrids technologies. In particular, DC technology is an area that continues to attract attention. I expect ICDCM to be a bigger conference in two years.


Fig. 1  Opening Ceremony.


Fig. 2  Matsue Castle.

# Report on the International Symposium on Extremely Advanced Transmission Technologies (EXAT 2019)

Werner Klaus

National Institute of Information and Communications Technology



## 1. Introduction

The 5$^{th}$ international symposium on Extremely Advanced Transmission Technologies (EXAT 2019) was held from 29$^{th}$ to 31$^{st}$ May 2019 in the city of Ise, home to the Ise Grand Shrines situated on the northern side of the beautiful Ise-Shima National Park in Mie Prefecture, Japan. It was organized by the IEICE Technical Committee on Extremely Advanced Transmission Technologies (EXAT) and the National Institute of Information and Communications Technology (NICT). Inaugurated in Tokyo in 2008, the symposium has been held so far biyearly in Sapporo, Kyoto, and Nara since 2013.

## 2. Background

The worldwide exponential traffic growth in optical networks of 30% per year and above that we experience in recent years has been the driving force behind an amazing development of optical fiber network technology. While striving for higher efficiency and better performance, today's fiber links both in telecom and datacom networks steadily approach their physical limit in transmission capacity leading to concern that these transmission systems will not be able to handle the traffic needs in less than a decade from now.

Space Division Multiplexing (SDM) is seen as a promising solution to deal effectively with this looming capacity crunch. Intensive research in this field over the past decade has brought forth sophisticated multi-core fiber designs and multi-mode transmission techniques constantly pushing the limits on achievable data rates and spectral efficiency with regard to a single strand of fiber. Recently, efforts are also under way in taking SDM out of the laboratory and bringing it closer to its adoption in commercial systems.

The EXAT community in Japan initiated the development of SDM technology in 2008 and since then has been playing a leading role in the investigations of the so-called 3M (multi-core, multi-mode, and multi-level modulation) technologies. The objective of the EXAT symposium is to discuss the current status and future trends of SDM related technology. This year's symposium was very well attended with over 100 participants from Japan and overseas. It featured 2 plenary and 18 invited talks, as well as an extensive poster session with 30 posters where all participants could gain an excellent overview of on-going SDM related research projects and some of the latest and hot research topics in this field.

## 3. Technical Sessions

On the first day, the symposium started with an opening remark by Dr. Yoshinari Awaji, the IEICE EXAT committee chair, presenting an overview of the symposium and introducing the venue Ise as shown in Fig. 1 on the left. After that, Dr. Nicolas Fontaine (Nokia Bell Labs, USA), shown in Fig. 1 on the right, gave a plenary talk about the progress in multimode and coupled-core transmission and presented also some applications of SDM technologies outside the telecom area such as imaging and astronomy.



Fig. 1  Opening remark by Dr. Yoshinari Awaji (left), Plenary talk by Dr. Nicolas Fontaine (right).

His talk was then followed by 4 invited talks. In the first one, Dr. Cristian Antonelli (University of L'Aquila, Italy) reviewed the modelling and simulation of the propagation effects in optical fibers for SDM transmission and their impact on the overall system performance. In the second one, Dr. Pierre Sillard (Prysmian Group, France) presented some recent advances in designing few-mode fibers. Next, Prof. Guifang Li (University of Central Florida, USA) shared with us some thoughts on exploiting spatial modes for applications other than simply increasing capacity, e.g., for improving physical layer security. Finally, in the fourth talk, Prof. Siddharth Ramachandran (Boston University, USA) gave a nice overview on orbital angular momentum modes in optical fibers and how these can be used in telecom and sensing applications.

The program of the second day consisted of 7 invited talks and a poster session in afternoon as shown in Fig. 2. In the first talk, Dr. Taiji Sakamoto (NTT, Japan) reviewed the recent progress of few-mode multicore

fibers and discussed challenges on how to realize long-haul transmission with these fibers. In the second one, Mr. Takemi Hasegawa (Sumitomo Electric Industries, Japan) gave an overview of the state-of-the-art in ultra-low loss fiber technologies for undersea transmission including a view on potential applications with regard to SDM. Next, Dr. Yongmin Jung (University of Southampton, UK) discussed optical amplifier techniques for SDM transmission. In the fourth talk, Dr. Takayuki Mizuno (NTT, Japan) reviewed some long-haul transmission efforts with regard to multicore fiber systems that make use of EDFA and Raman repeated amplification. In the fifth talk, Mr. Tetsu Morishima (Sumitomo Electric Industries, Japan) reviewed the challenges with regard to multicore fiber connectors. Next, Dr. Haoshuo Chen (Nokia Bell Labs, USA) discussed some interesting applications of mode control in multimode fibers to control the light at the fiber output with applications for endoscopy and remote beam forming. Finally, Dr. Georg Rademacher (NICT, Japan) described recent record transmission demonstrations over few-mode fibers. The topics of the poster session ranged from optical amplification for SDM fibers to loss characterization at splice points as well as coupled-core fibers, nonlinear compensation in multicore fibers and MIMO digital signal processing techniques for multimode fiber transmission.



Fig. 2  Poster session.

The third day started with another plenary talk given by Dr. Ioannis Tomkos (Athens Information Technology Center, Greece), shown in Fig. 3, where he reviewed the main outcomes of the collaborative European research project "INSPACE" introducing the concept of spatially and spectrally flexible optical networks. His talk was then followed by 6 invited talks. In the first one, Dr. Stephen Grubb (Facebook, USA) presented an interesting overview on submarine fiber transmission and some innovations that are needed to prepare these systems for the Petabit era. Next, Dr. Juan Carlos Alvarado-Zacarias (University of Central Florida, USA) reviewed the state-of-the-art in photonic lantern design and fabrication for SDM transmission. In the third talk, Dr. David Allioux (Cailabs, France) presented the method of multi-plane light conversion

which is considered to be a very efficient multiplexing technique for spatial modes in multimode fibers. Next, Dr. Noboru Yoshikane (KDDI, Japan) reviewed the current status of control technologies for SDM optical networks. In the fifth talk, Prof. Yojiro Mori (Nagoya University, Japan) discussed some new ideas on high port-count optical cross-connects and wavelength selective switches. Finally, Prof. Georgios Zervas (University College London, UK) described his group's recent work on the application of multicore fibers and related networking solutions for scalable data centers. In the closing session, Dr. Naoto Kadowaki, Vice President of NICT shown in Fig. 4, briefly summarized EXAT's history and NICT's role in promoting the development of SDM technology and emphasized the importance of international cooperation as well as information exchange in order to realize the necessary infrastructure for our future communication needs.
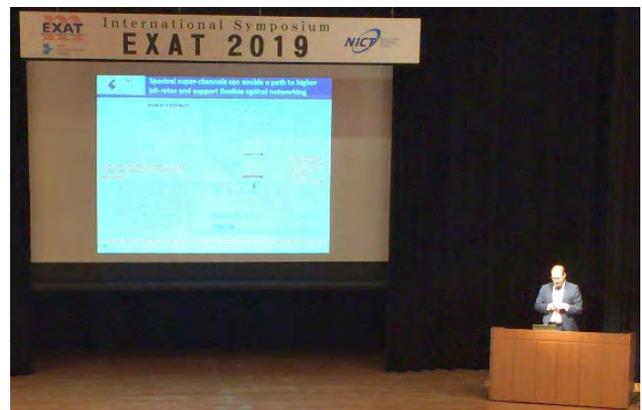


Fig. 3  Plenary talk by Dr. Ioannis Tomkos.

## 4. Conclusion

EXAT 2019 closed with great success offering ample opportunity for in-depth discussions as well as exchange of opinions and ideas on cutting-edge SDM technologies and the future of optical communications in a beautiful location. The symposium organizers would like to express their sincere thanks to all the invited speakers, especially those from oversea, as well as poster presenters and participants for having taken all the time and effort to come to Ise and contributing to the symposium to become such a wonderful forum for sharing information and expertise in this rapidly growing field of communications.



Fig. 4  Closing remark by Dr. Naoto Kadowaki.

# Report on ISADS 2019

Xiaodong Lu
Electronic Navigation Research Institute

## 1. Introduction

The Fourteenth International Symposium on Autonomous Decentralized Systems (ISADS) was held in Utrecht, the Netherlands, from April 8th to 10th, 2019. The ISADS 2019 was sponsored by the Computer Society and Technology and Engineering Management Society of the Institute of Electrical and Electric Engineers (IEEE) and in cooperation with the Institute of Electronics, Information and Communication Engineers (IEICE) Communications Society, IEICE Information and Systems Society, International Federation of Automatic Control (IFAC), International Federation for Information Processing (IFIP), and Object Management Group (OMG). In addition, ISADS 2019 was also strongly supported by HU University of Applied Sciences Utrecht [1,2].

The Concept of Autonomous Decentralized Systems (ADS), born in Japan 40 years ago, have technologically evolved in communication networks, information, control and service systems. It has been applied in many actual systems, and it has progressed in standardization activities. ADS technology has been making tangible improvement, and innovative new research is being reported successively. In particular, it is expected that ADS technology is applied to applications to promote transformation of social infrastructures, including the smart grid, environment management, resilience of system, Internet of Things, autonomous car and train, mobile communications.

The special topic of ISADS 2019 is "Technology and Business Innovation through Structure Change of Society and Life", which bring the future technologies and global applications for the discussions. The General Chair, Prof. Erik Puik and the Dean of HU University of Applied Sciences Utrecht, Prof. Cyrille Krul gave opening remarks.

## 2. Program

In ISADS 2019, Forum, one invited speech, four regular sessions, two workshops, a panel session and social events were organized.

### 2.1 Forum

At the Tenth Jubilee ISADS 2011, the first Forum on "Paradigm Shift of Research and Development for Information Technology under Changing and Unpredictable Market" was founded. With the advancement of science and technology, the trend of social and economic development was transformed from high-speed growth in competitive environment to sustainable development under global cooperation. The development of society and economy reduces the gap in material aspect of life among countries. As a result, the value system regarding life style is transformed from homogeneous to heterogeneous. Society, economy and life have been unpredictably changing and evolving under globalization, while sustainability is receiving more weight in addition to growth. Technology and business are interwoven in the real world, and consistency between research and development is crucial for sustainability in manufacturing, operation, maintenance, service and finance in the life-cycle of a system. The ADS concept, technologies and applications have been highly valued and expected to contribute to the structure change of society and life. The book based on the content of the first and second Forums was published by Wiley in 2014 [3]. At the end of 2018, the book for the third and fourth Forums was published by IET (The Institute of Engineering and Technology) [4].

The Forum Organization Committee Chair Prof. Kinji Mori gave an introduction of this Forum. To achieve the sustainable development in society and economy from the viewpoint of information technology, ISADS 2019 Forum focused on the topics of "Collaboration" that based on the analysis of new changes and trends in society, industry, and value, the future collaboration for innovation were discussed. During the forum, nine invited speakers from Europe, USA and Japan gave their speeches in three sessions:

● Session A: Society
(1) Remco Schellekens (Dutch Railways, the Netherlands), "Agile Train, Sustainable Train: Virtual Train"



Fig. 1  Speakers and Moderator of
Forum Session B.

(2) Huawei Zhao (Qilu University of Technology, China), "Blockchain in Decentralized Digital Economy"
(3) Colin Harrison (IBM, USA), "Autonomous Urban Systems"
● Session B: Industry
(4) Stefan Covaci (FOKUS, Germany), "5G as Enabler of Industrie 4.0"
(5) Farokh Bastani (University of Texas-Dallas, USA), "Standards for Internet of Things (IoT) Systems"
(6) Shigetoshi Sameshima (Hitachi, Japan), "Social Innovation for Society 5.0"
● Session C: Value
(7) Eleni Karatza (Aristotle University of Thessaloniki, Greece), "Scheduling Complex Real-time Applications in Cloud Environment with Shared Services and Resources"
(8) Takashi Kunifuji (East Japan Railway Company, Japan), "Open Innovation in Railway System"
(9) Jie Xu, (University of Leeds, UK), "Scalable Internet-of-Vehicles Services over Clouds"

## 2.2 Technical Sessions

ISADS 2019 had four regular sessions on Machine Learning, Quality of Services, Decentralization, and Security. In addition, the Technical Program Committee invited Dr. Alexander Overtoom who is the Chief Operating Officer (COO) of The Things Network, the Netherlands to give a speech on the topic of "Open, Community-Driven Network for Autonomous Decentralized Systems".

ISADS 2019 also hosted two workshops: International Workshop on Service Assurance in System Wide Information Management (SASWIM) and International Workshop on Blockchain in Autonomous Decentralized Systems (BcADS). At the workshop of SASWIM, the speakers gave the presentations of technologies and applications for constructing the common information sharing platform to achieve interoperability and harmonization for global air traffic management. At the workshop of BcADS, the presenters and participants discussed how to construct a decentralized digital economy with the support of blockchain and ADS technologies.

## 2.3 Social Events

The social highlights of ISADS 2019 were tour of city center and the banquet on April 9th. Before the banquet, all participants went on a walking tour of the downtown and visited the "Museum Speelklok" which has the world wonder collections of centuries-old self-playing musical instruments and the traditional Dutch street organs. During the lively museum tour, the cheerful live music brought us back to the city in 16th century.

The banquet held at the restaurant of "Paushuize" which is a grand Renaissance house recognized as a national heritage site in the Netherlands. It is one of the most beautiful and oldest buildings in Utrecht. To appreciate the great contribution of Prof. Kinji Mori as



Fig. 2  Gift-Giving Ceremony for Prof. Kinji Mori.

founding father of ADS and ISADS, the steering committee made a plaque for him. In addition, Program Committee Co-Chair, Prof. Leo van Moergestel painted a portrait of Prof. Kinji Mori as a special gift. The gift-giving ceremony was held during the banquet (Fig. 2).

## 2.4 Panel Session and PC Meeting

The Panel Session of ISADS 2019 was held on the last day. Three Panelists, Prof. Kinji Mori (Waseda University, Japan), Dr. Colin Harrison (IBM, USA) and Prof. Farokh Bastani (University of Texas-Dallas, USA), gave the speeches on the Future ADS and discussed the ADS applications. Moreover, how to improve the organization for operation to attract more people to contribute to ISADS was discussed with committee members and participates.

At the end, we had an extended Program Committee (PC) meeting to decide the organizer of the next ISADS. There were three candidates, China, Mexico, and USA who want to organize the next ISADS. At last, through bidding the PC meeting decided to hold the next ISADS in USA in 2021.

## 3. Conclusion

ISDAS 2019 was really successful. The organization committee thanks for the contributions to the symposium of all participants, all committee members, secretaries, and staffs for their hard work. The next ISADS will be held in 2021 in USA. We hope more participants can join this event.

## 4. References

[1] http://isads2019.org/
[2] Proceedings of 2019 IEEE 14th International Symposium on Autonomous Decentralized Systems (ISADS 2019).
[3] Kinji Mori, "Concept-Oriented Research and Development in Information Technology," Wiley, ISBN 978-1-118-47891-2, 2014.
[4] Kinji Mori and Takashi Kunifuji, "Autonomous Decentralized Systems and their Applications in Transport and Infrastructure," IET, ISBN 978-1-78561-281-7, 2018.

# IEICE-CS Related Conferences Calendar

| Date | Conference Name | Location | Note |
|------|-----------------|----------|------|
| 26 Oct. – 30 Oct. 2020 | 2020 International Symposium on Antennas and Propagation (**ISAP2020**) | Osaka, Japan | TBD |
| 20 May – 22 May 2020 | The 14th International Symposium on Medical Information and Communication Technology (**ISMICT 2020**) | Nara, Japan | Submission deadline: 15 Dec. 2019 |
| 7 Jan. – 10 Jan. 2020 | The 34th International Conference on Information Networking (**ICOIN 2020**) | Barcelona, Spain | Submission deadline: Closed |
| 9 Dec. – 11 Dec. 2019 | 7th International Conference on Smart Grid (**icSmartGrid 2019**) | Newcastle, Australia | Submission deadline: 1 Sep. 2019 |
| 6 Nov. – 8 Nov. 2019 | The 25th Asia-Pacific Conference on Communications (**APCC2019**) | Ho Chi Minh, Vietnam | To be held **soon** |
| 3 Nov. – 6 Nov. 2019 | International Conference on Renewable Energy Research and Applications (**ICRERA2019**) | Brasov, Romania | To be held **soon** |
| 29 Oct. – 1 Nov. 2019 | The 37th International Communications Satellite Systems Conference (**37th ICSSC**) | Okinawa, Japan | To be held **soon** |
| 27 Oct. – 30 Oct. 2019 | 2019 International Symposium on Antennas and Propagation (**ISAP2019**) | Xi'an, China | To be held **soon** |
| 16 Oct. – 18 Oct. 2019 | International Conference on Information and Communication Technology Convergence 2019 (**ICTC2019**) | Jeju Island, Korea | To be held **soon** |
| 22 Sep. 2019 | Technology Trials and Proof-of-Concept Activities for 5G Evolution & Beyond 2019 (**TPoC5GE 2019**) | Honolulu, USA | To be held **soon** |
| 18 Sep. – 20 Sep. 2019 | Asia-Pacific Network Operations and Management Symposium (**APNOMS 2019**) | Matsue, Japan | To be held **soon** |
| 5 Aug. – 8 Aug. 2019 | The 18th International Workshop on Assurance in Distributed Systems and Networks (**ADSN 2019**) | Fukuoka, Japan | Done |
| 28 Jul. – 2 Aug. 2019 | IEEE International Geoscience and Remote Sensing Symposium 2019 (**IGARSS 2019**) | Yokohama, Japan | Done |
| 7 Jul. – 11 Jul. 2019 | The 24th Opto-Electronics and Communications Conference / International Conference on Photonics in Switching and Computing 2019 (**OECC / PSC2019**) | Fukuoka, Japan | Done |
| 2 Jul. – 5 Jul. 2019 | International Conference on Ubiquitous and Future Networks 2019 (**ICFUN2019**) | Zagreb, Croatia | Done |
| 3 Jun. – 7 Jun. 2019 | 2019 Joint International Symposium on Electromagnetic Compatibility and Asia-Pacific International Symposium on Electromagnetic Compatibility, Sapporo (**EMC Sapporo & APEMC 2019**) | Sapporo, Japan | Done |
| 29 May – 31 May 2019 | International symposium on extremely advanced transmission technology (**EXAT 2019**) | Ise, Japan | **Reported** on this issue |

| Date | Conference Name | Location | Note |
|------|-----------------|----------|------|
| 20 May – 23 May 2019 | International Conference on DC Microgrids (**ICDCM2019**) | Matsue, Japan | **Reported** on this issue |
| 28 Apr. 2019 | Technology Trials and Proof-of-Concept Activities for 5G and Beyond Industry and Academic Panel 2019 (**TPoC5G Panel 2019**) | Kuala Lumpur, Malaysia | **Reported** on this issue |
| 8 Apr. – 15 Apr. 2019 | The 5th International Workshop on Smart Spectrum (**IWSS2019**) | Marrakech, Morocco | Done |
| 15 Apr. 2019 | The 12th International Workshop on Evolutional Technologies & Ecosystems for Beyond 5G (**WDN-5G WCNC2019**) | Marrakech, Morocco | **Reported** on this issue |
| 8 Apr. – 10 Apr. 2019 | The 14th International Symposium on Autonomous Decentralized Systems (**ISADS2019**) | Utrecht, Netherlands | **Reported** on this issue |
| 4 Dec. – 6 Dec. 2018 | International Conference on Smart Grids (**icSmartGrids2018**) | Nagasaki, Japan | **Reported** on this issue |

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

## ISMICT 2020 - 14th IEEE International Symposium on Medical Information Communication Technology
## Nara, Japan, 20-22 May, 2020

### Call for Papers

The 14th International Symposium on Medical Information Communication Technology, ISMICT 2020, aims to establish a forum to present new research and development results, exchange ideas, discuss practices, and share experiences among Technology and Medicine sides, including healthcare, wellness, clinical therapy, and surgery, as well as ICT, mechanical, and biomedical engineering. Moreover, activities of standard, regulation and business for medical ICT devices, systems and services will be promoted by national and international government and industry.

ISMICT 2020 will be held in Nara Kasugano International Forum 甍 IRAKA, 20-22 May 2020. Papers are invited on topics including, but not limited to, the following:

- Communication systems for medical applications
- Body area network (BAN) technologies
- Privacy and security issues
- Wearable and implantable devices
- Wellness and sports training
- Medical device regulatory science
- Pervasive health care and patient monitoring
- Antennas and radio propagation for Wireless BAN
- Internet of Medical Things
- AI/data analytics for medicine, healthcare and welfare

Authors are invited to submit full papers of 4-6 pages. The review process is according to the IEEE regulations and accepted papers will be included in the IEEE Xplore.
**More information at: www.ismict2020.org**

### Important Dates

**Paper submission deadline:** **15th December 2019**
**Acceptance notification:** **17th February 2020**
**Camera-ready paper due:** **31st March 2020**

### Organization

**General Co-Chairs:**
Prof. Minoru Okada, Japan
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# Special Section Calendar of IEICE Transactions on Communications

| Issue | Special Section | Note |
|---|---|---|
| Jan. 2021 | No special section this issue | |
| Dec. 2020 | IoT Sensor Networks and Mobile Intelligence | Submission due: 10 January 2020 |
| Nov. 2020 | Opto-electronics and Communications for Future Optical Network | Submission due: 20 December 2019 |
| Oct. 2020 | New Era of Satellite Communication / Broadcasting / Application Technologies | Submission due: 1 October 2019 |
| Sep. 2020 | Electromagnetic Compatibility in Conjunction with EMC Sapporo and APEMC 2019 | Submission due: 1 October 2019 |
| Aug. 2020 | No special section this issue | |
| Jul. 2020 | No special section this issue | |
| Jun. 2020 | Information and Communication Technology for IoT/CPS in Medicine and Healthcare | To be issued |
| May 2020 | No special section this issue | |
| Apr. 2020 | Network Resource Control and Management Technologies for Sustainable Social Information Infrastructure | To be issued |
| Mar. 2020 | No special section this issue | |
| Feb. 2020 | No special section this issue | |
| Jan. 2020 | Internet Architecture, Applications and Operation Technologies for a Cyber-Physical System | To be issued |
| Dec. 2019 | No special section this issue | |
| Nov. 2019 | No special section this issue | |
| Oct. 2019 | Exploring Drone for Mobile Sensing, Coverage and Communications: Theory and Applications | To be issued |
| Sep. 2019 | Enhancing Information Centric Networking Technologies Towards Real-world Infrastructure | Vol. E102-B, No. 9 |
| Aug. 2019 | Technology Trials and Proof-of-Concept Activities for 5G and Beyond | Vol. E102-B, No. 8 |
| Jul. 2019 | Communication Technologies and Service Qualities in Various Access Networks | Vol. E102-B, No. 7 |

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http://www.ieice.org/event/ronbun-e.php?society=cs

# Call for Papers

------- Special Section on Electromagnetic Compatibility in Conjunction with EMC Sapporo and APEMC 2019 -------

The IEICE Transactions on Communications announces that it will publish a special section entitled " Special Section on Electromagnetic Compatibility in Conjunction with EMC Sapporo and APEMC 2019 " in the **September 2020 issue**.

In the Electromagnetic Compatibility (EMC) field, there are conventional research topics such as interference among electronic equipment and on telecommunications. Recently, there raises new research topics with rapid spread of information communication technology: security and interference issue in IoT and wireless technologies and wireless power transfer technology that improves our lifestyle. Moreover, relation between nature phenomenon and electromagnetic environment and bioelectronics interactions are still important topics. The EMC field becomes much important in several many academic and industrial fields. In the June 2019, an international symposium on EMC (EMC Sapporo & APEMC 2019) will be held in Sapporo, Japan and many EMC issues will be discussed there. Because of such reasons, a special section is being planned (scheduled to appear in the September 2020 issue) to further promote research and development of future EMC fields as follows.

## 1. Scope
This special section aims at timely dissemination of research in these areas. Possible topics include, but are not limited to:
**EMC Management:** *Laboratory Accreditation, EMC Education*, **EMC Measurements:** *Standards and Regulations, Radiated and Conducted Emission and Immunity tests, Emission limits, Test Instrumentation & Facilities*, **Electromagnetic Environment:** *Natural and Man-made noise source, Control Intentional and Unintentional Emissions*, **Electromagnetic Interference Control:** *Shielding, Grounding & Meta-materials*, **High Power Electromagnetics:** *ESD and Transients, Lightning EM fields and Currents, EMP and IEMI, Information Leakage*, **Spectrum Engineering:** *Adaptive Interference Mitigation, Communications System EMC, Antenna and Wave Propagations*, **Low Frequency EMC:** *Power System EMC, Renewables, Electric Vehicles, Energy Efficient Technologies*, **Computational Electromagnetics:** *Numerical Modeling*, **Signal and Power Integrity:** *Chip, Package, PCB & Cables, Transmission Lines*, **Nanotechnology & Advanced Materials:** *Nanomaterials, Nanotubes and Nanofibers for Gaskets and Absorbing Screens*, **EMC for Emerging Wireless Technologies:** *Wireless Coexistence, Intra-System Interference, Wireless Power Transfer*, **Smart Grid, Power Electronics EMC:** *Power Electronics Converters/Inverters EMI/EMC, Grid-Connected PV Systems, Wind Farms, Transportation & Vehicles EMC*, **EMF Safety & Biomedical Issues**, *Human exposure to ELF/RF EM fields, Biological Effects, Medical Application, Medical Devices & Hospital Equipment*, **Others.**

## 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. 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 by **October 1 2019 (JST)**. Authors should choose the [Special-MC] Special Section on Electromagnetic Compatibility in Conjunction with EMC Sapporo and APEMC 2019 as a "Journal/Section" on the online screen. Do not choose [Regular EB].

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## ------- Special Section on New Era of Satellite Communication / Broadcasting / Application Technologies -------

The IEICE Transactions on Communications announces that it will publish a special section entitled "Special Section on New era of Satellite Communication/Broadcasting/Application Technologies" in the October 2020 issue.

Satellite communications have been mainly used for disaster-relief communications, backup communications and/or mobile communications on maritime ships and airplanes. Recently, due to remarkable technology progress on both satellite and terrestrial stations, HTS (High Throughput Satellite) systems consisting hundreds of multi-beams and/or thousands of small satellites have started to provide broadband services for earth stations in motions and as backhaul for cellular phone. On the other hand, as for satellite broadcasting, 4K/8K special technologies have been studied so as to be standardized. Its TV services will be widely spread all over the Japan toward 2020. Further, these developed technologies are applied to many other use for such as UAS (Unmanned Aircraft System), HAPS (High Altitude Platform System), Monitoring system using AIS (Automatic Identification System) and so forth.

This special section will provide an opportunity to summarize the recent research output on satellite communication/broadcasting/application technologies. Your contribution to this special section would be greatly appreciated.

## 1.  Scope

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

-Satellite communications (fixed-satellite communications, mobile satellite communications, inter-satellite communications, optical satellite communications, deep space communications, HTS, MEO, LEO)
-Satellite broadcasting (BS, mobile broadcasting, 4K/8K)
-Satellite applications (Unmanned aircraft communications system, HAPS, AIS, Positioning)
-Others on the elementary technologies, the system/earth station technologies, the onboard technologies and the applications concerning the above topics.

## 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. 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 by **October 1, 2019 (JST)**. Authors should choose the [Special-CB] Special Section on Satellite Communication/Broadcasting/Application Technologies as a "Journal/Section" on the online screen. Do not choose [Regular EB].

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# ------- Joint Special Section on Opto-electronics and Communications for Future Optical Network -------

The IEICE Transactions on Communications announces that it will publish a special section entitled "Joint Special Section on Opto-electronics and Communications for Future Optical Network" in the **November 2020** issue.

This Special Section will be published in conjunction with the 24th Optoelectronics and Communications Conference (OECC 2019), which was held in Fukuoka, Japan on July 7 – July 11, 2019, cosponsored by IEICE Communications Society and IEICE Electronics Society and co-organized with International Conference on Photonics in switching and computing 2019（PSC2019）.

The purpose of this Special Section is to present a collection of original papers that give an overview of current progress of research, development, and applications of optical communication systems and optoelectronics.

Submission of the paper presented at OECC/PSC 2019 is strongly encouraged. However, presentation of the paper at OECC/PSC 2019 is not mandatory for its inclusion in this Special Section. Presentation at the Conference does not ensure the acceptance of the paper. Note that the regular reviewing process will be performed for this Special Section.

## 1. Scope

The major topics of interest include:

- Core/Access/Data Center Networks and Subsystems (O1)
- Transmission Systems and Subsystems (O2)
- Optical Fibers, Cables and Fiber Devices (O3)
- Optical Active Devices and Modules (O4)
- Optical Passive Devices and Modules (O5)
- Photonics in Switching Technologies, Systems, and Architectures for Communications and Networking (P1)
- Photonics in Switching Technologies, Systems, and Architectures for Computing and Big Data (P2)

Papers in categories O1, O2, O3, P1 and P2 should be submitted to The IEICE Transactions on Communications, and papers in categories O4 and O5 to The IEICE Transactions on Electronics.

## 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 (IEICE Transactions on Communications), http://www.ieice.org/eng/shiori/mokuji_es.html (IEICE Transactions on Electronics). 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 **by December 20, 2019 (Japan Time)**. Considering the technical field of the paper, authors should choose either Opto-electronics and Communications for Future Optical Network of IEICE Transactions on Communications(Special-OB) or Opto-electronics and Communications for Future Optical Network of IEICE Transactions on Electronics(Special-OC) as a " Journal / Section" on the online screen. Do not choose [Regular-EB] or [Regular-EC].

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## ------- Special Section on IoT Sensor Networks and Mobile Intelligence -------

The IEICE Transactions on Communications announces that it will publish a special section entitled "Special Section on IoT Sensor Networks and Mobile Intelligence " in the **December 2020** issue.

In addition to ubiquitous sensor networks and mobile networks that support the Internet of Things (IoT) era, the research and development area of "mobile sensors" is growing. In detail, in addition to research and development on sensor technologies, mobility technologies, including connected cars, unmanned aerial vehicle (UAV), wearable technologies, and robots, and mobile ubiquitous computing that extracting valuable knowledge from collected sensor data are growing. Also, applications related to the ambient intelligence cooperated with sensing, mobility, and computing technologies through networking technology are important. Thus, research has been promoted to develop fundamental technologies including sensing, wireless networking, data analysis, and processing technologies as well as industrial applications that support ambient intelligence. The technical committee on Ambient Intelligence and Sensor Networks (ASN) and the technical committee on Mobile Network and Applications (MoNA), the predecessor of the technical committee on Sensor Networks and Mobile Intelligence (SeMI), planned symposium on "Ambient Intelligence and Sensor Networks Supporting Smart Mobility: Cars and Drone as Mobility in the IoT Era" in 2017 and symposium on "Sensor Networks and Mobile Intelligence Supporting Smart Society" to create new technologies and promote research activities in various application fields.

Because of such reasons, a special section is being planned (scheduled to appear in the December 2020 issue) to further promote research and development of the ambient intelligence with sensor networks and mobile sensors that support the IoT era.

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

[Sensing] Mobile sensing/sensor, sensing device, embedded device, image and acoustic sensing, environment sensing, vital sensing, power/energy saving, battery-less, energy harvesting

[Mobility] Connected car, drone, wearable, mobility management, robots, automated driving/driver assist technology, mobile security, behavior recognition, estimation, prediction, and control

[Mobile/ubiquitous computing] Edge/fog/cloud, machine learning, sensor fusion, database, cyber physical and intelligent environment, swarm intelligence, sensor and mobile data analysis/processing

[Sensor/adhoc/mobile networks] IoT/IoE, network virtualization, M2M/D2D, V2V/V2I/V2X, content delivery network, software defined networks, information/content centric network, architecture and protocols

[Applications] Smart mobility/ITS, VR/AR/game, people-flow analysis/control, medical/healthcare/sports/education assist, smart city, smart house, smart factory, disaster prevention and reduction, construction/agriculture/forestry/fisheries assist

### 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. 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 by **January 10, 2020 (JST)**. Authors should choose the Special Section on IoT Sensor Networks and Mobile Intelligence as a "Journal/Section" on the online screen. Do not choose [Regular EB].

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### 3. Special Section Editorial Committee

* Authors must agree to the "Copyright Transfer and Page Charge Agreement" via electronic submission.
* Upon accepted for publication, all authors, including authors of invited papers, should pay the page charges covering the partial cost of publication around May 2020. For detailed information, please visit http://www.ieice.org/eng/shiori/page2_cs.html#5
* 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/join/member.html
* The accepted papers will be published online soon on the web site of Transactions Online after the payment of page charges has been completed. For detailed information, please visit http://www.ieice.org/eng/shiori/page2_cs.html#8

# From Editor's Desk

## ●A New Member of Editorial Staff Joined

A new member joined the editorial staff in June this year and has been engaged in publication operations from this issue. Through the publication of GLOBAL NEWSLETTER (GNL), we are continuously trying to share information between overseas/foreign members and other members in IEICE-CS. We welcome your contribution of article submissions to GNL. For article submission, please refer to the Submission Guideline of IEICE-CS GLOBAL NEWSLETTER:

[ENG] http://www.ieice.org/cs/pub/global_howto.html
[JPN] http://www.ieice.org/cs/jpn/pub/global_howto.html

## ●New leaflets and slides of IEICE Communications Society Overview

Planning and Member Activities Committee produced new leaflets and slides of IEICE-CS overview. We have published the new leaflets in this issue (See next page!) .You also can get the new slides at the following URL.

[ENG] http://www.ieice.org/cs/jpn/aboutcs/IEICE_CS_intro_eng_20190709.pdf
[JPN] http://www.ieice.org/cs/jpn/aboutcs/IEICE_CS_intro_jpn_20190625.pdf

## ●IEICE Society Conference 2019 Held in Osaka

IEICE Society Conference 2019 will be held at Osaka University, from 10th to 13th September 2019. Complete English sessions are also scheduled in the conference. Please check out the latest conference information on the IEICE web site at:

[ENG] http://www.ieice-taikai.jp/2019society/en/index.html
[JPN] http://www.ieice-taikai.jp/2019society/jpn/index.html

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

## About Communications Society

IEICE Communications Society shall endeavor to facilitate research and investigation activities in the field of communications, and to contribute to research activities through cooperation with other societies, in order to promote the development of science and technology in this field.

## ◆ Technical Committees

Twenty regular technical committees and six ad hoc technical committees carry out research activities. The following is a list of the technical committees.

### Regular Technical Committees

- Antennas and Propagation (AP)
- Internet Architecture (IA)
- Space, Aeronautical and Navigational Electronics (SANE)
- Satellite Telecommunications (SAT)
- Electromagnetic Compatibility (EMCJ)
- Communication Quality (CQ)
- Information and Communication Management (ICM)
- Information Networks (IN)
- Smart Radio (SR)
- Short Range Wireless Communications (SRW)
- Communication Systems (CS)
- Energy Engineering in Electronics and Communications (EE)
- Network Systems (NS)
- Optical Communication Systems (OCS)
- Optical Fiber Technology (OFT)
- Photonic Network (PN)
- Healthcare and Medical Information Communication Technology (MICT)

- Radio Communication Systems (RCS)
- Wireless Power Transmission (WPT)
- Sensor Network and Mobile Intelligence (SeMI)  (Joint committees of ASN/MoNA）

### Ad Hoc Technical Committees

- Standardization & Innovation in ICT Technologies  (SIIT)
- Extremely Advanced Optical Transmission (EXAT)
- Network Virtualization (NV)
- Photonics-applied Electromagnetic Measurement  (PEM)
- Information-Centric Networking (ICN)
- Networked Digital Service Platform (DPF)

## ◆ Publications

### IEICE Transactions on Communication

The IEICE Transactions on Communications (English and Japanese editions) are published monthly.

The impact factor of IEICE Transactions on Communications (English edition) was 1.09 in 2017.

http://www.ieice.org/cs/jpn/EB/index.html

## IEICE Communications Express (ComEX)

IEICE Communications Express (ComEX) is an online letter journal, where researchers can exchange new topics easily and in a timely manner.

You can download PDF files from the ComEX site.

http://www.comex.ieice.org/



## Magazines

### ➢ GLOBAL NEWSLETTER (GNL)

GLOBAL NEWSLETTER (GNL) exchanges information on global activity between overseas/foreign members and other members in IEICE-CS.

GNL is published every March, June, September, and December.

http://www.ieice.org/cs/pub/global_news.html



### ➢ Communications Society Magazine "B-plus"

The Communications Society Magazine (Japanese edition only) "B-plus" provides technical reviews, surveys, practical topics, etc. "B-plus" is published quarterly in Japanese. The electronic version has been accessible free of charge since March 2015.

http://www.ieice.org/~cs-edit/magazine/

## ◆ Membership Services

### Technical Report Archives

Technical Report Archives is an archive of all the technical reports of IEICE-CS published more than one month ago. It is part of the IEICE Technical Report Online System.

### Email News

We call for papers of transactions and international conferences, as well as technical workshops from CS members by email.

## ◆ Sister Societies

Communications Society has sister-society agreements with the following six overseas societies.

- IEEE Communications Society (ComSoc)
- Informationstechnische Gesellschaft within The Verband Der Elektrotechnik Elektronik Informationstechnik (VDE/ITG)
- Korean Institute of Electromagnetic Engineering and Science (KIEES)
- The Korean Institute of Communications and Information Sciences (KICS)
- China Institute of Communications (CIC)
- IEEE Electromagnetic Compatibility Society (EMCS)

*To Probe Further and Keep Up-to-date with Communication Technologies*

# IEICE Communications Society

## IEICE Society Conference 2019

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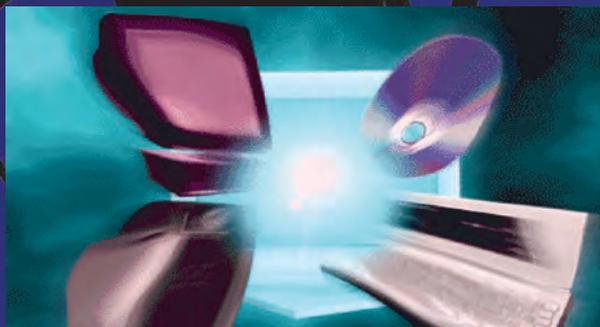
### 10–13 September 2019
### Osaka University, Toyonaka Campus, Osaka

Every autumn, each Society organizes a Society Conference to provide a forum where members can present their study results and exchange views. At present, four of the Societies -- the Engineering Sciences Society, the NOLTA Society, the Communications Society, and the Electronics Society -- hold their Society Conferences as a joint event. The Communications Society Conference includes English-language sessions in addition to the Japanese-language sessions.
Please check out the latest information on the IEICE web site at:

http://www.ieice-taikai.jp/2019society/en/