

Table of Contents

Trending Topics in the Eyes of Vice Director	1	Report on DLTs/DSPs in the AP Region	18
2018 IEEE ComSoc APB Awards Announcement	4	What's Up on the Asia-Pacific Board?.....	22
Interview of Best/Outstanding Young Researchers ...	8	Upcoming Conferences.....	23
Interview of Outstanding Paper Award Winners	15	Asia-Pacific Region Officers 2018-2019	25

Trending Topics in the Eyes of Vice Director

Industrial Internet of Things (IIoT), 5G, and Cognitive Learning

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Industrial Internet of Things (IIoT) refers to the use of Internet of Things (IoT) technologies to integrate the information technology (IT) and the operation technology (OT) for industrial applications. Through connecting things such as tools, machines, robots, automated guided vehicles (AGVs), unmanned aerial vehicles (UAVs) or drones, devices, assets, human, etc., IIoT provides real-time accessibility and enables intelligent industrial operations using advanced data analytics for transformational business outcomes. Some leading industry sectors that are driving the IIoT research and innovation include, but are not limited to, advanced manufacturing, logistics, transportation, digital healthcare, etc [1].



IIoT - Integrated Design of Secure Communications, Caching, Computing, and Control (SC4)

The basic building blocks of IIoT include the “things” that are attached with sensors and actuators, the networks, storage, data analytics, and security. The IIoT network supports two types of connectivity, each with its unique characteristics and quality of service (QoS) requirement:

- Connectivity for data acquisition: massive amount of data are collected from the things. Different

things may need different QoS, e.g., camera for process monitor and real-time quality inspection needs very high data rate, whereas temperature and vibration sensors may need much lower data rate.

- **Connectivity for control:** The control packets need to be transmitted from control centre to the machines, robots, etc., highly reliably within the given delay deadline, failing which may lead to product quality degradation, or even industrial incidents. Therefore, high reliability and bounded delay are the key QoS requirements.

Data collected from the “things” are analyzed for actionable insights in industrial operations. Data analytics is therefore the second pillar in IIoT. Rich applications are supported by IIoT. For example, in predictive maintenance, the machine and equipment are monitored with sensors and the remaining useful life (RUL) is estimated to schedule its next maintenance service. It provides great potential to save cost and improve operation efficiency over the conventional time-based maintenance and reactive maintenance, and reduces losses caused by interruptions from unexpected machine failures. Other use cases include automated quality inspection, process analytics and optimization, etc. Data analytics can be implemented at the network edge (referred to as edge computing), or in the cloud (cloud computing) [2]. While cloud computing accesses to high computational resources and rich data, its latency caused by data transfer between cloud and the edge may make it unsuitable for low-latency applications. Edge computing addresses the latency issue by analysing the data at where the data are generated and collected. It has also enabled smart scheduling for the edge-to-cloud data transfer, hence mitigates the network congestion and reduces the peak network capacity requirement. A flexible fog computing architecture has emerged as another promising solution [3]. Along with the computing structure, the data storage and caching needs to be designed to support efficient computing and fast data retrieval when historical data are needed.

The IT-OT convergence has brought new challenges to security design, due to the expanded security attack surfaces and threat vectors. IIoT security design needs to consider both the security protection for data, network, and the “things”, and security compromise detection. An integrative approach of secure communications, caching, computing, and control (SC4) is therefore important in IIoT. Modeling of the closed-loop interaction of sensing, signal and information processing, data analytics, communications and networks, cyber physical security, and process optimization and control, in a dynamically changing environment, is desired. Only then can we enable the real-time adaptation for optimal performance. Many new research problems arise and seek for new design approaches. With the high dimensionality, cognitive learning and artificial intelligence (AI) will be a promising tool.

5G for IIoT

The fifth generation (5G) network offers enhanced mobile broadband (eMBB), critical machine type communications (cMTC), massive machine type communications (mMTC), and fixed wireless access services [4]. Promising to provide much higher data volume, network energy efficiency and spectral efficiency, and 5 times lower latency than the fourth generation (4G) network, 5G aims to use one network to support multiple industries and use cases [4].

Based on analysis by Ericsson [5] on more than 400 industry digitalization use cases across 10 vertical

markets, 5G is expected to play a major role in over 200 use cases. Real-time automation, enhanced video services, monitoring and tracking, connected vehicles, hazard and maintenance sensing, smart surveillance, remote operations, autonomous robots, augmented reality (AR), top the list. Survey and analysis by Huawei and ABI [6], and by Qualcomm and Nokia [7], have also pointed to mission-critical drones, smart factory/manufacturing, next-generation virtual and augmented reality (VR/AR) glasses, low-complexity massive IoT devices such as sensors and meters, as the leading killer applications enabled by 5G.

In mMTC, ultra-reliable low latency communications (URLLC) are especially important enabling features. URLLC ensures that there is almost no lag time (millisecond latency) between the sending and receiving of data between machines, and very low rate of packet loss ($\leq 10^{-5}$). URLLC enables the use of machinery performing time-critical tasks such as factory automation, autonomous driving, remote surgery, etc. In 3GPP, shorter transmit time interval (TTI), shorter code word design, enhanced hybrid retransmission request (HARQ), grant-free uplink transmission, multiple antenna processing, etc., are being considered [8].

Cognitive Learning and AI for IIoT and 5G Optimization

Demanding QoS needs to be guaranteed in IIoT and 5G networks. Many challenges need to be addressed to achieve this, e.g., the wireless hostile environment with a lot of operating and moving machines, blockages, environment noises and interferences, the high dimensionality and coupled interaction of the optimizing parameters, etc. This makes cognitive learning and AI a very promising tool. AI may also facilitate automated fault detection and recovery in the network and the network devices, self-optimization, as well as security risk analysis and prevention. Articles in [9] provide a good overview for further research.

References

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2018 IEEE ComSoc Asia-Pacific Board Awards Announcement

IEEE ComSoc Asia-Pacific Young Researcher Award

This award honors young researchers who have been active in IEEE ComSoc publications and conference activities over the last three years (January 2015 to December 2017).

Eligibility

- The upper age limit for the applicant is 35 (i.e., the applicant must be born on or after 1982/01/01).
- The applicant must be a member of the IEEE ComSoc Asia-Pacific region.
- The “IEEE ComSoc Asia-Pacific Best Young Researcher Award” will be given to the best candidate, and other candidates will be considered for the “Outstanding Young Researcher Award(s)”.

Award Prize

- The recipient of “IEEE ComSoc Asia-Pacific Best Young Researcher Award” will receive a certificate and an honorarium of US \$500.
- Each recipient of the “IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award” will receive a certificate and an honorarium of US \$250.

Young Researcher Award Winners for Year 2018:

Best Young Researcher Award

Hui-Ming Wang (Xi'an Jiaotong University, China)

for contributions to research on physical-layer secrecy for wireless communications

Outstanding Young Researcher Awards

Kaigui Bian (Peking University, China)

for contributions to research on dynamic spectrum sharing

Peng Cheng (Zhejiang University, China)

for contributions to research on communications and control of large-scale networked systems

Kaoru Ota (Muroran Institute of Technology, Japan)

for contributions to research on optimization of wireless networks

Yuan Shen (Tsinghua University, China)

for contributions to research on network localization and navigation

Yong Zeng (University of Sydney, Australia)

for contributions to research on unmanned aerial vehicle (UAV) communications

Nan Zhao (Dalian University of Technology, China)

for contributions to research on interference alignment

List of Winners of IEEE ComSoc Asia Pacific Young Researcher Awards (2001-2017)

Year	Best Young Researcher	Outstanding Young Researchers
2001 (1 st)	Dr. Byoung-Hoon Kim	Dr. Wen-Jyi Hwang Dr. Eiji Oki Dr. Tomoaki Otsuki Dr. Shiann-Tsong Sheu
2005 (2 nd)	Dr. Qian Zhang	Dr. Ki-Dong Lee Dr. Jia-Chin Lin Dr. Naoki Wakamiya
2007 (3 rd)	Dr. Phone Lin	Dr. W. Choi Dr. H. Harai Dr. H. F. Lu
2009 (4 th)	Dr. Tarik Taleb	Dr. Sangheon Pack Dr. Wei Zhang Dr. Xinbing Wang Dr. Meixia Huang Dr. Jianwei Huang
2010 (5 th)	Dr. Wei Chen	Dr. Y.-W. Peter Hong Dr. Bang Chul Jung Dr. Ting See Ho
2011 (6 th)	Dr. Rui Zhang	Dr. Himal Asanga Suraweera Dr. Chee Wei Tan Dr. Wenyi Zhang Dr. Shinya Sugiura Dr. Jiming Chen
2012 (7 th)	Dr. Dusit Niyato	Dr. Chi Zhang Dr. Lingyang Song Dr. Chau Yuen Dr. Chan Byoung Chae Dr. Sudip Misra
2013 (8 th)	Dr. Mathew McKay	Dr. Feifei Gao Dr. Kyoung-Jae Lee Dr. Rongxing Lu Dr. Hiroki Nishiyama Dr. Caijun Zhong
2014 (9 th)	Dr. Yulong Zou	Dr. Nan Yang Dr. Haojin Zhu Dr. Kaishun Wu Dr. Jemin Lee Dr. Mugen Peng
2015 (10 th)	Dr. Mo Li	Dr. Tsung-Hui Chang Dr. Xiang Cheng Dr. Lingjie Duan Dr. Zubair Fadlullah Dr. Shibo He
2016 (11 th)	Dr. Jun Zhang	Dr. Lin Gao Dr. Namyoon Lee Dr. Yong Li Dr. Qian Wang Dr. Guanding Yu
2017 (12 th)	Dr. Xiangyun (Sean) Zhou	Dr. Xu Chen Dr. Junil Choi Dr. Linglong Dai Dr. Mianxiong Dong Dr. Jiajia Liu Dr. Sheng Zhou

IEEE ComSoc Asia-Pacific Outstanding Paper Award

This award honors outstanding original papers authored by members in the Asia-Pacific region and published in IEEE ComSoc journals and conferences over the last three years (January 2015 to December 2017).

Eligibility

- The paper must be published in IEEE ComSoc journals, magazines, conference proceedings, and so on (including those technically co-sponsored by ComSoc) in the last three years (January 2015 to December 2017).
- All authors' affiliations must be from the Asia-Pacific region at the time of publication.
- The paper should be nominated by an IEEE ComSoc member from the Asia-Pacific region.
- Self-nomination is not accepted.

Remark: A list of IEEE ComSoc journals and conference portfolio events can be found at:

<http://www.comsoc.org/publications/journals> and <http://www.comsoc.org/conferences/portfolio-events>

Award Prize

- Plaque and honorarium up to US \$500 (award total).

Outstanding Paper Award Winners for Year 2018:

Title: Nonorthogonal Multiple Access for 5G: Solutions, Challenges, Opportunities, and Future Research Trends

Authors: Linglong Dai, Bichai Wang, Yifei Yuan, Shuangfeng Han, Chih-Lin I, and Zhaocheng Wang

Source: IEEE Communications Magazine, vol. 53, no. 9, pp. 74-81, Sept. 2015.

Title: Gathering Optimization by Dynamic Sensing and Routing in Rechargeable Sensor Networks

Authors: Yongmin Zhang, Shibo He, and Jiming Chen

Source: IEEE/ACM Transactions on Networking, vol. 24, no. 3, pp. 1632-1646, 2016.

List of Winners of IEEE ComSoc Asia Pacific Outstanding Paper Awards (2012-2017)

Year	Outstanding Papers
2012 (1 st)	<p><u>Title:</u> Eigenvalue-based Spectrum Sensing Algorithms for Cognitive Radio</p> <p><u>Authors:</u> Yonghong Zeng and Ying-Chang Liang`</p> <p><u>Source:</u> IEEE Transactions on Communications, vol. 57, no. 6, pp.1784-1793, June 2009</p>
2013 (2 nd)	<p><u>Title:</u> Distance-adaptive Spectrum Resource Allocation in Spectrum-sliced Elastic Optical Path Network</p> <p><u>Authors:</u> Masahiko Jinno, Bartlomiej Kozicki, Hidehiko Takara, Atsushi Watanabe, Yoshiaki Sone, Takafumi Tanaka, and Akira Hiran</p> <p><u>Source:</u> IEEE Communications Magazine, vol. 48, no. 8, pp.138–145, Aug. 2010</p>
	<p><u>Title:</u> Joint Optimization for One and Two-way MIMO AF Multiple-relay Systems</p> <p><u>Authors:</u> Kyoung-Jae Lee, Hakjea Sung, Eunsung Park, and Inkyu Lee</p>

	<p><u>Source:</u> IEEE Transactions on Wireless Communications, vol. 9, no. 12, pp. 3671–3681, Dec. 2010.</p>
	<p><u>Title:</u> Cell Zooming for Cost-Efficient Green Cellular Networks <u>Authors:</u> Zhisheng Niu, Yiqun Wu, Jie Gong, and Zexi Yang <u>Source:</u> IEEE Communications Magazine, Vol. 48, no. 11, pp. 74–79, Nov. 2010.</p>
2014 (3rd)	<p><u>Title:</u> Toward Ubiquitous Massive Accesses in 3GPP Machine-to-Machine Communication <u>Authors:</u> Shao-Yu Lien, Kwang-Cheng Chen, Yonghua Lin <u>Source:</u> IEEE Communications Magazine, vol. 49, no. 4, pp. 66-74, Apr. 2011</p>
	<p><u>Title:</u> Optimal Spectrum Sharing in MIMO Cognitive Radio Networks via Semidefinite Programming <u>Authors:</u> Ying Jun (Angela) Zhang and Anthony Man-Cho So <u>Source:</u> IEEE Journal on Selected Areas in Communications, vol. 29, no. 2, pp. 362-372, Feb. 2011</p>
	<p><u>Title:</u> Delay and Capacity Tradeoff Analysis for MotionCast <u>Authors:</u> Xinbing Wang, Wentao Huang, Shangxing Wang, Jinbei Zhang, Chenhui Huj <u>Source:</u> IEEE Transactions on Networking, Vol. 19, No. 5, pp. 1354-1367, Mar. 2011</p>
2015 (4th)	<p><u>Title:</u> Enabling Wireless Power Transfer in Cellular Networks: Architecture, Modeling and Deployment <u>Authors:</u> Kaibin Huang and Vincent K. N. Lau <u>Source:</u> IEEE Transactions on Wireless Communications, vol. 13, no. 2, pp. 902-912, Feb. 2014</p>
	<p><u>Title:</u> Modeling and Analysis for Spectrum Handoffs in Cognitive Radio Networks <u>Authors:</u> Li-Chun Wang, Chung-Wei Wang, and Chung-Ju Chang <u>Source:</u> IEEE Transactions on Mobile Computing, vol. 11, no. 9, pp. 1499-1513, Sep. 2012</p>
2016 (5th)	<p><u>Title:</u> Wireless information and power transfer: Architecture design and rate-energy tradeoff <u>Authors:</u> Xun Zhou, Rui Zhang, and Chin Keong Ho <u>Source:</u> IEEE Transactions on Communications, Volume: 61, Issue: 11, Nov. 2013</p>
	<p><u>Title:</u> Relaying protocols for wireless energy harvesting and information processing <u>Authors:</u> Ali A. Nasir, Xiangyun Zhou, Salman Durrani, and Rodney A. Kennedy. <u>Source:</u> IEEE Transactions on Wireless Communications, Volume: 12, Issue: 7, Jul. 2013</p>
2017 (6th)	<p><u>Title:</u> Relay-by-smartphone: realizing multihop device-to-device communications <u>Authors:</u> Hiroki Nishiyama, Masaya Ito, and Nei Kato <u>Source:</u> IEEE Communications Magazine, Volume: 52, Issue: 4, April 2014</p>
	<p><u>Title:</u> Hybrid Full-/Half-duplex System Analysis in Heterogeneous Wireless Networks <u>Authors:</u> Jemin Lee and Tony Q. S. Quek <u>Source:</u> IEEE Transactions on Wireless Communications, Volume: 14, Issue: 5, May 2015</p>

Interview of 2018 APB Best/Outstanding Young Researchers

Best Young Researcher Award Winner

Hui-Ming Wang (*Xi'an Jiaotong University, China*)



Hui-Ming Wang (S'07-M'10-SM'16) is currently a Full Professor at Xi'an Jiaotong University (XJTU), Xi'an, China, and also a Vice Director of the Ministry of Education Key Laboratory for Intelligent Networks and Network Security, China. He received his Bachelor of Engineering degree and Ph.D. degree both from XJTU in 2004 and 2010. During 2007 to 2008, and 2009 to 2010, he was invited as a visiting scholar twice to the University of Delaware, Newark, USA, to conduct research with Prof. Xiang-Gen Xia.

Dr. Wang's research interest has focused on enhancing the reliability and security of wireless communications, especially on wireless physical layer security.

He has published one book (*Physical Layer Security in Random Cellular Networks*, Springer, 2016) and over 120 IEEE Journal/Conference papers, in which 9 papers have been ESI highly cited papers and 1 paper has been ESI hot paper. He was a recipient of the National Excellent Doctoral Dissertation Award in China in 2012, a Best Paper Award of IEEE ICC, 2014, and a Best Paper Award of WCSP, 2011. He is now an Associate Editor of IEEE Transactions on Communications, and was an Editor of IEEE Access in 2016-2017. He co-organized international workshops on the topics of physical layer security, at Globecom'15-17. He serves as a Symposium Co-chair for 2018 IEEE ICC.

1. Please briefly introduce the most significant work you have contributed to the research fields?

Cooperative communications is an efficient technique for enhancing the physical layer security of wireless transmissions. I established a framework for the hybrid cooperative relaying and jamming schemes via multi-node cooperation, and proposed a serial of schemes for the secrecy signal design, optimization and power allocation. To deal with the more practical scenarios, I proposed uncoordinated jamming mechanism and secrecy signal design for the spatially random distributed cooperative nodes, and also proposed secrecy transmission and cooperative jamming for the cognitive radio systems. I also developed prototype to verify the performance of the proposed schemes.

2. Where do you see your research heading in the next 2 years?

The extensive applications of Internet of Things (IoT) in the near future have become the most significant impetus of the development of wireless networks. On the other hand, wireless transmission security of IoT applications is always a great concern in both academia and industry. Due to the complexity and power constraints of IoT terminals, traditional security mechanism based on cryptography may not work well and physical layer security approach becomes a promising candidate. I believe that physical layer security will find its application in various IoT scenarios due to its inherent features. In the next few years I will try to develop both the theory and algorithms of physical layer security, as well as prototypes of hardware, to contribute to the enhancement of security of IoT applications.

Outstanding Young Researcher Award Winner

Kaigui Bian (*Peking University, China*)



Kaigui Bian received the Ph.D. degree in electrical and computer engineering from Virginia Tech, USA in 2011, and he received the B.S. degree in computer science from Peking University, China in 2005. He is now an associate professor and the associate director of Institute of Network Computing and Information Systems (NCIS), School of EECS, Peking University. He was a visiting faculty at Microsoft Research Asia in 2013. His research interests include cognitive radio networks, mobile computing, and wireless networking. Dr. Bian received the Best Paper Awards from IEEE ICC 2015, ICCSE 2017, BIGCOM 2018, and the Best Student Paper Award from IEEE DSC 2018. He was the recipient of the CCF-Intel

Young Faculty Researcher Award in 2014. He was awarded the Peking University Teaching Excellence Award in 2014, and the Tsang Hin-chi Teaching Excellence Award in 2017. He was a co-recipient of First Prize of Natural Science of Ministry of Education, China in 2017. Dr. Bian serves as an Editor for IEEE Transactions on Vehicular Technology, and an Associate Editor for IEEE Access.

1. Please briefly introduce the most significant work you have contributed to the research field?

The increased demand for wireless communications over the last years has led to the emergence of a new global priority, i.e., dynamic sharing of the radio spectrum among different stakeholders. We have been undertaking efforts to break down the exclusive-spectrum usage models and address the technical challenges in expanding spectrum sharing options, including the design of medium access control mechanisms among heterogeneous wireless networks, and security issues in dynamic spectrum sharing. A few representative publications appeared in IEEE JSAC, IEEE TMC, IEEE INFOCOM, ACM MobiCom, ACM MobiHoc, on topics of channel hopping based neighbor discovery, coexistence for heterogeneous wireless systems, and medium access control for full-duplex wireless networks.

2. Where do you see your research headings in the next 2 years?

My future research interest in the next two years lies in building systems for edge computing, and Internet of Things (IoT) applications. The first system is Proactive Content Push for edge computing, which employs a smart content delivery strategy that relies on deep learning techniques to learn the geographical distribution of popular contents in the future among edge users in video streaming networks and mobile social networks, and then push/recommend appropriate contents to certain groups of edge users, in order to save the bandwidth consumption of the content distribution network. The second system is Image-Sensing-Net, a vision guided aerial-ground air quality sensing system, by the fusion of haze images taken by the unmanned-aerial-vehicle (UAV) and the Air Quality Index (AQI) data collected by an on-ground wireless sensor network. This system leverages the computer vision technique to tell the AQI scale in different regions from the haze images, based on which it then can determine whether to wake up on-ground wireless sensors for small-scale AQI monitoring and inference.

Outstanding Young Researcher Award Winner

Peng Cheng (*Zhejiang University, China*)



Peng Cheng (M'10) received his B.S. in Automation, and Ph.D. in Control Science and Engineering from Zhejiang University, in 2004 and 2009, respectively. After graduation, he joined Zhejiang University as assistant professor, and promoted to Associate Professor in Dec. 2012. From Oct. 2010 to Feb. 2011, he worked as Research Fellow in Dept. of Electrical and Computer Engineering, National University of Singapore. From Jun. 2012 to Jun. 2013, he worked as Research Fellow in Information System Technology and Design Pillar, Singapore University of Technology and Design. Since Dec. 2015, he has been Full Professor in Dept. of Control, Zhejiang University in. His research interests include networked sensing and control, cyber-physical systems, control system security, and robust control and applications.

Peng Cheng serves as Associate Editor of IEEE Transactions on Control of Network Systems, and Wireless Networks. He also serves/served as Guest Editor of IEEE Transactions on Signal and Information Processing over Networks, and IEEE Transactions on Automatic Control. Peng Cheng has been awarded 2017 Changjiang Young Scholar, and 2016 JSPS Fellowship. He received IEEE WCSP'11 Best Paper Award, IEEE INFOCOM'14 Best Demo Award, QSHINE'14 Best Paper Award, IEEE ICC'14 Best Paper Award. He was the receipt of 2017 First Prize of Natural Science Award from Ministry of Education of P.R. China, 2016 Second Prize of National Science & Technology Progress Award of P.R. China.

1. Please briefly introduce the most significant/work you have contributed to the research filed?

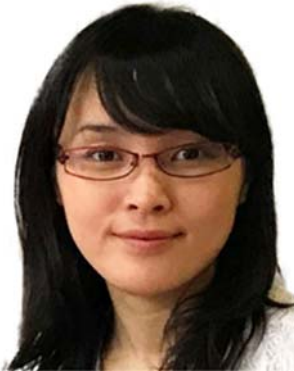
In sensor networks, how to properly schedule work modes is important for network utility maximization in the long run. We propose multiperiod scheduling to maximize total network utility by considering energy constraints and periodic sensing requirements. This problem is difficult to solve even by a centralized approach as it involves mixed-integer programming. We first transform the multiperiod problem to an equivalent single-period problem, then reduce it to a pure-integer programming problem. Furthermore, we propose an average consensus-based distributed algorithm (ACDA) to schedule the work modes of all sensors using only local information. We prove that ACDA converges exponentially fast and reaches global optimum.

2. Where do you see your research heading in the next 2 years?

Large-scale networked systems have penetrated a plethora of application domains from industrial and building automation, to environmental and health monitoring. The capability of closed loops can provide not only monitoring but also controlling functionalities over physical plants. However, the underlying nature of shared communication medium makes the systems vulnerable to various kinds of attacks. In the near future, I will focus on the security issues of large-scale network systems especially industrial control systems. By integrating the interdisciplinary expertise of communication, computation, and control, I'm interested in the vulnerability analyzation and identification, cyber-physical abnormal detection, resilient control design and implementation.

Outstanding Young Researcher Award Winner

Kaoru Ota (Muroran Institute of Technology, Japan)



Kaoru Ota was born in Aizu-Wakamatsu, Japan. She received M.S. degree in Computer Science from Oklahoma State University, USA in 2008, B.S. and Ph.D. degrees in Computer Science and Engineering from The University of Aizu, Japan in 2006, 2012, respectively. She is currently an Assistant Professor with Department of Information and Electronic Engineering, Muroran Institute of Technology, Japan. Dr. Ota has received best paper awards from ICA3PP 2014, GPC 2015, IEEE DASC 2015, IEEE VTC 2016-Fall, FCST 2017, 2017 IET Communications Premium Award and IEEE ComSoc CSIM Best Conference Paper Award 2018. She is an editor of IEEE Transactions on Vehicular Technology

(TVT), IEEE Communications Letters, as well as a guest editor of ACM Transactions on Multimedia Computing, Communications and Applications (leading), IEEE Internet of Things Journal, IEEE Communications Magazine, IEEE Network, IEEE Wireless Communications, IEEE Access, and IEICE Transactions on Information and Systems. She is the recipient of IEEE TCSC Early Career Award 2017.

1. Please briefly introduce the most significant work you have contributed to the research field?

In my opinion, the most important contribution in my recent research is the work in “QUOIN: Incentive Mechanisms for Crowd Sensing Networks”. This paper is published in IEEE Network in 2018 and has received more than 30 citations and classified as ESI highly cited paper. This paper proposes a new incentive mechanism called QUOIN, which simultaneously ensures Quality and Usability OF INFORMATION for crowd-sensing application requirements. To the best of our knowledge, it is the first work to consider an incentive mechanism efficient for all participants such as data collectors, service providers, and service consumers in crowd sensing networks. We apply a Stackelberg game model to the proposed mechanism to guarantee each participant achieves a satisfactory level of profits. Performance of QUOIN is evaluated with a case study, and experimental results demonstrate that it is efficient and effective in collecting valuable information for crowd-sensing applications.

2. Where do you see your research heading in the next 2 years?

As we all know, a serious earthquake occurs in Hokkaido, Japan. Millions of people, which includes my family, colleagues and students, suffered from large-scale and long-period network failure caused by the power outage. We lost all the possible way to contact the world. We can neither send messages regarding ourselves to the outside, nor find out what have happened and what will happen. Therefore, when I saw this question, the first thought came to my head is to develop a new-generation emergency communication method which is ready for this situation. Fortunately, we have already conducted a series of sustainable sensing, networking and transferring research in the last few years, and we need to combine them to a comprehensive system which can cover as much area as possible, in order to provide stable and fast networks to the residents and rescuers. In our plan, various tasks and technologies are included in this research, such as LPWAN, fast networking, UAV controlling, etc.

Outstanding Young Researcher Award Winner

Yuan Shen (Tsinghua University, China)



Yuan Shen (S'05-M'14) received the Ph.D. degree and the S.M. degree in electrical engineering and computer science from MIT in 2014 and 2008, respectively, and the B.E. degree in electronic engineering from Tsinghua University in 2005. He is now an Associate Professor with the Department of Electronic Engineering at Tsinghua University. Prior to that, he was a Research Assistant and then Postdoctoral Associate with the Wireless Information and Network Sciences Laboratory at MIT in 2005-2014. His research interests include statistical inference, communication and information theory, and optimization and control. His current research focuses on network localization and navigation, inference techniques, resource allocation, and cooperative networks.

Dr. Shen was a recipient of the Qiu Shi Outstanding Young Scholar award, the China's Youth 1000-Talent Program, and the Marconi Society Paul Baran Young Scholar Award. His papers received the IEEE ComSoc Fred W. Ellersick Prize and three Best Paper Awards from the IEEE Globecom, WCNC, and ICUWB. He is an elected Vice Chair (2017-2018) and Secretary (2015-2016) for the IEEE ComSoc Radio Communications Committee. He serves as TPC symposium Co-Chair for IEEE ICC (2020), Globecom (2018 and 2016), the EUSIPCO (2016), and the IEEE ICC ANLN Workshop (2018, 2017, and 2016). He also serves as Editor for the IEEE Transactions on Wireless Communications, IEEE Wireless Communications Letters, and IEEE/CIC China Communications, and served as Editor for IEEE Communications Letters.

1. Please briefly introduce the most significant work you have contributed to the research field?

Network localization and navigation (NLN) is a promising paradigm for providing ubiquitous high-accuracy location awareness, which is essential for many 5G applications including the Internet of Things (IoT) and autonomous vehicles. In recent years, my research has focused on the development of a foundation for NLN, in which mobile nodes exploit spatiotemporal cooperation for positional inference. The main contributions include the establishment of a theoretical framework for NLN and the design of efficient operation strategies for NLN. These contributions provided important insights into localization problems, which are valuable to the design and operation for practical localization networks.

2. Where do you see your research heading in the next 2 years?

In light of the increasing need for high-accuracy location-awareness, I am motivated to expand my current research to address crucial issues in the design and analysis of localization network, such as large-scale antenna systems for localization. Moreover, based on the theoretical work on localization networks, I will further determine the capability of integrated sensing, localization and communication for multi-agent networks, and design efficient strategies for the integrated schemes. By leveraging the insights and methodologies developed for wireless localization networks, I will develop a mathematical model for the heterogeneous system and analyze the interaction between the multi-mode information in the multi-agent networks.

Outstanding Young Researcher Award Winner

Yong Zeng (*University of Sydney, Australia*)



Yong Zeng (S'12-M'14) is a Lecturer at the School of Electrical and Information Engineering, The University of Sydney, Australia. He received the Bachelor of Engineering (First-Class Honours) and Ph.D. degrees from the Nanyang Technological University, Singapore, in 2009 and 2014, respectively. From 2013 to 2018, he worked as a Research Fellow and Senior Research Fellow at the Department of Electrical and Computer Engineering, National University of Singapore. He has published over 70 IEEE top-tier journal and conference papers, which have attracted more than 2600 Google Scholar citations.

Dr. Zeng is the recipient of the 2017 IEEE Communications Society Heinrich Hertz Prize Paper Award, 2017 IEEE Transactions on Wireless Communications Best Reviewer, 2015 and 2017 IEEE Wireless Communications Letters Exemplary Reviewer, and the Best Paper Award for the 10th International Conference on Information, Communications and Signal Processing. He serves as an Associate Editor of IEEE Access, Leading Guest Editor of IEEE Wireless Communications on "Integrating UAVs into 5G and Beyond" and China Communications on "Network-Connected UAV Communications".

1. Please briefly introduce the most significant work you have contributed to the research field?

One critical issue faced by UAV systems is the limited onboard energy of UAVs, which needs to be wisely spent to achieve the optimal performance. To this end, we developed a novel mathematical framework for energy-efficient UAV communications. The main novelty of our work lies in the new consideration of the UAV propulsion energy consumption, which is unique to UAV communications and is typically significantly higher than the conventional communication-related energy consumption. To mathematically quantify such new energy consumption component, we derive the rigorous mathematical model for UAV propulsion power consumption as a function of both the UAV velocity and acceleration. Furthermore, we propose the successive convex approximation technique to solve the non-convex UAV trajectory optimization problem, which has been widely adopted by subsequent works for UAV communications.

2. Where do you see your research heading in the next 2 years?

Wireless communications involving UAVs have received fast growing research interests in our community during the past few years. However, most existing efforts mainly focus on utilising UAVs as aerial communication base stations/access points to assist terrestrial communications from the sky, which is known as UAV-assisted wireless communication. In fact, another important paradigm is network-connected UAV, where UAVs with their own missions need to be supported by terrestrial networks such as cellular networks. In this case, UAVs are integrated with terrestrial networks as aerial users, instead of aerial base stations/access points. My research focus in the next 2 years will be on the development of fundamental theory and practical methods to address the new challenges faced by network-connected UAV communications.

Outstanding Young Researcher Award Winner

Nan Zhao (Dalian University of Technology, China)



Nan Zhao (S'08-M'11-SM'16) is currently an Associate Professor at Dalian University of Technology, China. He received the B.S. degree in electronics and information engineering in 2005, the M.E. degree in signal and information processing in 2007, and the Ph.D. degree in information and communication engineering in 2011, from Harbin Institute of Technology, Harbin, China. He has authored over 170 papers with over 2000 citations. His recent research interests include Interference Alignment, UAV Communications, Caching and Computing, and Physical Layer Security.

Dr. Zhao is serving or served on the editorial boards of 8 SCI-indexed journals, including IEEE Transactions on Green Communications and Networking, and as the TPC Co-Chair for IEEE/CIC ICC 2018 - SPC: Signal Processing for Communications symposium. He received Top Reviewer Award from IEEE Transactions on Vehicular Technology in 2016, and was nominated as an Exemplary Reviewer by IEEE Communications Letters in 2016. He won the best paper awards in IEEE VTC 2017 Spring, MLICOM 2017, ICNC 2018, WCSP 2018 and CSPA 2018.

1. Please briefly introduce the most significant work you have contributed to the research field?

For me, the most significant work in the last three years is the paper named “Optimization or Alignment: Secure Primary Transmission Assisted by Secondary Networks”, which is published in IEEE Journal on Selected Areas in Communications. Interference management of MIMO multiuser networks can be achieved by either interference alignment or joint precoding and decoding optimization, but which method is better? In this paper, we develop two schemes to solve the secure transmission problem for MIMO cognitive radio networks, by alignment or optimization, respectively, with some insightful comments drawn for these two methods. This is also the summarization of my own thinking on this direction for the last three years.

2. Where do you see your research heading in the next 2 years.

Interference between users is always a fundamental challenge for wireless networks as indicated by David Tse. Interference management will surely become even more serious in the upcoming 5G mobile networks, due to the densely deployed users, and more effort should be devoted to the interference management in the 5G-related networks, such as massive MIMO, NOMA, UAV, etc. In the next few years, I will continue to exploit the existing techniques, such as interference alignment and transceiver optimization, to solve the specific interference management problem in NOMA and UAV oriented networks. In addition, interference can also be leveraged to guarantee the security of wireless networks if well managed, which is also an important direction that should be noticed.

Interview of 2018 APB Outstanding Paper Award Winners

Title: *Nonorthogonal Multiple Access for 5G: Solutions, Challenges, Opportunities, and Future Research Trends*

Authors: *Linglong Dai, Bichai Wang, Yifei Yuan, Shuangfeng Han, Chih-Lin I, and Zhaocheng Wang*

Source: *IEEE Communications Magazine, (vol. 53, no. 9, pp. 74-81, September 2015)*

Abstract:

The increasing demand of mobile Internet and the Internet of Things poses challenging requirements for 5G wireless communications, such as high spectral efficiency and massive connectivity. In this article, a promising technology, non-orthogonal multiple access (NOMA), is discussed, which can address some of these challenges for 5G. Different from conventional orthogonal multiple access technologies, NOMA can accommodate much more users via nonorthogonal resource allocation. We divide existing dominant NOMA schemes into two categories: power-domain multiplexing and code-domain multiplexing, and the corresponding schemes include power-domain NOMA, multiple access with low-density spreading, sparse code multiple access, multi-user shared access, pattern division multiple access, and so on. We discuss their principles, key features, and pros/cons, and then provide a comprehensive comparison of these solutions from the perspective of spectral efficiency, system performance, receiver complexity, and so on. In addition, challenges, opportunities, and future research trends for NOMA design are highlighted to provide some insight on the potential future work for researchers in this field. Finally, to leverage different multiple access schemes including both conventional OMA and new NOMA, we propose the concept of software defined multiple access (SoDeMA), which enables adaptive configuration of available multiple access schemes to support diverse services and applications in future 5G networks.

1. What is the major contribution of this paper?

In this paper, a unified framework is proposed for the first time to unveil the inherent relationships between specific non-orthogonal multiple access (NOMA) schemes by a common umbrella. Under this unified framework, different NOMA schemes are systematically compared in terms of key features, spectral efficiency, grant-free access, receiver complexity, latency, pros/cons, and so on. Moreover, to leverage different multiple access schemes including both the conventional orthogonal multiple access (OMA) solutions and emerging NOMA schemes, the concept of software defined multiple access is proposed to allow the systems to adaptively configure the available multiple access schemes to support diverse services and applications in 5G. In addition, challenges, opportunities, and future research trends for NOMA design are elaborated extensively in this paper that inspired a lot of subsequent research works with significant advancements in the field.

Title: *Data Gathering Optimization by Dynamic Sensing and Routing in Rechargeable Sensor Networks*

Authors: *Yongmin Zhang, Shibo He, and Jiming Chen*

Source: *IEEE/ACM Transactions on Networking*, (vol. 24, no. 3, pp. 1632-1646, June 2016)

Abstract:

In rechargeable sensor networks (RSNs), energy harvested by sensors should be carefully allocated for data sensing and data transmission to optimize data gathering due to time-varying renewable energy arrival and limited battery capacity. Moreover, the dynamic feature of network topology should be taken into account, since it can affect the data transmission. In this paper, we strive to optimize data gathering in terms of network utility by jointly considering data sensing and data transmission. To this end, we design a data gathering optimization algorithm for dynamic sensing and routing (DoSR), which consists of two parts. In the first part, we design a balanced energy allocation scheme (BEAS) for each sensor to manage its energy use, which is proven to meet four requirements raised by practical scenarios. Then in the second part, we propose a distributed sensing rate and routing control (DSR2C) algorithm to jointly optimize data sensing and data transmission, while guaranteeing network fairness. In DSR2C, each sensor can adaptively adjust its transmit energy consumption during network operation according to the amount of available energy, and select the optimal sensing rate and routing, which can efficiently improve data gathering. Furthermore, since recomputing the optimal data sensing and routing strategies upon change of energy allocation will bring huge communications for information exchange and computation, we propose an improved BEAS to manage the energy allocation in the dynamic environments and a topology control scheme to reduce computational complexity. Extensive simulations are performed to demonstrate the efficiency of the proposed algorithms in comparison with existing algorithms.

1. What is the major contribution of this paper?

This paper addresses the data gathering optimization problem considering dynamic energy management, sensing, and routing in wireless rechargeable sensor networks. Firstly, a Balanced Energy Allocation Scheme (BEAS) has been proposed to manage the energy use adaptively according to the battery level and the amount of harvested energy at each sensor, so that all sensors can efficiently utilize the harvested energy and satisfy the necessary conditions for optimal energy management. Then, based on BEAS, a Distributed Sensing Rate and Routing Control (DSR2C) algorithm with fast convergence rate is designed by employing dual decomposition method and sub-gradient method, and is proved to converge to the optimal sensing rate and routing. By employing the proposed algorithms, sensors can dynamically determine their sensing and transmission strategies according to the instant profile of the energy arrival, such that the data gathering performance can be optimized.

2. Are there any new researches or results relevant to this paper? How do you see the development of this research in the near future?

Energy harvesting technologies have been widely studied in recent years since it can solve the power supply problem of sensor nodes, IoT devices, wearable electronics, etc. Many significant works in these areas have been done. Considering the uncertainties of harvested energy in various scenarios, how to use them

efficiently still is challenging, especially in large-scale networks. To apply the energy harvesting technologies in practical scenarios, there exist at least two research directions to be investigated: the first direction is to establish an efficient energy harvesting system (e.g., high energy density, predicable and reliable energy supply, efficient energy management scheme), and the second one is to develop an efficient data transmission scheme (e.g., low-complexity and fast-convergent algorithm, energy-efficiency routing, stable and reliable links). The popularity of energy harvesting technologies should last for quite a while in the near future.

Report on Distinguished Lecturer Tours (DLTs) and Distinguished Speaker Programs (DSPs) in the AP Region

Congratulations on another successful year of Distinguished Lecturer Tours (DLTs) and Distinguished Speaker Programs (DSPs)! This year, IEEE Communications Society has approved 17 DLTs and 2 DSPs in the Asia Pacific Region. Please see the following for further details.*

*Some information below is extracted from the DLT and DLP approval letters and may differ slightly from the actual events.

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- 2018 AP DLT #1: 26 March – 1 April 2018 by Prof. Hsiao-Hwa Chen
 2018 AP DLT #2: 1 – 13 March 2018 by Prof. Tony Q. S. Quek
 2018 AP DLT #3: 18 – 24 March 2018 by Prof. Tony Q. S. Quek
 2018 AP DLT #4: 6 – 13 March 2018 by Dr. Shui Yu
 2018 AP DLT #5: 28 March – 8 April 2018 by Prof. Angela Yingjun Zhang
 2018 AP DLT #6: 18 – 28 April 2018 by Prof. Tony Q. S. Quek
 2018 AP DLT #7: 23 – 30 July 2018 by Prof. Marco Di Renzo
 2018 AP DLT #8: 5 - 17 May 2018 by Dr. Andreas Molisch
 2018 AP DLT #9: 29 July - 4 August 2018 by Dr. R Venkatesha Prasad
 2018 AP DLT #10: 29 July - 4 August 2018 by Prof. Tony T. S. Quek
 2018 AP DLT #11: 22 - 18 July 2018 by Dr. Suresh Subramaniam
 2018 AP DLT #12: Early June 2018 by Prof. Shui Yu
 (Details of the above can be found in the May 2018 issue of the APB newsletter.)

2018 AP DLT#13: 21 October – 4 November 2018 Distinguished Lecturer: Prof. Jalel Ben-Othman

Hosting Chapter	2018 Section / Chapter Chair
Beijing Chapter	Xiaofeng Tao
Harbin Chapter	Weixiao Meng
Xi'an Chapter	Jiandong Li

Prof. Jalel Ben-Othman delivered a lecture series at the following locations:

1. Beijing, China – 24 October 2018

Lecture Venue: Beijing University of Posts and Telecommunications

2. Harbin, China – 26 October 2018

Lecture Venue: Harbin Institute of Technology

3. Xidian, China – 28 October 2018

Lecture Venue: Xidian University

4. Nanjing, China – 31 October 2018

Lecture Venue: Southeast University

2018 AP DLT#14: 22 – 27 August 2018

Distinguished Lecturer: Prof. Zhu Han

Hosting Chapter	2018 Section / Chapter Chair
Seoul Chapter	Sunghyun Choi
Beijing Chapter	Xiaofeng Tao
Xi'an Chapter	Jiandong Li

Prof. Zhu Han delivered a lecture series at the following locations:

1. Beijing, China – 23 August 2018

Lecture Venue: Beijing University of Posts and Telecommunications

2. Xi'an, China – 25 August 2018

Lecture Venue: Southwest Jiaotong University

3. Seoul, Korea – 27 August 2018

Lecture Venue: Seoul National University and Kyung Hee University

2018 AP DLT #15: 20 – 24 July 2018

Distinguished Lecturer: Prof. R Venkatesha Prasadk

Hosting Chapter	2018 Section / Chapter Chair
IEEE Sri Lanka Section	K. M. Liyanage
Student Chapter	Dinusha Nawarathne
Student Chapter	Sapumal Walisundara
Student Chapter	Shanaka Gunasekara

Prof. R Venkatesha Prasad delivered a lecture series at the following locations:

1. Peradeniya, Kandy, Sri Lanka – 21 July 2018

Lecture Venue: University of Peradeniya

2. Galle, Sri Lanka – 22 July 2018

Lecture Venue: University of Ruhuna

3. Moratuwa, Sri Lanka, Sri Lanka – 23 July 2018

Lecture Venue: University of Moratuwa

2018 AP DLT #16: 15 – 21 November 2018

Distinguished Lecturer: Prof. Tony Q. S. Quek

Hosting Chapter	2018 Section / Chapter Chair
Tokyo Chapter	Hidenori Nakazato
Chengdu Chapter	Zheng Ma

Prof. Tony Q. S. Quek a lecture series at the following locations:

1. Yokohama, Japan – 16 November 2018

Lecture Venue: Keio University

2. Tokyo, Japan – 17 November 2018

Lecture Venue: University of Electro-Communications

3. Tokyo, Japan – 18 November 2018

Lecture Venue: Tokyo Institute of Technology

4. Sichuan, China – 19 November 2018

Lecture Venue: University of Electronic Science and Technology of China

5. Xi'an, China – 20 November 2018

Lecture Venue: Southwest Jiaotong University

2018 AP DLT #17: 12 – 19 October 2018

Distinguished Lecturer: Dr. Lingyang Song

Hosting Chapter	2018 Section / Chapter Chair
Kansai Chapter	Kazuo Kumamoto
Tokyo Chapter	Hidenori Nakazato
Sendai Chapter	Nei Kato

Dr. Lingyang Song delivered a lecture series at the following locations:

1. Muroran, Japan – 15 October 2018

Lecture Venue: Muroran Institute of Technology

2. Sendai, Japan – 17 October 2018

Lecture Venue: Tohoku University

3. Osaka, Japan – 19 October 2018

Lecture Venue: Osaka Institute of Technology

2018 AP DSP #1: 23 February 2018

Distinguished Lecturer: Lingyang Song

Hosting Chapter	2018 Section / Chapter Chair
Sendai Chapter	Nei Kato

Dr. Lingyang Song delivered a lecture series at the following locations:

- Sendai, Japan – 23, February 2018

Lecture Venue: Tohoku University

Title: Mobile Social Big Data: WeChat Moments Dataset and Network Applications

2018 AP DSP #2: 10 - 15 October 2018
Distinguished Lecturer: Ali C. Begen

Hosting Chapter	2018 Section / Chapter Chair
Macau Chapter	Shaodan Ma Chak Chung Cheung

Dr. Ali C. Begen delivered a lecture series at the following locations:

- **Macau, China – 10 October 2018**

Lecture Venue: University of Macau

Title: Algorithms and Formats for Adaptive Streaming

- **Hong Kong, China – 15 October 2018**

Lecture Venue: Hong Kong University of Science & Technology

Title: Algorithms and Formats for Adaptive Streaming

What's Up on the Asia-Pacific Board? – APB Committee Reports

Technical Affairs Committee (TAC)

TAC is responsible for the selection of the APB Young Researcher Awards and the APB Outstanding Paper Awards. This year, we received 23 applications for the APB Young Researcher Awards and 6 nominations for the APB Outstanding Paper Awards. Out of them, the winners of one Best Young Researcher Award, 6 Outstanding Young Researcher Awards, and two APB Outstanding Paper Awards have been selected through careful review and discussions. Please see section on “2018 IEEE ComSoc Asia-Pacific Board Awards Announcement” for further details.

Meeting and Conference Committee (MCC)

MCC coordinates meeting and conference activities in the APB region. Please see “Upcoming Conferences” for a list of upcoming conferences in the IEEE Communications Society.

Information Services Committee (ISC)

The main task of ISC is to publish semi-annual AP Newsletters for release during the IEEE ICC and Globecom conferences, manage the APB homepage, manage the APB email broadcast to its members, and liaise the contribution to the IEEE Global Communication Newsletter (GCN).

- For the AP Newsletter, in addition to conventional topics such as call for awards, DLT report, and committee/local chapter activity report, ISC continues to look for new design ideas in terms of layout and content to bring better awareness of the APB and improve bonding of members.
- For the APB homepage, after migrating to the new hosting site, ISC continues to improve the look, content, and functionality of the APB homepage, such as the inclusion of information from sister societies.
- For the email broadcast, ISC takes care of dissemination of call for papers/participation under approval of AP Director, announcement of homepage and newsletter updates, approval of subscription requests, and so on. ISC is currently looking to improve two-way interactions between the APB and its members.

Membership Development Committee (MDC)

ComSoc launched a New Award

ComSoc initiated a new award called ComSoc Membership and Global Activities Contribution Award (ComSoc-MGACA) which will be presented to IEEE Communications Society (ComSoc) members by the IEEE Membership and Global Activities Council. You can find details from:

<https://www.comsoc.org/membership/chapters/chapter-awards/comsoc-membership-and-global-activities-contribution-award>

Tumbling of ComSoc membership seems to be calming down

For the last a few years, ComSoc members have been shrinking rapidly globally. However, as shown in the statistic in 2018, the declining trend seems to be slowed down little bit. ComSoc AP members need to actively work to attract young students to our society.

Table 1 Change in number of comsoc members in AP region from Dec. 2017 to Dec. 2018

	Country/Region	Higher Grade 2018	Higher Grade 2017	Student Member 2018	Student Member 2017	Total 2018	Total 2017	# of Sections
1	China	3,259	2,673	201	45	3,460	2,718	9
2	Japan	1,322	1,332	6	14	1,328	1,346	9
3	India	1,007	1,027	274	274	1,281	1,301	10
4	Australia	707	743	5	6	712	749	7
5	Korea	447	436	16	18	463	452	3
6	Taiwan	409	427	6	7	415	434	2
7	Singapore	169	177	0	2	169	179	1
8	Malaysia	135	153	1	5	136	158	1
9	Indonesia	90	197	3	7	93	104	1
10	New Zealand	103	105	0	0	103	105	4
11	Pakistan	93	119	14	37	107	156	3
12	Thailand	37	35	0	0	37	35	1
13	Sri Lanka	30	39	1	1	31	40	1
14	Bangladesh	30	27	1	1	31	28	1
15	Philippines	20	23	0	0	20	23	1
16	Vietnam	16	17	0	0	16	17	1
17	Nepal	6	0	0	0	6	0	0
18	Others	14	17	2	0	16	17	0
	Total	7,894	7,447	530	417	8,424	7,864	55

Source:

https://tblanalytics.ieee.org/#/site/IEEE/views/LandingPage_0/LandingPage?:iid=1&:usingOldHashUrl=true

Chapter Coordination Committee (CCC)

- Collaborate with the AP Office in running Distinguished Lecturer Tours (DLTs) and Distinguished Speaker Programs (DSPs)
- Collaborate with the AP Office in coordinating ComSoc Executives' visit to Chapters
- Collaboration with Sister Societies in AP region. Promote introductory articles in AP News Letter for Sister Societies

Upcoming Conferences

Conference Name	Conference Date	City	Country	Paper Deadline
OFC 2019	Mar. 3-7, 2019	San Diego	USA	Oct. 9, 2018
UNSA-ISCOMM 2019	Mar. 28-29, 2019	Arequipa	Peru	Dec. 15, 2018
IEEE ISPLC 2019	April 3-5, 2019	Prague	Czechia	Dec. 10, 2018
IEEE WCNC 2019	Apr. 15-18, 2019	Marrakech	Morocco	Nov. 2, 2018
IEEE INFOCOM 2019	Apr. 29-May 2, 2019	Paris	France	July 24, 2018
IEEE ICBC 2019	May 15-17, 2019	Seoul	South Korea	Dec. 7, 2019

IEEE ICC 2019	May 20-24, 2019	Shanghai	China	Nov. 14, 2018
IEEE CTW 2019	May 27-29, 2019	Selfoss	Iceland	March 29, 2019
IEEE CNS 2019	June 10-12, 2019	Washington, DC	USA	Dec. 21, 2018
IEEE SECON 2019	June 10-13, 2019	Boston, MA	USA	Jan. 25, 2019
IEEE PIMRC 2019	Sept. 8-11, 2019	Istanbul	Turkey	March 15, 2019
IEEE SmartGridComm 2019	Oct. 21-24, 2019	Beijing	China	April 15, 2019
IEEE GLOBECOM 2019	Dec. 9-13, 2019	Waikoloa, HI	USA	April 15, 2019

Asia-Pacific Region Officers (2018– 2019)

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Saewoong Bahk

Past Director:

Takaya Yamazato

Vice Directors:

Tomoaki Ohtsuki

Sumei Sun

Wei Zhang

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AP Office:

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ComSoc Liaison:

Hsiao-Hwa Chen

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Chairs: Sunghyun Choi
Hung-Yun Hsieh

Vice Chairs: Lingyang Song
Tony Q.S. Quek

Meetings & Conferences Committee:

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Vice Chairs: Chan-Byoung Chae

Information Services Committee:

Chairs: Y.-W. Peter Hong
Hiroshi Shigeno

Vice Chairs: Mianxiong Dong
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Vice Chairs: Hsuan-Jung Su

Chapters Coordination Committee:

Chairs: Youngchul Sung
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