27th International Telecommunication Networks and Applications Conference (ITNAC)

Keynote Speakers

Professor Ying-Dar Lin, IEEE Fellow and Distinguished Lecturer

Keynote Topic: Network Cloudification: SDN-NFV and 5G-MEC with Edge and Fog Computing

Abstract: The second wave of cloud computing, named network cloudification, in the forms of SDN (Software Defined Networking), NFV (Network Function Virtualization), and 5G-MEC (Mobile Edge Computing), is to centralize and virtualize networking into data centers. It enables operators to offer NaaS (Networking as a Service) with much lower CAPEX and OPEX with larger flexibility because devices become simpler, the number of administrators is less, and service orchestration is easier. It turns parts of communications currently done in hardware into computing done in software. However, the host of these data centers would not be Google-like super data centers as they are too far away from subscribers. The latency requirement of 10ms and 1ms decentralizes cloud computing down to edge and fog computing with CORD (central offices re-architected as data centers) and cellular base stations for SDN-NFV and 5G-MEC, respectively. In this talk, we first argue why, where and when SDN, NFV, 5G-MEC would prevail, and then illustrate how to make it happen with OpenFlow, SC (Service Chaining), NSH (Network Service header), etc. Then we examine how latency requirement dominates this virtualization game by listing key questions to answer in resource allocation in the architectures of SDN, NFV, and 5G-MEC. Their answers are mostly unknown now but would benefit the architects and developers of OpenFlow switches, SDN controllers, SDN-NFV apps, NFV data centers, MEC-enabled base stations, and operator's infrastructure in general.

Bio: Ying-Dar Lin is a Distinguished Professor of Computer Science at National Chiao Tung University (NCTU) in Taiwan. He received his Ph.D. in Computer Science from UCLA in 1993. He served as the CEO of Telecom Technology Center in Taipei during 2010-2011 and a visiting scholar at Cisco Systems in San Jose during 2007-2008. Since 2002, he has been the founder and director of Network Benchmarking Lab (NBL, www.nbl.org.tw), which reviews network products with real traffic. NBL became a certified test lab of the Open Networking Foundation (ONF) since July 2014. He also cofounded L7 Networks Inc. in 2002, which was later acquired by D-Link Corp. His research interests include design, analysis, implementation, and benchmarking of network protocols and algorithms, quality of services, network security, deep packet inspection, wireless communications, embedded hardware/software co-design, and recently network cloudification. His work on "multi-hop cellular" was the first along this line, and has been cited over 800 times and standardized into IEEE 802.11s, IEEE 802.15.5, WiMAX IEEE 802.16j, and 3GPP LTE-Advanced. He is an IEEE Fellow (class of 2013), an IEEE Distinguished Lecturer (2014-2017), and a Research Associate of ONF. He has served or is serving on the editorial boards of IEEE Transactions on Computers, IEEE Transactions on Sustainable Computing, IEEE Computer (Associate Editor-in-Chief), IEEE Network, IEEE Communications Magazine - Network Testing Series, IEEE Wireless Communications, IEEE Communications Surveys and Tutorials,

IEEE Communications Letters, Computer Communications, Computer Networks, Journal of Network and Computer Applications, and IEICE Transactions on Communications. He is currently the Editor-of-Chief of IEEE Communications Surveys and Tutorials. He has guest-edited several Special Issues in IEEE journals and magazines, co-chaired symposia at Globecom'13 and ICC'15, and chairs workshops and symposia in Globecom'18 and Globecom'19. He published a textbook, Computer Networks: An Open Source Approach (www.mhhe.com/lin), with Ren-Hung Hwang and Fred Baker (McGraw-Hill, 2011). It is the first text that interleaves open source implementation examples with protocol design descriptions to bridge the gap between design and implementation.

Professor Rudolf Mathar, Pro-Rector for Research and Structure at RWTH Aachen University

Keynote Topic: Elementary Channels for Quantization, Neural Networks and Molecular Information Exchange

Abstract: Basic concepts of information theory, namely entropy, mutual information and capacity of channels, are universal tools which can also be applied to analyze information processing of biological systems. The main intention of this talk is to demonstrate the usefulness of information theoretic approaches to neural networks. We will briefly discuss biological neural networks and the functionality principles of neurons. Corresponding idealizing models will include linear, binary threshold, rectifying, censoring and sigmoid neurons. These can be interpreted as information channels, which opens the door to the field of information theory. The capacity and corresponding bounds will be derived providing interesting insight into the control and behavior of neurons. We will also investigate the underlying molecular information exchange by a Poissonian diffusion model.

Bio: Rudolf Mathar received the Ph.D. degree from RWTH Aachen University in 1981. He held lecturer positions with Augsburg University and the European Business School. In 1989, he joined the Faculty of Natural Sciences, RWTH Aachen University. He has held the International IBM Chair in computer science with Brussels Free University in 1999. In 2004, he was appointed as the Head of the Institute for Theoretical Information Technology with the Faculty of Electrical Engineering and Information Technology, RWTH Aachen University. Since 1994, he has held visiting professor positions with The University of Melbourne, Canterbury University, Christchurch, and Johns Hopkins University, Baltimore. In 2002, he was a recipient of the prestigious Vodafone Innovation Award. In 2010, he was elected member of the NRW Academy of Sciences and Arts. He is co-founder of two spin-off enterprises. From 2011 to 2014, he served as the Dean of the Faculty of Electrical and Engineering and Information Technology. In 2012, he was elected as Speaker of the Board of Deans, RWTH Aachen University. Since 2014, he has been serving as Vice-rector for research and structure with RWTH Aachen University. His research interests include information theory, mobile communication systems, particularly optimization, resource allocation, and access control. Recently he has initiated projects in the area of compressed sensing and data science.

Professor Jean Armstrong, IEEE Fellow

Keynote Topic: Visible light communications: a solution to the spectrum crunch?

Abstract: Standard white lighting LEDs unlike conventional forms of lighting can be modulated at megahertz frequencies. As a result every LED light has the potential to transmit high speed data. This is the basis of important new forms of visible light communications (VLC) and visible light positioning (VLP). This talk will outline the key findings of our research on VLC and VLP and that of other leading groups around the world. The huge potential of this emerging field to deliver very high speed data and accurate indoor positioning will be explained. The many research challenges that still have to be overcome to turn this potential into reality will be outlined. VLC, particularly one form called LiFi, has attracted a lot of media attention. This talk will separate the facts from the hype.

Bio: Jean Armstrong is a Professor at Monash University, Australia, where she leads a research group working on topics including optical wireless, radio frequency and optical fiber communications. She has published numerous papers including over seventy on aspects of OFDM for wireless and optical communications and has six commercialized patents. Jean Armstrong was born in Scotland and before emigrating to Australia worked as a Design Engineer at Hewlett-Packard Ltd., Scotland. In Australia she has held a range of academic positions at Monash University, the University of Melbourne and La Trobe University. During her career she has received numerous awards including a Carolyn Haslett Memorial Scholarship, a Zonta Amelia Earhart Fellowship, the Peter Doherty prize for the best commercialization opportunity in Australia (joint winner), induction into the Victorian Honour Roll of Women, the 2014 IEEE Communications Society Best Tutorial Paper Award and most recently the IET Mountbatten Medal. She is a Fellow of the IEEE and IEAust. She was a Member of the Australian Research Council (ARC) Research Evaluation Committee in the most recent evaluation round and has previously served on the ARC College of Experts. Professor Armstrong is actively involved in IEEE Communications Society activities including editing (IEEE Communications Letters, IEEE Transactions on Communications, Journal of Optical Communications Networks), reviewing and conference organization.

Dr Luca Chiaraviglio, University of Rome Tor Vergata

Keynote Topic: Viability of 5G for Rural Communications

Abstract: Nowadays, at least two billion people are experiencing a complete lack of wireless cellular coverage. Such users live in rural areas and low-income regions, where the network operators are not keen to invest, mainly due to high Capital Expenditure (CapEx) and Operational Expenditure (OpEx) costs, as well as the scarcity of electricity from the grid. We tackle this challenge by proposing a 5G network explicitly designed to serve rural and low-income areas. Our solution exploits Remote Radio Heads (RRHs) mounted on top of Unmanned Aerial Vehicles (UAVs), as well as Large Cells (LCs) to increase the coverage range. In addition, 5G-nodes are powered by solar panels and batteries. Preliminary results, obtained over three representative case studies (located in Italy, Cook Islands, and Zimbabwe) show that providing connectivity in rural and low-income areas by means of the proposed 5G architecture is feasible. At the same time, we also show that the monthly subscription fee paid by the users can be kept sufficiently low, e.g., less than 1 [EUR/month] in low-income areas, and less than 10 [EUR/month] in rural regions.

Luca Chiaraviglio, Nicola Blefari-Melazzi, William Liu, Jairo A. Gutierrez, Jaap van de Beek, Robert Birke, Lydia Chen, Filip Idzikowski, Daniel Kilper, Paolo Monti, Antoine Bagula, Jinsong Wu, Bringing 5G in Rural and Low-Income Areas: Is it Feasible?, IEEE Communications Standards Magazine, on press, 2017.

Bio: Luca Chiaraviglio is at the University of Rome Tor Vergata, Italy, and an Adjunct Assistant Professor at the University of Cassino and Southern Lazio, Italy. He holds a Ph.D. in Telecommunication and Electronics Engineering, obtained from Polytechnic University of Turin, Italy. Previously to join the University of Rome Tor Vergata, he has been post-doc at the Telecommunication Network Group of Polytechnic University of Turin (Italy), ERCIM fellow at the Mascotte project of INRIA Sophia Antipolis (France), CNIT fellow at the University of Rome Sapienza (Italy), Assistant Professor at the DIET Department of the University of Rome Sapienza (Italy), and Senior Researcher at CNIT (Italy). During the last years, he has spent visiting research periods in different institutions, including: Etecsa SA (Cuba), Boston University (USA), and Auckland University of Technology (New Zealand). Luca has co-authored 100+ papers published in international journals and conferences, and he participates in the Program Committees of several conferences, including IEEE INFOCOM, IEEE GLOBECOM, and IEEE ICC. He serves as an Associate Technical Editor for the IEEE journal Communications Magazine (one of the leading journals in telecommunications) and as an Editor for IEEE Transactions on Green Communications and Networking. He participates/has participated in different European projects (H2020 SUPERFLUIDITY, FP7 TREND, FP7 ECONET, FP7 BONE) and he has been the coordinator of the national projects LIFETEL and DIAMETER. He has been recognized in the top 1% most cited authors in the Information and Communication Technology (ICT) sector worldwide (reference period: 2009-2016). He has won the IEEE VTC-Spring 2016 Best Paper Award (selected as a winner over 450 papers presented at the conference), the Sapienza Awards 2014, the Fabio Neri Fellowship 2013, the ERCIM Alain Bensoussan Fellowship 2012, the GARR Antonio Ruberti Award 2011, the GTTI Award 2011, and the IBM Ph.D. Award 2009. His main research activities are in the field of 5G network architectures, 5G economic analysis, optimization techniques, and performance evaluation of 5G networks. In the past, he has investigated the topics of energy efficiency in the ICT sector, reliability of network devices, measurements in cellular networks, and Internet tomography. His works cover both theoretical models, as well as more practical aspects such as simulation and implementation. He is an IEEE Senior Member. According to Google Scholar, his H-index is 25.

Dr Murray Milner, Crown Infrastructure Partners

Keynote Topic: Viability of 5G for Rural Communications

Abstract: New Zealand has been on a journey to deliver Ultrafast Broadband (UFB) to as many premises as possible following a commitment by the Prime Minister leading into the 2008 elections. This resulted in the formation of Crown Fibre Holdings in 2009 and the launch of the UFB initiative in 2011. The initial rollout was focussed on delivering Fibre to the Premise to 75% of urban premises and businesses by the end of 2019. This stage is now well advanced and will be completed ahead of schedule and below budget. In early 2017, the coverage was extended to 87% of New Zealand premises by 2022, including coverage of more than 340 additional towns. This was followed later in 2017 by the extension of broadband to 99% of New Zealand premises using wireless technologies delivering better than 50Mbps downstream by 2025. The latter initiative also includes mobile coverage of more than 1000km of roads throughout New Zealand. The goal of the UFB initiative is to provide consistent 100Mbps downstream and 50Mbps upstream to 87% of premises as a base affordable product and to enable expansion over time to deliver Gigabit and higher speed services with minor incremental investment. Gigabit per second services are already consumed by 5% of New Zealand households today, so Superfast Broadband is expected to rapidly emerge across New Zealand over the next decade.

Bio: Dr Milner has spent over 40 years in the ICT industry. He is widely recognised within his profession for his leadership in ICT development in New Zealand. He has been awarded Fellowships to work and study in both the UK and USA during his career. He is a Distinguished Fellow of IPENZ, an active member of IET and a Senior Member of IEEE and is on the editorial panel for the Australian Journal of Telecommunications and the Digital Economy. After spending much of his career with Telecom New Zealand, Dr Milner now runs a busy consulting practice in New Zealand and works extensively with central government, local government and enterprises on ICT strategy, economics and infrastructure development. He is currently Chair of Harmonic Analytics Limited, a Director of Crown Infrastructure Partners, a member of the Digital Advisory Board and the Capital Investment Committee for health, Chair of the Whole of Government Radio Network Governance Board and Chair of the Data Exchange Technical Advisory Board. As a Director of Crown Infrastructure Partners (formerly Crown Fibre Holdings) he has been involved in the rollout of the Ultrafast Broadband initiative across New Zealand since its conceptual beginnings in 2007.

Mr Andrew McGee, Huawei Australia

Keynote Topic: A view from the tower

Abstract: As the global leader in supplying innovation to carriers around the world Huawei has an enormous investment in research and development to push the envelope in telecommunications, consumer and enterprise technology. In this keynote we take a birds-eye look at the tech landscape and what the future holds for cloud and communications technologies. Which emerging trends and technologies will affect our lives as consumers, practitioners and vendors of technology? How do we, as custodians of technology, navigate a swiftly changing landscape to prepare for what's around the corner and determine the best strategies for our organisations?

Bio: Spanning the past 25 years in the IT industry, specialising in information management and platform solutions, Andrew has worked with companies from multiple industries across the Australian IT landscape. From being an IT practitioner to an IT leader, Andrew has always had a focus on customer outcomes and a passion for inspiring technical teams to stretch for greatness. He has partnered closely with governments, integrators, vendors, industry pundits and enterprises to use technology to solve problems, build clouds, drive innovation and gain market advantages. Andrew is a passionate technology advocate and tech industry watcher, speaking at industry and customer events on technology trends and their potential impact on business and society. Currently based in Melbourne, Andrew has previously called several Australian cities home including Perth, Darwin, Adelaide and Canberra, giving him a first-hand understanding of the wider Australian market and the unique subtleties across ANZ.