

APNOMS 2019

*The 20th Asia-Pacific
Network Operations and Management Symposium*

- Management in a Cyber-Physical World -

*September 18-20, 2019
Matsue, Japan*



Sponsored by



IEICE ICM



Technically Co-Sponsored by



IEEE

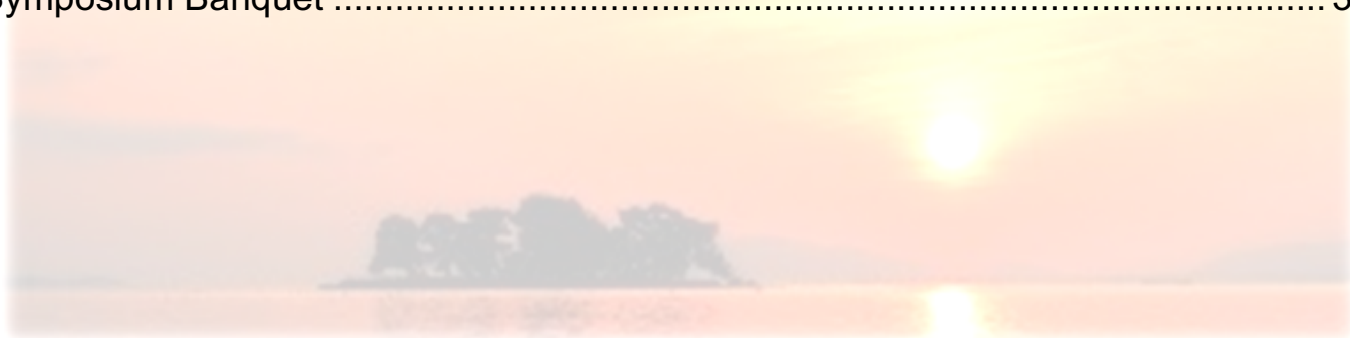
IEEE ComSoc™
IEEE Communications Society



APNOMS 2019

Contents

Organizing Committee	4
Technical Program Committee	6
Program at a Glance	8
Keynotes	10
Distinguished Experts Panel	13
Special Session	16
Tutorials	17
Technical Sessions	19
Poster Sessions	22
Innovation Session	24
Demo Session	26
Exhibitions	27
Venue Information	29
Transportation Information	30
Tour Information	32
General Information	34
Registration	35
Welcome Party	36
Symposium Banquet	37



Welcome to APNOMS 2019

The 20th Asia-Pacific Network Operations and Management Symposium

“Management in a Cyber-Physical World”

18 – 20 September 2019, Matsue, Japan

Sponsored by: IEICE ICM, KICS KNOM

Technically Co-Sponsored by IEEE Communications Society

APNOMS (Asia-Pacific Network Operations and Management Symposium) has been a premier conference on network operations and management in the Asia Pacific region. APNOMS 2019 is sponsored by IEICE Technical Committee on Information and Communication Management (ICM) and the KICS Technical Committee on Korean Network Operations and Management (KNOM). APNOMS meets almost every year, typically during September and boasts a rich history of success. It includes a full three-day program of keynotes, tutorials, technical sessions, panel discussions, poster sessions, and exhibits that focus on managing networks that span the computing and telecommunications areas.

APNOMS 2019, taking place in Matsue, Japan, marks the 20th anniversary, following the successful APNOMS '97 (Seoul), APNOMS '98 (Sendai), APNOMS '99 (Kyongju), APNOMS 2000 (Nara), APNOMS 2001 (Sydney), APNOMS 2002 (Jeju), APNOMS 2003 (Fukuoka), APNOMS 2005 (Okinawa), APNOMS 2006 (Busan), APNOMS 2007 (Sapporo), APNOMS 2008 (Beijing), APNOMS 2009 (Jeju), APNOMS 2011 (Taipei), APNOMS 2012 (Seoul), APNOMS 2013 (Hiroshima), APNOMS 2014 (Hsinchu), APNOMS 2015 (Busan), APNOMS2016 (Kanazawa), APNOMS2017 (Seoul).

The theme of APNOMS 2019 focuses on the technologies for “Management in a Cyber-Physical World”, which enables a flexible and dynamic system evolution. Discussions in the conference are expected to open up new possibilities.

Matsue is one of the best places to experience old Japan, Matsue is known as City of Water, you can enjoy its historical and traditional atmosphere by walking through a castle town, temple and shrines. Visitors are recommended to travel to scenic sites, historic sites, and tourist spots: Matsue castle which is one of twelve remaining original Japanese castles, the moats surrounding the castle, a picturesque traditional Japanese street with samurai residences (Shiomi Nawate Street), Matsue History Museum, Teramachi Temple area, and Lake Shinji-ko known as its beautiful sunset scenery. Matsue is also famous for traditional arts and crafts: Yakumo-nuri Lacquer, Magatama Agate Jewelry, and Washi Temari.

Finally, we would like to express our sincere thanks to the authors, reviewers, committee members, volunteers, and participants, who make a great effort to the success of APNOMS 2019. We are looking forward to seeing you in Matsue, Japan.



Organizing Committee

General Chair	Kiyohito Yoshihara (KDDI Research, Japan)
Vice Co-Chair	Hongtaek Ju (Keimyung Univ., Korea) Yen-Wen Chen (National Central Univ., Taiwan)
TPC Co -Chair	Yoshiaki Kitaguchi (Tokyo Institute of Technology, Japan) Woojin Seok (KISTI, Korea) Jiun-Long Huang (National Chiao Tung Univ., Taiwan)
Poster Co-Chairs	Yuncheng Zhu (Google, Japan) Byung-Seo Kim (Hongik Univ., Korea) Li-Hsing Yen (National Chiao Tung Univ., Taiwan)
Innovation Session Co-Chairs	Haruo Oishi (NTT, Japan) Jaeh Lee (Korea Univ. of Technology and Education, Korea) Chung-Hua Hu (CHT, Taiwan)
Special Session Co-Chairs	Ryo Yamamoto (UEC, Japan) Kyungbaek Kim (Chonnam National Univ., Korea) Kuen-Rong Lo (CHT, Taiwan)
Tutorial Co-Chairs	Takashi Kurimoto (National institute of Informatics, Japan) Buseung Cho (KISTI, Korea) Meng-Tsung Tsai (National Chiao Tung Univ., Taiwan)
DEP Co-Chairs	Noriaki Kamiyama (Fukuoka Univ., Japan) Sangheon Pack (Korea Univ., Korea) Yu-Huang Chu (CHT, Taiwan)
Exhibition Co-Chairs	Hiroki Nakayama (BOSCO Technologies, Japan) Kisang Ok (KT, Korea) Tse-Han Wang (CHT, Taiwan)
Demo Session Co-Chairs	Hiroki Nakayama (BOSCO Technologies, Japan) Youngjoon Won (Hanyang Univ., Korea)
Publicity Co-Chairs	Saburo Seto (NTT, Japan) Yoonhee Kim (Sookmyung Women's Univ., Korea) Cheng-Hsin Hsu (National Tsing Hua Univ., Taiwan)
Finance Co-Chairs	Shinji Yamashita (Fujitsu Laboratories, Japan) Takayoshi Nakayama (Fujitsu Laboratories, Japan) Mi-Jung Choi (Kangwon National Univ., Korea) Tsi-Uí Ík (National Chiao Tung Univ., Taiwan)
Registration Chair	Kazuhiko Kinoshita (Tokushima Univ., Japan)
Publication Co-Chairs	Cheng Zhang (Waseda Univ., Japan) Myung-Sup Kim (Korea Univ., Korea) Yu-Jia Chen (National Central Univ., Taiwan)
Local Arrangement Chairs	Kimio Tsuchikawa (NTT, Japan) Sayaka Yagi (NTT, Japan)

Secretaries	Seung-Joon Seok (Kyungnam Univ., Korea) Chi Yu Li (National Chiao Tung Univ., Taiwan) Hironori Kurokawa (NTT East, Japan)
Steering Committee	Wang-Cheol Song (Jeju National Univ., Korea) Young-Tak Kim (Yeungnam Univ., Korea) Shingo Ata (Osaka City Univ., Japan) Makoto Takano (Osaka Univ., Japan) Toshio Tonouchi (NEC, Japan) Choong Seon Hong (Kyung Hee Univ., Korea) Young-Woo Lee (KT, Korea) Yu-Chee Tseng (National Chiao Tung Univ., Taiwan) Chien Chen (National Chiao Tung Univ., Taiwan) Kiyohito Yoshihara (KDDI Research, Japan)
Advisory Board	Taesang Choi (ETRI, Korea) Seong-Beom Kim (Korea) Masayoshi Ejiri (Japan) Nobuo Fujii (Cyber Creative Institute, Japan) Yoshiaki Tanaka (Waseda Univ., Japan) James Won-Ki Hong (POSTECH, Korea) Doug Zuckerman (Perspecta Labs, USA) Kyung Hyu Lee (ETRI, Korea)
International Liaison	USA: Deep Medhi (Univ. of Missouri-Kansas City, USA) Latin America: Carlos Westphall (Federal Univ. of Santa Catarina, Brazil) Europe: Marcus Brunner (Swisscom, Switzerland) China: John Jiahai Yang (Tsinghua Univ., China) Hong Kong: Rocky K. C. Chang (Hong Kong Polytechnic Univ., China) Thailand: Teerapat Sanguankotchakorn (AIT, Thailand) Australia: Rajan Shankaran (Macquarie Univ., Australia) Canada: Raouf Boutaba (Univ. of Waterloo, Canada)



Technical Program Committee

Takuya Asaka (Tokyo Metropolitan Univ.)	Remi Badonnel (TELECOM Nancy - LORIA/INRIA)	Karima Boudaoud (Univ. of Nice Sophia Antipolis)
Marcus Brunner (Swisscom)	Hector Cancela (Facultad de Ingeniería, Universidad de la República)	Paulo Carvalho (Centro Algoritmi, Universidade do Minho)
Joaquim Celestino Júnior (State Univ. of Ceará)	Lin-huang Chang (National Taichung Univ.)	Hsi-Lu Chao (National Chiao Tung Univ.)
Chao-Chun Chen (National Cheng Kung Univ.)	Chien Chen (National Chiao Tung Univ.)	Ling-Jyh Chen (Academia Sinica)
Whai-En Chen (National Ilan Univ.)	Yen-Cheng Chen (National Chi Nan Univ.)	Yeong-Sheng Chen (National Taipei Univ. of Education)
Yu-Jia Chen (National Central Univ.)	Buseung Cho (Korea Institute of Science and Technology Information)	Mi-Jung Choi (Kangwon National Univ.)
Nakjung Choi (Nokia)	Young Choi (Regent Univ.)	Li-Der Chou (National Central Univ.)
Yu-Huang Chu (Chunghwa Telecom Co., Ltd.)	Laurent Ciavaglia (Nokia)	Yousef-Awwad Daraghmi (Palestine Technical Univ. Kadoorie)
José de Souza (Federal Univ. of Ceará)	Bruno Dias (Universidade do Minho)	Ahmed Elmisery (Universidad Técnica Federico Santa María)
Sonja Filiposka (Faculty of Computer Science and Engineering)	Alex Galis (Univ. College London)	Katja Gilly (Miguel Hernandez Univ.)
Rossitza Goleva (New Bulgarian Univ.)	Lisandro Granville (Federal Univ. of Rio Grande do Sul)	Bo Gu (Sun Yat-sen Univ.)
Badis Hammi (Télécom ParisTech)	Masaharu Hattori (KDDI Research)	Ping-Fan Ho (National Chiao Tung Univ.)
Choong Seon Hong (Kyung Hee Univ.)	James Hong (POSTECH)	Cheng-Hsin Hsu (National Tsing Hua Univ.)
Jenq-Muh Hsu (National Chaiyi Univ.)	Chih-Lin Hu (National Central Univ.)	Chi-Fu Huang (National Chung Cheng Univ.)
Kohei Ichikawa (Nara Institute of Science and Technology)	Takeshi Ikenaga (Kyushu Institute of Technology)	Keisuke Ishibashi (International Christian Univ.)
Jehn-Ruey Jiang (National Central Univ.)	Yong Jin (Tokyo Institute of Technology)	Hong Ju (Keimyung Univ.)
Carlos Kamienski (Universidade Federal do ABC)	Noriaki Kamiyama (Fukuoka Univ.)	Joon-Myung Kang (Barefoot Networks)
Hiroki Kashiwazaki (National Institute of Informatics)	Yuka Kato (Tokyo Woman's Christian Univ.)	Alexander Keller (IBM Global Technology Services)
Brigitte Kervella (LIP6)	Byung-Seo Kim (Hongik Univ.)	Myung-Sup Kim (Korea Univ.)
Young-Tak Kim (Yeungnam Univ.)	Kazuhiko Kinoshita (Tokushima Univ.)	Takeshi Kinoshita (NTT)
Tohru Kondo (Hiroshima Univ.)	Daisuke Kotani (Kyoto Univ.)	Tsan-Chang Kuo (Chunghwa Telecom)
Takashi Kurimoto (NII)	Huang-Chen Lee (National Chung-Cheng Univ.)	Jaeoh Lee (Korea Univ. of Technology and Education)
Young-Jun Lee (Korea National Univ. of Education)	Youngseok Lee (Chungnam National Univ.)	Po-Ruey Lei (ROC Naval Academy)
Jenq-Shiou Leu (National Taiwan Univ. of Science and Technology)	Chi-Yu Li (National Chiao Tung Univ.)	Jia-Ming Liang (Chang Gung Univ.)
Hwa-Chun Lin (National Tsing Hua Univ.)	Kate Ching-Ju Lin (National Chiao Tung Univ.)	Xuan Liu (Southeast Univ.)
Yan Ma (Beijing Univ. of Posts and Telecommunications)	Barbara Martini (CNIT)	Catalin Meirosu (Ericsson)
Takumi Miyoshi (Shibaura Institute of Technology)	Osamu Mizuno (Kogakuin Univ.)	Chawanat Nakasan (Kanazawa Univ.)

Hiroki Nakayama (Bosco Technologies Inc.)	Takayoshi Nakayama (Fujitsu Laboratories)	Shinsaku Numata (NTT Communications)
Toshiro Nunome (Nagoya Institute of Technology)	Satoshi Ohzahata (The Univ. of Electro-Communications)	Haruo Oishi (NTT)
Kisang Ok (Korea Telecom)	Tadafumi Oke (KYOWA EXEO Corp.)	Yoji Ozawa (Hitachi)
Sangheon Park (Korea Univ.)	Byungchul Park (Univ. of Toronto)	Hyunggon Park (Ewha Womans Univ.)
Soo-Hyun Park (Kookmin Univ.)	Ana Pont (Universitat Politècnica de València)	Ruibiao Qiu (F5 Networks, Inc.)
Ramin Sadre (Université Catholique de Louvain)	Teerapat Sanguankotchakorn (Asian Institute of Technology)	Ricardo Schmidt (Univ. of Passo Fundo)
Hugo Scolnik (FCEyN, Universidad de Buenos Aires)	Adarshpal Sethi (Univ. of Delaware)	Saburo Seto (NTT)
Rajan Shankaran (Macquarie Univ.)	Shiann-Tsong Sheu (National Central Univ.)	Yuji Soejima (NTT)
Wang-Cheol Song (Jeju National Univ.)	Kuo-Feng Ssu (National Cheng Kung Univ.)	Kiminori Sugauchi (Hitachi)
Eiji Takahashi (NEC Corporation)	Keichi Takahashi (Nara Institute of Science and Technology)	Makoto Takano (Osaka Univ.)
Mauro Tortonesi (Univ. of Ferrara)	Meng-Hsun Tsai (National Cheng Kung Univ.)	Shiao-Li Tsao (National Chiao Tung Univ.)
Chien-Chao Tseng (National Chiao Tung Univ.)	Masato Tsuru (Kyushu Institute of Technology)	Satoshi Uda (Japan Advanced Institute of Science and Technology)
Kazunori Ueda (Kochi Univ. of Technology)	Tse-Han Wang (Chunghwa Telecom Co., Ltd.)	Hung-Yu Wei (National Taiwan Univ.)
Carlos Becker Westphall (Federal Univ. of Santa Catarina)	Youngjoon Won (Hanyang Univ.)	Fang-Jing Wu (TU Dortmund)
Ryo Yamamoto (The Univ. of Electro-Communications)	Shinji Yamashita (Fujitsu Laboratories)	Taku Yamazaki (Shibaura Institute of Technology)
Kyoko Yamori (Asahi Univ.)	Jiahai Yang (Tsinghua Univ.)	Li-Hsing Yen (National Chiao Tung Univ.)
Chih-Wei Yi (National Chiao Tung Univ.)	Wonyong Yoon (Dong-A Univ.)	Kiyohito Yoshihara (KDDI Research Inc.)
Cheng Zhang (Waseda Univ.)	Yuncheng Zhu (Google)	Douglas Zuckerman (Perspecta Labs)



Program at a Glance

Wednesday, 18 September 2019			
	Multipurpose Hall	Small Hall	Large Exhibition Hall
08:00 ~	Registration @Lobby		
09:00 ~ 10:30 (90 min)	Tutorial 1 Computational intelligence meets vehicular edge computing	Tutorial 2 Vision, Technology and Standardization of Network and Service Management for 5G and beyond 5G	Exhibition Preparation
10:30 ~ 10:45 (15 min)	Coffee Break @ Lobby		
10:45 ~ 12:15 (90 min)	Tutorial 3 In-Network Learning for Software Defined Networking: Applications, Designs, and Challenges	Tutorial 4 A Decade of SDN - Management in a Cyber-Physical World	
12:15 ~ 13:15 (60 min)	Lunch		
13:15 ~ 13:55 (40 min)	Welcome Address: General Chair Keynote Speech 1: Dr. Tohru Asami	-	
13:55 ~ 14:25 (30 min)	Coffee Break @ Large Exhibition Hall		
14:25 ~ 16:05 (100 min)	Technical Session 1 Fog/Edge Computing and Cyber Physical System	Technical Session 2 Network Measurement	Exhibition
16:05 ~ 16:35 (30 min)	Coffee Break @ Large Exhibition Hall		
16:35 ~ 18:15 (100 min)	Technical Session 3 Software Defined Networks	Technical Session 4 Wireless Sensor Networks and Internet of Things	

Thursday, 19 September 2019			
	Multipurpose Hall	Small Hall	Large Exhibition Hall
08:00 ~	Registration @ Lobby		
09:00 ~ 10:00 (60 min)	Keynote Speech 2: Prof. Nen-Fu (Fred) Huang Keynote Speech 3: Prof. Choong Seon Hong		
10:00 ~ 10:30 (30 min)	Coffee Break @ Large Exhibition Hall		Poster Session 1
10:30 ~ 11:45 (75 min)	Technical Session 5 Data Analysis	Innovation Session	
11:45 ~ 12:15 (30 min)	Coffee Break @ Large Exhibition Hall		Poster Session 1
12:15 ~ 13:15 (60 min)	Lunch		
13:15 ~ 13:45 (30 min)	Coffee Break @ Large Exhibition Hall		Poster Session 2
13:45 ~ 15:25 (100 min)	Special Session	Technical Session 6 Network Function Virtualization and Virtual Network Function	
15:25 ~ 15:55 (30 min)	Coffee Break @ Large Exhibition Hall		Poster Session 2 + Demo Session
15:55 ~ 17:00 (65 min)	Movement to the Banquet Venue (bus)		
17:00 ~ 18:00 (60 min)	Special Time before Banquet		
18:00 ~ 20:00 (120 min)	Symposium Banquet		

Program at a Glance

Friday, 20 September 2019				
	Multipurpose Hall	Small Hall	Large Exhibition Hall	
08:00 ~	Registration @ Lobby			
09:00 ~ 10:00 (60 min)	Keynote Speech 4: Mr. Ray Budavari Keynote Speech 5: Prof. Kotaro Kataoka			
10:00 ~ 10:30 (30 min)	Coffee Break @ Large Exhibition Hall		Exhibition	Poster Session 3
10:30 ~ 12:10 (100 min)	Technical Session 7 Mobile Network	Technical Session 8 Resource Management		
12:10 ~ 13:10 (60 min)	Lunch			
13:10 ~ 14:50 (100 min)	Technical Session 9 Security			
14:50 ~ 15:20 (30 min)	Coffee Break @ Large Exhibition Hall			Poster Session 3
15:20 ~ 17:00 (100 min)	Distinguished Expert Panel	-	-	-
17:20 ~ 17:35 (15 min)	Best Paper Awards, Student Best Paper Awards Closing Remarks			



Keynotes

Keynote 1: Wednesday, September 18, 2019, 13:25-13:55, Multipurpose Hall

Theme: Challenges of Network as a Foundation for Diverse Businesses

Dr. Tohru Asami (Advanced Telecommunications Research Institute International, Japan)



Dr. Tohru Asami received B.E. degree and M.E. degree in electrical engineering from Kyoto University in 1974 and 1976 respectively, and Ph.D. from The University of Tokyo in 2005. In 1976, he joined KDD (KDDI). Since that time, he has been working in several research areas such as UNIX-based data communication systems, network management systems (especially expert systems for transmission line faults), etc. After C.E.O. of KDDI R&D Labs. Inc., in 2006, he moved to The University of Tokyo as a professor of Dept. of Information and Communication Engineering, Graduate School of Information Science and Technology. Since 2017, he has been President of Advanced Telecommunications Research Institute International, Japan. He is a member of the IEEE and IEICE (The Institute of Electronics, Information and Communication Engineers, Japan). From 2003 to 2005, he was a vice chairman of the board of directors of Information System Society in IEICE (IEICE-ISS).

Keynote 2: Thursday, September 19, 2019, 09:00-09:30, Multipurpose Hall

Theme: AIoT based Smart Agriculture Blockchain Service

Prof. Nen-Fu (Fred) Huang (National Tsing Hua University, Taiwan)



Prof. Nen-Fu (Fred) Huang received the Ph.D. degree in computer science from National Tsing Hua University (NTHU), Taiwan, in 1986. He is now serving as the Dean of EE/CS College of NTHU. From 1997-2000, he was the Chairman of Department of Computer Science, NTHU and since 2008, he is a Distinguished Professor of NTHU. From 2015-2016, he was the director of Computer and Communication Research Center (CCRC) of NTHU. His current research interests include Internet of Things (IoT), sensor networks, Smart Agriculture and agriculture blockchain, AI-based Big data Analysis for MOOCs courses, network security, SDN/NFV networks, and network applications/flows identification technologies. He received the Outstanding Teaching Award from the NTHU in 1993, 1998, and 2008, the Outstanding University/Industrial Collaboration Award from Ministry of Education, Taiwan in 1998, and Outstanding IT people Award from ITmonth, ROC in 2002. He received the Technology Transfer Award from National Science Council (NSC) of Taiwan in 2004. He received the Technology Creative Award from Computer and Communication Research Center (CCRC), NTHU in 2005, and the Outstanding University/Industrial Collaboration Award from the NTHU in 2010. He is the founder of Broadweb Corp., (www.broadweb.com) and from 2002 to 2006, he served as the CEO/Chairman of Broadweb, which was acquired by TrendMicro, an international security company, in 2013. He is also the founder of ShareCourse, an AI-based MOOCs platform (www.sharecourse.net), which provides MOOC courses including IoT, AI, Big Data Analysis, FinTech, Robot related courses. Dr. Huang has published more than 200 journal and conference papers, including more than 50 papers in IEEE INFOCOM/ICC/GLOBECOM flag-ship conferences. Dr. Huang also has granted/pending more than 60 patents. He is a fellow of the BCS (British Computer Society) and a senior member of the IEEE.

Keynote 3: Thursday, September 19, 2019, 09:30-10:00, Multipurpose Hall

Theme: Edge Computing for 5G Networks and Beyond

Prof. Choong Seon Hong (Kyung Hee University, Korea)



Prof. Choong Seon Hong (hereafter CS) received his B.S. and M.S. degrees in electronic engineering from Kyung Hee University, Seoul, Korea, in 1983, 1985, respectively. In 1988, he joined KT, where he worked on Broadband Networks as a member of the technical staff. From September 1993, he joined Keio University, Japan. CS received the Ph.D. degree at Keio University in March 1997. Since September 1999, CS has worked as a professor of the department of computer science and engineering, Kyung Hee University. And CS is now serving as the Dean for Office of Information Services, Kyung Hee University. CS has served as a General Chair, TPC Chair/Member, or an Organizing Committee Member for International conferences such as NOMS, IM, APNOMS, E2EMON, CCNC, ADSN, ICPP, DIM, WISA, BcN, TINA, SAINT, ICOIN, ICCE, ICUMU, ICUIMC, ICDC, ISPLC, ICC, GLOBECOM and many other international conferences. CS had also served as an associate editor of IEEE Transactions on Network and Service Management, International Journal of Network Management, Journal of Communications and Networks, and is serving an Associate Technical Editor of IEEE Communications Magazine and International Journal of Network Management. CS's research interests include Future Internet, Heterogeneous network, Network Management, Service Management, Network Security, Internet Services and Intelligent Edge Computing. CS published 180 international journal papers and 260 international conference papers.

Keynote 4: Friday, September 20, 2019, 09:00-09:30, Multipurpose Hall

Theme: Solving key challenges in data center networking and security with distributed analytics

Mr. Ray Budavari (Networking and Security Business Unit, VMware, Inc)



Ray Budavari is a founding member of the Networking and Security Business Unit (NSBU) at VMware and has worked at VMware for over 8 years on networking, security and cloud technologies. He focuses on all areas related to NSX as a platform architect including emerging technologies and is also engaged closely with the VMware Japan team supporting NSX in region. As a VMware Certified Design Expert (VCDX-NV) and VMware Certified Implementation Expert (VCIX-NV #001), Ray was the first person to obtain certification in the Network Virtualization track. In previous positions at VMware, as a Staff Solutions Architect, he focused on the design and implementation of large scale cloud environments and working with VMware's largest Service Provider and Enterprise customers across the world. Prior to VMware, Ray held a number of technical and architecture roles at Telstra Corporation, Australia's largest telecommunications company.



Keynote 5: Friday, September 20, 2019, 09:30-10:00, Multipurpose Hall

Theme: Interplay between Internet and Blockchain

Prof. Kotaro Kataoka (Indian Institute of Technology Hyderabad, India)



Kotaro Kataoka is an Associate Professor at Department of Computer Science and Engineering, Indian Institute of Technology Hyderabad as well as a Senior Researcher at Keio Research Institute at SFC. He has been a member of Asian Internet Interconnection Initiatives (AI3) project and Widely Integrated Distributed Environment (WIDE) project for research on Satellite based Internet, Post-Disaster Networking and etc. since 2000. He also served as an Expert of Japan International Cooperation Agency (JICA) for facilitating India-Japan collaborations under JICA FRIENDSHIP project between 2012 and 2019. His research interest covers Internet Architecture, Software-Defined Networking (SDN), Network Function Virtualization (NFV), Blockchain and any fun applications.



Distinguished Experts Panel

DEP Session: Friday, September 20, 2019, 15:20-17:00, Multipurpose Hall

Panel Chair

Prof. Noriaki Kamiyama (Fukuoka University, Japan)

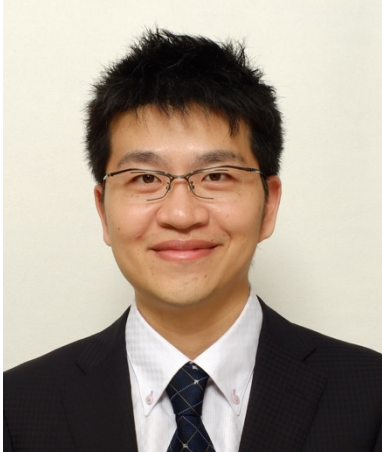


Noriaki Kamiyama received his M.E. and Ph.D. degrees in communications engineering from Osaka University in 1994 and 1996, respectively. From 1996 to 1997, he was with the University of Southern California as a visiting researcher. He joined NTT Multimedia Network Laboratories in 1997, and he has been at NTT Network Technology Laboratories by 2016. He was also with the Osaka University as an invited associate professor from 2013 to 2014 and an invited professor in 2015. From 2017, he is a professor of Fukuoka University. He has been engaged in research concerning content distribution systems, network design, network economics, traffic measurement and analysis, and traffic engineering. He received the best paper award at the IFIP/IEEE IM 2013. He is a member of IEEE, ACM, and IEICE.



Panel 1

Prof. Mianxiong Dong (Muroran Institute of Technology, Japan)



Mianxiong Dong received B.S., M.S. and Ph.D. in Computer Science and Engineering from The University of Aizu, Japan. He is currently a Professor in the Department of Sciences and Informatics, Advisor to Executive Director, and Vice Director of Office of Institutional Research at the Muroran Institute of Technology, Japan. He has received best paper awards from IEEE HPCC 2008, IEEE ICSS 2008, 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. Dr. Dong serves as an Editor for IEEE Transactions on Green Communications and Networking (TGCN), IEEE Communications Surveys and Tutorials, IEEE Network, IEEE Wireless Communications Letters, IEEE Cloud Computing, IEEE Access. He is the recipient of IEEE TCSC Early Career Award 2016, IEEE SCSTC Outstanding Young Researcher Award 2017, The 12th IEEE ComSoc Asia-Pacific Young Researcher Award 2017, Funai Research Award 2018 and NISTEP Researcher 2018 (one of only 11 people in Japan) in recognition of significant contributions in science and technology by MEXT. He is currently the Member of Board of Governors and Chair of Student Fellowship Committee of IEEE Vehicular Technology Society, and Treasurer of IEEE ComSoc Japan Joint Sections Chapter.

Panel 2

Dr. Yongseok Park (Samsung Electronics, Korea)



Dr. Yongseok Park is a Principal Engineer at the Network Analytics Lab of Samsung Electronics, Network Business Division. He is currently involved with strategic planning and development of advanced analytics solutions for LTE/5G mobile networks. He has also worked on strategic planning and standards for NFV/SDN. Before joining Samsung, he was with AT&T working on operations planning of private line services and network management of IP common backbone. He holds a Ph.D. degree in electrical and computer engineering from Purdue University, USA.



Panel 3

Dr. Yuh-Jiuh Cheng (Chunghwa Telecom Co., Ltd, Taiwan)



Dr. Yuh-Jiuh Cheng (M'94) received the M. S. degree in computer science and information engineering and the Ph.D. degree in electronic engineering from National Chiao Tung University, Hsinchu, Taiwan, R.O.C., in 1989 and 1998, respectively. He is now a project manager in Broadband Networks Laboratory, Telecommunication Laboratories, Chunghwa Telecom Co., Ltd, Taoyuan, Taiwan, R.O.C. He had been involved in developing of several systems including the C400 centralized test system, the village-based digital switching system, the integrated services digital network (ISDN) switching system, the broadband ATM switching system, the Chinese NAVTEX (Navigational Telex) receiver and the VoIP telephone. From 2013 to 2014, he was adjunct professor in department of electrical engineering from National Taiwan University of Science and Technology, Taipei, Taiwan, R.O.C. He holds more than 12 patents and has published more than 50 journal and conference papers in the previously described research areas. His research interests include VLSI/SoC design, ATM switch architectures, computer networks, computer architectures, ADSL technologies, IPv6 and optical switches. Dr. Cheng was awarded the National Science Council grant to study abroad at public expense in 1992 and received Chunghwa Telecom Research Award in 1985, 1989, 1992, and 1999, respectively.

Panel 4

Dr. Richard T.B. Ma (National University of Singapore, Singapore)



Richard T. B. Ma received the B.Sc. degree (Hons.) in computer science and the M.Phil. degree in computer science and engineering from the Chinese University of Hong Kong, in 2002 and 2004, respectively, and the Ph.D. degree in electrical engineering from Columbia University, in 2010. During the Ph.D. degree, he was a Research Intern with the IBM T. J. Watson Research Center, NY, USA, and the Telefonica Research, Barcelona. He is currently an Assistant Professor with the Department of Computer Science, National University of Singapore. His current research interests include distributed systems and network economics. He is a co-recipient of the Best Paper Award in the IEEE Workshop on Smart Data Pricing 2015, the IEEE ICNP 2014, and the IEEE IC2E 2013.



Special Session

Special Session: Thursday, September 19, 2019, 13:45–15:25, Multipurpose Hall

Theme: AI Technologies in Network Management

Chair: Prof. Celimuge Wu (The University of Electro-Communications, Japan)

AI Solutions for Challenging Network Management Situations

Dr. Yongseok Park (Samsung Electronics, Korea)



Dr. Yongseok Park is a Principal Engineer at the Network Analytics Lab of Samsung Electronics, Network Business Division. He is currently involved with strategic planning and development of advanced analytics solutions for LTE/5G mobile networks. He has also worked on strategic planning and standards for NFV/SDN. Before joining Samsung, he was with AT&T working on operations planning of private line services and network management of IP common backbone. He holds a Ph.D. degree in electrical and computer engineering from Purdue University, USA.

API for Trouble/Maintenance Notification toward Automatic Operation

Mr. Takatoshi Ikeda (KDDI, Japan)



Mr. Takatoshi Ikeda is a Manager at Global ICT Engineering Department of KDDI. He is responsible for the engineering and operation of Japanese research and education network. He and his team manage the IP backbone network and deploy the advanced technology to their operation. He was a guest researcher of NICT (National Institute of Information and Communications Technology) during 2006-2018. He researched on the data transfer over large bandwidth-delay network and deployed the system for network performance measurement called perfSONAR to JGN, Japanese testbed network as NICT researcher.



Tutorials

Tutorial 1: Wednesday, 18 September 2019, 9:00–10:30, Multipurpose Hall

Chair: Assistant prof. Sato Takehiro (Kyoto University, Japan)

Computational intelligence meets vehicular edge computing

Prof. Celimuge Wu (The University of Electro-Communications, Japan)



Celimuge Wu received his ME degree from the Beijing Institute of Technology, China in 2006, and his PhD degree from The University of Electro-Communications, Japan in 2010, where he is currently an associate professor. His current research interests include vehicular networks, sensor networks, intelligent transport systems, IoT and edge computing. He is/has been a TPC Co-Chair of Wireless Days 2019, ICT-DM 2019, ICT-DM 2018, and a track Co-Chair of many international conferences including IEEE VTC 2020-Spring, ICCCN 2019 and IEEE PIMRC 2016. He serves as an associate editor of IEEE Access, IEICE Transactions on Communications, International Journal of Distributed Sensor Networks, and MDPI Sensors.

Tutorial 2: Wednesday, 18 September 2019, 9:00–10:30, Small Hall

Chair: Prof. Wang-Cheol Song (Jeju National University, Korea)

Vision, Technology and Standardization of Network and Service Management for 5G and beyond 5G

Dr. Taesang Choi (ETRI, Korea)



Taesan Choi is a Principal Engineering Staff in ETRI, having joined the institute in 1996 after research and development careers on network and service management of telecommunications during his Ph.D studies at the University of Missouri at Kansas City. He has successfully managed a number of projects in the area of telecommunications and networking technologies, especially in Internet traffic engineering, traffic measurement and analysis, QoS management, SDN/NFV, and 5G AN & CN Management. He has also been actively contributed to various standardization organizations such as 3GPP, ITU-T and IETF in the area of Internet traffic engineering, Internet traffic measurement and analysis, CDN interconnection, SDN, NFV & 5G management and orchestration since 1993. He is currently serving as a rapporteur of ITU-T SG13 Q.6/WP1.

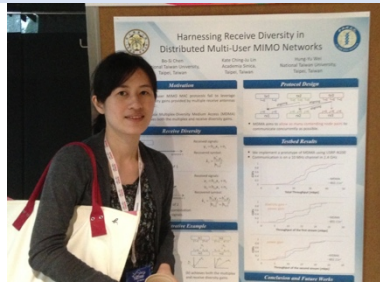


Tutorial 3: Wednesday, 18 September 2019, 10:45–12:15, Multipurpose Hall

Chair: Dr. Po-Ruey Lei (ROC Naval Academy, Taiwan)

In-Network Learning for Software Defined Networking: Applications, Designs, and Challenges

Prof. Kate Ching-Ju Lin (National Chiao Tung University, Taiwan)



Kate Ching-Ju Lin is a Professor in the Department of Computer Science at National Chiao Tung University, HsinChu, Taiwan. She is currently the director of the Institute of Network Engineering at National Chiao Tung University, HsinChu, Taiwan. Her current research interests include wireless systems, software-defined networking, visible light communications, and Internet of Things. Dr. Lin is an editor for ACM/Springer Wireless Networks. She has also served as PC members in many international conferences, including ACM SIGCOMM, ACM MOBICOM, USENIX NSDI, IEEE INFOCOM, IEEE ICNP, etc. She is a recipient of the Intel Distinguished Collaborative Research Award. Dr. Lin is an ACM member and IEEE senior member.

Tutorial 4: Wednesday, 18 September 2019, 10:45–12:15, Small Hall

Chair: Associate Prof. Takashi Kurimoto (National Institute of Informatics, Japan)

A Decade of SDN - Management in a Cyber-Physical World

Mr. Rich Bayliss (Director of Systems Engineering, APJ, Arista Networks)



Rich is the Director for Systems Engineering in Asia-Pacific, where he leads the pre and post sales engineering teams. Rich works with customers to define a common strategy to migrate complex legacy networks to simplified, software-driven networks. Rich places particular emphasis on the necessary changes to achieve security, reliability and operational efficiency through the use of agile operations and proven web-scale architectures. Rich has been internationally recognized for his contribution to the development of new networking standards and architectures. Rich has a Computer Science and Software Development Degree with Distinction from Deakin University, Victoria, Australia.



Technical Sessions

Technical Session 1: Wednesday, 18 September 2019, 14:25–16:05, Multipurpose Hall

Theme: Fog/Edge Computing and Cyber Physical System

Chair: Prof. Hiroki Kashiwazaki (National Institute of Informatics, Japan)

TS1-1	DTCluster: A CFSFDP Improved Algorithm for RFID Trajectory Clustering Under Digital-twin Driven Mengnan Cai*, Siye Wang*, Qinxuan Wu**, Yijia Jin***, Xinling Shen* (*Chinese Academy of Sciences / University of Chinese Academy of Sciences, China, **Zhejiang University, China, ***The Boeing Company, USA)
TS1-2	Bluetooth Mesh Networking: An Enabler of Smart Factory Connectivity and Management Terence Ching Yang Lam, Sherlyn Yew, Sye Loong Keoh (University of Glasgow, UK)
TS1-3	Artificial Intelligence Based Edge Caching in Vehicular Mobile Networks: Architecture, Opportunities, and Research Issues Kai-Min Liao, Guan-Yi Chen, Yu-Jia Chen (National Central University, Taiwan)
TS1-4	Artificial Intelligence-based Service Aggregation for Mobile-Agent in Edge Computing Md. Shirajum Munir, Sarder Fakhru'l Abedin, Choong Seon Hong (Kyung Hee University, Korea)

Technical Session 2: Wednesday, 18 September 2019, 14:25–16:05, Small Hall

Theme: Network Measurement

Chair: Prof. Kaoru Sezaki (The University of Tokyo, Japan)

TS2-1	Heterogeneous Data Ensemble Learning in End-to-End Diagnosis for IPTV Hao-Yu Kao, Yan-Yih Wang, Chih-Meng Huang, Chang-Ping Hsu (Chunghwa Telecom, Taiwan)
TS2-2	Detecting Wireless LAN Bottlenecks Using TCP Connection Measurement at Traffic Aggregation Point Sumiyo Okada, Chungha Lee, Hitoshi Ueno, Tomohiro Ishihara (Fujitsu Laboratories, Japan)
TS2-3	Locating Delay Fluctuation-Prone Links by Packet Arrival Intervals in OpenFlow Networks Nguyen Minh Tri, Syunya Nagata, Masato Tsuru (Kyushu Institute of Technology, Japan)
TS2-4	Ethereum Behavior Analysis with NetFlow Data Zhenzhen Li, Jiangpan Hou, Hai Wang, Chencheng Wang, Cuicui Kang, Peipei Fu (Chinese Academy of Sciences / University of Chinese Academy of Sciences, China)

Technical Session 3: Wednesday, 18 September 2019, 16:35–18:15, Multipurpose Hall

Theme: Software Defined Networks

Chair: Prof. Yu-Jia Chen (National Central University, Taiwan)

TS3-1	Flexible Network Resource-Allocation Architecture Using Specification Injection Masataka Sato, Shingo Horiuchi (NTT, Japan)
TS3-2	Multicast Routing Model to Minimize Number of Flow Entries in Software-Defined Network Seiki Kotachi, Takehiro Sato, Ryoichi Shinkuma, Eiji Oki (Kyoto University, Japan)
TS3-3	P4-Enabled Bandwidth Management Yan-Wei Chen, Li-Hsing Yen, Wei-Cheng Wang, Cheng-An Chuang, Yu-Shen Liu, Chien-Chao Tseng (National Chiao Tung University, Taiwan)
TS3-4	Reactive Controller Assignment for Failure Resilience in Software Defined Networks Faruk Acan*, Gürkan Gür**, Fatih Alagöz* (*Bogazici University, Turkey, **Zurich University of Applied Sciences (ZHAW), Switzerland)

Technical Session 4: Wednesday, 18 September 2019, 16:35–18:15, Small Hall

Theme: Wireless Sensor Networks and Internet of Things

Chair: Prof. Takumi Miyoshi (Shibaura Institute of Technology, Japan)

TS4-1	Building a V2X Simulation Framework for Future Autonomous Driving Tsu-Kuang Lee, Tong-Wen Wang, Wen-Xuan Wu, Yu-Chiao Kuo, Shih-Hsuan Huang, Guan-Sheng Wang, Chih-Yu Lin, Jen-Jee Chen, Yu-Chee Tseng (National Chiao Tung University, Taiwan)
TS4-2	PDMAC-SIC: Priority-based Distributed Low Delay MAC with Successive Interference Cancellation for Industrial Wireless Networks Yida Xu**, Qi Wang*, Jianmin Liu**, Chentao He**, Boyu Diao*, Yongjun Xu* (*Chinese Academy of Sciences, China, **University of Chinese Academy of Sciences, China)
TS4-3	Smart Control for Energy Efficient Networking of IEEE 802.11Ah-Based IoT Min-Cheol Kim, Young-Tak Kim (Yeungnam University, Korea)
TS4-4	A New Lossless Compression Scheme for WSNs Using RLE Algorithm Abdeldjalil Saidani, Jianwen Xiang, Deloula Mansouri (Wuhan University of Technology, China)

Technical Session 5: Thursday, 19 September 2019, 10:30–11:45, Multipurpose Hall

Theme: Data Analysis

Chair: Prof. Min-Te Sun (National Central University, Taiwan)

TS5-1	Susceptible-Infection-based Cost-effective Seed Mining in Social Networks Ashis Talukder, Choong Seon Hong (Kyung Hee University, Korea)
TS5-2	Measurement and Analysis of Adult Websites in IPv6 Networks Shize Zhang, Hui Zhang, Jiahai Yang, Guanglei Song, Jianping Wu (Tsinghua University / Beijing National Research Center for Information Science and Technology, China)
TS5-3	Best Feature Selection Using Correlation Analysis for Prediction of Bitcoin Transaction Count Se-Hyun Ji*, Ui-Jun Baek*, Mu-Gon Shin*, Young-Hoon Goo*, Jun-Sang Park**, Myung-Sup Kim* (*Korea University, Korea, **LG Electronics, Korea)

Technical Session 6: Thursday, 19 September 2019, 13:45–15:25, Small Hall

Theme: Network Function Virtualization and Virtual Network Function

Chair: Prof. Kazuhiko Kinoshita (Tokushima University, Japan)

TS6-1	Machine Learning-based Prediction of VNF Deployment Decisions in Dynamic Networks Stanislav Lange*, Hee-Gon Kim*, Se-Yeon Jeong*, Heeyoul Choi**, Jae-Hyung Yoo*, James Won-Ki Hong* (*Pohang University of Science and Technology, Korea, **Handong Global University, Korea)
TS6-2	NFVMP: An Architecture for NFV Applications from Multiple Providers Lishan Li, Ying Liu, Jianping Wu, Gang Ren (Tsinghua University, China)
TS6-3	Distributed Approach to Adaptive VNF Manager Placement Problem Mao-Jung Chiang, Li-Hsing Yen (National Chiao Tung University, Taiwan)
TS6-4	eVNF - Hybrid Virtual Network Functions with Linux eXpress Data Path Nguyen Van Tu, Jae-Hyoung Yoo, James Won-Ki Hong (POSTECH, Korea)

Technical Session 7: Friday, 20 September 2019, 10:30–12:10, Multipurpose Hall

Theme: Mobile Network

Chair: Prof. Myung-Sup Lee (Korea University, Korea)

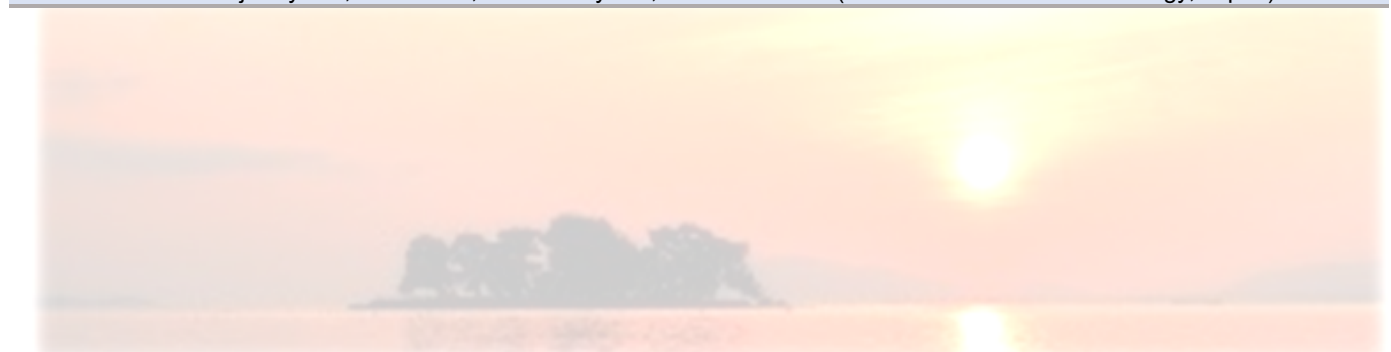
TS7-1	Understanding Intelligent RAN Slicing for Future Mobile Networks Through Field Test Ping Du, Akihiro Nakao (The University of Tokyo, Japan)
TS7-2	QoS-guaranteed User Association and Resource Allocation with CoMP JT in Ultra-Dense Networks Wei Kuang Lai, Chia-Yu Hsu, Yu-Po Kuo (National Sun Yat-sen University, Taiwan)
TS7-3	Machine Learning Approach for Automatic Configuration and Management of 5G Talha Ahmed Khan, Asif Mehmood, Javier Jose Diaz Rivera, Wang-Cheol Song (Jeju National University, Korea)
TS-4	A Hopfield Neural Networks Based Mechanism for Coexistence of LTE-U and WiFi Networks in Unlicensed Spectrum Madyan Alsenwi, Yan Kyaw Tun, Shashi Raj Pandey, Choong Seon Hong (Kyung Hee University, Korea)

Technical Session 8: Friday, 20 September 2019, 10:30–12:10, Small Hall

Theme: Resource Management

Chair: Dr. Woojin Seok (KISTI, Korea)

TS8-1	IT Resource Trend Analysis by Component Decomposition Based on Non-negative Matrix Factorization Yuji Saitoh, Tetsuya Uchiumi, Yukihiro Watanabe (Fujitsu Laboratories, Japan)
TS8-2	Automatic Parameter Tuning Framework for Performance Diagnosis Report Tetsuya Uchiumi, Yuji Saitoh, Yukihiro Watanabe (Fujitsu Laboratories, Japan)
TS8-3	Cache-Decision Policy Using User Tastes Tsukasa Kitamura*, Noriaki Kamiyama**, Miki Yamamoto* (*Kansai University, Japan, **Fukuoka University, Japan)
TS8-4	P2PTV Traffic Classification and Its Characteristic Analysis Using Machine Learning Koji Hayashi, Rina Ooka, Takumi Miyoshi, Taku Yamazaki (Shibaura Institute of Technology, Japan)



Technical Session 9: Friday, 20 September 2019, 13:10–14:50, Small Hall

Theme: Security

Chair: Prof. Motoyuki Ohmori (Tottori University, Japan)

TS9-1	Trajectory Protection Scheme Based on Fog Computing and K-anonymity in IoT Kexin Zhou, Jian Wang (Nanjing University of Aeronautics And Astronautics Nanjing, China)
TS9-2	A Collaborative DDoS Mitigation Solution Based on Ethereum Smart Contract and RNN-LSTM Meryam Essaid, DaeYong Kim, Soo Hoon Maeng, Park Sejin, Hong Taek Ju (Keimyung University, Korea)
TS9-3	A Method for Extracting Static Fields in Private Protocol Using Entropy and Statistical Analysis Min-Seob Lee*, Young-Hoon Goo*, Kyu-Seok Shim*, Sung-Ho Yoon**, Se-Hyun Ji*, Myung-Sup Kim* (*Korea University, Korea, **LG Electronics, Korea)
TS9-4	Hybrid Controller for Securing SDN from Switched DDoS and ARP Poisoning Attacks Teerapat Sanguankotchakorn, Shiva Kumar Arugonda (Asian Institute of Technology, Thailand)



Poster Sessions

Poster Session 1: Thursday, September 19, 2019, 10:00–10:30, 11:45–12:15, Large Exhibition Hall

Chair: Prof. Li-Hsing Yen (National Chiao Tung Univ., Taiwan)

P1-1	A SDN Controller Enabled Architecture for the IMS Zeqi Liu, Qichao Wang, Jae-Oh Lee (Korea University of Technology and Education, Korea)
P1-2	Network Slice Selection Function for Data Plane Slicing in a Mobile Network Javier Jose Diaz Rivera, Talha Ahmed Khan, Asif Mehmood, Wang-Cheol Song (Jeju National University, Korea)
P1-3	Predicting Malfunction of Mobile Network Base Station Using Machine Learning Approach YinHsin Liu, YaoChung Tu, ChangYu Hsu, HsinChieh Chao (Chunghwa Telecom Laboratories, Taiwan)
P1-4	Effective Uplink Data Transmission Scheme for MTCs in LTE-A Networks Yen-Wen Chen, Chih Hong Chang (National Central University, Taiwan)
P1-5	Location-based Flooding Area Restriction for Mobile-assisted Ad Hoc Networks Shota Ono*, Taku Yamazaki**, Takumi Miyoshi**, Kaoru Sezaki* (*The University of Tokyo, Japan, **Shibaura Institute of Technology, Japan)
P1-6	Evaluation of the Zero Rating System for MVNO in the New Mobile Network Era Ming Yang*, Ping Du*, Noriaki Kamiyama**, Akihiro Nakao* (*The University of Tokyo, Japan, **Fukuoka University, Japan)
P1-7	Evaluation of Assurance Closed Loop PoC for Achieving Scheduled Maintenance in Telecommunication Carrier Networks Kosuke Sakata, Motomu Nakajima, Aiko Oi, Yuichi Suto, Yuji Soejima (NTT, Japan)
P1-8	IPDAC: An Integrated IP Address Management Framework for Telecommunication Management Networks Tse-Han Wang*, Yen-Cheng Chen**, Yu-Tang Huang*, Chen-Min Hsu*, Kai-Sheng Hsu*, Chung-Hua Hu* (*Chunghwa Telecom, Taiwan, **National Chi Nan University, Taiwan)
P1-9	A Study on Utilization of Hybrid Blockchain for Energy Sharing in Micro-Grid Jeong Min Jeon, Choong Seon Hong (Kyung Hee University, Korea)
P1-10	Energy Efficient Resource Allocation in UAV-based Heterogeneous Networks Aunas Manzoor, Do Hyeon Kim, Choong Seon Hong (Kyung Hee University, Korea)
P1-11	Unmanned Aerial Vehicle Waypoint Guidance with Energy Efficient Path Planning in Smart Factory Sheikh Salman Hassan, Seok-Won Kang, Choong Seon Hong (Kyung Hee University, Korea)
P1-12	Research on Routing Incentive Strategy Based on Virtual Credit in VANET Xiaojuan Zhang*, Xiangyu Bai* ** (*Inner Mongolia University, China, **Chinese Academy of Sciences, China)
P1-13	Contents Delivery for Autonomous Driving Cars in Conjunction with Car Navigation System Arata Koike*, Yoshiko Sueda** (*Tokyo Kasei University, Japan, **Meisei University, Japan)
P1-14	A V2X Task Offloading Method Considering Automobiles' Behavior in Urban Area Hiroya Matsumoto, Osamu Mizuno (Kogakuin University, Japan)
P1-15	A QoS-based Opportunistic Routing Mechanism in Social Internet of Vehicle Yi Han*, Yao Zhang*, Huilin Liu**, Hecun Yuan*, Lanlan Rui*, Ying Wang* (*Beijing University of Posts and Telecommunications, China, **China Aerospace Science, China)
P1-16	Ant-inspired Backoff-based Opportunistic Routing for Ad Hoc Networks Taku Yamazaki, Shinnosuke Iwagami, Takumi Miyoshi (Shibaura Institute of Technology, Japan)
P1-17	Optimal Task-UAV-Edge Matching for Computation Offloading in UAV Assisted Mobile Edge Computing Ki Tae Kim, Choong Seon Hong (Kyung Hee University, Korea)
P1-18	Mobility Support for Networks on Trains Using Commercial Off-the-shelf Routers Sandy H. Hsiao, Hong-Rong Chang, Yu-Han Lu, Chi-Yu Li (National Chiao Tung University, Taiwan)
P1-19	A Machine Learning Based Smart Irrigation System with LoRa P3P Networks Yu chuan Chang, Ting-Wei Huang, Nen-Fu Huang (National Tsing Hua University, Taiwan)
P1-20	An Architecture for Managing IoT Device Object in Information Gateway Qichao Wang, Zeqi Liu, Jae-Oh Lee (Korea University of Technology and Education, Korea)
P1-21	Design of a Data Collection System with Data Compression for Small Manufacturers in Industrial IoT Environments Chunju Tsai*, Wen-Yueh Shih*, Yi-Shu Lu*, Jiun-Long Huang*, Lo-Yao Yeh** (*National Chiao Tung University, Taiwan, **National Center for High-Performance Computing, Taiwan)
P1-22	A Practical Approach with Big Data Analysis for Customer-Driven Network Optimization Chen-Yeu Yang, Gar-De Tsai, Der-Wen Perng (Chunghwa Telecommunication Laboratories, Taiwan)
P1-23	Visualizing User Action Data to Discover Business Process Yuki Urabe and Sayaka Yagi, Kimio Tsuchikawa, Takeshi Masuda (NTT, Japan)
P1-24	A Low-cost Enterprise Application Integration Architecture for Large-scale Environment Chi-Chang Huang, Chi-Yang Kuo, Jen-Hao Chen, Chao-Wen Huang (Chunghwa Telecom Co., Ltd., Taiwan)
P1-25	A Case Study of Captive-Portal Detection for Web Authentication on Wired LAN in a Campus Network Motoyuki Ohmori (Tottori University, Japan)
P1-26	Fault Location Prediction Based on Customer Complaint Amount Yan-Yih Wang, Chang-Ping Hsu, Chih-Meng Huang, Hao-Yu Kao (Chunghwa Telecom, Taiwan)
P1-27	RSP Consensus Algorithm for Blockchain Donghak Kim, Rehmat Ullah, Byung-Seo Kim (Hongik University, Korea)

Poster Session 2: Thursday, September 19, 2019, 13:15–13:45, 15:25–15:55, Large Exhibition Hall

Chair: Prof. Noriaki Kamiyama (Fukuoka Univ., Japan)

P2-1	A Search Approach Based on Query Similarity in Content-Centric Networks Jiun-Yu Tu*, Chih-Lin Hu**, Han Hu** (*Southern Taiwan University of Science and Technology, Taiwan, **National Central University, Taiwan)
P2-2	A Monitorable Peer-to-Peer File Sharing Mechanism Wei-Chiao Huang*, Lo-Yao Yeh**, Jiun-Long Huang* (*National Chiao Tung University, Taiwan, **National Center for High-Performance Computing, Taiwan)
P2-3	Enabling Inference Inside Software Switches Yung-Sheng Lu, Kate Ching-Ju Lin (National Chiao Tung University, Taiwan)
P2-4	Implementation and Evaluation of a Multi-Factor Web Authentication System with Individual Number Card and WebUSB Yuki Fujita*, Atsuo Inomata**, Hiroki Kashiwazaki*** (*Georepublic, Japan, **Osaka University, Japan, ***National Institute of Informatics, Japan)
P2-5	Data Provenance for Experiment Management of Scientific Applications on GPU Sejin Kim, Jisun Oh, Yoonhee Kim (Sookmyung Women's University, Korea)
P2-6	A Framework for Maritime Anti-Collision Pattern Discovery from AIS Network Po-Ruey Lei*, Pei-Rong Yu**, Wen-Chih Peng** (*ROC Naval Academy, Taiwan, **National Chiao Tung University, Taiwan)
P2-7	Long-Term Span Traffic Prediction Model Based on STL Decomposition and LSTM Yonghua Huo*, Yu Yan**, Dan Du***, Zhihao Wang*, Yixin Zhang**, Yang Yang** (*The 54th Research Institute of CETC, China, **Beijing University of Posts and Telecommunications, China, ***1st Military Representative Office of Military Equipment Shijiazhuang, China)
P2-8	Deep Learning Based Anomaly Detection Scheme in Software-Defined Networking Yang Qin, Junjie Wei, Weihong Yang (Harbin Institute of Technology (Shenzhen), China)
P2-9	DDoS Attack Detection on Bitcoin Ecosystem Using Deep-Learning Ui-Jun Baek*, Se-Hyun Ji*, Jee Tae Park*, Min-Seob Lee*, Jun-Sang Park**, Myung-Sup Kim* (*Korea University, Korea, **LG Electronics, Korea)
P2-10	Network Security Situation Prediction Based on Long Short-Term Memory Network Li Shang*, Wei Zhao*, Jiaju Zhang*, Qiang Fu*, Qian Zhao**, Yang Yang** (*State Grid Hebei Electric Power Co Ltd, China, **Beijing University of Posts and Telecommunications, China)
P2-11	FLchain: Federated Learning via MEC-enabled Blockchain Network Umer Majeed, Choong Seon Hong (Kyung Hee University, Korea)
P2-12	DB-Kmeans: An Intrusion Detection Algorithm Based on DBSCAN and K-means Gangsong Dong*, Yi Jin*, Shiwen Wang*, Wencui Li*, Zhuo Tao**, ShaoYong Guo** (*Information & Telecommunication Co. of State Grid Henan Electric Power Company, China, **Beijing University of Posts and Telecommunications, China)
P2-13	Improved Secure Computation over Real Numbers and Its Application to Reliability Engineering Takumi Iseki, Masahiro Hayashi (Tokyo City University, Japan)
P2-14	Space Weather Data Management System and Monitoring in Decentralized Storage Environment Y Andrian, Meryam Essaid, DaeYong Kim, Soo Hoon Maeng, Hong Taek Ju (Keimyung University, Korea)
P2-15	A Content-Centric Platform for Home Networks Pai-Hui Wang*, Tse-Han Wang**, Shih-Ting Lin*, Pei-Wen Chen*, Chien-Chao Tseng*, Jiun-Long Huang* (*National Chiao Tung University, Taiwan, **Chunghwa Telecom Co., Ltd., Taiwan)
P2-16	A Data-Over-Sound Application: Attendance Book SooHyun Kim, Hyunsu Mun, Youngseok Lee (Chungnam National University, Korea)
P2-17	Comparison of NVA and RLOWESS Algorithms in Indoor Positioning System Hung-Huan Liu, Wei-Chien Chen, Pin-Chun Hsu (Chung Yuan Christian University, Taiwan)
P2-18	ROS-based Robot Development Toward Fully Automated Network Management Takayuki Warabino, Yusuke Suzuki, Masanori Miyazawa (KDDI Research, Inc., Japan)
P2-19	Store-and-Forward Data Transfer Using Optimized Intermediate Node Woojin Seok*, Jeonghoon Moon*, Wontaek Hong**, Jaiseung Kwak*, Manhee Lee*** (*Korea Institute of Science and Technology Information, Korea, **KISTI & SungKyunKwan University, Korea, ***Hannam University, Korea)
P2-20	SLA Driven Operation- Optimizing Telecom Operation Based on SLA - Atsushi Takada, Naoyuki Tanji, Toshihiko Seki, Kyoko Yamagoe, Yuji Soejima, Mitsuho Tahara (NTT, Japan)
P2-21	A Fault Prediction Method Based on Load-capacity Model in the Communication Network Xilin Ji*, Xiao Liang**, Yun Zhou***, Yonghua Huo***, Xiaodan Shi****, Yang Yang**** (*Institute of Chinese Electronic Equipment System Engineering Company, China, **State Key Laboratory of Networking and Switching Technology, China, ***1st Military Representative Office of Military Equipment Shijiazhuang, China, ****The 54th Research Institute of CETC, China, *****Beijing University of Posts and Telecommunications, China)
P2-22	An Integrated Network Monitoring System for SDN VPN Yueh-Hsien Lin, Chien-Wen Yang, Ting-Che Chuang, Min Liu, Min-Chia Chang (Chunghwa Telecom Co., Ltd., Taiwan)
P2-23	The Design and Simulation of Service Recovery Strategy Based on Recovery Node in Clustering Network Hecun Yuan*, Biyao Li*, Huilin Liu**, Yi Han*, Lanlan Rui*, Ying Wang* (*Beijing University of Posts and Telecommunications, China, **China Aerospace Science, China)
P2-24	Survival Traffic Ratio Analysis for Cascading Failure in Interdependent Networks Hiroshi Yamashita, Masahiro Hayashi (Tokyo City University, Japan)
P2-25	Auction Based Resource Trading Using Relation Between Telecommunication Network Failure Rate and Users' Utility Haruo Oishi*, Kyoko Yamori**, Cheng Zhang*, Yoshiaki Tanaka* (*Waseda University, Japan, **Asahi University, Japan)
P2-26	Detecting Road Conditions in Front of the Vehicle Using Off-The-Shelf Camera Shao-Peng Lu, Min-Te Sun (National Central University, Taiwan)

Poster Session 3: Friday, September 20, 2019, 10:00–10:30, 14:50–15:20, Large Exhibition Hall

Chair: Dr. Yuncheng Zhu (Google, Japan)

P3-1	Blockchain-based Node-aware Dynamic Weighting Methods for Improving Federated Learning Performance YouJun Kim, Choong Seon Hong (Kyung Hee University, Korea)
P3-2	
P3-3	Design and Implementation of Storage System for Real-time Blockchain Network Monitoring System Jiwon Bang, Mi-Jung Choi (Kangwon National University, Korea)
P3-4	Block Analysis in Bitcoin System Using Clustering with Dimension Reduction Mu-Gon Shin*, Ui-Jun Baek*, Kyu-Seok Shim*, Jee Tae Park*, Sung-Ho Yoon**, Myung-Sup Kim* (*Korea University, Korea, **LG Electronics, Korea)
P3-5	Web Server for Analysis and Visualization of Bitcoin Data Hey Yeong Shin, DaeYong Kim, Soo Hoon Maeng, Kiyoung Lee, Hong Taek Ju (Keimyung University, Korea)
P3-6	CoachAI: A Project for Microscopic Badminton Match Data Collection and Tactical Analysis Tzu-Han Hsu, Ching-Hsuan Chen*, Nyan Ping Ju*, Tsi -Ui Ik*, Wen-Chih Peng*, Chih-Chuan Wang*, Yu-Shuen Wang*, Yuan-Hsiang Lin**, Yu-Chee Tseng*, Jiun-Long Huang*, Yu-Tai Ching* (*National Chiao Tung University, Taiwan, **National Taiwan University of Science and Technology, Taiwan)
P3-7	A Comprehensive Multisensor Dataset Employing RGBD Camera, Inertial Sensor and Web Camera Sabrina Ifahdini Soraya, Shao-Ping Chuang, Yu-Chee Tseng, Tsi -Ui Ik, Yu-Tai Ching (National Chiao Tung University, Taiwan)
P3-8	Multi-UAVs Collaboration System Based on Machine Learning for Throughput Maximization Yu Min Park, Min Kyung Lee, Choong Seon Hong (Kyung Hee University, Korea)
P3-9	BDD Method for Evaluating Reliability of Traffic-Path-Based Network Model Takuto Koizumi, Masahiro Hayashi (Tokyo City University, Japan)
P3-10	Method for Estimating the Damping Coefficient of Oscillation Dynamics in Networks Shinichi Kikuchi, Masaki Aida (Tokyo Metropolitan University, Japan)
P3-11	Reliable Design Method for Service Function Chaining Aiko Oi, Motomu Nakajima, Yuji Soejima, Mitsuho Tahara (NTT, Japan)
P3-12	Machine Learning Based Link State Aware Service Function Chaining Seyeon Jeong, Heegon Kim, Jae-Hyoung Yoo, James W. Hong (Pohang University of Science and Technology, Korea)
P3-13	Support Method to Generate Catalogs for Orchestrator Using Catalog Definition Templates K Takahashi, R Katayanagi, N Onai, M Ohtani (NTT, Japan)
P3-14	An Improved Genetic Algorithm for the Scheduling of Virtual Network Functions Qi Li*, Xing Wang**, Tao Zhao**, Ying Wang*, Zifan Li*, Lanlan Rui* (*Beijing University of Posts and Telecommunications, China, **State Grid Liaoning Electric Power Co., Ltd. Jinzhou Power Supply Company, China)
P3-15	Dynamic Auto-scaling of VNFs Based on Task Execution Patterns Asif Mehmood, Talha Ahmed Khan, Javier Jose Diaz Rivera, Wang-Cheol Song (Jeju National University, Korea)
P3-16	Joint User Association and Server Scaling in Multi-access Edge Computing Minh N. H. Nguyen, Chit Wutyee Zaw, Ki Tae Kim, Choong Seon Hong (Kyung Hee University, Korea)
P3-17	Design and Performance Evaluation of Very Large-scale Optical Frame Switching Networks Based on WSS for Future Data Centers Yuh Jih Cheng*, Bor-Tauo Chen*, Yu-Yun Lee** (*Chunghwa Telecom Co., Ltd., Taiwan, **Accton Technology Corporation, Taiwan)
P3-18	Design and Implementation of IPv4 and IPv6 Provisioning Technologies for VPC Architecture Chen-Hsiang Chen, Yu-An Lin, Wei-Te Wu, Yao-Te Huang, Chia-Chen Chu (Chunghwa Telecom, Taiwan)
P3-19	Design and Implementation of Container-based M-CORD Monitoring System Jibum Hong*, Woojoong Kim**, Jae-Hyoung Yoo*, James W. Hong* (*Pohang University of Science and Technology, Korea, **Open Networking Foundation (ONF), USA)
P3-20	Charging Factors for Enabling SDN/NFV Accounting Management Jean Jimmy Julien*, Fuchun Joseph Lin*, Chia-Hsuan Yu**, Wan Hsun Hu** (*National Chiao Tung University, Taiwan, **Chunghwa Telecom Co., Ltd., Taiwan)
P3-21	Energy Efficient Multi-Tenant Resource Slicing in Virtualized Multi-Access Edge Computing Yan Kyaw Tun, Madyan Alsenwi, Shashi R Pandey, Chit Wutyee Zaw, Choong Seon Hong (Kyung Hee University, Korea)
P3-22	Path Selection with Joint Latency and Packet Loss for Edge Computing in SDN Chih-Lin Hu*, Chao-Yu Hsu*, Sod-Erdene Khuukhenbaatar*, Yamkhin Dashdorj**, Yongqiang Dong*** (*National Central University, Taiwan, ** Mongolian University of Science and Technology, Mongolia, ***Southeast University, China)
P3-23	Inter-Session Network Coding with Clustering Routing in Wireless Delay Tolerant Networks Yang Qin, Weihong Yang, Lei Peng (Harbin Institute of Technology (Shenzhen), China)
P3-24	Quality of Service Measurement Mechanism of Cloud-Based Network Architecture Yung-Chang Lai, Jihh-Dao Jhan, Wen-Che Yang, Fei-Hua Kuo, Tai-Chueh Shih (Chunghwa Telecom Laboratories, Taiwan)
P3-25	Network Design System Recommending Similar Configurations Characterized by Manual Knowledges Yuji Kojima, Kodo Ran, Yasuhiko Aoki, Takeshi Nishiyama (Fujitsu, Japan)
P3-26	An SDN-based NAT Traversal Mechanism for End-to-end IoT Networking Hsu-Chien Wang, Chien Chen, Ssu-Hsuan Lu (National Chiao Tung University, Taiwan)

Innovation Session

Innovation Session: Thursday, September 19, 2019, 10:30–11:45, Small Hall

Theme: Architecture and Service Management

Chair: Mr. Haruo OISHI (NTT)

IS1-1	Development and Implementation of Geo-location-based Peer-to-peer Communication Framework Takumi Miyoshi*, Taku Yamazaki*, Olivier Fourmaux**, Yusuke Shimomura*, Takashi Toma*, Maho Ozaki* (Shibaura Institute of Technology, Japan,** UPMC Sorbonne Universités, France)
IS1-2	Sensing Quality Based Mechanism Design for Crowdsourcing-based Indoor Localization Wei Li*, Zhi Liu**, Cheng Zhang*, Yoshiaki Tanaka* (*Waseda University, Japan, **Shizuoka University, Japan)
IS1-3	Design and Implementation of Network Topology for ICT Service Monitoring System Yi Hsuan Hung, An Jung Cheng and Pin Kao (ChungHwa Telecom, Taiwan)



Demo Session

Demo Session: Thursday, September 19, 2019, 15:25–15:55, Large Exhibition Hall

Chair: Mr. Hiroki Nakayama (BOSCO Technologies Inc.)

DS1-1	Development and Implementation of Geo-location-based Peer-to-peer Communication Framework Takumi Miyoshi*, Taku Yamazaki*, Olivier Fourmaux**, Yusuke Shimomura*, Takashi Toma* and Maho Ozaki* (*Shibaura Institute of Technology, Japan, **UPMC Sorbonne Universités, France)
DS1-2	A Search Approach Based on Query Similarity in Content-Centric Networks Jiun-Yu Tu*, Chih-Lin Hu and Han Hu** (*Southern Taiwan University of Science and Technology, Taiwan, **National Central University, Taiwan)



Exhibitions

E1. Chunghwa Telecom: Intelligent IPTV End-to-end Service Diagnosis based on AI Booth number: 1	
 中華電信 Chunghwa Telecom	Chunghwa Telecom leverages AI capabilities for preemptive issue identification and resolution of IPTV service problem to improving the quality and the speed of operations. An IPTV service is typically composed of a number of network components from customer premise equipment (CPE) to service platform. It's difficult to identify the root cause of the service problem when customer make a complaint. We apply AI/deep learning method to pinpoint the cause of the trouble when trouble tickets are created and use ensemble learning method to deal with heterogeneous training data. Tickets no longer need to wait hours, or even days, just to be assigned to the right expert or team, thereby shortening time for issue resolution. Visit Chunghwa Telecom booth for more information and interaction.
E2. J's Communication Co., Ltd.: Security Service products for network operators Booth number: 2	
 J's Communication	J's Communication is a company that provides secure and comfortable security & network solutions. We display the following three products. SCVX: Provide secure Internet access using container technology. StellarCyber Starlight: Detects cyber breaches across your entire network, regardless of scale or complexity. Skybox Security: One platform to solve many challenges-vulnerabilities, threats, firewalls and compliance.
E3. NTT Advanced Technology Corporation: NetworkBrain Booth number: 3	
 NTTAT	NetworkBrain integrates with existing IT workflows such as network troubleshooting, design engineering, cyber-defense, and application performance management, to provide valuable insights, minimizing the time engineers spend in the command-line interface, or analyzing data across disparate tools. NetworkBrain employs a Dynamic Map as the single pane of glass for data visualization and Executable and Executable Runbook technology to automate the process of data analysis

E4. BOSCO Technologies Inc.: Connection Integration System for ICT Infrastructure Management
Booth number: 4



Because of SDN/NFV, ICT infrastructures are becoming large and complicated. The unified, simplified and flexible ICT infrastructure management that does not depend on environment is required to manage such an ICT infrastructure. To implement such a management system, we focused on the traceability, client-less operation, and zero-touch operation.

BOSCO Technologies provides a SMART-GW, the brand-new web-based unified and simplified ICT infrastructure management system. Operators can login to SMART-GW via web browsers and establish a connection such as SSH, http, RDP, and so on to manage the ICT infrastructures. All the connection behaviors are logged and traceable with user-friendly dashboards. Please visit our booth for more information and demonstrations.

E5. NTT: Real-time Network Traffic Monitoring System for Virtual Network
Booth number: 5



It is necessary to monitor virtual network traffic to manage and operate various service in a data center that applies network virtualization technology such as SDN and NFV. In addition, it is desirable to monitor the traffic from the outside of a server so as not to degrade the performance of it.

NTT presents a real-time network traffic monitoring system for a virtualized environment, which can be located outside of a server. By using a NTT's high-speed and flexible flow identification technology, the system can visualize the amount of network traffic for each Virtual Machine (VM). The system also provides a function to detect micro-burst traffic which is difficult to detect by using software. Please visit our booth for more information and demonstrations.

E6. VMware K. K.: Networking and Management solutions for Virtualized/Containerized Platform
Booth number: 6



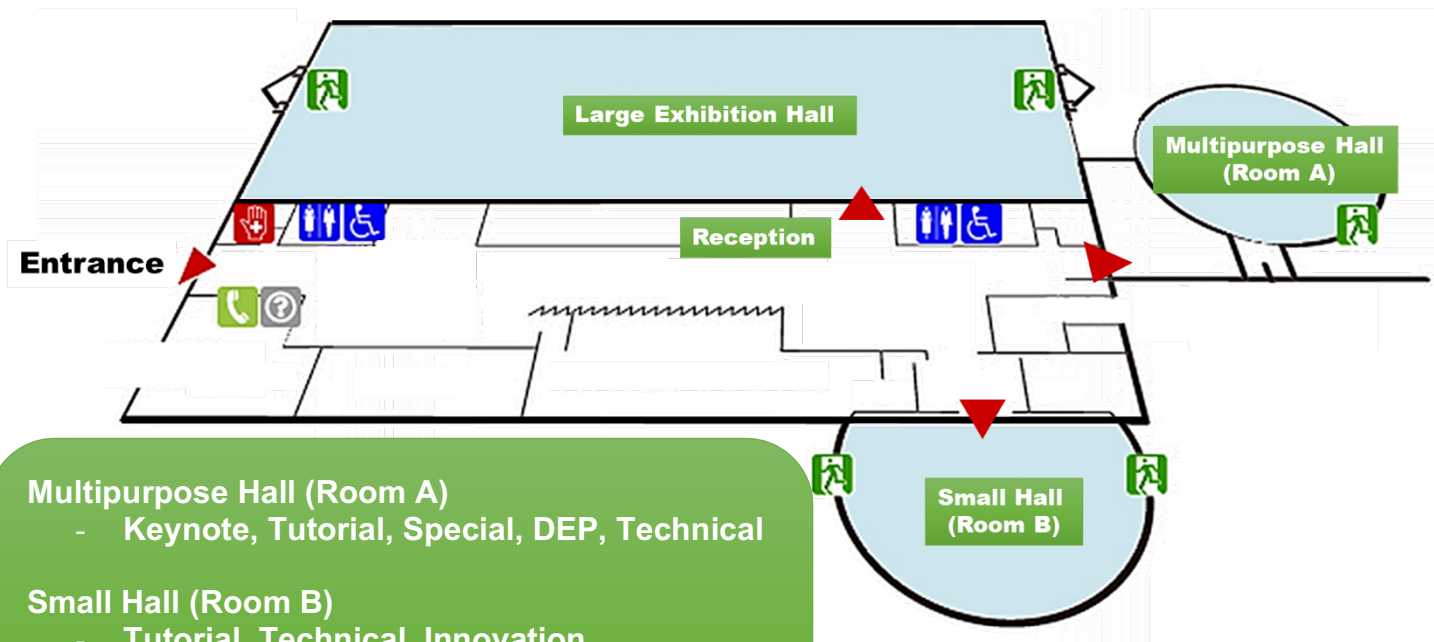
VMware has been providing solutions for computing platforms long years. In this booth we exhibit NSX, vRNI and other emerging solutions for various datacenter environment (vSphere, OpenStack, Kubernetes etc).

Venue Information

APNOMS 2019 will be held at "Kunibiki Messe" (Shimane Prefectural Convention Center) in Matsue, JAPAN.

The facilities we will use are as shown in the following pictures.

- ▶ Address: 1-2-1 Gakuen Minami, Matsue, Shimane 690-0826, Japan
- ▶ Tel: +81 852-24-1111
- ▶ Access Map: <http://www.kunibikimesse.jp/60.html>



Multipurpose Hall (Room A)

- Keynote, Tutorial, Special, DEP, Technical

Small Hall (Room B)

- Tutorial, Technical, Innovation

Large Exhibition Hall

- Poster, Exhibition, Demo
- Lunch, Coffee Break

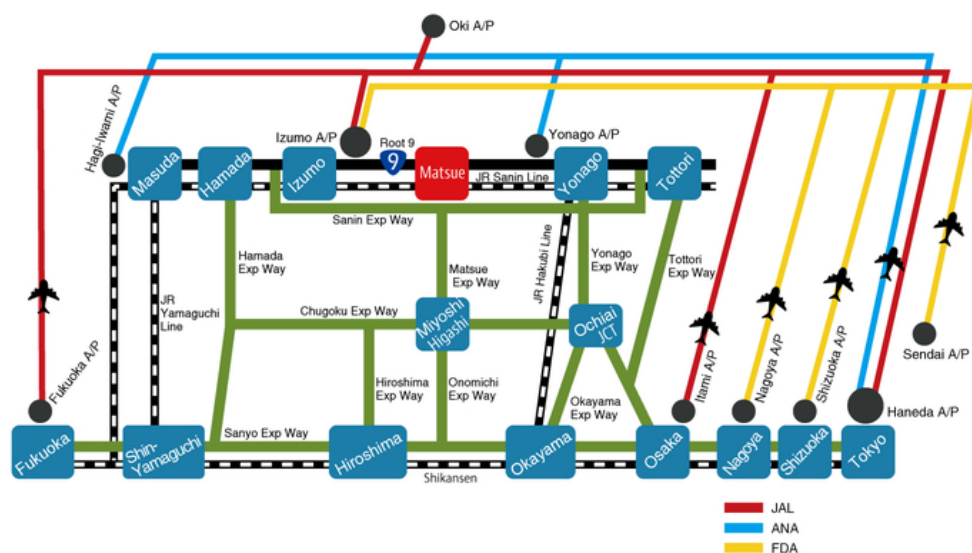
The conference will be held in the first floor of Kunibiki Messe



Transportation Information

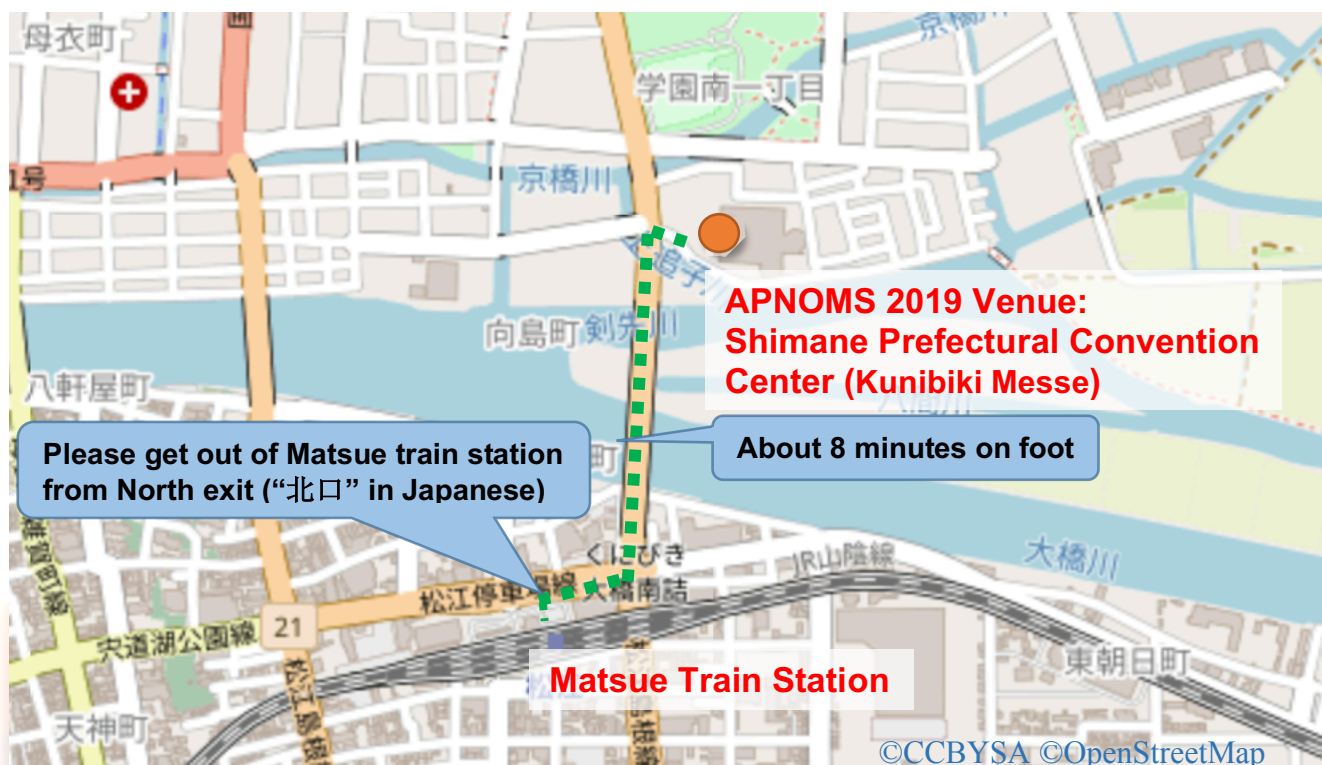
- Please refer to the following figures to know how to get to Matsue.

The way to arrive to Matsue train station from main airports and stations of Japan.



It takes about 8 minutes from Matsue train station to Kunibiki Messe, and it takes about 2 minutes from Matsue bus station to Kunibiki Messe

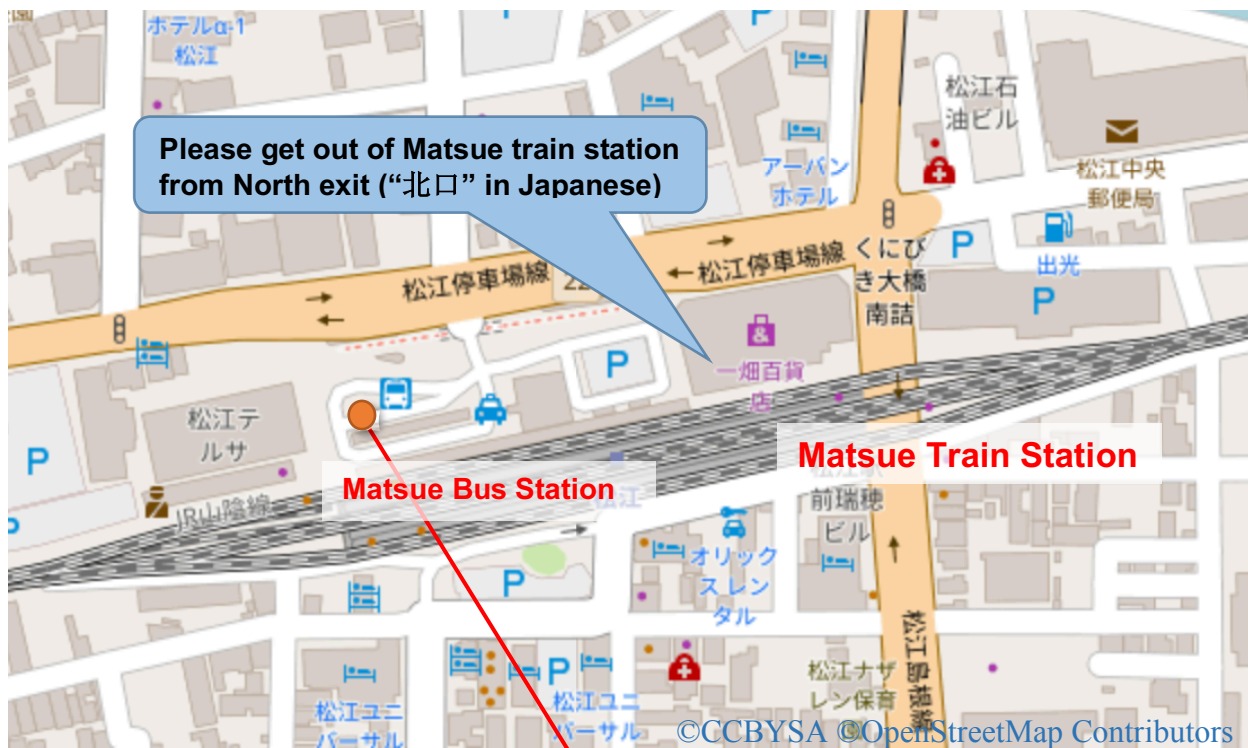
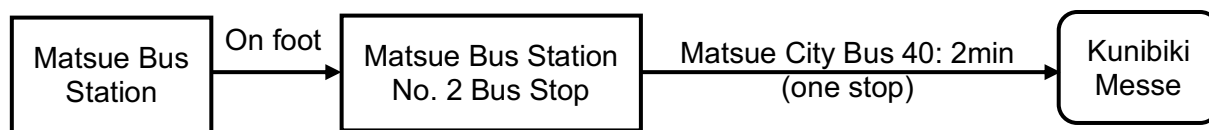
- How to get to Kunibiki Messe on foot.



The walking road map from Matsue train station to Kunibiki Messe.

● How to get to Kunibiki Messe by bus.

■ From Matsue Bus Station



The map and picture for bus station stop at Matsue bus station.

Tour Information

- Matsue City Centre**

Please visit the website for complete information <https://www.visit-matsue.com/discover>



Matsue Castle

Completed in 1611 and one of only 12 remaining original castles nationwide, Matsue Castle was built over a five-year period by Horio Yoshiharu, feudal lord and founder of Matsue. It was designated as a national treasure in 2015.

The elegance of the castle's swooping roofs and decor is often compared to the wings of a plover bird ('chidori'), which has led to the castle's nickname, Plover Castle ('chidori-jo'). There is a museum inside, and the top floor offers a panoramic view of the castle grounds and the city.



Horikawa Sightseeing Boat

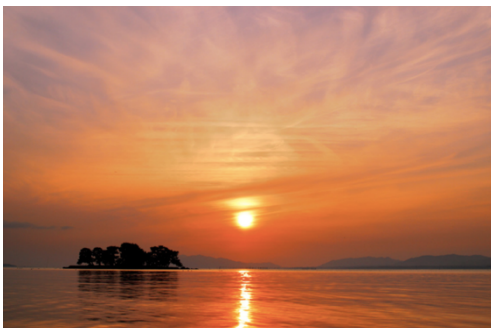
This boat tour circles the castle's historical inner and outer moats, passing points of interest which you may not see otherwise. The boat also passes under particularly low-built bridges from time to time, meaning the passengers need to duck down as the roof lowers. Kotatsu heaters are placed in the boat during winter and passengers can literally experience the "warmth" of Japanese tradition.



Shimane Art Museum

This art museum opened in 1999 and was designed by Kiyonori Kikutake, a prominent Japanese architect known as one of the founders of the Japanese Metabolist (architectural movement) group. It was built to look like a painter's palette, and looks also like the setting sun.

The art museum houses collections of western and Japanese paintings, print, sculptures, modern art, photography, and crafts. Situated on Lake Shinji's shore, Shimane Art Museum is one of the best spots for enjoying the beautiful sunsets.



Sunset Over Lake Shinji

Central Matsue is a great spot to watch Lake Shinji's magnificent sunsets. This view has been included in Japan's list of one hundred best sunsets, and it's not hard to see why, as the colours not only change over the final fleeting moments of daylight, but also vary in time over the changing seasons.

We recommend watching it from anywhere along Shirakata Park, from the Shimane Art Museum or the sunset viewing spot, which is located south of the museum along the lakefront promenade. From there, you can enjoy the closest view of the petite island of Yomegashima.

- Outer Matsue

Please visit the website for complete information <https://www.visit-matsue.com/discover>



Sada Shrine

Designated as an Important National Cultural Asset, Sada Shrine has the rare characteristic of being composed by three Taisha-tsukuri style halls, the same style of architecture as Izumo Taisha Grand Shrine.

Taking its name from Sada-no-okami, protector of the northern Shimane Peninsula, the shrine is dedicated to twelve deities, among which are the most important ones of Shintoism – the couple that created Japan, Izanagi and Izanami, and their children, Amaterasu and Susanoo.



Mihonoseki Harbour

Though access by public transportation is limited, the small historic harbour of Mihonoseki is well worth a visit. Mihonoseki flourished as a port for Kitamae-bune ships carrying goods to places like Osaka and Tokyo during the Edo period. Mihonoseki has also been an important connecting point between Japan and the Asian continent.

Surrounded by an abundance of nature and offering a wonderful view of Mt. Daisen, Mihonoseki remains just as [Lafcadio Hearn](#) described it many decades ago. Read the following articles to learn more about this small harbour town.



Shichirui Port (Meteor Plaza)

Located on the northern side of the Shimane Peninsula, Shichirui Port gives you access to the [Oki Islands](#) via daily ferries. It is also home to the Meteor Plaza, which displays a meteorite which fell through the roof of a nearby private residence in 1992. The meteorite is 25.2 cm in length and weighs 6,380g. There is also a sea water pool with sauna, a restaurant, and performance hall.



Nakaumi Lake

Lake Nakaumi is the fifth largest lake in Japan. Connected to the Sea of Japan via the Sakai Channel and to Lake Shinji through Ohashi River, it is a brackish lake with abundant wildlife. Its two main islands, connected by bridges and roads, are Daikonshima and Eshima.

The little Eshima Island is connected to Tottori Prefecture with a rigid frame bridge culminating at 45m above sea level, providing a vista-point for a majestic view of Mt Daisen. Lake Shinji and Nakaumi together are designated as Ramsar Convention Wetlands of International Importance since 2006.



General Information

About Matsue

Matsue is the capital city of Shimane Prefecture, in Southwest Japan. Known as the “City of Water”, Matsue stands by the Sea of Japan where Lake Shinji and Nakaumi meet, in the middle of Shimane Peninsula.

A former feudal stronghold, Matsue is a true castle town crossed with many canals and boasts one of the twelve remaining original castles in Japan. Famous for its beautiful sunsets over Lake Shinji, Matsue also prides itself on having been the adopted home of the writer Lafcadio Hearn, who became one of the first Westerners to take Japanese citizenship under the name of Koizumi Yakumo.

As an International City of Culture and Tourism, Matsue offers great sightseeing opportunities and welcomes international tourists with significant discounts. 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.



Registration

Notice: Author registration must be done by Early-Bird due date: **July 29, 2019.**

Registration Fees

Attendee/Type	Early-Bird (by July 29 2019)	Regular
Author	25,000 JPY	Not Available
Full	25,000 JPY	35,000 JPY
Student	5,000 JPY	10,000 JPY
Student (auditing only)	Free of charge	
Exhibitor	10,000 JPY	15,000 JPY

Author/Full/Student registration includes proceedings, admissions to tutorial sessions and all technical sessions(*), banquet, lunch, and coffee breaks. Student (auditing only) registration includes admissions to tutorial sessions and all technical sessions(*). Exhibitor registration includes banquet, lunch, and coffee breaks.

(*): [technical sessions](#), [innovation sessions](#), [poster sessions](#), [special sessions](#), [keynote sessions](#) and [DEP session](#).

(**): **No banquet tickets are included if you register after 9 AM (JST) on the first day (Sep. 18) of the symposium.**

If you have any food preference (vegetarian and so on), please register by the end of August. After that, we may NOT be able to meet your preference.

Extra items must be ordered at the same time of his/her online registration. On-site order is not available.

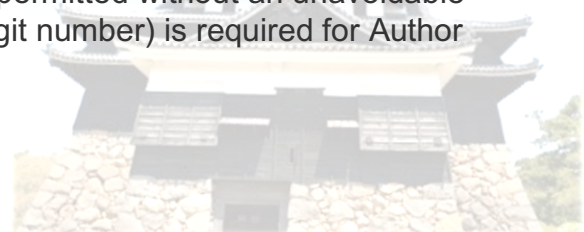
Item	Early-Bird (by July 29 2019)	Regular
Extra banquet ticket	7,000 JPY	Not Available

All of the fees will be charged only in Japanese YEN (JPY).

Especially for Authors (Important!)

Notice: In this section, a “paper” means technical, poster, or innovation session’s paper.

At least one author of an accepted paper must register as Author registration by the Early-Bird due date even if the author is a student, in order to guarantee the paper to be published in the symposium proceedings, IEICE Proceedings Series and IEEE Xplore. (Innovation session’s papers are included only in the symposium proceedings.) For authors with multiple accepted papers, **one Author registration is valid for only one paper**. Accepted paper must be presented at the conference site. Online presentation (e.g. Skype) is not permitted without an unavoidable reason such as a natural disaster. EDAS paper number (10-digit number) is required for Author registration.

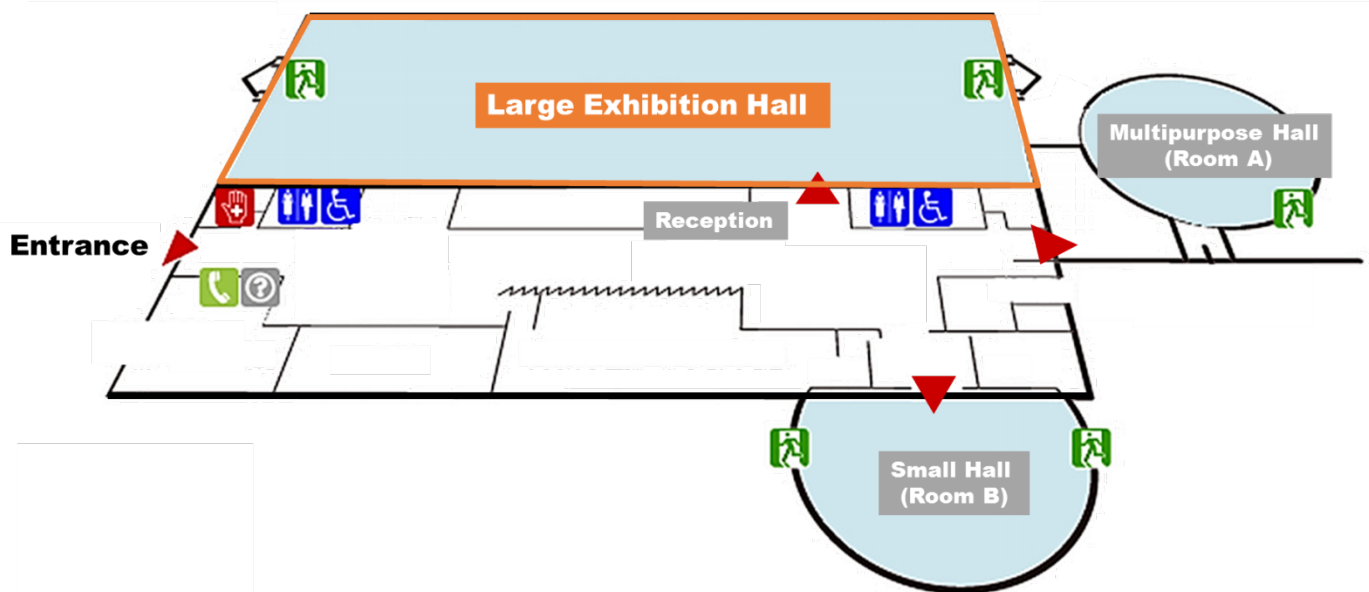


Welcome Party

Welcome Party

- **Date and Time:** Sep 18th (Wed.) 2019, 18:30 - 20:30
- **Location:** Large Exhibition Hall of Kunibiki Messe

Invited speakers, exhibitors, and all attendees with full registration are welcome to the welcome party.



Symposium Banquet

Symposium Banquet

- **Date and Time:** Sep 19th (Thu.) 2019, 18:00 - 20:00
- **Location:** Yushi-en Garden
- Bus to the banquet location will be provided by APNOMS 2019 organization committee.
And Bus back to Matsue train station will be provided.

Invited speakers, exhibitors, and all attendees with full registration are welcome to the symposium banquet.

From the venue to the Yushi-en Garden

