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## Trending Topics in the Eyes of Vice Director

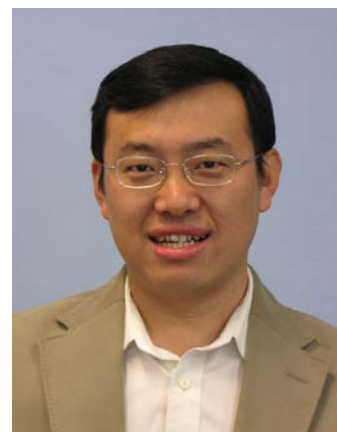
### Cybertwin-based Network Architecture

Wei Zhang

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A cybertwin based cloud-centric network architecture for future generation networks was recently proposed by Yu et al. [1]. By introducing cybertwin, which serves as communications assistant, network data logger, and digital asset owner of human and things, a new network architecture was put forward to address challenges of next generation networks, such as scalability, security, mobility, and availability.

Figure 1 shows the cybertwin-based next generation network architecture [1], in which there are four key components, i.e., Core Cloud, Edge Cloud, Cybertwin and the Ends.



- **Core Cloud** is fully-connected with each other to build the core networks through high-speed optical links. These core clouds in the proposed architecture provide computing, caching and communications resources for the ends as a network infrastructure service.
- **Edge Cloud** resides between the core cloud and the ends. It can help the core clouds to provide a very high quality of network services.
- **Cybertwin** is a digital representation of human or things in the virtual cyberspace and is located at the edge cloud. It serves in multiple capacities, i.e., communication assistant, network data logger, and

digital asset owner. It provides a new cybertwin based communication model to replace the traditional end-to-end communication model.

- **The Ends** refer to human and things in the network. They are consumers of the network services and are connected to the network via various access methods. The ends acquire services from the network via the cybertwin.

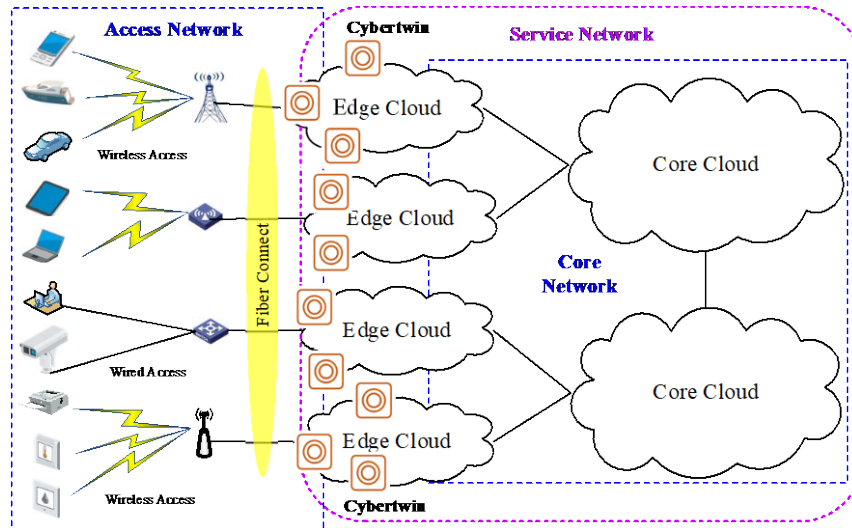


Fig. 1. Cybertwin based Cloud-Centric Network Architecture [1]

## Cybertwin

As shown in Fig. 2, cybertwin has three fundamental functions: communication assistant, network data logger and digital asset owner.

- **As communication assistant:** cybertwin is the digital representation of human or things in the cyber world and also acts as the virtual network ID of human and things. Cybertwin can better achieve various QoE because it knows well the users' QoS and will pay the cost to negotiate with telecommunications operator and cloud operator for the resource. The cybertwin based communication model requires the ends to first connect to its cybertwin that will acquire the required service from the cloud network on behalf of the ends. To provide high quality of service, cybertwin may request the service from multiple locations simultaneously.
- **As data logger:** In the proposed network architecture design, communications are completed through cybertwin. It means that the cybertwin can obtain and log all data about the end's behavior in real-time fashion.
- **As digital asset owner:** cybertwin can also convert the logged network data into a digital asset by processing these data as a service and publishing the service to other entities including the application service providers and cloud operators. This service can break the monopoly in which only a few big companies gather these valuable data. Further, it can also bring economic value to the owners of the data and may give birth to a new business model C2X (customer-to-everything).

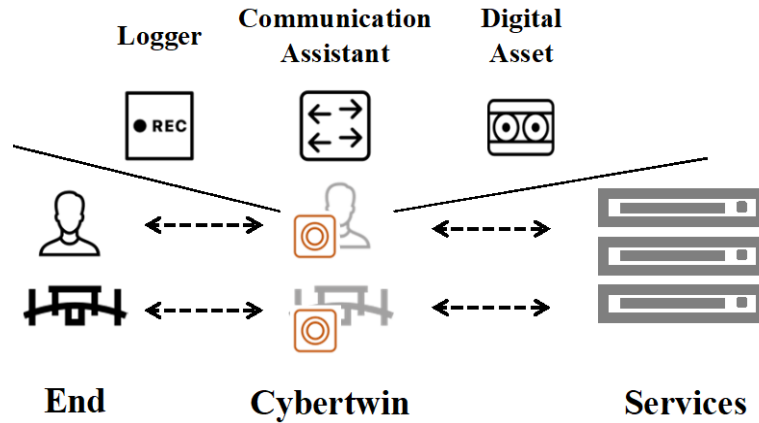


Fig. 2. Cybertwin based communication [1]

One of the benefits of cybertwin is to support the locator/identifier separation. The bottleneck problem of current networks to implement locator/identifier separation is the lack of an identity authentication mechanism. As a communication assistant, cybertwin has its inherent ability to provide such an identity authentication.

More benefits of cybertwin based communication model, including security, mobility, availability and scalability, can be found in [1].

## Reference

[1] Q. Yu, J. Ren, Y. Fu, Y. Li, and W. Zhang, "Cybertwin: An origin of next generation network architecture," submitted to IEEE Wireless Communications Magazine. Also available at <https://arxiv.org/abs/1904.11313>.

### Cellular Internet of UAVs for 5G and Beyond

Dr. Lingyang Song  
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Unmanned Aerial Vehicles (UAVs) are regarded as one of the best candidates to execute critical sensing missions, such as emergency search-and-rescue and traffic monitoring, due to their ease of deployment, high autonomy, and the capability to hover. Moreover, the low cost and high flexibility also make UAVs useful for the sensing applications with a huge volume of data, e.g., video recording and landscape photography. To turn the above technological visions into reality, seamless connectivity over wireless networking is necessary. Our *Future IoT Laboratory* is recently working on the research and development on the integration of UAVs with cellular networks, referred as a cellular Internet of UAVs. Some research topics are described in the following.

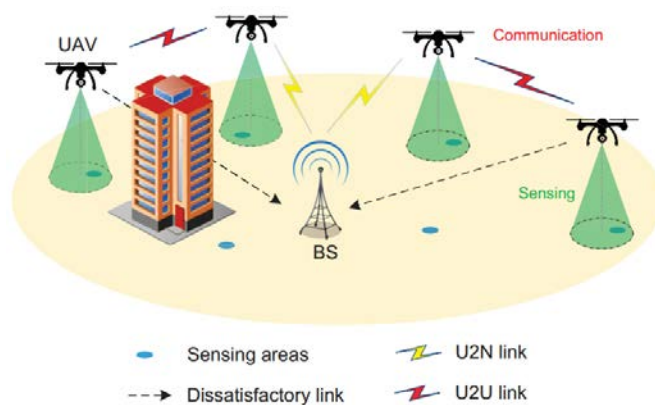


Fig. 3. UAV-to-X Communications

#### Protocol Design:

In the cellular Internet of UAVs, the sensory data needs to be transmitted to the base station (BS) for timely processing. To realize the UAV sensing over cellular networks, we designed a sense-and-send protocol [1], which contains two phases: UAV sensing and UAV communications. Since the sensing and the communications are coupled by the trajectory of the UAVs, it is necessary to consider them jointly.

#### UAV-to-X Communication:

To improve the cell-edge UAV performance, we proposed UAV-to-X (U2X) communications [2], consisting of UAV-to-network (U2N) and UAV-to-UAV (U2U) communications, as shown in Fig.3. Unlike the U2N where the sensory data is sent to the BS directly, the U2U allows two UAVs in proximity to set up a direct link bypassing the BS.

## Cooperation Techniques:

Cooperation techniques can effectively improve the Quality-of-Service (QoS) of sensing and communications in the cellular Internet of UAVs. For example, multiple UAVs executing the same sensing task can reduce the sensing failure. We studied the key techniques, such as trajectory design [3] and radio resource allocation [4], to achieve the cooperation gain among the UAVs.

## Implementation:

As air pollution is becoming the largest environmental health risk, the monitoring of air quality has drawn much attention in both theoretical studies and practical implementations. We developed an aerial-ground air quality monitoring system to report real-time fine-grained 3D air quality distribution maps [5], as shown in Fig. 4.

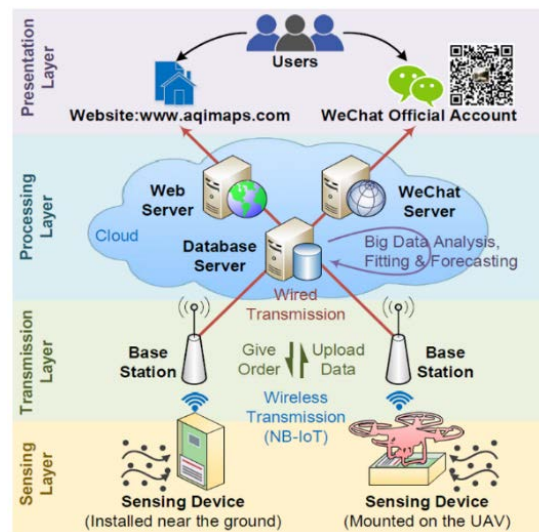


Fig. 4. Aerial-ground Air Quality Monitoring System

## Future Directions:

To cope with the strict QoS requirements and expected immense amounts of traffic, future cellular networks are a mixture of different technologies. Some cellular communication techniques are applicable to the cellular Internet of UAVs, such as Massive MIMO for U2N communications, Millimeter-Wave for U2U communications, Cognitive Radio for cooperative UAV communications, etc. For more details, please visit:

<http://net.pku.edu.cn/songly/index.html>

## Reference

- [1] S. Zhang, et al, "Cellular Controlled Cooperative Unmanned Aerial Vehicle Networks with Sense-and-Send Protocol", IEEE IoT Journal, vol. 6, no. 2, pp. 1754-1767, Apr. 2019.
- [2] S. Zhang, et al, "Cellular UAV-to-X Communications: Design and Optimization for Multi-UAV Networks", IEEE Trans. Wireless Commun., vol. 18, no. 2, pp. 1346-1359, Feb. 2019.
- [3] S. Zhang, et al, "Dual Trajectory Optimization for a Cooperative Internet of UAVs", IEEE Commun. Lett.,

April 2019 (Early Access).

[4] H. Zhang, et al, "Cooperation Techniques for a Cellular Internet of Unmanned Aerial Vehicles", IEEE Wireless Commun., accepted. Arxiv:1954.01257.

[5] Z. Hu, et al, "Aerial-Ground Air Quality Sensing: Architecture, Technologies and Implementation", IEEE Network Magazine, vol. 33, no. 2, pp. 14-22, Apr. 2019.

## Call for Application/Nomination of APB Awards

### Call for Applications of the 14th Asia-Pacific Young Researcher Award

IEEE Communications Society (ComSoc) Asia-Pacific Board (APB) sponsors the "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 2016 to December 2018).

#### Eligibility

- The upper age limit for the applicant is 35 (i.e., the applicant must be born on or after 1983/01/01).
- 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.

#### Application Process

Please email an application to [apb-officers-tac@ieee.org](mailto:apb-officers-tac@ieee.org) with the subject of "2019 Asia-Pacific Young Researcher Award Application" before the deadline. The application should be a single PDF file containing:

- A cover page that contains the applicant's name, affiliation, mailing address, telephone, e-mail address, and date of birth.
- The applicant's biography (no more than 400 words).
- A description of the applicant's major research contributions over the last 3 years, including clear discussions of three most representative publications (e.g., journal/conference/magazine papers and monographs) published over the last 3 years (no more than two A-4 pages). For each publication, please provide citation number (both from SCI and Google Scholar), impact factor (if applicable), significance of the publication, and the applicant's own contribution to the publication.
- A complete list of publications and conference activities (over the last 3 years only) as well as the citation number and H-index (of the entire career) from both SCI and Google Scholar.
- Awards/recognitions received (over the last 3 years only).

The last three years refer to the duration between January 2016 and December 2018. A publication accepted but not officially published by December 2018 should NOT be included in the application. An application not adhering to the above guidelines will not be considered.

#### Important Dates

- Application Submission Deadline: July 31, 2019
- Announcement of Awardees: October 1, 2019
- Award Ceremony at IEEE Globecom 2019 (December 2019)

Applications and inquiries should be directed to the following email address.

APB Technical Affairs Committee: [apb-officers-tac@ieee.org](mailto:apb-officers-tac@ieee.org)

## Call for Nominations of the 8th Asia-Pacific Outstanding Paper Award

IEEE Communications Society (ComSoc) Asia-Pacific Board (APB) sponsors "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 2016 to December 2018).

### 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 2016 to December 2018).
- 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).

### Selection Criteria

- Quality, originality, utility, timeliness, and clarity of presentation.

### Nomination and Selection Processes

IEEE ComSoc APB will constitute a selection committee to select the award recipient from the eligible nominees.

Please email a nomination to [apb-officers-tac@ieee.org](mailto:apb-officers-tac@ieee.org) with the subject of "**2019 Asia-Pacific Outstanding Paper Award Nomination**" before the deadline. The nomination should be a single PDF file containing:

- A cover page that contains the nominator's name, affiliation, address, telephone, and e-mail address.
- Information of the nominated paper, including title, authors' names, affiliations, source (conference/publication details), publication date, and the authors' contact information.
- Letter of recommendation (one A-4 page).
- Number of SCI and Google scholar citations, impact factor if applicable.
- A copy of the nominated paper.

### Important Dates

- Nomination Submission Deadline: July 31, 2019
- Announcement of Awardees: October 1, 2019
- Award Ceremony at IEEE Globecom 2019 (December 2019)

Applications and inquiries must be sent to the following address by e-mail.

APB Technical Affairs Committee: [apb-officers-tac@ieee.org](mailto:apb-officers-tac@ieee.org)



## Report on Distinguished Lecturer Tours in the AP Region

*Up to this point, IEEE Communications Society has already approved 5 Distinguished Lecturer Tours in the Asia Pacific Region. We are excited for the success of those that have already taken place and also for those that are coming up soon. We are on track to having another successful year of DLTs in the Asia-Pacific region. The followings are the descriptions and reports of these DLTs.*

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### 2019 AP DLT#1: 10 – 16 March 2019

#### Distinguished Lecturer: Prof. Tony Q. S. Quek

Hosting Chapter	2019 Section / Chapter Chair
Malaysia Chapter	Aduwati Sali
Taipei Chapter	Yao-Win Peter Hong

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

**1. Kuala Lumpur, Malaysia – 11 March 2019**

Lecture Venue: Universiti Putra Malaysia, Universiti Teknologi Mara

**2. Kuala Lumpur, Malaysia – 12 March 2019**

Lecture Venue: Nilai University

**3. Hsinchu, Taiwan – 13 March 2019**

Lecture Venue: National Tsing Hua University

**4. Taipei, Taiwan – 14 March 2019**

Lecture Venue: National Taiwan University

**5. Hsinchu, Taiwan – 15 March 2019**

Lecture Venue: National Chiao Tung University

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### 2019 AP DLT#2: 15 – 24 April 2019

#### Distinguished Lecturer: Prof. Tony Q. S. Quek

Hosting Chapter	2019 Section / Chapter Chair
Beijing Chapter	Xiaofeng Tao
Nanjing Chapter	Lianfeng Shen

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

**1. Beijing, China – 15 April 2019**

Lecture Venue: Beijing University of Posts and Telecommunications

**2. Beijing, China – 16 April 2019**

Lecture Venue: Beijing Institute of Technology

**3. Chongqing, China – 17 April 2019**

Lecture Venue: Chongqing University

**4. Chongqing, China – 18 April 2019**

Lecture Venue: Chongqing University of Posts and Telecommunications

**5. Hangzhou, China – 18 August 2018**

Lecture Venue: Zhejiang University

**2019 AP DLT #3: 9 – 17 March 2019**

**Distinguished Lecturer: Prof. Suresh Subramaniam**

Hosting Chapter	2019 Section / Chapter Chair
New South Wales Chapter	Stephen Joyce and Ollencio D'Souza
South Australia Chapter	Ngoc Hung Nguyen and Brian Ng
Victoria Chapter	Kandeepan Sithamparanathan

Prof. Suresh Subramaniam delivered a lecture series at the following locations:

**1. Wollongong, Australia – 12 March 2019**

Lecture Venue: University of Wollongong

**2. Sydney, Australia – 13 March 2019**

Lecture Venue: Engineers Australia

**3. Adelaide, Australia – 14 March 2019**

Lecture Venue: University of Adelaide

**Melbourne, Australia – 15 March 2019**

Lecture Venue: RMIT University

**2019 AP DLT #4: 1 – 27 May 2019**

**Distinguished Lecturer: Prof. Octavia Dobre**

Hosting Chapter	2019 Section / Chapter Chair
Chengdu Chapter	Zheng Ma
Xi'an Chapter	Jiandong Li
Beijing Chapter	Xiaofeng Tao
Nanjing Chapter	Lianfeng Shen

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

**1. Chengdu, China – 3 May 2019**

Lecture Venue: Southwest Jiaotong University

**2. Xi'an, China – 9 May 2019**

Lecture Venue: Xidian University

**3. Beijing, China – 14 May 2019**

Lecture Venue: Beijing University of Post and Telecommunications

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**4. Nanjing, China – 17 May 2019**

Lecture Venue: Southeast University

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**2019 AP DLT #5: 14 – 24 March 2019****Distinguished Lecturer: Prof. Nirwan Ansari**

<b>Hosting Chapter</b>	<b>2019 Section / Chapter Chair</b>
Hong Kong Chapter	Ray Cheung
Beijing(Shenzhen) Chapter	Simon Pun
Macau Chapter	Shaodan Ma

Prof. Nirwan Ansari delivered a lecture series at the following locations:

**1. Hong Kong, China – 18 March 2019**

Lecture Venue: City University of Hong Kong

**2. Macau, China – 20 March 2019**

Lecture Venue: University of Macau

**3. Shenzhen, China – 22 March 2019**

Lecture Venue: Southern University of Science and Technology

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

### **Technical Affairs Committee (TAC)**

#### **Action Plan 2019**

- TAC will promote and select outstanding active young researchers for the 14th Asia-Pacific Young Researcher Award. Call for applications of the award is included in this newsletter.
- TAC will also promote and select outstanding original papers for the 8th Asia-Pacific Outstanding Paper Award. Call for nominations of the award is included in this newsletter.

### **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 APB 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 APB 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 members decreased by 14.5% in worldwide (27103 to 23159) and -17.7% in AP region (8424 to 6927)
- We have AP region chapter chairs meeting in Shanghai in May 19th and 20th, prior to ICC (discuss activities, initiatives, and future plans)

### **Chapter Coordination Committee (CCC)**

#### **Mission of CCC**

- Plan and coordinate the Regional Chapter meeting once a year where possible
- Collaborate with the AP Office in running the DLT program
- Support the AP Office in organizing Executives' visit to Chapters
- Collaborate with Sister Societies in the AP region.

## News

In the past several years, we were very successful in accommodating all the above mission items. A good number of Distinguished Lecture Tours and pilot program of technical presentation using the IEEE Internet Conferencing Service have been organized in the AP Region. In this year, we organized the 2019 Asia Pacific Regional Chapters Chair Congress (AP-RCCC) in conjunction with ICC 2019 in Sanghai. The AP-RCCC is a good opportunity to gather and share various ComSoc activities in the AP region. This years's AP-RCCC is shown below.

<b>IEEE Communications Society AP Region Regional Chapter Chairs Congress (AP-RCCC)</b>		
<b>Sunday, May 19, 2019</b>		
6:30 – 8:30 pm	ComSoc hosted RCCC Dinner	
<b>Monday, May 20, 2019</b>		
8:30 - 9:00am	Registration	
9:00 - 9:50am	Welcome & Introductions	ComSoc President Khaled Letaief, ComSoc President-Elect Vincent Chan, and APB Director Saewoong Bahk
9:50 - 10:30am	ComSoc Inside – Admin & Support	Susan Brooks
10:30-11:00 am	Coffee Break	
10:30 - 11:10am	Member & Global Activities	Nei Kato
11:10 - 11:50am	Technical Activities and Industry Outreach	Adam Greenberg
11:50am - 12:30pm	Q&A Session about ComSoc	All
12:30-1:30 pm	Lunch	
1:30pm-2:30pm	ComSoc APB Report	APB Director Saewoong Bahk, and Committee Chairs of TAC, MCC, ISC, CCC, MDC Chair: APB VD Prof T. Ohtsuki
2:30 - 3:30pm	Best Practices for the AP Region Chapters	Chair: APB VD Dr. Sumei Sun APB officers, Chapter Chairs
	2018 IEEE Communications Society Chapter Awards and CAA winner (Harbin Chapter)	

3:30-4:00 pm	Coffee Break	
4:00 - 5:00 pm	Open Discussion – Member Development Reports from selected Chapter Chairs	Chair: APB VD Prof. Wei Zhang
5:00-5:30 pm	AP-RCCC Wrap-up	The next VP Member and Global Activities Nei Kato , and APB Director Saewoong Bahk
6:00-9:30 pm	IEEE ICC 2019 Welcome Reception	

## Upcoming Conferences

Conference Name	Conference Date	City	Country	Paper Deadline
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 ISIT 2019	July 7-12, 2019	Paris	France	Jan. 20, 2019
IEEE/CIC ICC 2019	Aug. 11-13, 2019	Changchun	China	May 5, 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
OFC 2020	March 3-8, 2020	San Diego, CA	USA	TBD
IEEE WCNC 2020	April 20-23, 2020	Seoul	Korea	Oct. 4, 2019
IEEE INFOCOM 2020	April 27-30, 2020	Beijing	China	July 31, 2019
IEEE ICC 2020	June 7-11, 2020	Dublin	Ireland	Oct. 18, 2019

## Asia-Pacific Region Officers (2018– 2019)

### **Director:**

Saewoong Bahk

### **Past Director:**

Takaya Yamazato

### **Vice Directors:**

Tomoaki Ohtsuki

Sumei Sun

Wei Zhang

### **Secretary and Treasurer:**

Jemin Lee

### **AP Office:**

Ewell Tan

Munir Mohammed

### **ComSoc Liaison:**

Hsiao-Hwa Chen

Nei Kato

Borhanuddin Mohd Ali

### **Technical Affairs Committee:**

Chairs: Sunghyun Choi  
Hung-Yun Hsieh

Vice Chairs: Lingyang Song  
Tony Q.S. Quek

### **Meetings & Conferences Committee:**

Chairs: Meixia Tao

Vice Chairs: Chan-Byoung Chae

### **Information Services Committee:**

Chairs: Y.-W. Peter Hong  
Hiroshi Shigeno

Vice Chairs: Mianxiong Dong  
Liquan Fu

### **Membership Development Committee:**

Chairs: Byonghyo Shim  
Neelesh Mehta

Vice Chairs: Hsuan-Jung Su

### **Chapters Coordination Committee:**

Chairs: Youngchul Sung  
Iti Saha Misra

Vice Chairs: Sheng Zhou  
Koji Yamamoto

### **Advisors:**

Tomonori Aoyama (Keio University)

Daehyoung Hong (Sogang University)

Noriyoshi Kuroyanagi (Chubu University)

Byeong Gi Lee (Seoul National University)

Kwang Bok Lee (Seoul National University)

Lin-Shan Lee (National Taiwan University)

Wanjiun Liao (National Taiwan University)

Zhisheng Niu (Tsinghua University)

Naohisa Ohta (Keio University)

Iwao Sasase (Keio University)

Desmond Taylor (University of Canterbury)

Naoaki Yamanaka (Keio University)

Takaya Yaamazato (Nagoya University)