



*The 88<sup>th</sup> IEEE  
Vehicular Technology Conference*

Final Programme



27 – 30 August 2018

**Chicago, USA**

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## Welcome from the General Chair

I am extremely pleased to have the honor of welcoming you to the 88th IEEE Vehicular Technology Conference, VTC2018-Fall, and to its host city, the great International City of Chicago.

Beyond the slate of outstanding tutorials, workshops, and technical sessions, VTC2018-Fall will feature world-class keynote speakers, exciting plenary panels, and a three-day Industry Program. Marty Cooper, Honorary Conference Chair, a native Chicagoan, and among other contribution, the “Father of the Cellphone” will provide our lead-off keynote. The four-day program features Tutorials, Workshops and a mini-Conference on Monday followed by Theme Days focusing on 5G and Applications, Autonomous Vehicles, and Smart Cities and IoT. Attendees will have the opportunity to hear from some of the world’s most distinguished industry leaders and researchers. This includes Dr. Aylin Yener who will be our featured speaker at our Women in Engineer lunch on Tuesday.

Our venue is Chicago, one of the truly great world destination cities. Chicago boasts world re-known museums, parks, zoos, botanical gardens, architectural tours, and many other exciting venues to engage the visitor. The city has one of the most diverse business communities in the world, and is the home of numerous innovations including the zipper, TV remote control, meat packing, deep dish pizza, the Ferris Wheel,

Skyscrapers and Modern “Glass and Steel” Architecture, nuclear energy, and of course two-way radios and the cellphone. Greater Chicago is home to a very vibrant academic environment with nearly 100 colleges and universities.

I’d like to take this opportunity to thank all the members of the Organizing Committee and Technical Program Committee and their leaders for the outstanding work they have done to create this incredible event. I am literally amazed by the dedication and diligence of the hundreds of experts in our research community who have devoted their time to paper review process. Finally I would like to recognize the excellence and the tremendous research and preparation shown by the numerous authors who submitted their works for consideration and especially those involve with the nearly 500 papers that will be presented at our VTC2018-Fall event.

We have made every effort to enhance and extend the already impressive VTC tradition of excellence in this VTC2018-Fall event. I hope each of our delegates will not only benefit from the conference program but will develop many new and beneficial relationships and finally have a truly memorable time in the great City of Chicago!

Dennis Roberson  
*General Chair, IEEE VTC2018-Fall*

## Welcome from the TPC Chairs

It is with pleasure that we welcome you to IEEE VTC2018-Fall—the 88th edition of VTC. This Chicago edition of the conference has proven to be extremely popular, including around 500 papers covering a wide range of topics brought forward by the leading industrial, academic, and governmental innovators, thinkers, and pioneers.

VTC has a long-established history of bringing together the scopes of vehicular technology and mobile/cellular/wireless communications, thereby also covering the intersection of these topics through vehicular communications. Indeed, it is through vehicular technology and particularly the readily-available power source therein that the earliest mobile/cellular telephony in the form of “car phones” was possible.

It is therefore fitting that we have with us a true pioneer and innovator, the “Father of the Cell Phone” Marty Cooper. Marty has to his name “Cooper’s Law”, the wireless communications equivalent of Moore’s Law. Such a profound projection is in line with Marty’s truly visionary achievement of inventing and leading the development of the first ever personal mobile/cellular

phone. It is through such an atmosphere of forward-thinking that this conference aims to inspire the latest generation of dedicated and skilled engineers, scientists and leaders that will maintain the record of unparalleled human, societal and economic development that wireless communications and vehicular technology have had.

Putting together such a conference is a significant undertaking, involving a large team of dedicated individuals. With this in mind, we would like to thank the Technical Program Committee, and particularly the Track Chairs, who have contributed vast time and effort towards making the conference a success. We would also like to thank the VTC conference administrative team for their excellent behind-the-scenes work, without which there would be no VTC. Finally, we would like to thank the leadership of the conference for their exceptional work.

We hope you enjoy VTC2018-Fall!

Oliver Holland  
*TPC Chair*

Octavia A. Dobre and Miguel Sepulcre Ribes  
*TPC Co-chairs, IEEE VTC2018-Fall*

## Congratulations!

Roberson and Associates is proud to support VTC2018-Fall. Your enduring commitment as delegates to this conference with its focus on wireless, mobile, and vehicular technologies inspires us all.

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## Welcome from the VTS President

On behalf of the IEEE Vehicular Technology Society, it is truly an honor and a pleasure to welcome all of you to our society's flagship conference, the 2018 IEEE 88th Vehicular Technology Conference – VTC2018-Fall.

This year's Fall 2018 edition of the Vehicular Technology Conference series will provide attendees with a superb collection of presentations, tutorials, talks, industry panels, and other activities that will facilitate the exchange of knowledge, enable professional development and growth, and support numerous networking opportunities with other conference attendees from around the world.

Given the impressive range of technical and networking activities offered by VTC2018-Fall, we are very fortunate to have an extraordinary city serving as the host for this conference – Chicago. From the Magnificent Mile to Navy Pier, Millennium Park to the Willis Tower, Chicago is a vibrant and world-class metropolitan center specializing in science and technology, history, architecture, cuisine, music, and the

arts; a great place to explore during your stay in this remarkable city!

Organizing a world-class conference event such as VTC2018-Fall involves a large and highly dedicated team of volunteers, and we are very thankful to everyone making this conference an outstanding success! I would like to sincerely thank General Chair Dennis Roberson and Honorary Chair Marty Cooper, Technical Program Chair Oliver Holland, Technical Program Co-chairs Octavia Dobre and Miguel Sepulcre Ribes, and the rest of the conference organizing team for their time, effort, dedication, and commitment for making VTC2018-Fall one of the premier international conference events in vehicular technology!

I am looking forward to seeing all of you at VTC2018-Fall where we will be *Connecting the Mobile World!*

With warmest regards,

Alex Wyglinski, *President*  
IEEE Vehicular Technology Society

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## Tuesday Opening Keynotes

*Tuesday 28 August 2018 8:45–9:20 Grand Ballroom*

### **The Times They Are A-changin'! Or Are They?**

**Martin “Marty” Cooper**, *Wireless Pioneer and ‘Father of the Cell Phone’*

Wireless technology has evolved dramatically over the last 50 years, and yet many of the challenges of the future are familiar.

**Marty Cooper** famously led the Motorola team that developed the first mobile cellular telephone. He led the regulatory effort that resulted in a competitive cellular service that could serve handheld portable cell phones, a model adopted by most countries. Marty graduated from the Illinois Institute of Technology with a bachelor’s degree in electrical engineering in 1950 and served in the Navy during the Korean conflict. He joined Motorola in 1954. He earned a master’s in electrical engineering (1957) and received an Honorary Doctorate from IIT where he serves as a Life Trustee. At Motorola, Marty and his teams created the Pageboy II, the first nationwide high capacity paging system (1970), and the first public land-mobile trunked radio system (1973) as well as numerous wireless innovations. He became a division manager and ultimately served as vice president and director of research (1978–83) for the company.

In April 1973 Marty introduced the DynaTAC phone at a press conference in New York City. To make sure that it worked before the press conference, he placed the first public cell-phone call, to Joel Engel, head of AT&T Bell Labs rival project, and gloated that he was calling from a portable cellular phone. After a decade

of further development and resolving regulatory challenges, Motorola introduced the first portable cell phone for consumers, the DynaTAC 8000x in 1983.

Marty then left Motorola to co-found Cellular Business Systems, Inc. (CBSI), which became the leading company in billing cellular phone services. In 1986 he and his partners sold CBSI to Cincinnati Bell for \$23 million. Marty and his wife, Arlene Harris, then founded Dyna, LLC, the central organization from which they launched other companies including ArrayComm (developed multi-antenna arrays for wireless systems), and GreatCall (the Jitterbug cell phone with large buttons and simple features meant for the elderly, recently sold to Samsung).

Widely recognized for his technical leadership, entrepreneurial and business achievements, and his inventions and publications, other achievements include: Life IEEE Fellow, IEEE VTS President, IEEE Centennial Medal (1984), Charles Star Draper Prize (2013), Prince Asturias Award for Scientific and Technical Research (2009), Marconi Prize (2013). He is also widely known for introducing the “Law of Spectral Efficiency” now known as “Cooper’s Law”.

*Tuesday 28 August 2018, 9:20–9:55 Grand Ballroom*

### **Mobility and the Continued Importance of Efficiency**

**Ann M. Schlenker**, *Director, Center for Transportation Research, Argonne National Laboratory, USA*

The transportation industry is experiencing an inflection point for new automotive technology, connected and automated vehicles, mobility service companies, and electrification. Simultaneously, societal expectations are evolving for urbanization growth and an on-demand service economy. Efficiency and optimization opportunities exist at multiple levels in the value chain of mobility and can yield tangible benefits to the consumer.

The presentation will provide external drivers that are encouraging the shift from a transportation-centric focus to mobility, and highlight research examples that demonstrate the need to remain centered on efficiency at various scales of technologies, systems and services.

**Ann Schlenker** is the Director for the Center for Transportation Research at Argonne National Laboratory. Ms. Schlenker’s applied research area is actively seeking to improve efficiency at a component, vehicle and transportation system level, while preserving transportation consumer choice, affordability and domestic economic growth. Her responsibilities include evaluating the energy and environmental impacts of advanced

technologies and new transportation fuels. Her portfolio includes early stage fundamental and applied light and heavy duty vehicle research that is informed by collaborative partnerships which develop, demonstrate and deploy new technologies. Previously, Ms. Schlenker spent more than 30 years with Chrysler Engineering in Product Developments, serving in a variety of executive positions.

*Tuesday 28 August 2018 9:55–10:30 Grand Ballroom*

### **Keynote**

**Julius Knapp**, *Chief, Office of Engineering and Technology, FCC, USA*

**Julius Knapp** has been with the FCC for 43 years and since 2006, has served as the Chief of the FCC’s Office of Engineering and Technology (OET). OET is the Commission’s primary resource for engineering expertise and provides technical support to the Chairman, Commissioners and FCC Bureaus and Offices. He received the FCC’s Silver and Gold Medal Awards for distinguished service at the Commission as well as the Presidential Distinguished Rank Award for exceptional achievement in the career Senior Executive Service. Mr. Knapp has been the recipient of the Eugene C. Bowler award for

exceptional professionalism and dedication to public service; the Federal Communications Bar Association Excellence in Government Service Award; the WCAI Government Leadership award; the National Spectrum Management Association Fellow Award; the Association of Federal Communications Consulting Engineers E. Noel Luddy Award; and, the Satellite Industry Association Satellite Leadership in Government Award. Mr. Knapp is a Life Member of the IEEE. He received a Bachelor’s degree in electrical engineering from the City College of New York in 1974.

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## Tuesday Industry Track: 5G and Wireless

Tuesday 28 August 2018 11:00–12:30 Grand Ballroom

### Panel: Telco Executives on Markets, Technology and Customer Requirements

<b>Moderator:</b>	<b>Brian K. Daly</b>	<i>Assistant Vice President, Standards &amp; Industry Alliances, AT&amp;T</i>
<b>Panelists:</b>	<b>Farooq Bari</b>	<i>Lead Member of Technical Staff, AT&amp;T</i>
	<b>Egil Gronstad</b>	<i>Senior Director, Technology Development and Strategy, T-Mobile</i>
	<b>Toshiro Kawahara</b>	<i>Senior Manager responsible for 5G Deployment Strategy, NTT DOCOMO</i>
	<b>Javan Erfanian</b>	<i>Senior Associate Director-Technology Research &amp; Strategy, Bell Mobility</i>
	<b>Jason Koch</b>	<i>Senior Vice President, Product Strategy, Verizon</i>

**Brian K. Daly** Assistant Vice President, Standards & Industry Alliances is a thought leader for emerging technologies. Brian identifies the impact of disruptive innovation and telecommunication regulation on the industry, and shapes the development of standards in an open source world to enable the next generation software defined ICT end to end ecosystem. His current focus is 5G next generation networks and softwarization, public safety initiatives including mission critical services for FirstNet, earthquake early warning, and wireless emergency alerts, IoT including C-V2X, Smart Cities, and UAS/UAVs, Cybersecurity, and national security/emergency preparedness/critical infrastructure protection. He is a leading contributor to ATIS Board, TOPS Council and Standards Committee initiatives, resulting in the implementation of key industry standards.

Brian represents AT&T on the FCC's Technological Advisory Council (TAC), assisting the FCC with other industry experts to identify important areas of innovation and develop informed technology policies supporting America's competitiveness and job creation in the global economy. He co-leads the TAC's 5G and IoT working group, and previously led the shaping of a national objective for Mobile Device Theft Prevention. His leadership is also reflected in other federal advisory committee and industry initiatives, including working groups under the FCC's Communications Reliability, Security, and Interoperability Committee (CSRIC) and the White House/National Science Foundation Advanced Wireless Platforms Research initiative.

He is a Board Director of the IEEE Industry Standards and Technology Organization (ISTO), and is a past Board member of the IEEE ComSoc Standards Development Board. He is chair of the SAE's Cellular V2X Advanced Applications Task Force, co-chair of the ANSI Unmanned Aircraft Systems Standardization Collaborative Critical Infrastructure & Environment working group, Chair of the North American Fraud Forum and Security Group under the GSM Association's North American Regional Interest Group, represents ATIS on the National Public Safety Telecommunications Council Board, leads 5G Americas Strategic initiatives, and is a member of CTIA's Cybersecurity Working Group.

**Farooq Bari** is Lead Member of Technical Staff with AT&T. He holds a Ph.D. in electrical and computer engineering from the University of British Columbia, Vancouver, Canada. His general area of interest is in emerging technologies with a recent focus on 5G, IoT and open source initiatives. Over the years he has contributed to standards related work in 3GPP, IETF, IEEE, GSMA, NGMN, ATIS, 5GA and Onem2m. He has also served in various industries leadership positions such as on IEEE SA Standards Board and its committees, chairing collaborative work between GSMA and WBA on Wi-Fi / cellular integration, and as guest editor for industry publications. Before working on industry standards, he was a research engineer involved in R&D and new product development in the area of embedded systems.

**Egil Gronstad** is the Senior Director of Technology Development and Strategy for T-Mobile USA. In this role, Egil is leading all Advanced Radio Technology Planning, Innovation and Development activities, Spectrum evaluations and strategies and radio related standards activities to secure long term alignment between business objectives and spectrum/technology availability and ecosystem.

Egil has more than 25 years of experience in product marketing, product development and technology management in the mobile wireless industry, and has worked in executive roles for multiple Mobile Network Operators and Vendors. He has a proven track record in defining, introducing and developing new technologies for the wireless telecommunications market.

Egil is a graduate of University of California, Santa Barbara, where he received his Bachelor of Electrical Engineering and Computer Science.

**Toshiro Kawahara** received his BS. and MS degrees in the Department of Electronics at Kyoto University, Kyoto, Japan, in 1989 and 1991, respectively, and his MS in Management of Technology from Massachusetts Institute of Technology's Sloan School of Management. In 1991, he joined NTT Radio System Laboratories, and in 1992 he transferred to NTT Mobile Communications Network, Inc. (now NTT DOCOMO, Inc.).

Since joining NTT, he has engaged in the research and development of radio access technologies, video and audio signal processing and codec. From 2002 to 2004, he was at DOCOMO Communications Laboratories USA, and engaged in the research and development of Internet protocols and security. He has served in his current position since 2005, and works in the development of radio access network equipment for LTE and LTE-Advanced networks, and currently is responsible for the deployment strategy of 5G.

**Javan Erfanian** has been involved in telecommunications research and industry for the past 15+ years. He did his education at the Universities of Calgary and Toronto in Canada. His publications are cited in research journals and textbooks and, in addition to being a speaker, he has taught many academic and industry courses and programs, particularly on Communications and Wireless Systems.

In his IEEE involvement, Javan was Chair of IEEE Communications Society in Toronto in 1995-1999 which brought him two international awards. He was the Canadian correspondent for IEEE Communications Magazine in late 90s. He received an IEEE Millennium Medal in 2000, and has been an IEEE Communications Society Lecturer. In his professional career, Javan is currently Senior Associate Director - Technology Research & Strategy, at Bell Mobility in Canada. In this role, Javan conducts research and charts technology strategy, while working with the global industry and academia on research, innovations and new standards.

**Jason Koch**'s biography was not available at press deadline.

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Tuesday 28 August 2018 14:00–15:30 Grand Ballroom

**Panel: Systems and Product Advances using 5G, IoT and ACT**

**Moderator:** **Russell Gyurek** *Director, IoT-CTO and Industries, Cisco*  
**Panelists:** **Henrik Sahlin** *Master Researcher, Ericsson*  
**Rao Yallapragada** *Director of Advanced Technologies, Intel*  
**Barry Einsig** *Global Automotive and Transportation Executive, Cisco*  
**Simone Redana** *Head of Network & Architecture Research Group, Nokia Bell Labs*

Infrastructure and network suppliers review systems and product advances using 5G, IoT, Autonomous and Connected Technologies.

**Russell Gyurek** is currently the Director, IoT-CTO and Industries at Cisco. He has over 25 years of networking related technology experience, the majority in leadership positions. Russ' range of expertise includes; IoT/connectivity of things, analytics and big data, cloud, optical networking technologies, broadband architectures and related technical policy, and emerging market development. He has held various leadership roles in creating strategy and direction in these areas. In Russ' current role he is responsible for technology leadership, market development and partner due diligence & enablement related to IoT.

Russ has played key roles in IEEE standards development and ratification including 802.3. Russ holds an appointed position on the FCC-TAC (Technical Advisory Council) where he has chaired Working Groups on the "sunset of the PSTN", "network resiliency", "IoT", and Next Generation Internet. He is currently the working group Chairman for the FCC "Next Generation Policy and Regulations" team. Russ has led and participated on numerous technical policy teams in the past 10 years. These include the state of California, West Virginia, and the country of Lebanon. Prior to Cisco, Russ held senior technical and leadership roles at BellSouth (AT&T), in the networking part of the business. Russ has a BSEE from Trine University and an MBA from UNC's Cameron School of Business

**Henrik Sahlin** is active within the section of antenna systems at Ericsson Research, Gothenburg, Sweden. He has actively participated in 3GPP (Third Generation Partnership Project) standardization for LTE (Long Term Evolution) and NR (New Radio, 5G) with a focus on initial access and reduced latency with physical layer design. Receiver algorithms in base stations and mobile devices have been a central research area for Henrik within several wireless standards such as NR, LTE, WCDMA

and GSM. Currently Henrik is focusing on wireless communication for automotive applications and use cases.

**Rao Yallapragada's** biography was not available at deadline.

**Barry Einsig** is the Global Automotive and Transportation Executive in Cisco's Automotive and Connected Car Group responsible for driving the growth strategy, business planning, thought leadership and solutions designs and validation for all modes of transportation. He has been in the industry for over 20 years serving in a variety of roles providing industry leading solutions for Automotive, Transportation and Smart Cities.

**Dr. Simone Redana** is Head of Network & Architecture Research Group in Nokia Bell Labs and Chairman of the 5GPPP Architecture Working Group. His research interests are on novel architecture solutions for 5G era and 5G business acceleration for verticals. He is currently responsible for the Standardization Research on E2E Network Architecture and Automation in Nokia, leading a group of experts on Radio Access Network (RAN) and Core Network (CN) protocols, architecture and automation. He contributed in 3GPP to the standardization of Self Organizing Network (SON) and Relays for Long Term Evolution (LTE).

Simone is Chairman of the 5GPPP Architecture WG since January 2016 with the publication of two White Papers in June 2016 and January 2018 respectively. He has coordinated the EU funded project 5G NORMA (Novel Architecture for the 5G era) during the 1st year. Simone contributed and led relay concept design in various EU research projects (WINNER II, WINNER+ and ARTIST4G). He received the MSc and PhD degree from Politecnico di Milano in 2001 and 2005 respectively. He joined Siemens Communication in 2006 and since 2008 he has been with Nokia in Munich, Germany.

Tuesday 28 August 2018 16:00–17:30 Grand Ballroom

**Panel: Regulation-Standards Barriers and Opportunities**

**Moderator:** **Brian K. Daly and Russell Gyurek**  
**Panelists:** **Jim Lansford** *Director, standards group for V2X and Wi-Fi, Qualcomm*  
**Martin C. Dolly** *3GPP/Wireless Security Expert, AT&T Labs*  
**Stephen Hayes** *Director of Standards, Ericsson North America*  
**Tom Anderson** *Senior Technology Consultant, ATIS*  
**Jason Smith** *Senior Director, Device Check, IMEI Services, GSMA*  
**Paul Anuszkiewicz** *Vice President-Spectrum Planning, CTIA-The Wireless Association*

**Brian K. Daly's** biography appears on the previous page.

**Russell Gyurek's** biography appears above.

**Dr. Jim Lansford** is a Director in the standards group at Qualcomm, responsible for V2X and Wi-Fi standards and strategy. He has over 35 years of experience in communications systems, digital signal processing, and strategic business development. Prior to its acquisition by Qualcomm in August 2015, he was a Fellow in the Global Standards Group at Cambridge Silicon Radio (CSR).

Dr. Lansford has been Chief Technology Officer of three wireless startups (Momentum Microsystems, Mobilian, and Alereon) and held senior technical positions at Harris and Intel Corporation before CSR and Qualcomm. Dr. Lansford was formerly the co-chair of 802.15.3a (high speed UWB) as well as former chair of 802.19 (Coexistence) within IEEE 802, and was also a vice-chair of IEEE 802.15.2. He is currently chair of the Wireless Next Generation Standing Committee in IEEE 802.11. In the Wi-Fi Alliance, he chairs the Automotive Market Segment Task Group, the DSRC Task Groups, and the Long Range Strategy Group.

Dr. Lansford has a Ph.D. in Electrical Engineering from Oklahoma State, an MSEE from Georgia Tech, and a BSEE with highest honors from Auburn University.

**Martin C. Dolly** has been with AT&T Bell Laboratories/AT&T Labs for 33 years, where his areas of expertise being in security, signaling, and services, particularly Government Priority Services.

As Lead Member of Technical Staff, Martin is responsible for Signaling and Security Standards representing AT&T and DHS/OEC in 3GPP CT 1/3/4 (Signaling) Working Groups, 3GPP SA3 (Security), and the Internet Engineering Task Force (IETF). In addition, Martin chairs and is one of the main contributors to the anti-Robocalling standards efforts in the ATIS-SIP Forum Task Force. Martin has represented AT&T and the Alliance for Telecommunications Industry Solutions (ATIS) on multiple Working Groups of the FCC's CSRIC, mostly recently on Working Group 8: "Priority Services," and CSRIC Working Group 10 – SS7/Diameter Vulnerabilities of the FCC's CSRIC V, and the 5G (IoT) and Software-Defined Network & Network Function Virtualization Sub-Working Group's of the Cybersecurity Working Group of the FCC's Technological Advisory Council.

**Stephen Hayes** is the Director of Standards for Ericsson in North America. He has worked on various cellular issues over the last 20 years and been heavily involved in the evolution of the 3GPP family of technologies. His current focus includes the ATIS committees and 3GPP. He is also involved in several US advisory groups such as the FCC TAC (Technical Advisory Committee).

Stephen is currently the Vice-Chair of 3GPP TSG-RAN. Stephen was chairman of the 3GPP systems group (3GPP-SA) from 2006-2011. Before that, Stephen was the chair of the Core Network group in 3GPP. Stephen is also the chair of the 3GPP group on working procedures. Within ITU-T Stephen is chair of the Rapporteur group on Standardization Strategy.

**Tom Anderson's** biography was not available at press deadline.

**Jason Smith's** biography was not available at press deadline.

**Paul Anuszkiewicz** is CTIA's Vice President for Spectrum Planning and Technology Standards. He is responsible for technology and technical matters concerning spectrum advocacy, spectrum allocation for the network evolution to 5G and other technical areas to aid CTIA's members and as a technical resource to policy makers. He has over 30 years of technology planning, network engineering and operational experience.

Prior to CTIA, Mr. Anuszkiewicz was CEO of Caten McGuire, a wireless technology consulting firm responsible for developing technology strategy, and he also served as CTO and VP of Network Operations for two U.S based cellular operators. Mr. Anuszkiewicz has worked with international governments on regulatory and spectrum auction issues. Mr. Anuszkiewicz holds a Bachelor's Degree in Electrical Engineering from California State University and an MBA from the University of Dallas. He is a registered Professional Engineer and holder of several technology patents.

Mr. Anuszkiewicz serves on the Board of Directors of Wireless Innovation Forum "WinnForum", the CBRS Alliance and as a Member of the Commerce Spectrum Management Advisory Committee (CSMAC) for the US Department of Commerce.

## Wednesday Plenary Panel

*Wednesday 29 August 2018 9:00–10:30 Grand Ballroom*

### **Panel: Mission Critical & Operational Appls of CAV Technologies in Selected Industries**

<b>Moderator:</b>	<b>Hani Mahmassani</b>	<i>Director, Northwestern University Transportation Center</i>
<b>Panelists:</b>	<b>Logan Jones</b>	<i>Senior Director, HorizonX, the Boeing Company</i>
	<b>Thomas Kaminski</b>	<i>Vice President, Mobile Automation, Dematic – Mobile Automation</i>
	<b>Regis Luther</b>	<i>VP of Engineering and Chief Technology Officer, AM General, LLC</i>
	<b>Michael Murphy</b>	<i>Chief Engineer, Caterpillar Mining Group</i>
	<b>John F. Reid</b>	<i>Director, Product Technology and Innovation, John Deere</i>
	<b>David Thurston</b>	<i>Chief Engineer, Canadian Pacific Railway</i>

In the first of two parts (continued in the Industry Sessions after the coffee break), leading figures from a range of industries present on applications of connected and autonomous vehicles in their sectors. The panel continues within the Industry Sessions in an open Q&A format to give attendees an opportunity to address issues important to them.

**Hani Mahmassani's** biography was not available at press deadline.

**Logan Jones** is Senior Director of the New Business Horizons group in a newly formed strategic ventures group called HorizonX. In this position, Jones leads a team of professionals in developing new businesses to extend Boeing's core capabilities into adjacent markets.

Prior to his current role, Jones was the strategy leader for Boeing Military Aircraft (BMA) where he oversaw the portfolio of investments and strategies to extend core products and capabilities in the rotorcraft, commercial derivative, global strike, and autonomous systems divisions. Before moving to St. Louis, Jones was a contracts representative in Ridley Park, PA where he was responsible for proposing, negotiating, and executing contracts for both global and domestic customers on the Chinook and Osprey programs. He began his career with The Boeing

Company in finance as a part of the Business Career Foundations Program (BCFP) in Mesa, AZ.

Jones is a graduate of Montana State University, where he received a Bachelor of Science degree in Marketing and a Master of Science in Program Management from Boston University. He also graduated with an Executive MBA from Washington University in St. Louis.

**Thomas Kaminski's** biography was not available at press deadline.

As VP of Engineering and Chief Technology Officer at AM General, **Regis Luther** oversees the ideation, development, and prototyping of vehicles for military and commercial applications. Additionally, he has been instrumental in developing a corporate technology road map that considers current and future automotive and technology trends, such as advanced powertrain options, alternative fuels, and autonomous technologies.

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Previously, Mr. Luther served in a dual role as Vice President of Portfolio Planning & Program Management and Vice President of Defense Engineering at Navistar. Luther holds a BS in Chemical Engineering from Youngstown State University, a Master's of Engineering in Chemical Engineering from Johns Hopkins University, and an Executive MBA from University of Houston. He is also a Certified CM Configuration Manager and an Automotive Services Excellence (ASE) re-certified Truck Technician with a Commercial Driver's License.

**Michael Murphy's** biography was not available at press deadline.

**Dr. John Reid** came to Deere and Company in January 2001 after a 14-year career at the University of Illinois where he was recognized internationally for his contributions in automation and control for off-road equipment. Reid's expertise includes machine vision perception, controls, and hardware-in-the-loop design. Previously, Reid served as a consultant to agricultural and food industries in their effort to deploy advanced technologies into precision agriculture and systems automation.

Dr. Reid has been a deep technical expert and transformational leader in many off-road technology areas. His work began in the 1980's with his PhD work on the development of computer vision algorithms for agricultural vehicle guidance, and continued into the 1990's with the research development of the first large-scale autonomous systems in agriculture. After arriving at Deere in 2001, Dr. Reid led Field Robotics for the Enterprise. In 2006

Dr. Reid moved into a new Enterprise position, Director, Product Technology and Innovation, in which he provided transformational Innovation Delivery Leadership. He has led the establishment a global network of technology innovation centers that support strategic capability development and deliver game-changing innovation through the activities of these global technology innovation centers. In 2018, Dr. Reid also took responsibility to lead John Deere's effort in Automation towards Autonomy. Dr. Reid, a 2017 John Fellow, is currently a Board Member of Fraunhofer USA. And he is the current Chairman of the Board for the Innovation Research Interchange.

**Dr. David Thurston** has been involved in systems engineering, emphasizing design, construction and operations of railroad and transit systems for over 38 years. He received a BS in Electrical and Computer Engineering from Clemson University, a MS in Electrical and Computer Engineering, George Mason University, and a PhD in the School of Engineering at Temple University. He is currently Chief Engineer – Train Control for Canadian Pacific Railway.

In addition, he is a Registered Professional Engineer in eight states, an Honorary Fellow and Chairman of the North American Section in the Institution of Railway Signal Engineers, and Elected Board Member and Vice President – Land Transportation Division of the Vehicular Technology Society, Institution of Electrical and Electronic Engineers.

## Wednesday Industry Track: ACE (Autonomous, Connected, and Electric) Vehicles

*Wednesday 29 August 2018 11:00–12:30 Grand Ballroom*

### **Panel: Mission Critical & Operational Appls of CAV Technologies in Selected Industries**

<b>Moderator:</b>	<b>Hani Mahmassani</b>	<i>Director, Northwestern University Transportation Center</i>
<b>Panelists:</b>	<b>Logan Jones</b>	<i>Senior Director, HorizonX, the Boeing Company</i>
	<b>Thomas Kaminski</b>	<i>Vice President, Mobile Automation, Dematic – Mobile Automation</i>
	<b>Regis Luther</b>	<i>VP of Engineering and Chief Technology Officer, AM General, LLC</i>
	<b>Michael Murphy</b>	<i>Chief Engineer, Caterpillar Mining Group</i>
	<b>John F. Reid</b>	<i>Director, Product Technology and Innovation, John Deere</i>
	<b>David Thurston</b>	<i>Chief Engineer, Canadian Pacific Railway</i>

The Plenary Panel from before the coffee break continues within the Industry Sessions in an open Q&A format to give attendees further opportunity to address issues important to them.

*Wednesday 29 August 2018 14:00–15:30 Grand Ballroom*

### **Panel: Challenges and Opportunities in Building ACE Vehicles**

<b>Moderator:</b>	<b>Alvin Chin</b>	<i>Senior Researcher, Machine Learning, BMW Technology Corporation</i>
<b>Panelists:</b>	<b>Oliver Rumpf-Steppat</b>	<i>Head of Product Requirements-Dev. &amp; Connected Drive, BMW USA</i>
	<b>Leo Yeykelis</b>	<i>UX Research Lead, Toyota Research Institute</i>
	<b>Jochen (Joe) Renz</b>	<i>Director, New Mobility Lab</i>
	<b>Jerry Quandt</b>	<i>Executive Director, Illinois Autonomous Vehicles Association</i>
	<b>Jürgen Willis</b>	<i>Senior Director of Product Management, Microsoft Azure Object Storage Service</i>

Autonomous, connected and electric vehicles are being mentioned everywhere these days. Every car manufacturer is all in in this vision of creating an autonomous, connected and electric vehicle. The building blocks are there, however, there still remain gaps in order to provide a trustful, secure, personal, and an awesome customer experience in the vehicle. What are the challenges and opportunities in order to achieve this vision? In this panel, industry experts will address topics of data collection, data processing, data storage, machine learning, intelligence and AI, services and applications, security, blockchain and UX for autonomous, connected and electric vehicles.

**Dr. Alvin Chin** is a Senior Researcher in Machine Learning at BMW Technology Corporation, Chicago. His research interests include connected car, machine learning, big data, mobile social networking, and ubiquitous computing. Dr. Chin has authored more than 30 publications and 10 patents, including pending. He received a PhD in Computer Science from the University of Toronto and previously worked for Nokia Research Center, Nokia and Microsoft in Beijing, China.

**Oliver Rumpf-Steppat** is Head of Product Requirements, Development and Connected Drive for BMW in US and is based in NJ. Prior to that, he held roles as Head of Technical Product Management for Electronics and Driver Environment, Head of Electronic Architecture, and Head of Mid Platform Information and Communication. At BMW, he has covered the complete development process from early phases and concept work for vehicle projects (Chief Engineer Interior and E/E for MINI/small vehicle product line) over series development of components and features (Head-Up display, Cluster, Head unit-platform) up to System integration and validation on vehicle level. Oliver joined BMW in 1992 as a PhD candidate in the field of Systems Engineering and Use of CASE tools for E/E system development.

**Leo Yeykelis**'s biography was not available at press deadline.

**Joe Renz** co-founded New Mobility Consulting & New Mobility World with his brother Alexander (Alex). "We understand the car as an important building block in the future of multi-modal mobility. However, much of disruptive innovation happens in the form of solutions around the car and in the broader mobility

ecosystem. Alex and I go far beyond the car itself and take a holistic view of the emerging smart mobility and transportation space aka New Mobility World. Simply put, cars and IT are in our blood. I am an Electronics Engineer from Stuttgart, Germany (Home of Mercedes, Bosch, Porsche, etc), and now, after a 20-year corporate IT career, reside in Chicago, USA."

**Jerry Quandt** is Executive Director of the Illinois Autonomous Vehicles Association, a privately-funded, not-for-profit organization dedicated to the advancement of autonomous vehicle technologies within the State of Illinois. The organization's focus is to establish Illinois as the leader in the development, design, and application of the system-of-systems that will transform mobility as we know it.

Jerry has worked most of his career in marketing and business transformation in a variety of verticals. His passion is to continue to create consumer-centric solutions leveraging bleeding-edge technologies to increase people's quality of life.

**Jürgen Willis** directs Azure's web-scale service used by Fortune 500 companies, leading service providers and fast growing startups. Previously at Microsoft, Jürgen led the Azure Fabric Controller team that manages the deployment, health and maintenance of Azure Virtual Machines. He also has led Product Management for a number of .NET components.

Prior to Microsoft, Jürgen was a Senior Manager with Accenture, advising Enterprise clients in the Telecommunications and Financial Services industries and leading the implementation of both custom and packaged solutions.

**Wednesday 29 August 2018 16:00–17:30 Grand Ballroom**

### **Panel: Business, Technology and Societal Impacts of Autonomous Vehicles**

**Moderator:** **Kamesh Namuduri** *Professor, University of North Texas*  
**Panelists:** **Joel Roberson** *Partner, Holland & Knight LLP*  
**Helka-Liina Määttä** *Senior Researcher, Ericsson*  
**Matt Satterley** *Federal Public Policy Manager, AirMap*  
**Jae H. Kim** *Senior Technical Fellow, Boeing Research & Technology*

Globally, efforts are underway to integrate Unmanned Aircraft Systems (UAS) into the civilian airspace. This integration is necessary and important before the industry develops and deploys real-world commercial applications such as transportation of people and package delivery using UASs. Traditionally, communication support to air traffic management (ATM) comes from satellite communications (SATCOM) operating at the geostationary orbit level. Recently, two additional alternative paradigms are being investigated for UAS Traffic Management (UTM): 4G/5G cellular communications operating on the ground, and aerial networks and communications operating in the mid-air. The three levels of communication paradigms differ in terms of performance factors such as latency and data-rates that they can support. SATCOM has been enhanced to support global tracking after the incidents involving the missing aircraft such as the Malaysian Aircraft MH370.

Today, with the support of a constellation of communication satellites, minute-by-minute global tracking of an aircraft, is possible. ATM-like infrastructure is being envisioned for UTM as well by the industry. Telecommunications industry is working towards cellular communication-supported services for UTM. Cellular networks offer wide area, high speed, and secure connectivity for Beyond Radio Line-of-Sight (BRLoS) use cases. In recent years, there have been many field trials involving using terrestrial LTE networks to provide connectivity to UASs. Going forward, 5G would be a natural choice for supporting UAS traffic management. Aerial networks offer a solution to sharing information in the mid-air among the UASs with low latency and high data rates. However, establishing connectivity among the UASs without any supporting infrastructure is extremely challenging. Aerial ad hoc networks can complement satellite and cellular-network supported UAS navigation, command, and control. The panel will discuss the state of the art, challenges, standards, and regulatory aspects in providing communication support to UTM will be discussed.

**Kamesh Namuduri** received his B.S. degree in Electronics and Communication Engineering from Osmania University, India, in 1984, M.S. degree in Computer Science from University of Hyderabad in 1986, and Ph.D. degree in Computer Science and Engineering from University of South Florida in 1992. Over the past ten years, his research is focused on aerial networking and communications. He co-organized a series of workshops on

"Airborne Networking and Communications" in conjunction with IEEE, AIAA, AUAVSI, and ACM Conferences. He currently serves as Chair of the IEEE Standards Working Group (IEEE 1920.1: Aerial Communications and Networking Standards). He is a co-editor for the book titled "UAV Networks and Communications" published by the Cambridge University Press in 2017. He published over one hundred research articles to date.

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He leads the Smart and Connected Community project on “Deployable Communication Systems” in collaboration with the government, public, and private organizations. This living laboratory project was demonstrated thrice during the Global City Teams Challenge hosted jointly by the National Institute of Standards and Technology and US Ignite in 2015, 2016, and 2017. He contributed to the development of research agenda, requirements and blueprints highly deployable communications systems led by the NIST and National Public Safety Telecommunications Council.

**Joel Roberson** is a Washington, DC Partner at Holland & Knight and a member of the firm’s Public Policy & Regulation Practice Group. Mr. Roberson’s practice focuses on public policy development, legislative advocacy and regulatory compliance with an emphasis in vehicle technology policy. He has significant experience in bipartisan coalition building, strategy development and high-stakes negotiation.

Mr. Roberson advises high-tech clients on emerging public policy and regulatory issues, including self-driving cars, unmanned aircraft systems (UAS), corporate average fuel economy (CAFE) standards, cybersecurity, privacy, and data breach response. Mr. Roberson has extensive experience working with the Federal Aviation Administration (FAA) to develop policy to support the integration of drones into the national airspace. He is well-versed in preparing clients to testify before Congress, including congressional investigations into data breaches. Before joining Holland & Knight, Mr. Roberson served as a law clerk for the House Judiciary Committee where he prepared members of Congress to debate the first reauthorization of the Patriot Act.

Prior to entering private practice, Mr. Roberson worked within the elected leadership offices of two U.S. House of Representatives. In the immediate wake of Hurricane Katrina, Mr. Roberson led three groups of volunteer law students to both Mississippi and Louisiana to provide volunteer legal services.

**Helka-Liina Määttänen** has been working with 3GPP technologies since 2006. Her research interests include downlink MIMO systems, small cells, LTE-WLAN interworking, 5G mobility and Aerials. She has been active in 3GPP WG1 and 3GPP WG2. She is co-author of several drone related publications and has been active for both LTE Rel-15 SI and WI on Aerials. She was rapporteur of LTE Rel-15 WI on Aerials.

She joined Ericsson in 2014 and worked before that at Broadcom, Renesas Mobile and subcontracting for Nokia while working on her doctoral thesis. She received her M.Sc. and Ph.D. degree in communications engineering from Helsinki University of Technology in 2004 and 2012, respectively. Her other interests include playing viola and motorcycles.

**Matthew Satterley** is AirMap’s Senior Federal Public Policy Manager. He manages the federal affairs portfolio with a focus on legislative analysis and development, as well as regulatory advocacy. He has served on multiple federal advisory committees and has significant experience in coalition building.

Matthew’s work with AirMap is helping to shape Unmanned Traffic Management in the US and abroad. He manages AirMap’s participation in the Low Altitude Authorization and Notification Capability program, as well as the UAS Integration Pilot Program, and the Unmanned Traffic Management Pilot Program, initiatives providing industry feedback which will inform future unmanned traffic lawmaking and regulation.

Prior to joining AirMap, Matthew served the Office of Congressman Frank A. LoBiondo (NJ-02) as Deputy Chief of Staff and Legislative Director where he interpreted and drafted legislative proposals in support of Congressman LoBiondo’s Chairmanship of the Aviation Subcommittee in the U.S. House of Representatives. He worked with the House Transportation and Infrastructure Committee in developing the Aviation Innovation, Reform, and Reauthorization Act of 2016. Additionally, he supported the Congressman’s work on the House Armed Services Committee and the Permanent Select Committee on Intelligence.

Matthew has also served the Offices of Congresswoman Buerkle (NY-25), Congressmen Mack (FL-14), and McHugh (NY-23) contributing to their respective legislative agendas. He is a graduate of St. Lawrence University, with a degree in government.

**Dr. Jae H. Kim** is responsible for providing Enterprise-wide integrated system solutions and products to meet Boeing’s needs in the Cyber Security, Communications and Network Technology Domain, while supporting a long range business strategy for the products and services.

Dr. Kim has been a PI/PM for a number of U.S. Department of Defense programs from DARPA, Army CERDEC, Air Force AFRL, Navy ONR and NASA. He has been also serving as an Affiliate Professor and Graduate Faculty of Electrical and Computer Engineering Department, University of Washington, Seattle, WA since 2000 and IEEE Associate Editor for the Communications Letters (Monthly Technical Journal) for a decade since 2001. Prior to joining Boeing in 1991, he has been a Senior Research Scientist and Project Manager at the California Institute of Technology (Caltech), NASA Jet Propulsion Laboratory since 1987. He was a Technical Program Chair of IEEE MILCOM 2011 (Baltimore, MD) on November 2011. Dr. Kim received his B.S. and M.S. from Seoul National University, and Ph.D. from University of Florida, Gainesville, all from Electrical and Computer Engineering.

Dr. Kim is an author/co-author of 100+ publications, two books as Editors, 8 U.S. Patents (2 U.S. and 1 International Patent pending), 10 NASA Technical Innovation Awards, and 25+ Boeing Technology Awards for outstanding technical performances. Dr. Kim co-edited a book, “Green IT: Technologies and Applications” published by Springer-Verlag (August 2011), that has been listed as a top 25% most downloaded eBooks in the relevant Springer eBook Collection in 2012, and co-edited a book, “UAV Networks and Communications,” published by Cambridge University Press.

## Thursday Plenary Panel

*Thursday 30 August 2018, 9:00–10:30 Grand Ballroom*

### **Plenary Panel: Smart Cities/Intelligent Communities and IoT (Part I)**

**Moderator:** **Danielle DuMerer** *CIO & Commissioner, City of Chicago*  
**Panelists:** **Paul Steinberg** *CTO, Motorola Solutions*  
**Robert Bell** *Co-founder, Intelligent Community Forum*  
**Hardik Bhatt** *Leader, Smart Cities & Mobility Business, Amazon Web Services*

This panel was organized by Dennis Roberson and Randy Berry, and will include a Welcome Address from Moderator Danielle DuMerer.

**Danielle DuMerer** works at the City of Chicago's Department of Innovation and Technology, as CIO to improve how residents interact with government and leading its smart city initiatives. She previously served as Chicago's CTO as well as Director of Planning, Policy, & Management.

In 2016, Danielle and her team were recognized by the Chicago chapters of SIM and AITP as the Most Effective IT Team in a large company. Prior to working in government, Danielle developed K-12 educational technology products at the McGraw-Hill Companies. She also worked in the Library and Archives field, serving a variety of educational and non-profit organizations to promote equitable access to and preservation of information resources. Danielle holds a Master of Library and Information Science degree from the University of Maryland, College Park and a Bachelor of Arts from the University of Illinois, Urbana-Champaign.

**Paul Steinberg** leads the company's technology and intellectual property strategy, as well as the strategic venture capital investment activities. Paul joined Motorola in 1992 as a senior software development engineer in the wireless infrastructure group.

Prior to his current position, he was chief architect for carrier broadband wireless infrastructure products in Motorola's network infrastructure unit. He serves on technical advisory boards for multiple companies, is a member of the Federal Communications Commission Technical Advisory Council and is also a member of the Illinois State Governor's Smarter Illinois Advisory Board. Before joining Motorola, Paul was a distinguished member of the technical staff at AT&T Bell Laboratories where he worked on operating system development.

**Robert Bell** heads research, analysis and content development activities and directs the multi-stage analysis of communities for the annual Intelligent Community Awards program. He also

authors the in-depth content on the Top7 Intelligent Communities that are core to ICF's mission.

Robert developed and leads the Intelligent Community Accelerator programs. Serving as the content lead for ICF's Global Summit, he is also the author or editor of ICF's research reports, and lead co-author of Brain Gain, Seizing Our Destiny and Broadband Economies. A regular blogger and frequent keynote speaker and moderator at municipal and telecom industry events, Robert has also led economic development missions and study tours to cities in Asia and the US.

**Hardik Bhatt** is a business leader with tremendous acumen in both strategy and execution for growth and transformations. Hardik has moved seamlessly between private and public sector. Since 2017, he leads smart cities and mobility business verticals for Amazon Web Services (AWS), where Hardik is responsible for helping state and local governments become more efficient, competitive, and engaged with the use of cloud, data analytics, Internet of Things, artificial intelligence and machine learning technologies.

In 2015, Governor Rauner recruited him as the Chief Information Officer and Secretary of Innovation & Technology for Illinois. In 2 years, Hardik brought Illinois from bottom 4th to top 3rd in national digital rankings and pioneered Illinois' data analytics, smart state and blockchain initiatives. Hardik also transformed Information Technology as an innovation enabler, by consolidating State's 38 separate IT organizations into a newly created Department of Innovation and Technology. Between 2010 and 2015, he led global business development for Cisco's Smart Cities and IoT businesses. Previously, Hardik has been the CIO of City of Chicago and a consultant with Oracle Corporation and Tata Consultancy Services. Hardik is also an angel investor. As a civic leader, he serves on boards of Fermi National Labs and Abraham Lincoln Presidential Library and Museum.

## Thursday Industry Track

*Thursday 30 August 2018, 11:00–12:30 Grand Ballroom*

### **Panel: Smart Cities/Intelligent Communities and IoT (Part II)**

<b>Moderator:</b>	<b>Robert Bell</b>	<i>Co-founder, Intelligent Community Forum</i>
<b>Panelists:</b>	<b>Dan Mathieson</b>	<i>Mayor, City of Stratford, Ontario</i>
	<b>Doug McCollough</b>	<i>Chief Information Officer, City of Dublin, Ohio</i>
	<b>Moez Chaabouni</b>	<i>Solutions Architect, Informatica</i>
	<b>Sanida Bratt</b>	<i>Sr. Director of Emerging Solutions, Motorola Solutions</i>

This panel addresses the use of new technologies such as Autonomous and Connected Vehicles and other advanced technologies to address the needs and Requirement of Cities and Communities. Transportation is inherently a local issue and as the example of Uber demonstrates, the evolution and applications of vehicular technology depends on successful collaboration with local government.

The panel consists of community leaders who will share their perspectives on what makes transportation technology programs work for companies, the community and its citizens. ICF has recognized more than 170 cities, metro areas and counties around the world using digital technology to build inclusive prosperity, solve social problems and enrich culture, empowering "the place called home" to survive and thrive in today's disruptive digital economy. This panel provides the perspective and progress experienced with new technologies by the executives directly responsible for the well being of their communities.

**Robert Bell's** biography appears above.

**Dan Mathieson** is in his fourth term as Mayor and has sat on municipal council since 1995. During his tenure Dan has been a member on numerous boards and committees in healthcare, municipal affairs, law enforcement, athletics, not-for-profits, universities and colleges. In Stratford, as part of his community initiatives, a fleet of 20 vehicles, including 10 public transit and municipal fleet vehicles, will become the platform for

demonstrating up to 200 new connected car technologies using the city's extensive WiFi network.

Mayor Dan Mathieson is currently Chair of the Ontario Municipal Property Assessment Corporation (MPAC), Chair of Kings University College at Western University, Chair of the Stratford Police Services Board, a member of the Board of Directors of Festival Hydro and Rhyzome Networks, the Stratford Festival, and the Advisory Board of the University of

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Waterloo-Stratford Campus. Dan is also a Governor on the Board of I-Canada and is on the Advisory Board for Walsh University - Institute for the Study of the Intelligent Community. In November, 2015 Dan was awarded the Alumni Award of Excellence from the Master of Public Administration, Local Government program at Western University. He is also the 2016 Western University, Public Administration Distinguished Practitioner in Residence, lecturing on governance and innovation in public institutions.

In 2012, Dan was chosen by the Canadian Advanced Technology Alliance (CATA) to receive the Queen Elizabeth II Diamond Jubilee Medal, paying tribute to community leaders whose endeavors have set them apart as technology innovators. As well, Dan received the Queen Elizabeth II Golden Jubilee Medal in 2002 for public service. He holds a Bachelor of Arts Degree from the University of Guelph and a Masters of Public Administration Degree from the University of Western Ontario.

As CIO of the City of Dublin, **Doug McCollough** has embraced the rich community of innovation that is Central Ohio. Through collaborations and partnerships, he has emerged as a leader and subject matter expert in the areas of Smart and Connected Communities, Smart Mobility, Intelligent Transportation, and Connected and Autonomous Vehicles, particularly in a local government context.

In 2015, the City of Dublin, Ohio teamed up with the City of Marysville, Ohio and Union County, all neighbors of the North American Headquarters of Honda R&D Americas as well as a cluster of over 60 automotive manufacturers and suppliers, to apply for the Advanced Transportation and Congestion Management Technology Deployment (ATCMTD) Grant Award from USDOT FHWA. The newly formed Council of Governments won a \$6MM grant to deploy Dedicated Short-Range Communications (DSRC) technologies in support of Connected and Autonomous Vehicle Testing on a 35 mile stretch of Ohio Highway newly dubbed the 33 Smart Mobility Corridor the same year the City of Columbus won the USDOT Smart City Challenge - a \$50MM Grant. These and other awards have spurred an unprecedented wave of investment and innovation in Connected and Autonomous Vehicle testing, Intelligent Transportation Systems, and Smart Mobility, in addition to more common Smart City programs. Multiple coordinated projects in the region including the 33 Smart Mobility Corridor, Smart Columbus, the Smart Center of the Transportation Research Center, the Drive Ohio Alliance, and others enjoy rich community support from the Ohio State University Center for Automotive Research, ODOT, USDOT, and a host of industry partners.

Doug earned a bachelor's degree from the University of Toledo in Information Systems and Operations Management and a

Master of Business Administration degree from the University of Notre Dame.

**Moez Chaabouni** serves as a Sr. Account Executive at Informatica leveraging his many years of experience in the CIO role to be a trusted adviser and advocate for his customers and help their combined Business and IT teams move quickly to empower transformational data automation initiatives leveraging the right components of our market-leading Informatica Intelligent Data Platform for Data Integration, Cloud Data Management, Big Data Management, Data Quality, Data Security and Master Data Management. Moez is also an adjunct member of The Ohio State University faculty with the Department of Computer Science and Engineering.

Moez was the Deputy CIO with the City of Columbus where as a member of the Director's office participated in the overall operations and administrative management of the Department of Technology by directing the activities of the applications, GIS, Quality Assurance, Database, and Architecture groups. Moez also lead the nomination team for Columbus to win the Intelligent Community of the Year in 2015, laying the foundation for Columbus to win the US-DOT Smart City Challenge in 2016.

Prior to his responsibilities at the City of Columbus, Moez was the Founder and CEO of My CIO, LLC; CIO for Hondros College; CIO for Title First Agency and President of Scimus Information Systems, a sister company of Title First Agency; Senior Consultant with Rational Software (prior to the IBM acquisition); several years of consulting with Compuware Corporation; faculty member at Wright State University teaching Computer Science and conducting research in conjunction with Wright Patterson Air Force Base. Moez received his bachelor's degree in Computer Information Systems from The Ohio State University and a master's degree as well as postgraduate PhD-track studies in Computer Science from Wright State University.

**Sanida Bratt** is a Sr. Director of Emerging Solutions at Motorola Solutions focusing on Safe Cities and Safe Schools.

Prior to Motorola, Sanida held an executive leadership role at Hyla Mobile, a venture backed company dedicated to delivering sustainability, profitability, and greater access to mobile technology for all. Prior to Hyla Mobile, she was a Vice President of Product Management for Synchronoss where she was responsible for leading the product strategy and product management for the company's Cloud Platform and its expansion into IoT markets. For her efforts she was recognized by Connected World Magazine's - 2014 Top Women of M2M. Previously, Sanida served in key product roles at HERE and SmithMicro Software.

Sanida has an undergraduate degree in Electrical Engineering and Executive Education from Kellogg Graduate School of Management.

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## Tutorials

A range of tutorials will be held on Monday 27 August given by experts from industry and academia.

*Monday 27 August 2018 9:00–12:30 Room 4L*

### **T1: Non-Orthogonal Multiple Access for 5G and Beyond**

*Lajos Hanzo, Univ. of Southampton*

Driven by the rapid escalation of the wireless capacity requirements imposed by advanced multimedia applications (e.g., ultra-high-definition video, virtual reality etc.), as well as the dramatically increasing demand for user access required for the Internet of Things (IoT), the fifth generation (5G) networks face challenges in terms of supporting large-scale heterogeneous data traffic. Non-orthogonal multiple access (NOMA), which has been recently proposed for the 3rd generation

partnership projects long-term evolution advanced (3GPP-LTE-A), constitutes a promising technology of addressing the above-mentioned challenges in 5G networks by accommodating several users within the same orthogonal resource block. By doing so, significant bandwidth efficiency enhancement can be attained over conventional orthogonal multiple access (OMA) techniques. This motivated numerous researchers to dedicate substantial research contributions to this field. In this context, we provide a comprehensive overview of the state-of-the-art in power-domain multiplexing aided NOMA, with a focus on the theoretical NOMA principles, multiple antenna aided NOMA design, on the interplay between NOMA and cooperative transmission, on the resource control of NOMA, on the co-existence of NOMA with other emerging

potential 5G techniques and on the comparison with other NOMA variants. We highlight the main advantages of power-domain multiplexing NOMA compared to other existing NOMA techniques. We summarize the challenges of existing research contributions of NOMA and provide potential solutions. Finally, we offer some design guidelines for NOMA systems and identify promising research opportunities for the future.

**Lajos Hanzo**—Royal Society Wolfson Fellow, FREng, FIEEE, FIET, Fellow of EURASIP, DSc—received his degree in electronics in 1976 and his doctorate in 1983. In 2009 he was awarded the honorary doctorate "Doctor Honoris Causa" by the Technical University of Budapest. During his 40-year career in telecommunications he has held various research and academic posts in Hungary, Germany and the UK. Since 1986 he has been with the School of Electronics and Computer Science, University of Southampton, UK, where he holds the chair in telecommunications. He has successfully supervised 113 PhD students, co-authored 18 John Wiley/IEEE Press books on mobile radio communications totalling in excess of 10 000 pages, published 1700+ research contributions at IEEE Xplore, acted both as TPC and General Chair of IEEE conferences, presented keynote lectures and has been awarded a number of distinctions.

Currently he directs an academic research team, working on a range of research projects in the field of wireless multimedia communications sponsored by industry, the Engineering and Physical Sciences Research Council (EPSRC) UK, the European IST Programme and the Mobile Virtual Centre of Excellence (VCE), UK. He is an enthusiastic supporter of industrial and academic liaison and he offers a range of industrial courses. He is also a Governor of the IEEE VTS. During 2008 - 2012 he was the Editor-in-Chief of the IEEE Press and since 2009 he has been a Chaired Professor also at Tsinghua University, Beijing. Click here for further information on research in progress and associated publications. Lajos has 33,000+ citations.

**Yuanwei Liu** is a Lecturer (Assistant Professor) with the School of Electronic Engineering and Computer Science, Queen Mary University of London, since 2017. He was with the Department of Informatics, King's College London, from 2016 to 2017, where he was a Post-Doctoral Research Fellow.

His research interests include 5G wireless networks, Internet of Things, stochastic geometry, and matching theory. He received the Exemplary Reviewer Certificate of the IEEE Wireless Communication Letters in 2015 and the IEEE Transactions on Communications in 2017. He has served as a TPC Member for many IEEE conferences, such as GLOBECOM and ICC. He currently serves as an Editor of the IEEE Communications Letters and the IEEE Access.

**Monday 27 August 2018 14:00–17:30 Room 4B**

## **T2: Orthogonal Time Frequency Space (OTFS) Modulation**

*A. Chockalingam, IISc, Bangalore, India; Yi Hong, and Emanuele Viterbo, Monash University, Australia*

Orthogonal time frequency space (OTFS) modulation has been very recently proposed by Hadani et al. at WCNC'17, San Francisco. It was shown to provide significant advantages over OFDM in doubly dispersive channels. OTFS multiplexes each information symbol over a 2D orthogonal basis functions, specifically designed to combat the dynamics of the time-varying multipath channels – typical in emerging mass transportation systems such as self-driving cars, high-speed trains, drones, flying cars, and supersonic flight. As a result, all information symbols experience a constant flat fading equivalent channel. OTFS is only in its infancy, leaving many opportunities for significant developments on both practical and theoretical fronts.

**Ananthanarayanan Chockalingam** (S'92–M'93–SM'98) is a Professor at Indian Institute of Science (IISc), Bangalore, India working in the area of wireless communications and networking. From December 1993 to May 1996, he was a Postdoctoral Fellow and an Assistant Project Scientist with the Department of Electrical and Computer Engineering, University of California, San Diego, CA, USA. From May 1996 to December 1998, he was with Qualcomm, Inc., San Diego. He is a Fellow of the Indian National Academy of Engineering; the National Academy of

Sciences, India; the Indian National Science Academy; and the Indian Academy of Sciences.

**Yi Hong** (S'00–M'05–SM'10) is a Senior lecturer in the ECSE Dept. at Monash University, Melbourne, Australia. She obtained her Ph.D. degree in Electrical Engineering and Telecommunications from the University of New South Wales (UNSW), Sydney, and received the NICTA-ACoRN Earlier Career Researcher Award at the Australian Communication Theory Workshop, Adelaide, Australia, 2007. Dr. Hong was an Associate Editor for IEEE Wireless Communication Letters and Transactions on Emerging Telecommunications Technologies. She was the General Co-Chair of IEEE Information Theory Workshop 2014, Hobart; the TPC Chair of Australian Communications Theory Workshop 2011, Melbourne. Her research interests include communication theory, coding and information theory with applications to telecommunication engineering.

**Emanuele Viterbo** (M'95–SM'04–F'11) received the Ph.D. degree in electrical engineering from the Politecnico di Torino, Torino, Italy, in 1995. From 1990 to 1992, he was with the European Patent Office, The Hague, The Netherlands. From 1995 to 1997, he held a post-doctoral position at the Politecnico di Torino. From 1997 to 1998, he was a Post-Doctoral Research Fellow with the Information Sciences Research Center, AT&T Research, Florham Park, NJ, USA. From 1998 to 2005, he was an Assistant Professor and then an Associate Professor, Politecnico di Torino. From 2006 to 2009, he was with the University of Calabria, Italy, as a Full Professor. He is currently a Professor with the Electrical and Computer Systems Engineering Department and an Associate Dean in graduate research with Monash University, Melbourne, Australia. He has been an ISI Highly Cited Researcher since 2009.

**Monday 27 August 2018 9:00–12:30 Room 4E**

## **T3: Towards Networked Airborne Computing: Applications, Challenges, and Enabling Technologies**

*Kejie Lu, UPRM, Yan Wan, UT-Arlington, Shengli Fu, UNT, Junfei Xie, TAMU-CC*

In recent years, unmanned aerial vehicles (UAVs) have attracted significant attention from industry, federal agencies, and academia. Although most existing UAV applications involve a single UAV, more and more emerging applications require multiple cooperative UAVs with computing capabilities. Such a trend leads to opportunities for researchers to tackle rich fundamental challenges across many disciplines, such as aerospace, control, communication, networking, and computing.

In this tutorial, our objective is to explore this new and cross-disciplinary area: networked airborne computing. We will address how to design and develop future generations of UAV-based networked airborne computing system, which consists of a network of smart UAVs that integrates communication, control, computing and storage capabilities.

Specifically, we will first discuss how existing and potential applications can be developed in the paradigm of networked airborne computing. After summarizing the requirements of these applications, we will address the challenges in system design, control, communications, networking and computing. We will then elaborate on enabling technologies, such as advanced control mechanism, long-range communication system, software-defined networking, network function virtualization, various virtualization mechanisms in computing, and mixed reality based human machine interface technology for manned-unmanned teaming. We will then demonstrate a networked airborne computing platform we are currently developing and invite audience to participate in some hands-on exercises. Finally, we will discuss open issues and important future directions before concluding the tutorial.

**Dr. Kejie Lu** is a professor in the Department of Computer Science and Engineering, University of Puerto Rico at Mayagüez (UPRM). He received his Ph.D. degree in Electrical Engineering from the University of Texas at Dallas in 2003. Since July 2005, he has been a faculty member in UPRM. His research interests include architecture and protocol design for computer and communication networks, cyber-physical system, network-based computing, and network testbed development.

**Dr. Yan Wan** is currently an Associate Professor in the Electrical Engineering Department at the University of Texas at Arlington. She

received her Ph.D. degree in Electrical Engineering from Washington State University in 2009. From 2009 to 2016, she was an assistant professor and then an associate professor at the University of North Texas. Her research interests lie in developing fundamental theories and tools for the modeling, evaluation, and control tasks in large-scale dynamic networks and cyber-physical systems.

**Dr. Shengli Fu** is currently a professor and the Chair in the Department of Electrical Engineering, University of North Texas (UNT), Denton, TX. He received his Ph.D. degree in Electrical Engineering from the University of Delaware, Newark, DE, in 2005, before he joined UNT. His research interests include coding and information theory, wireless communications and sensor networks, aerial networks, and drone systems design.

**Dr. Junfei Xie** is an Assistant Professor at the Department of Computing Sciences of Texas A&M University - Corpus Christi. She received her Ph.D. degree in Computer Science and Engineering in 2016 from University of North Texas. Her current research interests include airborne networks, unmanned systems, spatiotemporal data mining, dynamical system modeling and control, and complex information systems.

**Monday 27 August 2018 14:00–17:30 Room 4E**

#### **T4: AI Paradigm for User Experience and Network Management in Next-Generation Indoor Networks**

*Haris Gacanin, Nokia Bell Labs*

The shift from managing network nodes and devices to managing functions that are part of services provided to users will be addressed. These functions are mostly related to the end-to-end user experience and directly coupled with different network management strategies. This tutorial gives an overview of multi-disciplinary research related to user experience and network management with their components and design challenges. We address the shortcomings of contemporary rule-based optimization protocols and re-thinking our operations and management for boosting the network performance. Specifically, a paradigm shift toward the confluence of computer science and communication engineering would be necessary to embrace and study interactions between network design and user experience.

**Haris Gacanin** received his Dipl.-Ing. degree in Electrical engineering from University of Sarajevo, Bosnia and Herzegovina, in 2000. In 2005 and 2008, he received M.E.E. and Ph.D. from Tohoku University, Japan. He was with Tohoku University from April 2008 until May 2010 first as Japan Society for Promotion of Science postdoctoral fellow and then, as Assistant Professor. Since 2010, he is with Alcatel-Lucent (now Nokia), where he is currently Department Head at Nokia Bell Labs leading research activities related to application of artificial intelligence and machine learning to network optimization with focus on mobile/wireless/wireline physical (L1) and media access (L2) layer technologies and network architectures. He has more than 200 publications (journals, conferences and patents) and invited/tutorial talks. He is senior member of the Institute of Electrical and Electronics Engineers (IEEE) and the Institute of Electronics, Information and Communication Engineering (IEICE).

**Monday 27 August 2018 9:00–12:30 Room 4F**

#### **T5: Mobile Edge Cloud for Cyber Physical System Applications**

*Sayed Chhattan Shah, Hankuk University of Foreign Studies*

Mobile edge cloud is emerging as a promising technology to IoT and CPS applications such as smart home and intelligent video surveillance. In smart home, various sensors are deployed to monitor the home environment and physiological health of individuals. The data collected by sensors are sent to an application, where numerous algorithms for emotion and sentiment detection, activity recognition and situation management are applied to provide healthcare services and to manage resources at the home. The executions of these algorithms require a vast amount of computing and storage resources.

To address the issue, the conventional approach is to send the collected data to an application on an internet cloud. This approach has several drawbacks such as high communication latency and energy consumption.

To overcome the drawbacks of the conventional cloud-based approach, a mobile edge cloud is proposed.

In mobile edge cloud, multiple mobile and stationary devices interconnected through wireless local area networks are combined to create a small cloud infrastructure at a local physical area such as home. Compared to traditional systems such as mobile cloud, mobile edge cloud introduces several complex challenges due to the heterogeneous computing environment, heterogeneous and dynamic network environment, node mobility, and limited battery power. The real-time requirements associated with IoT and CPS applications make the problem even more challenging. In this tutorial, we will discuss the applications and challenges associated with design and development of mobile edge cloud system and an architecture based on a cross layer design approach for effective decision making.

**Sayed Chhattan Shah** is an Assistant Professor of Computer Science in the Department of Information Communication Engineering at Hankuk University of Foreign Studies Korea. He is also Director of Mobile Grid and Cloud Computing Laboratory. His research interests lie in the fields of parallel and distributed computing systems, ad hoc networks and cyber physical systems. He received his Ph.D. in Computer Science from Korea University in 2012 and his M.S. in Computer Science from National University of Computer and Emerging Sciences in 2008. Prior to joining HUFSS, he was a Senior Researcher at the Electronics and Telecommunications Research Institute South Korea and Engineer at the National Engineering and Scientific Commission Pakistan. He also held faculty positions at Seoul National University of Science and Technology, Korea University, Dongguk University, Hamdard University and Isra University.

*Shah is an Editor of IEEE Internet Initiative and Associate Editor of Information Processing Systems. He has served as the Conference Chair and on program committees of various international conferences. He is a senior member of IEEE, and a member of IEEE Communications Society, International Telecommunication Union, Korean GNSS Society, and International Association of Engineers.*

**Monday 27 August 2018 14:00–17:30 Room 4F**

#### **T6: Wireless Transmission of Big Data: A Data Oriented Approach**

*Hong-Chuan Yang, University of Victoria; Mohamed-Slim Alouini, KAUST*

Wireless communication systems play an essential role in the generation and transmission of big data. The design and optimization of wireless transmission strategies for big data application are of critical current interest. In this proposed tutorial, we present a unique data-oriented approach for the design and analysis of wireless transmission strategies, specifically targeting at big data transmission. Novel data-oriented performance metrics are proposed and applied to the analysis of wireless transmission strategies in the information theoretical and practical transmission settings. We also develop analytical frameworks to accurately characterize the data transmission time in both cognitive and non-cognitive environments. Compared to conventional analytical approach, the data-oriented approach offers important new insights and leads to interesting new research directions. Through this tutorial, the attendees can obtain a brand new perspective to the analysis and optimization of wireless transmission technologies for big data applications.

**Dr. Hong-Chuan Yang** received the Ph.D. degree in electrical engineering from the University of Minnesota in 2003. He is a professor of the Department of Electrical and Computer Engineering at the University of Victoria, Canada. From 1995 to 1998, He was a Research Associate at the Science and Technology Information Center (STIC) of the Ministry of Posts & Telecomm. (MPT), Beijing, China. His current work mainly focuses on different aspects of wireless communications, with special emphasis on channel modeling, diversity techniques, system performance evaluation, cross-layer design, and energy efficient communications. He has published over 200 journal and conference papers. He is the author of the book *Introduction to Digital Wireless Communications* by IET press and the co-author of the book *Order Statistics in Wireless Communications* by Cambridge University Press.

**Dr. Mohamed-Slim Alouini** received the Ph.D. degree in electrical engineering from the California Institute of Technology (Caltech) in 1998. He also received the Habilitation degree from the Université Pierre et Marie Curie in 2003. Dr. Alouini started his academic career at the University of Minnesota in 1998. In 2005, he joined Texas A&M University at Qatar, Doha, and in 2009, he was appointed as Professor of Electrical Engineering at KAUST, Thuwal, Makkah Province, Saudi Arabia, where he is responsible for research and teaching in the areas of Communication Theory and Applied Probability. More specifically, his research interests include design and performance analysis of diversity combining techniques, MIMO techniques, multi-hop/cooperative communications systems, cognitive radio systems, and multi-resolution, hierarchical and adaptive modulation schemes. Dr. Alouini has published many papers on the above subjects, and he is co-author of the textbook *Digital Communication over Fading Channels* published by Wiley Interscience. He is a Fellow of the IEEE, a member of the Thomson ISI Web of Knowledge list of Highly Cited Researchers.

**Monday 27 August 2018 9:00–12:30 Room 4G**

### **T7: 4G and 5G based V2X Communications**

*Yi Qian, University of Nebraska-Lincoln*

A wide variety of work has been done in vehicle-to-everything (V2X) communications to enable various applications for road safety, traffic efficiency and passenger infotainment. Although IEEE 802.11p used to be considered as the main technology for V2X, new research trends nowadays are considering cellular technology as the future of V2X due to its rapid development and ubiquitous presence. This tutorial surveys the recent development and challenges on 4G LTE and 5G mobile wireless networks to support efficient V2X communications. In the first part, we highlight the technical motivations of 4G LTE for V2X communications. In the second part, we explore the LTE V2X architecture and operating scenarios being considered. In the third part, we discuss the challenges and the new trends in 4G and 5G for supporting V2X communications such as physical layer structure, synchronization, resource allocation, security, multimedia broadcast multicast services (MBMS), as well as possible solutions to these challenges. Finally, we discuss some open research issues for future 5G based V2X communications.

*Yi Qian is a professor in the Department of Electrical and Computer Engineering, University of Nebraska-Lincoln (UNL). Prior to joining UNL, he worked in the telecommunications industry, academia, and the government. His research interests include information assurance and network security, network design, network modeling, simulation and performance analysis for next generation wireless networks, wireless ad-hoc and sensor networks, vehicular networks, smart grid communication networks, broadband satellite networks, optical networks, high-speed networks and the Internet. He is serving on the editorial board for several international journals and magazines, including serving as the Associate Editor-in-Chief for IEEE Wireless Communications Magazine. He was the Chair of IEEE Communications Society Technical Committee for Communications and Information Security 2014-2015. He is the Technical Program Committee Chair for IEEE ICC 2018. He is a Distinguished Lecturer for IEEE Vehicular Technology Society & a Distinguished Lecturer for IEEE Communications Society.*

*Prof. Qian received the Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award in 2011, and the Holling Family Distinguished Teaching Award in 2012, both from University of Nebraska-Lincoln. In the recent years, he has been a frequent speaker on many topics in his research areas in various venues and forums, as a keynote speaker, a tutorial presenter, and an invited lecturer.*

**Monday 27 August 2018 14:00–17:30 Room 4G**

### **T10: Recent Advances in Ultra-Reliable Low-Latency Wireless Comms: Communication and Control Co-Design**

*Guodong Zhao, UESTC; Changyang She, Uni. of Sydney; Muhammad A. Imran, University of Glasgow*

Recently, wireless networks are undergoing a transition from connecting people to connecting things, which will allow human interaction with the physical world in a real-time fashion, e.g., tactile

internet, industrial automation, self-driving vehicles, and remote surgery. Therefore, future wireless networks need to support real-time control with Ultra-Reliable and Low-Latency Communications (URLLC), which is also one of the major goals in fifth generation (5G) communication systems. In this tutorial, we discuss some fundamental design aspects and challenges to enable the real-time control in future wireless networks. In particular, we introduce the recent advances in communication-control co-design to capture the strong dynamics and interdependencies between wireless communication and control systems. We also discuss the co-design of Physical (PHY) and Medium Access Control (MAC) layers to guarantee URLLC requirements under limited wireless resource. Finally, we will discuss open problems and potential research directions in URLLC.

*Guodong Zhao (SM'16) received his Ph.D. Degree from Beihang University, Beijing, China, in 2011 and his B.E. degree from Xidian University, Xi'an, China, in 2005. He visited the Hong Kong University of Science and Technology, Hong Kong, in 2012.5-2013.8, Lehigh University, USA, in 2016.7-2017.1, and University of Glasgow, UK, in 2017.10-2017.11. He is now an associate professor at University of Electronic Science and Technology of China (UESTC) and an honorary lecturer at University of Glasgow. His current research interests are within the areas of wireless communications and control. He published over 50 papers in IEEE journals and conferences. In 2012, he received the best paper award from IEEE Global Telecommunication Conference (Globecom) and the best Ph.D. thesis award from Beihang University.*

*Changyang She (M'17) received his B. Eng and Ph.D. degrees in Electronics and Information Engineering from Beihang University, Beijing, China in 2012 and 2017, respectively. He is now a postdoctoral research fellow with Singapore University of Technology and Design. After March 2018, he will be a postdoctoral research associate in the University of Sydney. His research interests lie in the areas of ultra-reliable and low-latency communications, machine type communication, big data for resource allocation in wireless networks and energy efficient transmission in 5G systems. He has given a tutorial on ultra-reliable and low-latency communications in IEEE International Conference on Communications in China (ICCC) 2017.*

*Muhammad Ali Imran (M'03, SM'12) received his M.Sc. (Distinction) and Ph.D. degrees from Imperial College London, UK, in 2002 and 2007, respectively. He is a Professor in Communication Systems in University of Glasgow, Vice Dean of Glasgow College UESTC. He is the Head of Communications, Sensing and Imaging research group and lead the 5G research activities in Glasgow. He has led a number of multimillion-funded international research projects encompassing the areas of energy efficiency, fundamental performance limits, sensor networks and self-organising cellular networks. He has supervised 30+ successful PhD graduates and published over 300 peer-reviewed research papers including more than 20 IEEE Transaction papers. He has been awarded IEEE Comsoc's Fred Ellersick award 2014, FEPS Learning and Teaching award 2014, Sentinel of Science Award 2016, and twice nominated for Tony Jean's Inspirational Teaching award.*

**Monday 27 August 2018 9:00–12:30 Room 4L**

### **T11: Channels and Modulation Methods for Wireless Communications in High-Mobility Environments**

*A.F. Molisch, U South. Cal.; R. Hadani, U Texas Austin, A. Monk, CoherE, Christian Ibars, CoherE*

This tutorial describes recent developments of the physical layer for wireless communications in high-mobility environments (V2X, high-speed rail HSR). We first discuss the applications and requirements for communications in such environments, covering both communications for vehicle operation (car-to-car communication for autonomous driving, train control, track monitoring) and entertainment-oriented communication such as web access for passengers. We then review propagation channels for V2X and high speed trains, and point out the differences to conventional cellular channels (such as high Doppler, loss of WSSUS properties even within short time periods, etc.). Next, we discuss the impact of these channel properties on OFDM-based V2X and HSR communication, including IEEE 802.11p and LTE. We in particular discuss intercarrier interference, and the difficulty of timely feedback,

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which makes opportunistic scheduling and adaptive modulation and coding more difficult. We then discuss fundamentals of time-frequency spreading and their application to new modulation formats designed for high-mobility environments. We derive from first principles modulation methods suitable for signaling in V2X and HSR - type environments (i.e., delay- and Doppler-dispersive environments). We establish the advantages of spreading in both time and frequency domain for such environments, and analyze modulation and multiple access based on those principles, in particular the recently introduced OTFS (Orthogonal Time Frequency Space) modulation that has been proposed to 3GPP for 5G systems. Performance simulations and comparisons between these new modulations with OFDM will wrap up the tutorial.

*Andreas F. Molisch is the Solomon-Golomb - Andrew-and-Erna-Viterbi Chair Professor at the University of Southern California. He has done extensive research on wireless propagation channels and system design, authoring more than 500 journal and conference papers, 70 standards contributions, and 80 patents. He is an IEEE Distinguished Lecturer, a Fellow of the National Academy of Inventors, Fellow of IEEE, AAAS, IET, a Member of the Austrian Academy of Sciences, and recipient of numerous awards, including the Eric Sumer Award of the IEEE and the James Evans Avant-Garde Award of the IEEE VTS.*

*Ronny Hadani is an associate professor in the Mathematics Department of the University of Texas at Austin. Before that, he was a Dickson postdoctoral fellow in the Mathematics Department of the University of Chicago. He holds a PhD in pure mathematics from Tel-Aviv University under the direction of Prof. Joseph Bernstein and a Master degree in applied mathematics from The Weizmann Institute of Science under the direction of Prof. Achi Brandt. He also serves as the Chief Technology Officer at Cohere Technologies*

*Anton Monk is VP Strategic Alliances & Standards at Cohere Technologies. He was co-founder of Entropic Communications, a publicly traded company that invented the MoCA home networking standard, and was CTO of MoCA. He developed cable, satellite and wireless ICs and systems at Conexant and ComStream and was a researcher at JPL. He holds a PhD from UC San Diego.*

*Christian Ibars received his Master's degree from UPC, Laurea from Politecnico di Torino, and PhD from the New Jersey Institute of Technology. He was Head of the Communications Systems at CTTC (Centre Tecnologic de Telecomunicacions de Catalunya) and Senior Wireless Standards Engineer at Intel. He is now Principal Engineer, Wireless Standards, at Cohere Technologies. He is the author of over 80 international journal and conference papers.*

The following tutorials have been cancelled:

### **T8: Privacy Challenges in the Smart City: Technologies and Solutions for Intelligent Transportation**

*David Eckhoff, TUMCREATE Singapore and Isabel Wagner, De Montfort University, UK*

### **T9: Interference Management in Wireless Networks**

*Venugopal Veeravalli, University of Illinois at Urbana-Champaign and Aly El Gamal, Purdue University*

### **T12: REM's Enabled Optimal Spectrum Sharing and Management**

*Liljava Gavrilovska, Valentin Rakovic, Daniel Denkovski, Ss Cyril and Methodius University*

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## **IEEE Connected and Automated Vehicles Symposium**

With the advances in computing and communication technologies, vehicle technology has entered a new era of connected and automated vehicles (CAVs). The host of technologies that are required to enable CAVs are many and span several engineering and science disciplines. This symposium aims to bring together researchers who are working on different aspects of CAVs. IEEE CAVS is a symposium for reporting advances in all aspects of CAVs, including theory, tools, protocols, networks, applications, systems, test-beds and field deployments.

### **General Co-chairs:**

*Yaser .P. Fallah*, University of Central Florida, USA  
*Javier Gozalvez*, Universidad Miguel Hernandez de Elche, Spain  
*Behzad Dariush*, Honda Research Institute, USA

### **Technical Program Co-chairs:**

*Michele Rondinone*, Hyundai Motor Europe Technical Center GmbH  
*Ching-Yao Chan*, University of California-Berkeley, USA

### **Local Organizing and Publicity Chair:**

*Baldomero Coll-Perales*, Universidad Miguel Hernandez de Elche

### **Symposium Administration:**

*Clint R. Keele*, IEEE VTS

### **Technical Program Committee:**

*Ali Balador*, RISE SICS Västerås  
*Gaurav Bansal*, Toyota-itc  
*Alessandro Bazzi*, CNR/IEIIT  
*Mate Boban*, Huawei European Research Center  
*Claudia Campolo*, Università Mediterranea di Reggio Calabria  
*Alvin Chin*, BMW Technology Corporation  
*Akansel Cosgun*, Monash University  
*Alejandro Correa*, Universidad Miguel Hernandez de Elche  
*Raghendra V. Cowlagi*, Worcester Polytechnic Institute  
*Mauro Fusco*, TNO  
*Ryan M. Gerdes*, Virginia Tech  
*Hendrik-Jörn Günther*, VOLKSWAGEN

*Jérôme Härri*, EURECOM

*Yunyi Jia*, Clemson University

*Daniel Jiang*, Mercedes-Benz Research & Development North America

*Malik Khan*, Cohda Wireless

*Hariharan Krishnan*, General Motors Research & Development

*Vinod Kulathumani*, West Virginia University

*Tim Leinmueller*, DENSO

*Yan Lu*, Nvidia

*Javad Mohammadpour Velni*, University of Georgia

*Antonella Molinaro*, Università "Mediterranea" di Reggio Calabria

*Pedro M. d'Orey*, Instituto de Telecomunicações & University of Porto

*Ehsan Moradi Pari*, Honda R&D

*Jaehung Park*, Seoul National University

*Jonathan Petit*, OnBoard Security

*Xiangjun (Alex) Qian*, Tencent Inc

*Jayanthi Rao*, Ford Motor Company

*Jackeline Rios-Torres*, ORNL

*Karsten Roscher*, Fraunhofer ESK

*Matthias Schmid*, Clemson University

*Jens Schmuëdderich*, Honda Research Institute Europe

*Oyunchimeg Shagdar*, VEDECOM Institute

*Christoph Sommer*, University of Paderborn

*Amin Tahmasbi*, Honda R&D Americas

*Jorge Villagra*, Centre for Automation and Robotics (CSIC-UPM)

Monday 27 August 2018 8:30-10:30 Boulevard A

### CAVS Welcome & Keynotes

- 1 Enabling Autonomy in Mass Production Vehicles**  
Xinzhou Wu, Senior Director of Engineering and Head of ADAS/Autonomous Driving R&D, Qualcomm, USA
- 2 Baidu RAL: From Autonomous Driving to Robotics**  
Ruigang Yang, Head of Robotics and Auto-driving Lab, Baidu Research, USA

Monday 27 August 2018 11:00-12:30 Boulevard A

### CAVS1: CAVS Oral Session 1

Chair: Yaser P. Fallah, University of Central Florida, USA

- 1 Concurrent Data Dissemination at Intersections in mmWave for Cooperative Perceptions**  
Akihito Taya, Takayuki Nishio, Masahiro Morikura, Koji Yamamoto, Kyoto University
- 2 Measuring Performance Impact of Battery Swapping on Mobility Behavior**  
Abhik Banerjee, Vidhya Murali, Vijendran Gopalan Venkoparao, Robert Bosch Engineering and Business Solutions
- 3 On the Feasibility of Integrating mmWave and IEEE 802.11p for V2V Communications**  
Marco Giordani, University of Padova, Italy; Andrea Zanella, University of Padova; Takamasa Higuchi, Onur Altintas, TOYOTA InfoTechnology Center USA; Michele Zorzi, University of Padova
- 4 Field Experiments on Sensor Data Transmission for 5G-based Vehicle-Infrastructure Cooperation**  
Akihiro Ogawa, Katsunori Ushida, Shinsuke Kuroda, Hidenori Yamashita, Takuji Kantou, Sumitomo Electric Industries, LTD.; Riich Kudo, NTT Corporation; Kiichi Tateishi, NTT DOCOMO, INC.
- 5 An IEEE 802.11p-assisted LTE-V Scheduling for Reliable Multi-link V2X Communications**  
Rafael Molina-Masegosa, Javier Gozávez, Miguel Sepulcre, Universidad Miguel Hernandez de Elche (UMH)
- 6 Kalman filter based spatial prediction of wireless connectivity for autonomous robots and connected vehicles**  
Ramviyas Parasuraman, Purdue University; Petter Ogren, KTH Royal Institute of Technology; Byung-Cheol Min, Purdue University

Monday 27 August 2018 13:30-15:30 Boulevard A

### CAVS2: CAVS Oral Session 2

Chair: Miguel Sepulcre Ribes, Universidad Miguel Hernandez de Elche, Spain

- 1 Centralized Model Predictive CACC Control Robust to Burst Errors in Communication**  
Raj Haresh Patel, eurecom; Christian Bonnet, Jérôme Härrä, EURECOM
- 2 Decision Making for Connected and Automated Vehicles: A Max-Plus Approach**  
Mauro Fusco, TNO; Elham Semsar-Kazerouni, ASML; Jeroen Cornelius Zegers, TNO; Jeroen Ploeg, 2getthere, Eindhoven University of Technology
- 3 A Driver Behavior Modeling Structure Based on Non-parametric Bayesian Stochastic Hybrid Architecture**  
Hossein Nourkhiz Mahjoub, Behrad Toghi, Yaser P. Fallah, University of Central Florida
- 4 Transitions from Autopilot to Manual Control in Highly Automated Driving: Cognitive Simulations**  
Woojin Kim, Hyun-Suk Kim, Seung-Jun Lee, Jungsook Kim, Daesub Yoon, ETRI

### 5 3D Scan Registration Based Localization for Autonomous Vehicles – A Comparison of NDT and ICP under Realistic Conditions

Su Pang, Daniel Kent, Xi Cai, Hothaifa Al-Qassab, Daniel Morris, Hayder Radha, Michigan State University

### 6 Automated Signal Extraction from Controller Area Networks

Brent Nolan, Scott Graham, Barry Mullins, Christine Schubert Kabban, Air Force Institute of Technology

### 7 Optimizing a Misinformation and Misbehavior (MIB) Attack Targeting Connected Cars

Bruce DeBruhl, California Polytechnic State University; Patrick Tague, CMU

16:00-17:45 Boulevard A

### CAVS3: CAVS Posters

Chair: Javier Gozávez, Universidad Miguel Hernandez de Elche, Spain

- 1 Real-time Air Pollution Exposure and Vehicle Emissions Estimation using IoT, GNSS Measurements and Web-Based Simulation Models**  
Thibault, Philippe Pognant-Gros, Philippe Degeilh, Guillaume Sabiron, IFP New Energies; Kusan Thanabalasingam, Infotem; Luc Voise, IFP New Energies
- 2 Performance Analysis of Physical-Layer-Based Authentication for Electric Vehicle Dynamic Charging**  
Terry Guo, Mohamed Mahmoud, Tennessee Tech University
- 3 State Estimation for Mitigating Positioning Errors in V2V Networks Employing Dual Beamforming**  
Nivetha Kanthasamy, Raghvendra V. Cowlagi, Alexander Wyglinski, Worcester Polytechnic Institute
- 4 Autonomous Vehicle Scheduling At Intersections Based On Production Line Technique**  
Nasser Aloufi, California State University Dominguez Hills; Amlan Chatterjee, California State University
- 5 Toward a Standard-Compliant Implementation for Consensus Algorithms in Vehicular Networks**  
Elena Cinque, University of L'Aquila; Henk Wymeersch, Christopher Lindberg, Chalmers University of Technology; Marco Pratesi, University of L'Aquila
- 6 Identifying DSRC Channel Loss Factors of Urban Intersections using RSS Datasets**  
S M Osman Gani, Yaser P. Fallah, University of Central Florida; Syed Amaar Ahmad, Savari Inc.
- 7 Visual Servoing for Mobile Navigation**  
Jeffrey Kane Johnson, Maeve Automation
- 8 Key Management System for Private Car-Sharing Scenarios**  
Ana C. Hernández Gómez, Universitat Rovira i Virgili; Jordi Castellà-Roca, Alexandre Viejo, Universitat Rovira i Virgili
- 9 Measurements and Analysis of DSRC for V2T Safety-Critical Communications**  
Junsung Choi, Virginia Tech; Vuk Marojevic, Mississippi State University; Carl Dietrich, Virginia Tech
- 10 Exploiting the Shape of CAN Data for In-Vehicle Intrusion Detection**  
Zachariah E Tyree, Florida Atlantic University; Robert Bridges, Oak Ridge National Laboratory

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## Workshops

### **W1: 5G Millimeter-Wave Channel Measurement, Models, and Systems**

Both industry and the research community urgently require accurate characterization of wireless channels in the bands above 6 GHz. In response to this need, the U.S. National Institute of Standards and Technology (NIST) is coordinating a 5G mmWave Channel Model Alliance of companies, academia, and government organizations that is supporting the development of more accurate, consistent, and predictive channel models. This edition of the Alliance workshop will provide a unique opportunity for members of the Alliance and other members of the 5G and cmWave/mmWave channel modeling communities to share ideas and discuss progress in this important area. It expands the scope beyond measurement and modeling techniques to include a system-level analysis of mmWave capabilities, challenges, and opportunities.

**Workshop Chairs:** *David G. Michelson*, University of British Columbia  
*Akbar M. Sayeed*, University of Wisconsin-Madison  
*David W. Matolak*, University of South Carolina

### **Papers**

*Monday 27 August 2018 9:00-10:30 Room 4A*

#### **Session I**

*Chair: David G Michelson, University of British Columbia*

#### **Keynote: A Road Map for 5G mmWave Channel Model Development**

David G Michelson, University of British Columbia

#### **1 A Frame-Theoretic Scheme for Robust Millimeter Wave Channel Estimation**

Stoica Andrei, Jacobs University; Giuseppe Abreu, Jacobs University, Ritsumeikan University; Hiroki Iimori, Ritsumeikan University

#### **2 Cross-layer Interference Modeling for 5G MmWave Networks in the Presence of Blockage**

Solmaz Niknam, Reza Barazideh, Balasubramaniam Natarajan, Kansas State University

#### **3 Simulating Motion - Incorporating Spatial Consistency Into NYUSIM Channel Model**

Shihao Ju, Theodore S. Rappaport, New York University

*Monday 27 August 2018 11:00-12:30 Room 4A*

#### **Session II**

*Chair: Jeanne Quimby, NIST - Boulder*

#### **Keynote: Channel Sounder Spatial and Temporal Verification**

Jeanne Quimby, NIST - Boulder

#### **1 Design and Evaluation of a Millimeter Wave Channel Sounder for Dynamic Propagation Measurements**

Mohammad Soliman, Paul Unterhuber, Fabian de Ponte Müller, Martin Schmidhammer, Stephan Sand, German Aerospace Center (DLR); Armin Dekorsy, University of Bremen

#### **2 Effect of Passive Reflectors on the Coverage of IEEE 802.11ad mmWave Systems**

Shivesh Hiranandani, Sameer Mohadikar, Wahab Ali Gulzar, Ozgur Ozdemir, Ismail Guvenc, North Carolina State University; David Matolak, University of South Carolina

#### **3 Random User Pairing in Massive-MIMO-NOMA Transmission Systems Based on mmWave**

Mohammad Reza Ghavidel Aghdam, University of Tabriz. Iran; Reza Abdoolee, California State University, Bakersfield; Fatemeh Asghari Azhiri, Behzad Mozaffari Tazehkand, University of Tabriz. Iran

*Monday 27 August 2018 14:00-15:30 Room 4A*

#### **Session III**

*Chair: David G Michelson, University of British Columbia*

#### **Keynote: 5G mmWave New Radio : Technology, Performance and What's next**

Amitava Ghosh, Nokia

#### **5G mmWave Channel Model Alliance Update**

Kate Remley and Jeanne Quimby, NIST

#### **Research Group Updates**

Kate Remley and Jeanne Quimby, NIST

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### **W2: 1st International Workshop on Dependable Wireless Communications (DEWCOM)**

Over the past couple of decades, wireless communication technologies have become immensely adopted in various fields, appearing in a plethora of applications ranging from tracking victims, responders and equipment in disaster scenarios to machine health monitoring in networked manufacturing systems etc. Most of these applications demand strictly bounded timing response and are highly dependent on the performance of the underlying wireless communication technology. In most cases, these systems are required to have dependable timeliness requirements since data communication must be conducted within predefined temporal bounds along with fulfilling other requirements such as reliability, security etc. This is mainly because failure to address these requirements may compromise the expected behavior of the system and cause economic losses or endanger human lives. In addition, the broadcast nature of wireless communications in an open environment makes it more vulnerable to unwanted external entities compared to the wired communications. This makes the support of dependable wireless communications in open environments, where multiple devices are contending for the resources, a challenging task. Therefore, future wireless communications must tackle these challenging issues such as low communication reliability, real-time support, security, reachability and fault-tolerance.

**Workshop Chairs:** *Jose Alberto Fonseca*, University of Aveiro  
*Jaime Lloret*, Universidad Politecnica de Valencia  
*Paolo Pagano*, CNIT - National Inter-University Consortium for Telecommunications, Italy

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## Program

Monday 27 August 2018 8:30-9:30 Boulevard B

### Keynote

#### Dependability in the age of 5G and beyond

Rui L. Aguiar, University of Aveiro, Portugal

Monday 27 August 2018 9:30-10:30 Boulevard B

### Session I

Chair: Arunita Jaekel, University of Windsor, Canada

#### 1 A Novel Rateless Coded Protocol for Half-Duplex Relaying Systems with Buffered Relay

Chuangmu Yao, Wu Hui, Zhejiang University

#### 3 Attacker Placement for Detecting Vulnerabilities of Pseudonym Change Strategies in VANET

Ikjot Saini, Sherif Saad Ahmed, Arunita Jaekel, University of Windsor

#### 4 Blockchain Enabled Vehicular Communications: Fad or Future?

Paulo C. Bartolomeu, Instituto de Telecomunicações / University of Aveiro; Joaquim Ferreira, Instituto de Telecomunicações / ESTGA

Monday 27 August 2018 11:00-12:20 Boulevard B

### Session II

Chair: Joaquim Ferreira, University of Aveiro, Portugal

#### 1 Compromised Secrecy Region With Adaptive Jamming for Heterogeneous Cellular Networks and Social Relationship Model

Shiwei Yan, Yong Shang, Yanbo Huang, Ming Zhang, Peking University

#### 2 Flight Schemes Considering Breaks for Wireless Relay Networks Using Drones during Large-Scale Disasters

Hiroki Yanai, Hiraku Okada, Kentaro Kobayashi, Masaaki Katayama, Nagoya University

#### 3 Interference Mitigation and Cooperative Communication for Energy and QoS Aware Body Area Networks and Body-to-Relay Networks

Emeka E Egbogah, General Dynamics Mission Systems Canada

#### 4 IOTA-VPKI: a DLT-based and Resource Efficient Vehicular Public Key Infrastructure

Andrea Tessei, Luca Di Mauro, Mariano Falcitelli, Sandro Noto, Paolo Pagano, CNIT

Monday 27 August 2018 14:00-15:20 Boulevard B

### Session III

Chair: Rui Aguiar, University of Aveiro, Portugal

#### 1 Maximum Secrecy-Key Capacity Design for Amplify-and-Forward Relays in Secure Cooperative Networks

Shiwei Yan, Mengfei Xie, Huanrong Sun, Yong Shang, Ming Zhang, Peking University

#### 2 Multi-user Detections for Sparse Code Multiple Access System

Joonki Kim, Daesik Hong, University of Yonsei

#### 3 Providing Reliable Throughput with UPWARC as a Wireless Communications Architecture for High-Speed Trains

Subharthi Banerjee, Michael Hempel, Hamid Sharif, University of Nebraska-Lincoln

#### 4 Wireless Outdoor Network Planning for a Smart City Pilot

Hadeel Abdah, Fatma Marzouk, Akeem Mufutau, Universidade de Aveiro; Joaquim Ferreira, Instituto de Telecomunicações / ESTGA; Rui Aguiar, University of Aveiro

Monday 27 August 2018 15:20-16:00 Boulevard B

### Poster Session

#### 1 A Secure Transmission Scheme based on the Twice Channel Estimation for the Pilot Contamination

Shengbin Lin, Dawei Ma, Jizhong Zhang, Haibo Liu, Rongze Xia, Communication Sergeant School, Army Engineering University; Yue Zhong, Chongqing Lixin Vocational Education Center

#### 2 Security Performance Analysis based on the average rate over Rayleigh Fading Channels

Shengbin Lin, Rongze Xia, Haibo Liu, Dawei Ma, Jizhong Zhang, Communication Sergeant School, Army Engineering University; Yue Zhong, Chongqing Lixin Vocational Education Center

Monday 27 August 2018 16:00-17:00 Boulevard B

### Panel

#### Dependable Wireless Communications: opportunities and challenges

Moderator: Joaquim Ferreira, University of Aveiro, Portugal

Panelists: Hiraku Okada, Nagoya University, Japan  
Rui Aguiar, University of Aveiro, Portugal  
Arunita Jaekel, University of Windsor, Canada

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## W3: Massive Full Dimension (FD)-MIMO in 5G Mobile Communications

As the fourth generation (4G), namely LTE-Advanced, becomes great commercial success, the fifth generation (5G) mobile communication systems are attracting significant amount of interest from industry and academia. Unlike legacy systems which were designed for voice and data, 5G covers a wide range of use cases including enhanced mobile broadband (eMBB), ultra-reliability low-latency communication (URLLC), and massive machine-type-communication (mMTC).

Massive Full Dimension (FD)-MIMO plays important role to meet the diverse requirements of 5G use cases. For eMBB with 1000x faster data-rate than 4G, massive FD-MIMO with hundreds of antennas is considered as a key enabler for overcoming challenging propagation conditions, especially in mmWave band. For mMTC with millions of connected devices, massive FD-MIMO enables extreme high-order MU-MIMO and new multiple-access schemes such as non-orthogonal multiple access (NOMA). For URLLC communications with very low latency and very high reliability (e.g., vehicular communications, automotive control), superior spatial diversity from massive antenna arrays is essential.

Recently, 3GPP 5G NR standards have finished its first design for 5G system which includes massive FD-MIMO technologies such as hybrid beamforming, reference signal and CSI feedback design for eMBB use case. However, massive MIMO technologies for the other 5G use cases have not been studied and developed. The goal of this workshop is to bring together leading researchers in both academia and industry to share their views on and to identify concepts and technologies for massive FD-MIMO for the other use cases (e.g., URLLC and mMTC) as well as potential enhancement of massive FD-MIMO technologies for eMBB use case for 5G.

### Workshop Organizers:

Moon-il Lee, InterDigital Communications, Inc.

Lingjia Liu, Virginia Tech

Runhua Chen, China Academy of Telecommunications Technology  
Oghenekome Oteri, InterDigital, Inc.

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## Program

Monday 27 August 2018 9:30-10:30 Room 4C

### Session I

Chair: Kome Oteri, InterDigital, USA

**Keynote: Massive MIMO: A key feature for 5G New Radio**  
Amitava Ghosh, Nokia

**1 System Level Performance Characteristics of Sub-6GHz Massive MIMO Deployments with the 3GPP New Radio**  
Frederick W. Vook, Nokia Networks; William J. Hillery, Eugene Vistosky, Jun Tan, Xuning Shao, Mihai Enescu, Nokia Bell Labs

**2 Indoor Experimental Trial on Hybrid 16-Beam Spatial-Multiplexing for High SHF Wide-band Massive MIMO in 5G**

Manabu Sakai, Kenji Nakagawa, Hiroki Iura, Naofumi Iwayama, Akihiro Okazaki, Mitsubishi Electric Corporation; Nobuhide Nonaka, 5G Laboratory, Satoshi Suyama, Jun Mashino, Yukihiko Okumura, NTT DOCOMO, INC.; Atsushi Okamura, Mitsubishi Electric Corporation

Monday 27 August 2018 11:00-12:30 Room 4C

### Session II

Chair: Kome Oteri, InterDigital, USA

**1 Field Experimental DL MU-MIMO Evaluations of Low-SHF-Band C-RAN Massive MIMO System with over 100 Antenna Elements for 5G**

Kenichiro Yamazaki, Kohei Izui, Kanada Nakayasu, Toshifumi Sato, NEC; Tatsuki Okuyama, Jun Mashino, Satoshi Suyama, Yukihiko Okumura, NTT DOCOMO, INC.

**2 Bi-directional Training with Rank Optimization and Fairness Control**

Hao Zhou, Northwestern University; Jialing Liu, Qian Cheng, Diana Maamari, Huawei Wireless Research and Standards; Weimin Xiao, Huawei U.S. Wireless R&D; Anthony Soong, Huawei Technologies

**3 System-level Model and Performance Evaluations of Tomlinson-Harashima Precoding for 5G Networks**

Xin Wang, Ru Feng, Xiaolin Hou, DOCOMO Beijing Communications Laboratories Co., Ltd

Monday 27 August 2018 14:00-15:30 Room 4C

### Session III

Chair: Kome Oteri, InterDigital, USA

**Keynote: Massive MIMO: Vehicle-to-X Communications: The Killer Application of Millimeter Wave**

Robert Heath, University of Texas at Austin

**1 Impact of Analog Beamforming on 5G-NR mmWave System Performance**

Bishwarup Mondal, Intel; Avik Sengupta, Gregory Ermolaev, Intel Corporation; Victor Sergeev, Lobachevsky State University of Nizhni Novgorod; Alexei Davydov, Intel; Eddy Kwon, Intel Corporation

**2 Capacity and Coverage Performance Scaling in Outdoor Dense Millimeter Wave Access Networks**

Mustafa Akdeniz, Sagar Dhakal, Intel Labs; Jan Schreck, Intel; Nageen Himayat, Intel Labs

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## W4: 5th International Workshop on Research Advancements in Future Networking Technologies

Recently, a lot of research efforts have been made from both academia and industry side to promote various new and emerging network paradigms. The reason is that during the past decade, it has been realized that the current internet architecture was originally designed for end-to-end host centric communications, however, the actual focal of communications is the content itself. Hence, we have witnessed new architectures such as an Information-Centric Network (ICN) with various extensions like Content-Centric Network (CCN), Named Data Network (NDN), Data-Oriented Network Architecture, and so on. On the other hand, enormous efforts in cellular networks have been made for improving the user experience and as a result, today, we are able to use LTE-A and other networks. In this context, the upcoming 5G networking architectures, whose ongoing research is focused on the networking mechanisms in regards to the massive increase in the number of connected devices, bandwidth requirements, reduced latency, and the deployment of supporting operational mechanisms such as network virtualization, cloud-based deployments, mobile edge computing, and storage and new utilization scenarios. Moreover, these new technologies are being applied in other networking domains as well, including VANETs, Smart Grid, Smart Cities, Internet of Things, Big Data, etc.

### General Chairs:

*Syed Hassan Ahmed*, Georgia Southern University, USA

*Danda Rawat*, Howard University, USA

*Muhammad Alam*, Xi'an Jiaotong-Liverpool University, China

### Technical Program Committee:

*Di Zhang*, Waseda University

*Mahasweta Sarkar*, San Diego State University

*Suzan Bayhan*, University of Helsinki

*Muhammad Azfar Yaqub*, Kyungpook National University

*Awais Ahmad*, Yeungnam University

*Marica Amadeo*, University "Mediterranea" of Reggio Calabria

*Wael Guibene*, Intel Labs

*Muhammad Faran Majeed*, Asian Institute of Technology

*Cormac J. Sreenan*, University College Cork

*Rasheed Hussain*, University of Amsterdam

*Abdul Wahid*, Comsats Institute of Information Technology

*Zhihan Lv*, University College London

*Imran Khan*, Schneider Electric

*Suhail Jabbar*, National Textile University, Faisalabad

*Murad Khan*, Sarhad University, Peshawar

*Muhammad Bilal Amin*, Kyung Hee University

*Muhammad Toaha Raza Khan*, Kyungpook National University

*Kishwer Abdul Khaliq*, University of Bremen

*Fatima Hussain*, Ryerson University

*Adnan Shahid*, Taif University

*Syed Ali Hassan*, SECS, NUST Pakistan

### Publicity Co-chairs:

*Al-Sakib Khan Pathan*, Southeast University

*Zhiwei Yan*, China Internet Network Information Center, Beijing

*Ali Kashif Bashir*, University of the Faroe Islands

### Steering Committee:

*Mohsen Guizani*, University of Idaho (Best Paper Award Comm.)

*Hassnaa Moustafa*, Intel Corporation

*Guo Song*, Hong Kong Polytechnic University

*Claudia Campolo*, University in Reggio Calabria

*Ravi Ravindran*, Huawei Corp.

*Tanveer Zia*, Charles Sturt University

*Houbing Song*, Embry-Riddle Aeronautical University

*Jaime Lloret*, UPV, Valencia (Best Paper Award Committee)

*Safdar Hussain Bouk*, DGIST (Best Paper Award Chair)

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## Program

Monday 27 August 2018 11:00-12:30 Boulevard C

### Session I

Welcome by Syed Hassan Ahmed, Georgia Southern University

- 1 A Location-based Topology Management for Energy Hole Problem in Wireless Sensor Networks**  
Qu Yinxiang, Yifei Wei, Yinglei Teng, Mei Song, Beijing University of Posts and Telecommunications
- 2 An Energy-Efficient Approach for Large Scale Opportunistic Networks**  
Hemant Kumar, Syed Ali Hassan, Sajid Saleem, National University of Sciences and Technology
- 3 An Entropy-SVM Based Interest Flooding Attack Detection Method in ICN**  
Ting Zhi, Ying Liu, Beijing Jiaotong University; Zhiwei Yan, CNNIC
- 4 BGP Route Leak Prevention Based on BGPsec**  
Jian Jin, CAICT

Monday 27 August 2018 14:00-15:30 Boulevard C

### Session II

- 1 Exploiting Big Data Analytics for Smart Urban Planning**  
Saba Ameer, Munam Ali Shah, COMSATS Institute of Info Technology
- 2 Hybrid-Vehcloud: An Obstacle Shadowing Approach for VANETs in Urban Environment**  
Anirudh Paranjothi, Uni. of Oklahoma; Mohammad S. Khan, East Tennessee State University; Mohammed Atiquzzaman, Uni.of Oklahoma

### 3 On Fractional Resource Usage in Subcarrier and Power Allocation for OFDM Networks

Yiran Li, Huawei Technologies Co., Ltd

Monday 27 August 2018 16:00-17:20 Boulevard C

### Session III

- 1 Performance Analysis of LDPC-based Rate Adaptive Relays over Nakagami Channels**  
Bushra Chaoudhry, University of Stuttgart; Syed Ali Hassan, National University of Sciences and Technology; Joachim Speidel, University of Stuttgart
- 2 Resource Allocation for Relay-Assisted D2D Communications with Network Coding**  
Wenhuan Huang, Chen Ming, Southeast University; Zhaohui Yang, King's College London; Nuo Huang, Lu Pei, Southeast University
- 3 Simulation Study on Collaborative Content Distribution in Delay Tolerant Vehicular Networks**  
Rusheng Zhang, Carnegie Mellon University; Bo Yu, Krishnan, General Motors Research & Development
- 4 Using Incoherent Doppler Sensing with Machine Learning for Detecting Movement**  
Billy Kihei, ReachRF LLC; Muhammad Rizwan, University of Management and Technology

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## W5: Workshop on Vehicular Information Services for the Internet of Things (VISIT 2018)

The Internet of Things (IoT) has recently gained great attention from both academia and industry. Among the key enablers of IoT, smart vehicles have been promising solutions for providing on-road communication and ubiquitous information services. The real value of vehicular resources is much realized when translated into information services that put these resources into action. Expanding the smart vehicle-based services/applications beyond the intelligent transportation services requires research and development efforts to explore new service scopes, create innovative system architectures, and design enabling technologies. Enabling pervasive and diversified vehicular service provisioning in the IoT era entails synergizing several related technologies such as distributed cloud and fog computing, networking infrastructures, crowdsourcing, public sensing, information-centric networking, privacy and security techniques.

This workshop is designed to highlight the ongoing efforts towards vehicular service provisioning and related technology blend. It also addresses issues that arise when dealing with smart vehicles such as resource and service discovery, data communication and delivery, quality of information assessment, resource recruitment, and incentive modelling.

### Workshop Co-Chairs

*Sherin Abdelhamid*, Queen's University, Canada  
*Khalid Elgazzar*, University of Louisiana at Lafayette, USA  
**Technical Program Committee**  
*Damla Turgut*, University of Central Florida  
*Aboelmagd Noureldin*, Royal Military College of Canada  
*Hatem Abou-zeid*, Ericsson Canada

*Amr El Mougny*, German University in Cairo  
*Mervat AbuElkheir*, Mansoura University  
*Karim Emara*, Ain Shams University  
*Ala Abu Alkheir*, University of Ottawa  
*Eslam AbdAllah*, Ain Shams University  
*Tamer AbdElkader*, Ain Shams University  
*Salimur Choudhury*, Lakehead University

## Program

Monday, 27 August 2018 14:00-14:40 Room 4D

### Keynote

**Building the Ultimate Smart Driving Machine: Integrating Digital Services with the Vehicle**  
Alvin Chin, BMW Technology Group

Monday, 27 August 2018 14:40-15:30 Room 4D

### Session I

- 1 An MDP Model of Vehicle-Pedestrian Interaction at an Unsignalized Intersection**  
Ya-Chuan Hsu, Swaminathan Gopalswamy, Srikanth Saripalli, Dylan A. Shell, Texas A&M University
- 2 Ultra-Low Power IoT Traffic Monitoring System**  
Siraj Muhammad, Hazem Refai, University of Oklahoma; Matthew Blakeslee, Oklahoma Department of Transportation

Monday, 27 August 2018 16:00-17:30 Room 4D

### Session II

- 1 A Deep Learning Approach for Automotive Radar Interference Mitigation**  
Jiwoo Mun, Heasung Kim, Jungwoo Lee, Seoul National University
- 2 Traffic-Aware Traffic Signal Control Framework Based on SDN and Cloud-Fog Computing**  
Hung-Chin Jang, Ting-KuanLin, National Chengchi University
- 3 Adaptive Time-Bound Key Management Scheme For The Internet of Things**  
Noran AboDoma, Ahmad Mostafa, The British University in Egypt; Eman Shaaban, Ain Shams University

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## W6: 3rd International Workshop of CorNER: Communication for Networked Smart Cities

The demands for high data rates and ultra-reliable coverage become demanding issues due to increase in the number of device population in the world by 2020. The huge demand for high quality life makes local governments and administrators put careful planning in cities for the future. As a premier agent for stimulating a quality of life compatible with a resource efficient economy, the smart city phenomenon has recently seized the imagination of the academia and the industry significantly. As the Internet of things (IoT) and Tactile Internet are predicted to be a primary driving force for future cities, advanced communication methods will play a crucial role in assisting real-time data acquisition and utilization from distributed sensors. However, smart cities will also have to function within the limitations of the national economy and available resources. Consequently, the challenges in the realization of smart cities are many and varied.

In general, low energy consumption, constrained bandwidth, latency and budgetary limitations are predominating. To overcome these hurdles, it is essential that new ideas and theories for optimizing the network in terms of energy, spectral utilization, latency and monetary issues are presented to achieve a robust environment monitoring and sustainable transportation network, among other provisions. This led the researchers to pave the way for future wireless networks under the umbrella of 5G communications as well. This is an amalgamation of a multitude of technologies ranging from device level algorithms such as low power transmissions to system-level architectures such as software-defined networking (SDN), the challenges posed by each of these techniques are critical. The smart city idea is also known to work at the intersection of various techniques such as device-to-device (D2D) communications, massive multiple-input multiple-output (MIMO), millimeter wave (mmWave) communications, full-duplex transmissions and Internet of Things (IoT) to name a few.

### Workshop Chair:

*João Guerreiro*, Universidade Autónoma de Lisboa

*Syed Ali Hassan*, National University of Sciences and Technology

*Dushantha Nalin K Jayakody*, National Research Tomsk

Polytechnic University

*Rui Dinis*, Universidade Nova de Lisboa

### Organizers:

### Program

9:00-10:30 Room 4D

#### Session 1

Chair: *Luca Beltramelli*, Mid Sweden University, Sweden

#### Keynote: Named Data Networking in Connected and Smart Cities

Syed Hassan Ahmed, Georgia Southern University

#### 1 Network Time Synchronization Using OFDM-Based Cooperative Consensus (CoCo) Algorithm

Sajith Mohan Chakkedath, Mary Ann Weitnauer, Georgia Institute of Technology

#### 2 Smart Waste Bin: A New Approach for Waste Management in Large Urban Centers

Kellow Pardini, Joel Rodrigues, National Institute of Telecommunications (Inatel); Syed Ali Hassan, National University of

Sciences and Technology; Neeraj Kumar, Thapar University Patiala;

Vasco Furtado, University of Fortaleza (UNIFOR), Fortaleza-CE, Brazil

11:00-12:30 Room 4D

#### Session 2

Chair: *Luca Beltramelli*, Mid Sweden University, Sweden

#### Keynote: Achieving High Power Efficiency in OFDM Systems

João Guerreiro, Institute of Telecommunications

#### 1 Automated Reservation Mechanism for Charging Connected and Autonomous EVs in Smart Cities

Binod Vaidya, Hussein T. Mouftah, University of Ottawa

#### 2 A Survey: Why and How Automated Cars Should Communicate to Other Road Users?

Hiro Onishi, Alpine Electronics

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## VTC2018-Fall Technical Papers

### Tuesday 28 August 2018

11:00-12:30 Room 4A

#### 1A: Resource Management in Vehicular Networks

Chair: *Di Yuan*, Uppsala University, Sweden

#### 1 Toward Building an Individual Preference Model for Personalizing Settings in the Vehicle

Olav Laudy, Causality Link; Johann P. Prenninger, BMW Group; Alvin Chin, Jilei Tian, BMW Technology Corporation

#### 2 Low Complexity SNR-Based Packet Level Burst-Error Model for Vehicular Ad-Hoc Networks

Thomas Blazek, Christoph Mecklenbräuker, TU Wien

#### 3 A GA-based Strategy for Deploying Cable Connected Roadside Units in VANETs

Zhilong Li, Jing Liu, Qi Zhang, Shanghai Jiao Tong University

#### 4 Cooperative longitudinal positioning at intersections using DSRC

Haiyang Zhang, Bernd Schäufele, Daimler Center for Automotive IT Innovations (DCAITI); Johann Nikolai Hark, Oliver Sawade, Ilja Radusch, Fraunhofer Institute for Open Communication Systems (FOKUS)

11:00-12:30 Room 4B

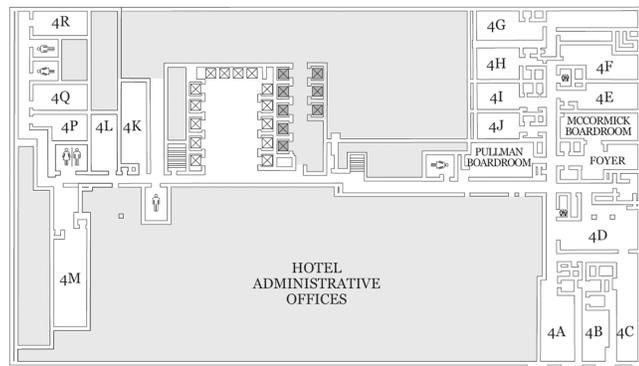
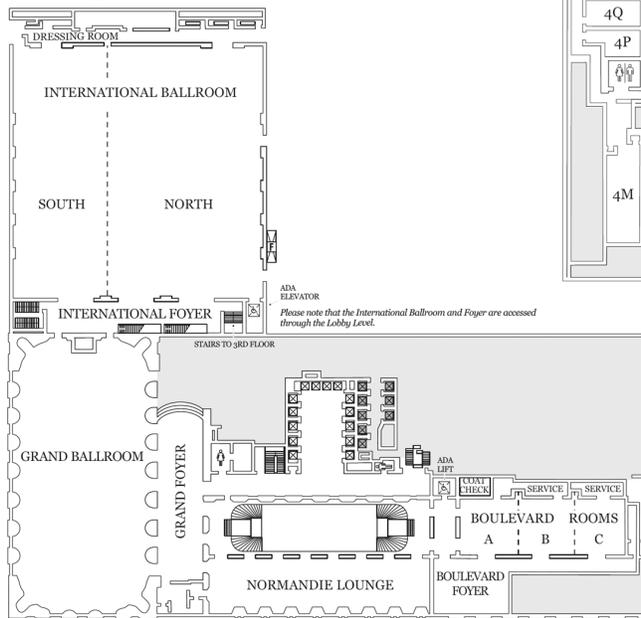
#### 1B: Intelligent Green Communications

Chair: *Yunlong Cai*, Zhejiang University, China

#### 1 Machine Learning Based Uplink Transmission Power Prediction for LTE and Upcoming 5G Networks using Passive Downlink Indicators

Robert Falkenberg, Benjamin Sliwa, Nico Piatkowski, Christian Wietfeld, TU Dortmund University

## Lobby Level



## 4th Floor

## Floor Plans

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	Room 4A (A)	Room 4B (B)	Room 4C (C)	Room 4D (D)	Room 4E (E)	Room 4F (F)	Boulevard A Room 4G/4H (G)	Boulevard B Room 4J (H)	Boulevard C (I)	Normandie Lounge (P)	Grand Ballroom (Industry Program)	
7:00-17:30	MONDAY 27 August											
9:00-17:30	Registration (Normandie Lounge)											
18:00-20:00	CAVS Symposium, Tutorials, and Workshops (See Individual Entries) VTC - VPPC - CAVS Welcome Reception (Grand Ballroom)											
TUESDAY 28 August												
7:00-17:30	Registration (Normandie Lounge)											
8:00-8:25	Welcome: <b>Dennis Roberson</b> , VTC2018-Fall General Chair; <b>Oliver Holland</b> , VTC2018-Fall TPC Chair; <b>João P. Trovão</b> , VPPC2018 General Chair; <b>Alex Wyglinski</b> , VTS President (Grand Ballroom)											
8:25-9:05	Keynote: <b>Marty Cooper</b> , Father of the Cell Phone; Dyna LLC (Grand Ballroom)											
9:05-9:45	Keynote: <b>Ann Schlenker</b> , Director - Center for Transportation Research, Argonne National Laboratory (Grand Ballroom)											
9:45-10:30	Keynote: <b>Julius Knapp</b> , Chief of the FCC's Office of Engineering and Technology, FCC (Grand Ballroom)											
10:30-11:00	Refreshments (Grand Foyer and Normandie Lounge)											
11:00-12:30 (1)	Resource Management in Vehicular Networks	Intelligent Green Communications	MIMO	mm-Wave/5G Channel Modeling and Measurements	Recent Results: Interference Management	Spectrum Sensing I	Room 4G Performance Evaluation in Sensor Networks		Spectrum and Multiple Antenna Systems		5G Perspectives: Telcos	
12:30-14:00	Lunch (Grand Ballroom)											
14:00-15:30 (2)	Recent Results: 5G Systems and Networks	Precoding and Beamforming	Securing Vehicular Communications	Modulation and Multiple Access	Potentials of 5G and Beyond in Connected Vehicles	Channel Estimation and Synchronization	Room 4G Recent Results: Modulation and Coding		IoT, M2M, Protocols and Security		5G Perspectives: Telco Supplier & Networking Companies	
15:30-16:00	Refreshments (Grand Foyer and Normandie Lounge)											
16:00-17:30 (3)	Channel Estimation and Pilot Design	Device-to-Device Communications	Spectrum Sensing II	Recent Results: Massive MIMO	Recent Results: Vehicular Networks and Services I	Autonomous and Connected Vehicles	Room 4G Collaborative Perspective in Mobility	Room 4J Indoor Positioning	TVT Papers I		Regulatory Issues, Barriers and Perspectives	
WEDNESDAY 29 August												
8:00-17:30	Registration (Normandie Lounge)											
9:00-10:30	Keynote Panel: Hani Mahmassani, Director NW University Transportation Center (moderator); Senior Executives from Boeing, John Deere, Canadian Pacific, AM General outline how they use advanced communications, autonomous and connectivity technologies											
10:30-11:00	Refreshments (Grand Foyer and Normandie Lounge)											
11:00-12:30 (4)	MIMO Detection	Implementation and Experimentation in Positioning and Localization	Charging Infrastructure and Powertrains for Electric Vehicles	Optimization and Design in IoT, M2M, Sensor Networks, and Ad-Hoc Networking	Recent Results: Multiple Access	MIMO Systems	Boulevard A Emerging Technologies	Boulevard B Cloud- and Fog-RAN	Boulevard C Full-Duplex and Interference Mitigation	Localization, Positioning and Sensors in Transportation	Technology Experts expand on Applications	
12:30-14:00	Lunch (Grand Ballroom)											
14:00-15:30 (5)	Cellular and PHY in Vehicular Networking	Machine Learning in IoT, M2M, Sensor Networks, and Ad-Hoc Networking	Security and Performance Analysis in Wireless Networks	Data Forwarding/ Routing in Connected Vehicles	Green Edge Computing for IoT	Recent Results: Resource Allocation	nm-Wave Systems	Channel Modeling and Measurements	Cell Free Massive MIMO and MU MIMO	Radio Access, Heterogeneous and Green Networks	User Experience with Self Driving Vehicles	
15:30-16:00	Refreshments (Grand Foyer and Normandie Lounge)											
16:00-17:30 (6)	Green Wireless Communications	Recent Results: Vehicular Networks and Services II	Estimation and Detection in IoT, M2M, Sensor Networks, and Ad-Hoc Networking	Channel and Resource Allocation	Recent Results: Performance Evaluation I	IoT Communications and Security	MIMO Channel Characterization and Impact	Multi-Carrier and OFDM Systems I	URLLC and IoT	TVT Papers II	Aerial Networks Hybrid and Unmanned Drones	
18:30-22:00	Gala Banquet (Grand Ballroom)											
THURSDAY 30 August												
8:00-16:00	Registration (Normandie Lounge)											
9:00-10:30	Keynote Panel: <b>Danielle DuMerer</b> , CIO, City of Chicago (Moderator); <b>Paul Steinberg</b> , CTO, Motorola Solutions; <b>Robert Bell</b> , Co-Founder Intelligent Community Forum; <b>Hardik Bhatt</b> , Leader, Smart Cities & Mobility Business, Amazon Web Services discuss the applications of 5G, autonomous vehicles, IoT and other advanced technologies in the community/city environment. (Grand Ballroom)											
10:30-11:00	Refreshments (Grand Foyer and Normandie Lounge)											
11:00-12:30 (7)	Network Protocols in IoT, M2M, Sensor Networks, and Ad-Hoc Networking	Mobile Communications and Networking	Connectivity Beyond Vehicular Networks	Recent Results: UAVs/Drones	Recent Results: Performance Evaluation II	Radio Resource and Mobility Management	Room 4M Multi-Carrier and OFDM Systems II	Interference and Coexistence	C-RAN and Edge Computing	Antenna Systems, Signals and Propagation	Perspectives from Community/City Managers	
12:30-14:00	Lunch (Grand Ballroom)											
14:00-15:30 (8)	Vehicular and Satellite Systems	Practical Applications in IoT, M2M, Sensor Networks, and Ad-Hoc Networking	Traffic Management	Energy Harvesting Communications	Green Wireless Sensor Communications	Recent Results: Energy Efficiency	Boulevard A Performance Evaluation and RF Design	Recent Results: Wireless Connectivity	Fundamental Limits and Performance Analysis	Vehicular Communications and Networks		
15:30-16:00	Refreshments (Grand Foyer and Normandie Lounge)											
16:00-17:30 (9)	Hardware Impact and Secret Communications	Channel Selection and Performance Testing in Vehicular Networks	Distributed Performance Optimization in Next Generation Networks	Channel Coding and Iterative Detection	Wireless Communications and Networking	Recent Results: Channel Measurements and Modeling		Intelligent Transportation	Performance Analysis of Next Generation Networks			

- 2 **Deep Learning for Optimized Wireless Transmission to Multiple RF Energy Harvesters**  
Yuan Xing, Yuchen Qian, Liang Dong, Baylor University
- 3 **Deep Learning-based Intelligent Dual Connectivity for Mobility Management in Dense Network**  
Chujie Wang, Zhifeng Zhao, Zhejiang University; Qi Sun, China Mobile Research Institute; Honggang Zhang, Zhejiang University
- 4 **Energy Efficient Learning-based 60GHz Band Coverage Prediction for Multi-band WLAN**  
Xiaoyan Wang, Masahiro Umehira, Shigeki Takeda, Hiroyuki Otsu, Takyuya Kawatani, Ibaraki University

11:00-12:30 Room 4C

### 1C: MIMO

Chair: Kun Wang, University of California, Davis, USA

- 1 **Deep Learning for Super-Resolution DOA Estimation in Massive MIMO Systems**  
Hongji Huang, Guan Gui, Hikmet Sari, Nanjing University of Posts and Telecommunications; Fumiyuki Adachi, Tohoku University
- 2 **Dual-Mode Index Modulation Schemes for CPSC-MIMO Systems**  
Swaroop Jacob, Cisco Systems India Private Limited; Lakshmi Narasimhan, IIT Palakkad; A. Chockalingam, Indian Institute of Science, Bangalore
- 3 **MMSE-THP with QoS Requirements for the Downlink of Multiuser MIMO Systems**  
Xinyang Guo, Dewei Yang, Hua Wang, Jingming Kuang, Beijing Institute of Technology; Xiaojie Wen, Beijing Institute of Satellite Information Engineering
- 4 **Joint Turbo Receiver for LDPC-Coded MIMO Systems Based on Semi-definite Relaxation**  
Kun Wang, University of California, Davis; Zhi Ding, University of California at Davis
- 5 **Low Complexity Signal Detection in MIMO Systems**  
Sayyed Shafivulla, Aaqib Patel, Mohammed Zafar Ali Khan, Indian Institute of Technology Hyderabad

11:00-12:30 Room 4D

### 1D: mm-Wave/5G Channel Modeling and Measurements

Chair: Andreas F. Molisch, University of Southern California, USA

- 1 **ADMM for Hybrid Precoding of Relay in Millimeter-Wave Massive MIMO System**  
Wenyuan Xu, Yongchao Wang, Xuan Xue, University of Xidian
- 2 **Millimeter Wave Channel Measurements and Modelling in an Indoor Hotspot Scenario at 28 GHz**  
Pan Tang, Zhang Jianhua, Beijing University of Posts and Telecommunications; Mansoor Shafi, Spark, New Zealand; Pawel A. Dmochowski, Peter J. Smith, Victoria University of Wellington
- 3 **Field Measurements and Parameter Calibrations of Propagation Model for Digital Audio Broadcasting in Norway**  
Rebekka Olsson Omslandseter, Lei Jiao, Magne Arild Haglund, University of Agder
- 4 **Long-term channel estimation for mm-wave hybrid beamforming systems of coherent signals based on 2-D MUSIC algorithm**  
Jing Wu, Wei Heng, Jinming Hu, Xiang Li, Ke Wang, Southeast University

11:00-12:30 Room 4E

### 1E: Recent Results: Interference Management

Chair: Monisha Ghosh, University of Chicago, USA

- 1 **Accurate Characterization of Dynamic Cell Load in Noise-Limited Random Cellular Networks**  
Gourab Ghatak, CEA Leti; Antonio De Domenico, CEA-Leti; Marceau Coupechoux, TELECOM Paris Tech
- 2 **Impulse Noise Suppression for Single-Carrier Coded Systems by Monte Carlo Expectation Maximization**  
Der-Feng Tseng, Shi-Shun Lin, National Taiwan University of Science and Technology
- 3 **Impacts of Phase Noise on CFBMC-OQAM**  
Long D. Le, Ha H. Nguyen, University of Saskatchewan
- 4 **Analysis of Uplink Co-Channel Interference on the Cellular Networks**  
Jimin Bae, Eunhye Park, Younghan Han, Korea Advanced Institute of Science and Technology
- 5 **Blind Interference Alignment in multi-cell mmWave access and fronthaul**  
Vaia Kalokidou, Angela Doufexi, Mark Beach, University of Bristol

11:00-12:30 Room 4F

### 1F: Spectrum Sensing I

Chair: Tilahun Melkamu Getu, École de Technologie Supérieure, Canada

- 1 **An Evolutionary Game Approach Towards Energy-Activated Cooperative Spectrum Sensing**  
Tian Yang, Moez Esseghir, Lyes Khoukhi, University of Technology of Troyes
- 2 **A Simple F-Test Based Multi-Antenna Spectrum Sensing Technique**  
Tilahun Melkamu Getu, École de Technologie Supérieure (ÉTS); Wessam Ajib, University of Quebec at Montreal; René Jr. Landry, École de Technologie Supérieure (ÉTS)
- 3 **Independent Component Analysis-based Source Separation with Noise Cancelling for Cyclostationary Detection in Cognitive Radios**  
Mario Bkassiny, SUNY Oswego; Sudharman K. Jayaweera, University of New Mexico
- 4 **Performance Tradeoffs of Spectrum Sensing and Target State Estimation and Fusion**  
Qiang Liu, Oak Ridge National Laboratory

11:00-12:30 Room 4G

### 1G: Performance Evaluation in Sensor Networks

Chair: Faisal Alfouzan, Glasgow Caledonian University, UK

- 1 **A New Analytical Model for the Performance Evaluation of the Uplink Transmission in NB-IoT networks**  
Nguyen Tuan Anh, Philippe Martins, Van Tam Nguyen, Télécom ParisTech; Nguyen T. Mai Trang, UPMC - Lip 6
- 2 **Modeling of Enhanced Distributed Channel Access with Station Grouping: A Throughput Analysis**  
Luca Beltramelli, Guntupalli Lakshmikanth, Mikael Gidlund, Patrik Österberg, Ulf Jennehag, Mid Sweden University
- 3 **Performance Analysis of Millimeter-Wave Hybrid Satellite-Terrestrial Relay Networks over Rain Fading Channel**  
Liang Xiao, Jian Jiao, Bowen Feng, Shaohua Wu, Bin Cao, Zhang Qinyu, Harbin Institute of Technology
- 4 **Slotted Aloha-NOMA with MIMO Beamforming for Massive M2M Communication in IoT Networks**  
Mohamed Elkourdi, Asim Mazin, Richard D. Gitlin, University of South Florida

**5 Traffic-Aware Backscatter Communications in Wireless-Powered Heterogeneous Networks**

Sung Hoon Kim, Dong In Kim, Sungkyunkwan University

11:00-12:30 Normandie Lounge

**1P: Spectrum and Multiple Antenna Systems**

**1 Carrier Aggregation for Underlay Cognitive Radio Wireless Mesh Networks**

Ousmane Zeba, Shunsuke Saruwatari, Takashi Watanabe, Osaka University

**2 Distribution-Free Spectrum Sensing for Full Duplex Cognitive Radio**

Kartik Patel, University of Texas at Austin; Dhaval Patel, Ahmedabad University; Miguel López-Benítez, University of Liverpool; Sanjay Chaudhary, Ahmedabad University

**3 A Two-Stage Content Pushing Service Based on Virtual MIMO in LTE-V Networks**

Qing Wei, Li Wang, Beijing University of Posts and Telecommunications

**4 Identifier Based Greedy Approach for Mitigating Harmful Interference**

Rohit Singh, Douglas Sicker, Carnegie Mellon University

**5 Impact of Secondary User Interference on Primary Network in Cognitive Radio Systems**

Amit Kachroo, Sabit Ekin, Oklahoma State University

**6 Adaptive Space-time Algorithm Using Frost's and Maximin**  
Krittetash Pinyoanuntapong, Ramanpreet Nannre, Hyuck M. Kwon, Wichita State University; Khanh Pham, Air Force Research Laboratory, Kirtland Air Force Base

**7 Hybrid Beamforming Design in Multi-Cell MU-MIMO Systems with Per-RF or Per-Antenna Power Constraints**  
Christo Kurisummoottil Thomas, Dirk T.M. Slock, EURECOM

**8 Interference Alignment for Transceiver Design in Multi-user MIMO Relay System**

Armeline Dembo Mafuta, Tom Walingo, University of KwaZulu-Natal

**9 Robust THP Transceiver Design with Partial CSI in TDD MU-MIMO Systems**

Wei Ji, Ling Qiu, University of Science and Technology of China; Yuanjie Li, Huawei Technologies, Co.Ltd

**10 The Effect of Diversity Combining on ISI in Massive MIMO**  
Arkady Molev Shteiman, Stefano Galli, Laurence Mailander, Xiao Feng Qi, Futurewei Technologies, Inc.

**11 Theoretical System Capacity of Multi-user MIMO THP in the Presence of Terminal Mobility**

Hirofumi Saganuma, Yukiko Shimbo, Nobuhiro Hiruma, Waseda University; Hiromichi Tomeba, Takashi Onodera, Sharp Corporation; Fumiaki Maehara, Waseda University

14:00-15:30 Room 4A

**2A: Recent Results: 5G Systems and Networks**

Chair: Mohamed Elkourdi, University of South Florida, USA

**1 Optimal Cross Slice Orchestration for 5G Mobile Services**

Dinh Thai Hoang, University of Technology Sydney; Dusit Niyato, Ping Wang, Nanyang Technological University; Antonio De Domenico, Emilio Calvanese Strinati, CEA-LETI

**2 Reinforcement learning approach for Advanced Sleep Modes management in 5G networks**

Fatma Ezzahra Salem, Zwi Altman, Orange Labs; Azeddine Gati, Orange; Tijani Chahed, Institut Mines-Telecom, Telecom SudParis; Eitan Altman, INRIA

**3 Turbo-like Iterative Multi-user Receiver Design for 5G Non-orthogonal Multiple Access**

Xiangming Meng, Yiqun Wu, Chao Wang, Yan Chen, Huawei

**4 Accelerating Beam Sweeping in mmWave Standalone 5G New Radios using Recurrent Neural Networks**

Asim Mazin, Mohamed Elkourdi, Richard D. Gitlin, University of South Florida

**5 Efficient Load Balancing Scheme in 5G Heterogeneous Cellular Networks**

Jin-Bae Park, Kwang Soon Kim, Yonsei University

14:00-15:30 Room 4B

**2B: Precoding and Beamforming**

Chair: Priyabrata Parida, Virginia Tech, USA

**1 A SLNR-based Precoding Algorithm for Max-Min Fairness Problem in Physical-Layer Multicasting**

Shuo Zhang, Mingchuan Yang, Qing Guo, Yuming Wei, Harbin Institute of Technology

**2 Analog Beamforming for mmW Circular Arrays with Limited Number of RF Chains**

Petteri Kela, Mário Costa, Huawei Technologies Finland; Kari Leppanen, Huawei Technologies Oy (Finland). Co. Ltd.; Riku Jäntti, Department of Communications and Networking, Aalto University

**3 Low Complexity Hybrid Precoding Using Beam Steering for mmWave MIMO Systems**

Minjung Cho, Hyukyeon Lee, Kyungmook Oh, Jaeseok Kim, Yonsei University

**4 Precoder Design Algorithm for Hybrid MIMO System with Discrete Phase Shifters and D/A Converters**

Daichi Tamate, Yukitoshi Sanada, Keio University

**5 A Codebook With Adjustable Angular Coverage for MIMO Spatial Channel Distributions**

Wonjin Sung, Changhyeon Kim, Sungin Shin, Sogang University; Jonghyun Park, LG Electronics

14:00-15:30 Room 4C

**2C: Securing Vehicular Communications**

Chair: Isabel Wagner, De Montfort University, UK

**1 A fixed-point model for semi-persistent scheduling of vehicular safety messages**

Xu Wang, Randall Berry, Northwestern University; Ivan Vukovic, Jayanthi Rao, Ford Motor Company

**2 Assessment of Positioning Errors on V2V Networks Employing Dual Beamforming**

Nivetha Kanthasamy, Ruixiang Du, Kuldeep S. Gill, Alexander Wyglinski, Raghvendra V. Cowlagi, Worcester Polytechnic Institute

**3 Vehicle-to-Vehicle Communication for Autonomous Vehicles: Safety and Maneuver Planning**

Anum Ali, The University of Texas at Austin; Libin Jiang, Shailesh Patil, Junyi Li, Qualcomm; Robert W. Heath Jr., The University of Texas at Austin

**4 Software Downloads in Trusted Zones with Wake-up Sensors for Connected Vehicles**

Stefan Aust, NEC Communication Systems, Ltd.

**5 Pearson Correlation Analysis for Misbehavior Detection in VANET**

Prinkle Sharma, University of Massachusetts Dartmouth; Jonathan Petit, OnBoard Security; Hong Liu, University of Massachusetts Dartmouth

14:00-15:30 Room 4D

## 2D: Modulation and Multiple Access

Chair: Yuteng Wu, Illinois Institute of Technology, USA

- 1 A Downlink NOMA System Based on Combinatorial Design**  
Yuteng Wu, Edidiong Attang, G. E. Atkin, Illinois Institute of Technology
- 2 A Reduced Complexity OQPSK-Type Detector for SOQPSK**  
Rami Othman, Yves Louët, CentraleSupélec/IETR; Alexandre Skrzypczak, Zodiac Data Systems
- 3 Golden Angle Modulation: Approaching the AWGN Capacity**  
Peter Larsson, Mikael Skoglund, KTH Royal Institute of Technology
- 4 Impact of Timing Offset on Optical Spatial Pulse Position Modulation**  
Hammed Gbolahan Olanrewaju, John Thompson, Wasii Popoola, University of Edinburgh
- 5 Modulation-based detect-and-forward relaying in noncoherent UWB systems.**  
Yi-Fang Hou, Gemtek Technology Co., Ltd., Taiwan; Tsan-Ming Wu, Chung Yuan Christian University

14:00-15:30 Room 4E

## 2E: Potentials of 5G and Beyond in Connected Vehicles

Chair: Haris Volos, DENSO International America, Inc., USA

- 1 Machine Learning Based Context-predictive Car-to-cloud Communication Using Multi-layer Connectivity Maps for Upcoming 5G Networks**  
Benjamin Sliwa, Robert Falkenberg, Thomas Liebig, Johannes Pillmann, Christian Wietfeld, TU Dortmund University
- 2 Wideband High Velocity RF Channel Emulation for the Test & Verification of 5G mmWave Systems**  
Jue Cao, Di Kong, Fai Tila, Angela Doufexi, Andrew Nix, University of Bristol
- 3 Novel Direct 31-Term Calibration for Characterisation of Automotive Communication Cables in the GHz Range**  
Sebastian Wagner, Reinhard Stolle, Augsburg University of Applied Sciences
- 4 Anchorless Routing for URLLC Services in 5G Network**  
Koji Tsubouchi, Ryosuke Kurebayashi, Ashiq Khan, Goro Kunito, Shigeru Iwashina, NTT DOCOMO, INC.
- 5 A study on packet collision reduction scheme for LTE V2X sidelink communications**  
Tomoki Maruko, Shinpei Yasukawa, NTT DOCOMO INC.; Riich Kudo, NTT Corporation; Satoshi Nagata, Mikio Iwamura, NTT DOCOMO INC.

14:00-15:30 Room 4F

## 2F: Channel Estimation and Synchronization

Chair: Roohollah Amiri, Boise State University, USA

- 1 Blind Estimation Algorithms for IQ Imbalance in Direct Down-conversion Receivers**  
Peiyang Song, Nan Zhang, Xidian University; Hang Zhang, Science and Technology on Communication Networks Laboratory; Fengkui Gong, Xidian University
- 2 Channel Aware Sparse Signaling for Ultra Low-latency Communication in TDD systems**  
Wonjun Kim, Hyoungju Ji, Byonghyo Shim, Seoul National University
- 3 Improved Tomlinson-Harashima Precoding with Transmit Antenna Selection and User Sorting**  
Junyuan Dong, Ling Qiu, University of Science and Technology of China; Yuanjie Li, Huawei Technologies, Co.Ltd

## 4 Joint Channel Estimation and Signal Detection for FBMC based on Artificial Neural Network

Zhuyi Li, Ming Lei, Minjian Zhao, Zhejiang University; Min Li, Macquarie University

## 5 Low-complexity Adaptive Channel Estimation

Xianyu Chen, Ming Jiang, Sun Yat-sen University

14:00-15:30 Room 4G

## 2G: Recent Results: Modulation and Coding

Chair: Vaia Kalokidou, University of Bristol, UK

- 1 Blind Modulation Classification of Different Variants of QPSK and 8-PSK for Multiple-Antenna Systems with Transmission Impairments**  
Rahul Gupta, Sudhan Majhi, Indian Institute of Technology Patna; Octavia A. Dobre, Memorial University
- 2 Space-Time Indexed Multiple-LED Complex Modulation Schemes for VLC Systems**  
K. V. S. Sai Sushanth, Indian Institute of Science, Bangalore; Swaroop Jacob, Cisco Systems India Private Limited; A. Chockalingam, Indian Institute of Science, Bangalore
- 3 Spectrally Efficient QAM-FBMC System Using FTN Scheme with Block-Wise Interleaved Filters**  
Seongbae Han, Sooyong Choi, Yonsei University
- 4 Doubly-Selective Channel Estimation in FBMC-OQAM and OFDM Systems**  
Ronald Nissel, Fjolla Ademaj, Markus Rupp, TU Wien
- 5 Embedded Delay-Doppler Channel Estimation for Orthogonal Time Frequency Space Modulation**  
Patchava Raviteja, Tran Khoa Phan, Yi Hong, Emanuele Viterbo, Monash University

14:00-15:30 Normandie Lounge

## 2P: IoT, M2M, Protocols and Security

- 1 Comparison of Slotted Aloha-NOMA and CSMA/CA for M2M Communications in IoT Networks**  
Asim Mazin, Mohamed Elkourdi, Richard D. Gitlin, University of South Florida
- 2 Intelligent Parking Management System Design from a Mobile Edge Computing (MEC) Perspective**  
Cong Zhang, University of Electronic Science and Technology of China
- 3 Automated Reverse Engineering and Attack for CAN using OBD-II**  
Tae Un Kang, Hyun Min Song, Seonghoon Jeong, Huy Kang Kim, Korea University
- 4 Performance Evaluation of LoRaWAN In North America Urban Scenario**  
Hai Wang, Abraham O. Fajolu, University of Calgary
- 5 Synchronization Improvement on IEEE 802.15.8 For Distributed D2D Wireless Networks**  
Huan-Bang Li, Kenichi Takizawa, Masafumi Moriyama, Lin Shan, Ou Zhao, Fumihide Kojima, National Institute of Information and Communications Technology (NICT)
- 6 Closed-form Flow Level Performance Modeling for Cellular Networks with User Mobility**  
Antonia Maria Masucci, Orange Labs; Salah Eddine Elayoubi, CentraleSupélec
- 7 Adverse Selection via Matching in Cooperative Fog Computing**  
Zexuan Yang, Li Wang, Yinan Ding, Mei Song, Beijing University of Posts and Telecommunications
- 8 EmuLab of Security Credential Management System (SCMS) for Vehicular Communications**  
Robert D. Murrill III, Matthew D. Furtado, Hong Liu, University of Massachusetts Dartmouth

**9 Information Reconciliation Based on Systematic Secure Polar Code for Secret Key Generation**  
Shengjun Zhang, Liang Jin, Shilei Zhu, Kaizhi Huang, Zhou Zhong, NDSC

**10 Risk Assessment of Autonomous Vehicles Using Bayesian Defense Graphs**  
Ali Behfarnia, Ali Eslami, Wichita State University

16:00-17:30 Room 4A

**3A: Channel Estimation and Pilot Design**

Chair: Jean-Yves Chouinard, Laval University, Canada

**1 On the Phase Tracking Reference Signal (PT-RS) Design for 5G New Radio (NR)**

Yinan Qi, Mythri Hunukumbure, Hyungju Nam, Hyunil Yoo, SaiDhiraj Amuru, Samsung

**2 Pilot Decontamination Based on Superimposed Pilots in Massive MIMO Systems**

Luis A. Lago, Yan Zhang, Zunwen He, Zesong Fei, Beijing Institute of Technology

**3 SB-SAGE based Joint MCFOs and Channel Estimation for DMIMO-OFDM Systems**

Sucharita Chakraborty, Naincy Kamal Kujur, Indian Institute of Technology, Kharagpur; Debarati Sen, Indian Institute of Technology Kharagpur

**4 Sparse Channel Estimation Using Multiple DFT Matrices for Massive MIMO Systems**

Jun Shikida, Kazushi Muraoka, NEC Corporation; Naoto Ishii, NEC

**5 Channel Estimation for MU-MIMO Systems with Some Inactive Users**

Mohamed Lassaad Ammari, Laval University; Jean-Yves Chouinard, Université Laval; Paul Fortier, Laval University

16:00-17:30 Room 4B

**3B: Device-to-Device Communications**

Chair: Yujie Li, University of New Brunswick, Canada

**1 A Speed-Aware Joint Handover Approach for Clusters of D2D Devices**

Yujie Li, Ziwen Su, Lianfen Huang, Xiamen University; Wei Song, University of New Brunswick

**2 Analysis of Area Spectral Efficiency in D2D Underlaid Downlink Cellular Networks**

Youwen Zhang, Ling Qiu, Guangji Chen, Xiaowen Liang, University of Science and Technology of China

**3 Outage Probability Analysis in D2D-Enabled mmWave Cellular Networks with Clustered Users**

Esma Turgut, M. Cenk Gursoy, Syracuse University

**4 Social Awareness Aided D2D Relay Selection Based on Fuzzy and Entropy Theories**

Kuan Wu, Ming Jiang, Hong-Zhou Tan, Sun Yat-sen University

**5 A Pattern Division Multiple Access Scheme with Low Complexity Iterative Receiver for 5G wireless communication systems**

KaiZhang, Beijing University of Posts and Telecommunications; Jin Xu, Zhengzhou University of Light Industry; Changchuan Yin, Chunyu Pan, Beijing University of Posts and Telecommunications

16:00-17:30 Room 4C

**3C: Spectrum Sensing II**

Chair: Wen-Jing Wang, University of Victoria, Canada

**1 Noise-Robust Feature Combination Method for Modulation Classification Under Fading Channels**

Siyang Zhou, Zhilu Wu, Zhendong Yin, Zhutian Yang, Harbin Institute of Technology

**11 Security Performance Analysis of MISOSE Transmission with Random Unitary Beamforming**

Tingnan Bao, University of Victoria; Hong-Chuan Yang, University of Victoria; Mazen O. Hasna, Qatar University

**2 Queuing Analysis for Slotted Secondary Transmission with Adaptive Modulation and Coding under Spectrum Sensing Imperfection**

Wen-Jing Wang, Hong-Chuan Yang, University of Victoria

**3 Spectrum Occupancy Prediction in Coexisting Wireless Systems using Deep Learning**

Oluwaseyi Omotere, Lijun Qian, Prairie View A&M University

**4 Time Series Analysis of Multiple Primary User Environment using HMM-based Spectrum Sensing**

Yuya Aoki, Takeo Fujii, The University of Electro-Communications; Teruji Ide, National Institute of Technology, Kagoshima College

16:00-17:30 Room 4D

**3D: Recent Results: Massive MIMO**

Chair: Zhi Ding, University of California, Davis, USA

**1 Sequential Linear Detection in One-Bit Quantized Uplink Massive MIMO with Oversampling**

Ali Bulut Üçüncü, Middle East Technical University; Ali Ozgur Yilmaz, Middle East Technical University (METU)

**2 Robust LMMSE Beamformer Design by Naive UL/DL Duality and Validation for Non-Cooperative Massive MIMO**

Kalyana Gopala, Eurecom; Dirk T.M. Slock, EURECOM

**3 Iterative Weighted Nuclear Norm Minimization-based Channel Estimation for Massive Multi-User MIMO systems**

Muamer Hawej, Yousef R. Shayan, Concordia University

**4 A Semi-blind based Channel Estimator for Pilot Contaminated One-bit Massive MIMO Systems**

Boddupelly Srinivas, IIT Kharagpur; Khushboo Mawatwal, Debarati Sen, Saswat Chakrabarti, Indian Institute of Technology Kharagpur

**5 MU-Massive MIMO for UWA Communication**

Mohammad Junaid Bocus, Angela Doufexi, Dimitris Agrafiotis, University of Bristol

16:00-17:30 Room 4E

**3E: Recent Results: Vehicular Networks and Services I**

Chair: Yan Chen, Huawei, China

**1 Out-of-Coverage Multi-Hop Road Safety Message Distribution via LTE-A Cellular V2V (C-V2V)**

Lorenzo Gibellini, Maria Luisa Merani, University of Modena and Reggio Emilia

**2 Dynamic Route Selection for Vehicular Store-Carry-Forward Networks and Misbehaviour Vehicles Analysis**

Hu Yuan, Carsten Maple, Kevin Ghirardello, University of Warwick

**3 Exploiting Mobility Context Awareness in Cellular Networks for Assisting Vehicular Use Cases**

Nandish P. Kuruvatti, Univ of Kaiserslautern; Harold Moses Mutabazi, Hans Schotten, University of Kaiserslautern

**4 Secure Distributed Anonymous Data Collection for Vehicular Ad-Hoc Networks**

Jabari Stegall, Alexander Wyglinski, Worcester Polytechnic Institute

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**5 Determining Suitable Grid Size for One-to-Many Charging Vehicle within Wireless Sensor Network**

Min-Hong Shen, Shuo-Han Chen, Wei-Shin Li, National Tsing Hua University; Tsan-Sheng Hsu, Academia Sinica; Wei-Kuan Shih, National Tsing Hua University; Hsin-Wen Wei, Tamkang University

16:00-17:30 Room 4F

**3F: Autonomous and Connected Vehicles**

Chair: Bugra Turan, Koc University, Turkey

**1 Risky Driving Behavior Detection using In-vehicle WiFi Signals**

Hashim Saeed, Tabish Saeed, Muhammad Tahir, Momin Ayub Uppal, Lahore University of Management Sciences

**2 An Autonomous Overtaking Maneuver Based on Relative Position Information**

Meihong Zhang, Tingting Zhang, Zhang Qinyu, Harbin Institute of Technology

**3 Sensing Hidden Vehicles by Exploiting Multi-Path V2V Transmission**

Kaifeng Han, Seung-Woo Ko, The University of Hong Kong; Hyukjin Chae, Byoung-Hoon Kim, LG Electronics; Kaibin Huang, The University of Hong Kong

**4 Predicting Steering Actions for Self-Driving Cars Through Deep Learning**

Chaojie Ou, Safaa Bedawi, Arief Koesdwiady, Fakhri Karray, University of Waterloo

**5 Eye-glance Frequency As a Function of Driver's Intent to Lane Changes**

Sylvia Bhattacharya, Shonda Bernadin, Florida State University

16:00-17:30 Room 4G

**3G: Collaborative Perspective in Mobility**

Chair: Alvin Chin, BMW R&D Group, USA

**1 On Optimal Proactive and Retention-Aware Caching with User Mobility**

Ghafour Ahani, Di Yuan, Uppsala University

**2 V2X Applications Using Collaborative Perception**

Radovan Miucic, Ashish Sheikh, Changan US R&D Center, Inc.; Zeljko Medenica, Changan U.S. R&D; Raju Kunde, Changan US R&D Center, Inc.

**3 A Collaborative Environment Perception Approach for Vehicular Ad hoc Networks**

Sadia Ingrachen, LARI laboratory, Mouloud Mammeri University of Tizi-Ouzou; Nadjib Achir, University of Paris 13; Paul Muhlethaler, Inria Paris; Tounsia Djamah, LARI laboratory, Mouloud Mammeri University of Tizi-Ouzou; Amine Berqia, Université Mohammed V de Rabat, ENSIAS, Morocco

16:00-17:30 Room 4J

**3H: Indoor Positioning**

Chair: Kai-Ten Feng, National Chiao Tung University, Taiwan

**1 An Indoor RFID Location Algorithm Based on Support Vector Regression and Particle Swarm Optimization**

Li Yang, Qinshu Liu, Jie Xu, Jing Hu, Tiecheng Song, Southeast University

**2 Beamformed Fingerprint Learning for Accurate Millimeter Wave Positioning**

João Gante, INESC-ID, IST, Universidade de Lisboa; Gabriel Falcão, Instituto de Telecomunicações, University of Coimbra; Leonel Sousa, INESC-ID, IST, Universidade de Lisboa

**3 Line Model-Based Drift Estimation Method for Indoor Monocular Localization**

Guanyuan Feng, Lin Ma, Xuezhai Tan, Harbin Institute of Technology

**4 Refined Autoencoder-based CSI Hidden Feature Extraction for Indoor Spot Localization**

Hsiao-Chien Tsai, Chun-Jie Chu, National Chiao Tung University; Po-Hsuan Tseng, National Taipei University of Technology; Kai-Ten Feng, National Chiao Tung University

**5 WiFi Fingerprint based Indoor Localization with Iterative Weighted KNN for WiFi AP Missing**

Donglin Wang, Feng Zhao, Ting Wang, Westlake Institute for Advanced Study; Xuetao Zhang, Xi'an Jiaotong University

16:00-17:30 Normandie Lounge

**3P: TVT Papers I**

**1 Analytical Modelling for Mobility Signalling in Ultra Dense Networks**

Azar Taufique, University of Oklahoma; Abdelrahim Mohamed, University of Surrey; Hasan Farooq, University of Oklahoma; Ali Imran, The University of Oklahoma

**2 Hierarchical Hypothesis and Feature-Based Blind Modulation Classification for Linearly Modulated Signals**

Rahul Gupta, Indian Institute of Technology Patna

**3 Inverse Multipath Fingerprinting for Millimeter Wave V2I Beam Alignment**

Vutha Va, University of Texas at Austin; Junil Choi, Pohang University of Science and Technology (POSTECH); Takayuki Shimizu, TOYOTA InfoTechnology Center, U.S.A., Inc.; Gaurav Bansal, Toyota-itc; Robert Heath, The University of Texas at Austin

**4 Joint sparse graph for FBMC/OQAM systems**

Lei Wen, National University of Defense Technology

**5 Lyapunov Scheduling and Optimization in Network Coded Wireless Multicast Network**

Nadieh Moghadam, Ivani LLC

**6 Millimeter Wave Analog Beamforming With Low Resolution Phase Shifters for Multiuser Uplink**

Patchava Raviteja, Yi Hong, Emanuele Viterbo, Monash University

**7 MRO for Handover Failure Reduction in Small-Cell Networks**

Nguyen Minh Thang, Sungoh Kwon, University of Ulsan; Hongsoo Kim, Electronics and Telecommunications Research Institute

**8 On Bounds of Spectral Efficiency of Optimally Beamformed NLOS Millimeter Wave Links**

Rakesh R T, Debarati Sen, Indian Institute of Technology Kharagpur; Goutam Das, IIT Kharagpur

**9 Optimal Replica Distribution in Edge-Node-Assisted Cloud-P2P Platforms for Real-Time Streaming**

Wei Zhao, Osaka University; Jiajia Liu, Xidian University, China; Takahiro Hara, Osaka University

**10 Power-aware maximization of ergodic capacity in D2D underlay networks**

Chang Liu, Eastern New Mexico University

**11 Propagation Models and Performance Evaluation for 5G Millimeter-Wave Bands**

Shu Sun, Theodore S. Rappaport, New York University; Mansoor Shafi, Spark, New Zealand; Pan Tang, Zhang Jianhua, Beijing University of Posts and Telecommunications; Peter J. Smith, Victoria University of Wellington; Shihao Ju, New York University

**10 Small Cell Base Station Sleep Strategies for Energy Efficiency**

Chang Liu, Eastern New Mexico University

# Wednesday 29 August 2018

11:00-12:30 Room 4A

## 4A: MIMO Detection

Chair: *Ismail Guvenc, North Carolina State University, USA*

- 1 Low Complexity Metric Function for Gibbs Sampling MIMO Detection**  
Yutaro Kobayashi, Yukitoshi Sanada, Keio University
- 2 Outage Analysis of M-BLAST Layered Symbol Detection Algorithm for Spatial Multiplexing**  
Yavuz Yapıcı, Ismail Guvenc, North Carolina State University; Yuichi Kakishima, DOCOMO Innovations, Inc.
- 3 Robust Distributed Detection in Massive MIMO Wireless Sensor Networks under CSI Uncertainty**  
Apoorva Chawla, Indian Institute of Technology Kanpur; Adarsh Patel, Syracuse University; Aditya K. Jagannatham, Indian Institute of Technology Kanpur; Pramod K. Varshney, Syracuse University
- 4 Uplink Performance Analysis of Oversampled Wideband Massive MIMO with One-Bit ADCs**  
Ali Bulut Üçüncü, Ali Ozgur Yilmaz, Middle East Technical University (METU)
- 5 Analytical Performance Evaluation of Low-Complexity FDE Receivers for Uplink Massive MIMO with Coarse ADCs**  
João Guerreiro, Instituto de Telecomunicações; Rui Dinis, Universidade Nova de Lisboa; Paulo Carvalho, FCT- Universidade Nova de Lisboa

11:00-12:30 Room 4B

## 4B: Implementation and Experimentation in Positioning and Localization

Chair: *Jenq-Shiou Leu, National Taiwan University of Science and Technology, Taiwan*

- 1 CSI Based High Accuracy Device Free Passive Localization System**  
Yuge Liu, Wenhui Xiong, University of Electronic Science and Technology of China; Zhaowei Zhu, ShanghaiTech University; Shaoqian Li, University of Electronic Science and Technology of China
- 2 Experimental Verification: Enabling Obstacle Mapping Based On Radio Tomographic Imaging**  
Shengxin Xu, Heng Liu, Fei Gao, Sisi Chen, Beijing Institute of Technology
- 3 Field Experiment of Localization based on Machine Learning in LTE network.**  
Noboru Kanazawa, Atsushi Nagate, Atsushi Yamamoto, Softbank Corp.
- 4 UAV-RT: An SDR Based Aerial Platform for Wildlife Tracking**  
Amir Torabi, Michael W. Shafer, Gabriel S. Vega, Kellan M. Rothfus, Northern Arizona University
- 5 Towards the Implementation of Recurrent Neural Network Schemes for WiFi Fingerprint-Based Indoor Positioning**  
He-Yen Hsieh, Setya Widyanan Prakosa, Jenq-Shiou Leu, National Taiwan University of Science and Technology

11:00-12:30 Room 4C

## 4C: Charging Infrastructure and Powertrains for Electric Vehicles

Chair: *Luis F. Abanto-Leon, Eindhoven University of Technology, Netherlands*

- 1 Electric Vehicle Charging in Residential Day-Ahead Real Time Pricing**  
Kab Seok Ko, Qualcomm Institute, University of California, San Diego; Seokheon Cho, Ramesh Rao, University of California, San Diego; Jimyung Kang, Korea Electrotechnology Research Institute

## 2 Privacy Preserving Distributed Stable Matching of Electric Vehicles and Charge Suppliers

Fatih Yucel, Eyuphan Bulut, Virginia Commonwealth University; Kemal Akkaya, Florida International University

## 3 Pricing-Based Decentralized Balancing Control for Charging Stations

Yujin Sim, Gangminh Lee, Jinsol Park, Korea Advanced Institute of Science and Technology; Dong-Ho Cho, KAIST

## 4 PMSM Current Sensor FDI based on DC Link Current Estimation

Haibo Li, Yi Qian, Sohrab Asgarpour, University of Nebraska-Lincoln; Hamid Sharif, University of Nebraska – Lincoln

11:00-12:30 Room 4D

## 4D: Optimization and Design in IoT, M2M, Sensor Networks, and Ad-Hoc Networking

Chair: *Paulo Alexandre Regis, University of Nevada, USA*

- 1 An Optimization-based mTSP-CR Mobile Data Gathering Algorithm for large-scale Wireless Sensor Networks**  
Jianxin Ma, Shuo Shi, Xuemai Gu, Harbin Institute of Technology
- 2 Data Offloading and Sharing for Latency Minimization in Augmented Reality Based on Mobile-Edge Computing**  
Wenliang Liu, Jinke Ren, Guan Huang, Yinghui He, Guanding Yu, Zhejiang University
- 3 Phase Transitions of Massive Device Connectivity via Convex Geometry**  
Tao Jiang, Yuanming SHI, ShanghaiTech University
- 4 Power Allocation and Mode Selection with Superposition Coding for Device-to-Device Networks**  
Yuanyuan Liao, Liying Li, Zhenwei Ou, Guodong Zhao, Zhi Chen, University of Electronic Science and Technology of China
- 5 Analysis and Design of Ultra-Reliable Short Blocklength Analog Fountain Codes**  
Ke Zhang, Jian Jiao, Zixuan Huang, Bowen Feng, Shaohua Wu, Bin Cao, Zhang Qinyu, Harbin Institute of Technology

11:00-12:30 Room 4E

## 4E: Recent Results: Multiple Access

Chair: *Eiji Okamoto, Nagoya Institute of Technology, Japan*

- 1 Non-Orthogonal Multiple Access (NOMA) for Underwater Acoustic Communication**  
Mohammad Junaid Bocus, Dimitris Agrafiotis, Angela Doufexi, University of Bristol
- 2 Multiuser Diversity Gain in Uplink NOMA**  
Eren Balevi, The University of Texas at Austin
- 3 On The Impact of Line-of-Sight and Spatial Correlation on NOMA Performance**  
Sunil Dhakal, Philippa A. Martin, University of Canterbury; Peter Smith, Victoria University of Wellington
- 4 Bidirectional Primary and Secondary Transmissions with Hybrid-SWIPT in Cognitive Radio Networks**  
Devendra Singh Gurjar, Ha H. Nguyen, University of Saskatchewan
- 5 Measurement experiments on 920 MHz Band for Spectrum Sharing with LoRaWAN**  
Mai Ohta, Fukuoka University; Koichi Adachi, Naoki Aihara, The University of Electro-Communications; Osamu Takyu, Shinshu University; Takeo Fujii, The University of Electro-Communications; Makoto Taromaru, Fukuoka University

11:00-12:30 Room 4F

#### 4F: Recent Results: MIMO Systems

Chair: Emanuele Viterbo, Monash University, Australia

- 1 Synthesis of Waveform Covariance Matrix for MIMO Radar Transmit Beampatterns: LASSO and IRLS Approaches**  
Mohamed Rihan, Lei Huang, Shenzhen University
- 2 SC-FDE Based MIMO Uplink Transmission over Infrared Communication Channels**  
Omer Narmanlioglu, Ozyegin University; Bugra Turan, Koc University; Refik Caglar Kizilirmak, Nazarbayev University; Sinem Coleri Ergen, Koc University; Murat Uysal, Ozyegin University
- 3 TIBWB-OFDM: A Promising Modulation Technique for MIMO 5G Transmissions**  
Andreia Pereira, Pedro Bento, Marco Gomes, Instituto de Telecomunicações - University of Coimbra; Rui Dinis, Universidade Nova de Lisboa; Vitor Silva, University of Coimbra
- 4 Matrix Normalization Based ZF Hybrid Precoded Multi-User MIMO mmWave Systems with Massive Array**  
Hang Li, Qian Wang, Xiaojing Huang, Y. Jay Guo, University of Technology Sydney
- 5 Uplink Coverage in Heterogeneous mmWave Cellular Networks with User-Centric Small Cell Deployments**  
Xueyuan Wang, M. Cenk Gursoy, Syracuse University

11:00-12:30 Boulevard A

#### 4G: Emerging Technologies

Chair: John Chapin, Roberson and Associates, USA

- 1 Safe Driving Capacity of Autonomous Vehicles**  
Yuan-Ying Wang, Hung-Yu Wei, National Taiwan University
- 2 Supplier Cooperation in Drone Delivery**  
Suttinee Sawadsitang, Dusit Niyato, Nanyang Technological University; Puay Siew Tan, Singapore Institute of Manufacturing Technology; Ping Wang, Nanyang Technological University
- 3 Vehicle Speed Enforcement using Absolute Speed Handheld Lidar**  
Mahendra Mandava, Robert S. Gammenthaler, Steven F. Hocker, Applied Concepts, Inc.
- 4 Evaluation of EEG-Based Predictions of Image QoE in Augmented Reality Scenarios**  
Brian Bauman, Patrick Seeling, Central Michigan University
- 5 Does Internet of Things Disrupt Residential Bandwidth Consumption?**  
Yaser Al Mtawa, Anwar Haque, University of Western Ontario; Bassel Bitar, Bell Canada

11:00-12:30 Boulevard B

#### 4H: Cloud- and Fog-RAN

Chair: Yanxiang Jiang, Southeast University, China

- 1  $\mathcal{L}_2$ -Box Optimization for Green Cloud-RAN via Network Adaptation**  
Fan Zhang, ShanghaiTech University; Qiong Wu, Hao Wang, ShanghaiTech University; Yuanming Shi, ShanghaiTech University
- 2 Decentralized Asynchronous Coded Caching in Fog-RAN**  
Wenlong Huang, Yanxiang Jiang, Southeast University; Mehdi Bennis, University of Oulu; Fu-Chun Zheng, Southern University; Haris Gacanin, Nokia Bell Labs; Xiaohu You, Southeast University
- 3 Distributed Edge Caching in Ultra-dense Fog Radio Access Networks: A Mean Field Approach**  
Yabai Hu, Yanxiang Jiang, Southeast University; Mehdi Bennis, University of Oulu; Fu-Chun Zheng, Southern University

- 4 Enhanced Diversity and Network Coded 5G Wireless Fog-Based-Fronthaul Networks**  
Nabeel I. Sulieman, Eren Balevi, Richard D. Gitlin, University of South Florida
- 5 Joint Scheduling and Beamforming via Cloud-Radio Access Networks Coordination**  
Ahmed Douik, Caltech; Hayssam Dahrouj, Effat University; Tareq Y. Al-Naffouri, Mohamed-Slim Alouini, King Abdulah University of Science and Technology (KAUST)

11:00-12:30 Boulevard C

#### 4I: Full-Duplex and Interference Mitigation

Chair: Yazan H. Al-Badarne, Texas A&M University, USA

- 1 A Cooperative Power Control Scheme for Two-user Gaussian Interference Channel**  
Liyuan Zhang, Meng Ma, Peking University; Yongqiang Fei, Huawei Technologies Co., Ltd.; Yiming Lei, Bingli Jiao, Peking University
- 2 An Eigenvalue-Based Multi-Antenna RFI Detection Algorithm**  
Tilahun Melkamu Getu, École de Technologie Supérieure (ÉTS); Wessam Ajib, University of Quebec at Montreal; René Jr. Landry, École de Technologie Supérieure (ÉTS)
- 3 Analog Least Mean Square Loop for Self-Interference Cancellation in Generalized Continuous Wave SAR**  
Anh Tuyen Le, Yijiang Nan, University of Technology Sydney; Le Chung Tran, University of Wollongong; Xiaojing Huang, Y. Jay Guo, University of Technology Sydney; Yiannis Vardaxoglou, Loughborough University
- 4 MIMO Pre-coder Design Based on Weighted Euclidean Distance Maximization in Interference Channel**  
Peng Luo, Bo Pang, Yong Jin Daniel Kim, Rose-Hulman Institute of Technology
- 5 On the Asymptotic Throughput of the k-th Best Secondary User Selection in Cognitive Radio Systems**  
Yazan Al Badarneh, Costas N. Georghiadis, Texas A&M University; Mohamed-Slim Alouini, King Abdulah University of Science and Technology (KAUST)

11:00-12:30 Normandie Lounge

#### 4P: Localization, Positioning and Sensors in Transportation

- 1 Enhanced Vehicle Localization in Urban NLoS using Multipath Ray Tracing Fingerprints**  
Marcelo Nogueira de Sousa, Ilmenau University of Technology; Reiner Thomä, Technische Universität Ilmenau
- 2 Robust UWB Localization of a Reflecting Plane Using Multi-Path Delay**  
Seonwoo Lee, Georgia Tech; Mary Ann Weitnauer, Georgia Institute of Technology.
- 3 Time Optimal Multi-UAV Path Planning for Gathering ITS Data from Roadside Units**  
Hamidullah Binol, Florida International University; Eyuphan Bulut, Virginia Commonwealth University; Kemal Akkaya, Florida International University; Ismail Guvenc, North Carolina State University
- 4 AEKF-Based 3-D Localization of Road Surface Images with Sparse Low-Accuracy GPS Data**  
Diya Li, Yazhe Hu, Tomonari Furukawa, Virginia Tech
- 5 Optimal Primary Exclusive Region Design for Cognitive Radio VANETs on Multiple Roads**  
Yuxiang Fu, Keiji Yoshikawa, Shota Yamashita, Koji Yamamoto, Takayuki Nishio, Masahiro Morikura, Kyoto University

**6 Positioning pedestrians and cyclists in urban intersections using VLF magnetic fields**

Maxim Ralchenko, Mike Roper, Peter Kwasniok, Vital Alert Communication, Inc. and Waldo Technologies Inc.

**7 High-Speed Seismic Data Acquisition over mm-Wave Channels**

Varun Amar Reddy, Georgia Institute of Technology; Gordon Stüber, Georgia Tech; Suhail I. Al-Dharrab, King Fahd University of Petroleum and Minerals

**8 UAV-based Data Gathering using An Artificial Potential Fields Approach**

Celia Yasmine Tazibt, University Paris 13; Nadjib Achir, University of Paris 13; Paul Muhlethaler, Inria Paris; Tounsia Djamah, LARI laboratory, Mouloud Mammeri University of Tizi-Ouzou

**9 Empirical Power Consumption Model for UAVs**

Hasini Viranga Abeywickrama, Beeshanga Abewardana Jayawickrama, Ying He, Eryk Dutkiewicz, University of Technology Sydney

**10 Evaluating Complementary Strengths and Weaknesses of ADAS Sensors**

Ismael J Xique, Michigan Tech Research Institute; William Buller, Michigan Tech University; Benjamin Hart, Michigan Tech Research Institute; Eric Dennis, Zahra Bahrani Fard, Center for Automotive Research

**11 Study on State-of-the-art Cloud Services Integration Capabilities with Autonomous Ground Vehicles**

Praveen Damacharla, Dhvani Mehta, the University of Toledo; Ahmad Y Javaid, Vijay K. Devabhaktuni, The University of Toledo

14:00-15:30 Room 4A

**5A: Cellular and PHY in Vehicular Networking**

Chair: Vuk Marojevic, Mississippi State University, USA

**1 Downlink Multiuser Detection of Ultra-Low Latency Virtual-Cell Vehicular Networks**

Chih-Hsiu Zeng, National Taiwan University; Kwang-Cheng Chen, University of South Florida

**2 Latency Modeling for Mobile Edge Computing Using LTE Measurements**

Haris Volos, Takashi Bando, Kenji Konishi, DENSO International America, Inc.

**3 Measurement and Analysis of Cellular Networks under Mobility: Investigation of Change Detection**

Taulant Berisha, Thomas Blazek, Christoph Mecklenbräuer, TU Wien

**4 Performance Analysis of Unsupervised LTE Device-to-Device (D2D) Communication**

Fabian Eckermann, Julian Freudenthal, Christian Wietfeld, TU Dortmund University

**5 Low Complexity Multiuser Detection in the Downlink of Ultra-Low Latency Virtual-Cell Based Vehicular Networks**

Chih-Hsiu Zeng, National Taiwan University; Kwang-Cheng Chen, University of South Florida

14:00-15:30 Room 4B

**5B: Machine Learning in IoT, M2M, Sensor Networks, and Ad-Hoc Networking**

Chair: Bo Yang, Texas A&M University, USA

**1 A Scalable MAC Framework for Internet of Things Assisted by Machine Learning**

Bo Yang, Prairie View A&M University; Xuelin Cao, University of Houston; Lijun Qian, Prairie View A&M University

**2 Cross-Device Self-Diagnostic Production System for Vehicle Technology by Artificial Neural Network**

Ren C. Luo, Hao Wang, National Taiwan University

**3 Joint Power Allocation in Interference-Limited Networks via Distributed Coordinated Learning**

Roohollah Amiri, Hani Mehrpouyan, Boise State University; David Matolak, University of South Carolina; Maged El-kashlan, Queen Mary University of London

**4 Traffic Prediction Based on Random Connectivity in Deep Learning with Long Short-Term Memory**

Yuxiu Hua, Zhifeng Zhao, Zhejiang University; Zhiming Liu, China Mobile Research Institute; Xianfu Chen, VTT Technical Research Centre of Finland; Rongpeng Li, Honggang Zhang, Zhejiang University

**5 SCRAM: A Novel Approach for Reliable Ultra-Low Latency M2M Applications**

Sally Nafie, Friedrich-Alexander Universität Erlangen-Nürnberg (FAU); Joerg Robert, FAU Erlangen-Nuernberg; Albert Heuberger, Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)

14:00-15:30 Room 4C

**5C: Security and Performance Analysis in Wireless Networks**

Chair: Mohamed Abdallah, Hamad Bin Khalifa University, Qatar

**1 Physical Layer Security Analysis of UAV Based Communication Networks**

Aymen Omri, Mazen O. Hasna, Qatar University

**2 Physical Layer Security for Hybrid RF/VLC DF Relaying Systems**

Jaber Al-khori, Galymzhan Nauryzbayev, Mohamed Abdallah, Mounir Hamdi, Hamad Bin Khalifa University

**3 Secrecy Performance of Generalized Selection Diversity Combining Scheme with Gaussian Errors**

Jules M. Moualeu, University of the Witwatersrand; Walaa Hamouda, Concordia University; Fambirai Takawira, University of the Witwatersrand

**4 On the Reliability and Security Performance of Opportunistic Relay Selection in Millimeter Wave Networks**

Shaoyu Wang, Kaizhi Huang, Xiaoming Xu, Shuai Zhang, NDSC

**5 Competitive Security Pricing in Cyber-Insurance Market: A Game-Theoretic Analysis**

Shaohan Feng, Zehui Xiong, Dusit Niyato, Ping Wang, Nanyang Technological University

14:00-15:30 Room 4D

**5D: Data Forwarding/ Routing in Connected Vehicles**

Chair: Sebastian Kuhlmergen, Technische Universität Dresden, Germany

**1 Simulation Framework for Evaluating Video Delivery Services over Vehicular Networks**

P. Pablo Garrido Abenza, Pablo Piñol, Manuel P. Malumbres, O. López-Granado, Miguel Hernández University

**2 Unicast Assisted GeoBroadcast in Urban Vehicular Ad-hoc Networks**

Mehdi Tavakoli Garrosi, Tongxing Lu, Leibniz Universität Hannover; Lei Zhong, Toyota InfoTechnology Center; Yusheng Ji, National Institute of Informatics

**3 Application Synchronization among Multiple MEC Servers in Connected Vehicle Scenarios**

Tiia Ojanperä, VTT Technical Research Centre of Finland; Hans van den Berg, TNO Information and Communication Technology, The Netherlands; Wieger IJntema, Ramon S. Schwartz, Miodrag Djurica, TNO

**4 Graph-based Dynamic Zone Configurations for Resource Management in V2V Communications**

Prajwal Makkimane Keshavamurthy, Ramya Panthangi Manjunath, Panagiotis Spapis, Huawei Technologies Duesseldorf GmbH; Dirk

Dahlhaus, University of Kassel; Emmanouil Pateromichelakis, Huawei Technologies Duesseldorf GmbH; Chan Zhou, Huawei Technologies, German Research Center

- 5 Coordinated Lane Changing Using V2V Communications**  
LeWang, Renato F. Iida, Alexander Wyglinski, Worcester Polytechnic Institute

14:00-15:30 Room 4E

**5E: Green Edge Computing for IoT**

Chair: Feng Ye, University of Dayton, USA

- 1 Optimal Resource Partitioning and Bit Allocation for UAV-enabled Mobile Edge Computing**  
Meng Hua, Southeast University; Yi Wang, Zhengzhou University of Aeronautics; Zhengming Zhang, Chunguo Li, Yongming Huang, Luxi Yang, Southeast University
- 2 Low-Complexity Mode Selection and Resource Allocation for Energy-Efficient D2D Communications**  
Shengjie Guo, Xiangwei Zhou, Louisiana State University; Sa Xiao, University of Electronic Science and Technology of China; Mingxuan Sun, Louisiana State University
- 3 Latency-aware In-network Computing for Internet of Battery-less Things**  
Qianao Ju, Georgia Institute of Technology; Geng Sun, Jilin University; Hongsheng Li, Southeast University; Ying Zhang, Georgia Institute of Technology
- 4 Energy-Efficient Resource Allocation for Latency-Sensitive Mobile Edge Computing**  
Xihan Chen, Yunlong Cai, Qingjiang Shi, Minjian Zhao, Guanding Yu, Zhejiang University
- 5 Incentive D2D Off-loading Scheme for Energy Efficiency in the Next-Generation Mobile Networks**  
Daidong Ying, Feng Ye, University of Dayton

14:00-15:30 Room 4F

**5F: Recent Results: Resource Allocation**

Chair: Joaquin Escudero-Garzas, Texas A&M University, USA

- 1 Time Allocation Methods for Secure Wireless Powered Communication Networks**  
Jihwan Moon, Korea University; Hoon Lee, SUTD; Changick Song, Korea National University of Transportation, Chungju, Korea; Inkyu Lee, Korea University
- 2 Predictive Resource Allocation with Deep Learning**  
Jia Guo, Beihang University; Chenyang Yang, Beihang University, Beijing
- 3 Fair Resource Allocation in Wireless Networks**  
Dara Ron, Chung-Ang University; Jung-Hyun Bang, Jung-Ryun Lee, University of Chung-Ang
- 4 Expanding Cellular Network Capacity with Multi-Network Access**  
Nandi Zhang, Jon M. Peha, Marvin A. Sirbu, Carnegie Mellon University
- 5 Simplified Optimal Scheduling (SOS) for Network Coded Wireless Multicast**  
Nadieh Moghadam, Ivani LLC; Guomei Zhang, Xi'an Jiaotong University; Hongxiang Li, University of Louisville

14:00-15:30 Boulevard A

**5G: mm-Wave Systems**

Chair: Ming-Xian Chang, National Cheng Kung University, Taiwan

- 1 A Semi Blind Joint CFO Estimation, Equalization and Data Detection in Presence of Non-linearity for mm-Wave Communications**  
Preeti Priya, Indian Institute of Technology Kharagpur; Shashank Verma, Sucharita Chakraborty, Indian Institute of Technology, Kharagpur; Debarati Sen, Indian Institute of Technology Kharagpur
- 2 Beamforming in Millimeter Wave Systems: Prototyping and Measurement Results**  
Cody Scarborough, University of Michigan; Kiran Venugopal, Qualcomm Corporate R&D; Ahmed Alkhateeb, Arizona State University; Robert W. Heath Jr., The University of Texas at Austin
- 3 Cell Selection Technique for Millimeter-Wave Cellular Systems with Cell and Beam Synchronization Signals**  
Mohammed Saquib Khan, Muhammad Asim, Qasim Sultan, Yong Soo Cho, Chung-Ang University
- 4 Efficient Maximum-Likelihood Detection for the MIMO System in Hybrid Mode**  
Ming-Xian Chang, National Cheng-Kung University; Szu-Lin Su, National Cheng Kung University
- 5 Non-Orthogonal Multiple Access Based on Hybrid Beamforming for mmWave Systems**  
Mojtaba Ahmadi Almasi, Boise State University; HANI MEHRPOUYAN, Boise State University

14:00-15:30 Boulevard B

**5H: Channel Modeling and Measurements**

Chair: Jakob Thrane, Technical University of Denmark, Denmark

- 1 Channel Characterization for Massive MIMO in Subway Station Environment at 6 GHz and 11 GHz**  
Jianzhi Li, Bo Ai, Ruisi He, Mi Yang, Qi Wang, Bei Zhang, Zhangdui Zhong, Beijing Jiaotong University; Yang Hao, Queen Mary University of London
- 2 Directional Analysis of Massive MIMO Channels at 11 GHz in Theater Environment**  
Jianzhi Li, Bo Ai, Ruisi He, Mi Yang, Yu Zhang, Xin Liu, Zhangdui Zhong, Beijing Jiaotong University; Yang Hao, Queen Mary University of London
- 3 Drive test minimization using Deep Learning with Bayesian approximation**  
Jakob Thrane, Matteo Artuso, Darko Zibar, Henrik L. Christiansen, Technical University of Denmark
- 4 Frequency-Domain Modeling of OFDM Transmission with Insufficient Cyclic Prefix using Toeplitz Matrices**  
Grzegorz Cisek, Tomasz Zielinski, AGH University of Science and Technology

14:00-15:30 Boulevard C

**5I: Cell Free Massive MIMO and MU MIMO**

Chair: Byonhyo Shim, Seoul National University, South Korea

- 1 Coordinated Subarray Based Multi-User Beam Training for Indoor Sub-THz Communications with Split Hybrid Structures**  
Renmin Zhang, Hua Zhang, Wei Xu, Chunming Zhao, Southeast University
- 2 Efficient Group-Sparse Transceiver Design for Multiuser MIMO Relaying in C-RAN**  
Ayoub Saab, Jiaxin Yang, Benoit Champagne, Ioannis Psaromiligkos, McGill University

- 3 AoD-based Statistical Beamforming for Cell-Free Massive MIMO Systems**  
Seungnyun Kim, Byonhyo Shim, Seoul National University
- 4 Joint User Scheduling and Power Allocation for Energy Efficient Millimeter Wave NOMA Systems With Random Beamforming**  
Sunyoung Lee, Jae Hong Lee, Seoul National University
- 5 Downlink Performance Analysis of Cell-Free Massive MIMO with Finite Fronthaul Capacity**  
Priyabrata Parida, Harpreet S. Dhillon, Virginia Tech; Andreas F. Molisch, University of Southern California

14:00-15:30 Normandie Lounge

**5P: Radio Access, Heterogeneous and Green Networks**

- 1 Adaptive MMSE-SVD to improve the tracking ability against fast fading**  
Yuta Seki, Amnart Boonkajay, Fumiyouki Adachi, Tohoku University
- 2 Delay-Optimal Scheduling for Heterogeneous Users in NOMA Networks**  
Yu-Pin Hsu, Jeng-Shiun Ho, Yu-Chih Huang, Shin-Lin Shieh, National Taipei University
- 3 Nearest-Vehicle Communication in Regular Street Systems**  
Jeya Jeyaraj, Martin Haenggi, University of Notre Dame
- 4 System Throughput Analysis on Using Joint Detection in Distributed Antenna System**  
Haruya Ishikawa, Yukitoshi Sanada, Keio University

- 5 Energy Efficient Pilot and Data Power Allocation in Massive MIMO Communication Systems under Consideration of Circuit Power**  
Ye Zhang, Wei-Ping Zhu, Concordia University
- 6 Channel-Dependent Dynamic Frequency Bandwidth Allocation Method Among Service Channels to Maximize Integrated System Throughput**  
Tatsuki Sakai, Tokyo University of Science; Yasuaki Yuda, Panasonic Corporation; Kenichi Higuchi, Tokyo University of Science
- 7 Evaluation of Precoding Scheme for Multi-User MIMO SWIPT Systems**  
Dongheon Lee, Youngrok Jang, Minchae Jung, Sooyong Choi, Yonsei University
- 8 Information Age and Packet Loss Performance Analysis of Energy Harvesting WSNs**  
Amina Hentati, Ecole polytechnique de Montréal; Jean-François Frigon, École Polytechnique de Montréal; Wessam Ajib, University of Quebec at Montreal
- 9 User-centric power saving in self-organizing mobile networks**  
Matteo Artuso, Jakob Thrane, Henrik L. Christiansen, Technical University of Denmark
- 10 Outage Probability of the EH-based Full-Duplex AF and DF Relaying Systems in  $\alpha$ - $\mu$  Environment**  
Galymzhan Naurzybayev, Mohamed Abdallah, Hamad Bin Khalifa University; Khaled Rabie, Manchester Metropolitan University

16:00-17:30 Room 4A

**6A: Green Wireless Communications**

Chair: Pei Li, Southeast University, China

- 1 Simultaneous Wireless Information and Power Transfer for the MISO Interference Channel: Gain from Decoding Interferences**  
Sung Ho Chae, Chosun University; Cheol Jeong, Dongshin University; Sung Hoon Lim, Korea Institute of Ocean Science and Technology
- 2 Sum-Throughput Maximization for MIMO Full-Duplex Wireless Powered Communication Network with Finite Alphabet Inputs**  
Yingru Peng, Feng Ke, South China University of Technology
- 3 Wireless Powered Buffer-aided Communication over K-user Interference Channel**  
Xiaolong Lan, Southwest Jiaotong University; Qingchun Chen, Guangzhou University; Lin Cai, University of Victoria
- 4 Optimal BS Sleeping Ratio for Energy-Delay Tradeoff in Wireless-Backhauling UDN**  
Li Pei, Gao Shen, Shen Yi, Pan Zhiwen, Xiaohu You, Southeast University; Ding Fei, Nanjing University of Posts and Telecommunications
- 5 Contract-based Trading on Parallel Computing Resources for Cellular Networks with Virtualized Base Stations**  
Mingjin Gao, Rujing Shen, Institute of Computing Technology; Jun Li, Nanjing University of Science and Technology; Yonghui Li, University of Sydney; Jinglin Shi, Institute of Computing Technology

16:00-17:30 Room 4B

**6B: Recent Results: Vehicular Networks and Services II**

Chair: Renato F. Iida, Worcester Polytechnic Institute, USA

- 1 A Stochastic Hybrid Framework for Driver Behavior Modeling Based on Hierarchical Dirichlet Process**  
Hossein Nourkhiz Mahjoub, Behrad Toghi, Yaser P. Fallah, University of Central Florida

- 2 Optimal Local and In-Route Charging Management of Electric Mobility-On-Demand Systems**  
Mustafa Ammous, Syrine Belakaria, Sameh Sorour, Ahmed Abdel-Rahim, University of Idaho
- 3 Effectiveness of subjective measurement of drivers' status in automated driving**  
Jungsook Kim, Woojin Kim, Hyun-Suk Kim, Daesub Yoon, ETRI
- 4 Simulation-based Evaluation of ETSI ITS-G5 and Cellular-VCS in a Real-World Road Traffic Scenario**  
Sebastian Kühlmorgen, Patrick Schmager, TU Dresden; Andreas Festag, Technische Hochschule Ingolstadt (THI); Gerhard Fettweis, TU Dresden
- 5 Exploiting Map Topology Knowledge for Context-predictive Multi-interface Car-to-cloud Communication**  
Benjamin Sliwa, Johannes Pillmann, Maximilian Klauf, Christian Wietfeld, TU Dortmund University

16:00-17:30 Room 4C

**6C: Estimation and Detection in IoT, M2M, Sensor Networks, and Ad-Hoc Networking**

Chair: Zafar Ali Khan Mohammed, Indian Institute of Technology Hyderabad, India

- 1 Indoor Occupancy Estimation using Visible Light Sensing (VLS) System**  
Mohammad Al Mestiraihi, Hisham Abuella, Sabit Ekin, Oklahoma State University
- 2 On non-Randomized Hard Decision Fusion under Neyman Pearson Criterion using LRT**  
Fayazur Rahaman Mohammad, Mohammed Zafar Ali Khan, Indian Institute of Technology Hyderabad
- 3 Transitional Region Based Distance Estimation for Wireless Sensor Networks**  
Chunchao Lane, Chang Liu, Brian Pasko, Eastern New Mexico University

- 4 Unmanned Aerial Vehicles Positioning Scheme for First-responders in a Dynamic Area of Interest**  
Paulo Alexandre Regis, Amar Nath Patra, Shamik Sengupta, University of Nevada, Reno

16:00-17:30 Room 4D

**6D: Channel and Resource Allocation**

Chair: Jose Joaquin Escudero-Garzas, Texas A&M University, USA

- 1 Dynamic Spectrum Allocation with Carrier Aggregation for Aircraft-to-Ground Communication**  
J. Joaquin Escudero-Garzas, University of Florida; Alfredo Garcia, Texas A&M University; Stephen G. Wilson, University of Virginia
- 2 Fairness Aware Resource Allocation for Average Capacity Maximisation in General Authorized Access User**  
Shubhekshya Basnet, Beeshanga Abewardana Jayawickrama, Ying He, Eryk Dutkiewicz, University of Technology Sydney
- 3 QoS and Security Aware Power Allocation Scheme for Wiretap Cognitive Radio Networks**  
Yichen Wang, Tao Wang, Xiao Tang, Pinyi Ren, Xi'an Jiaotong University
- 4 Resource Allocation for Device-to-Device Communications with Rate Guarantee**  
Yi-Feng Hsiao, Jung-Chun Kao, Shih-Han Lin, National Tsing Hua University
- 5 Transmit Power Allocation for General Authorized Access in Spectrum Access System using Carrier Sensing Range**  
Shubhekshya Basnet, Beeshanga Abewardana Jayawickrama, Ying He, Eryk Dutkiewicz, University of Technology Sydney

16:00-17:30 Room 4E

**6E: Recent Results: Performance Evaluation I**

Chair: Mazen O. Hasna, Qatar University, Qatar

- 1 Performance Evaluation and Packet Scheduling in HeNB Deployments**  
Rui R. Paulo, Fernando J Velez, Instituto de Telecomunicações-DEM, Universidade da Beira Interior; Giuseppe Piro, Politecnico di Bari
- 2 Reducing Cubic Metric of Circularly Pulse-Shaped OFDM Signals Through Constellation Shaping Optimization With Performance Constraints**  
Yenming Huang, Rueibin Yang, Borching Su, National Taiwan University
- 3 On CQI Estimation for Mobility and Correlation Properties of Gaussian Process Regression**  
Samira Homyouni, Stefan Schwarz, Markus Rupp, Technische Universität (TU) Wien
- 4 Full 3D Electromagnetic Modeling of Inductive Loops**  
Milica Markovic, Jiaoyue Li, California State University Sacramento
- 5 Power Imbalance Detection in Smart Grid via Grid Frequency Deviations: A Hidden Markov Model based Approach**  
Shah Hassan, Hadia Sajjad, Muhammad Mahboob Ur Rahman, Information Technology University, Lahore

16:00-17:30 Room 4F

**6F: IoT Communications and Security**

Chair: Chin-Ya Huang, National Taiwan University of Science and Technology, Taiwan

- 1 A Unique Backoff Algorithm in IEEE 802.15.6 WBAN**  
Abdul Saboor, Rizwan Ahmad, National University of Sciences and Technology (NUST), Pakistan; Waqas Ahmed, Pakistan Institute of Engineering and Applied Sciences; Muhammad Mahtab Alam, Tallinn University of Technology, Tallinn, Estonia

- 2 Analysis of Uplink NOMA in Cellular IoT: A Physical Layer Security Perspective**  
Shuai Zhang, Xiaoming Xu, Jianhua Peng, NDSC; Yajun Chen, National Digital Switching System Engineering&Technological R&D Center; Shaoyu Wang, NDSC

- 3 Design and Implement Dual-Band Wireless Networking assisted Fault Tolerant Data Transmission in Intelligent Buildings**

Chin-Ya Huang, National Taiwan University of Science and Technology; Wang-Wei Chung, National Chiao-Tung University; Cih-Yan Liu, National Central University

- 4 Detecting and Mitigating Spoofing Attacks against Automotive Radars**

Prateek Kapoor, Ankur Vora, Kyoung-Don Kang, Binghamton University

16:00-17:30 Boulevard A

**6G: MIMO Channel Characterization and Impact**

Chair: Diana Maamari, Huawei Technologies Duesseldorf GmbH, Germany

- 1 The Distribution of SINR and the achieved Throughput in Interference Alignment under a Gauss Markov Channel**  
Hemant Saggarr, Babak Daneshrad, Gregory J. Pottie, University of California Los Angeles
- 2 Throughput Degradation Due to Mobility in Millimeter Wave Communication Systems Using Random Beamforming**  
Mustafa Aljumaily, University of Tennessee, Knoxville; Husheng Li, University of Tennessee
- 3 Conversion of the Channel Covariance in FDD Systems with 3D Antenna Array**  
Min Qin, University of Science and Technology of China; Yi Zhang, Haichao Wei, Shanghai Huawei Technologies; Li Chen, Xiaohui Chen, Guo Wei, University of Science and Technology of China
- 4 Generalized Low-Rank Matrix Completion via Nonconvex Schatten p-Norm Minimization**  
Qiong Wu, Fan Zhang, Hao Wang, Yuanming Shi, ShanghaiTech University
- 5 Multi-Antenna Fading Channel Prediction Empowered by Artificial Intelligence**  
Wei Jiang, German Research Center for Artificial Intelligence; Hans Schotten, University of Kaiserslautern

16:00-17:30 Boulevard B

**6H: Multi-Carrier and OFDM Systems I**

Chair: Nauman Aslam, Northumbria University at Newcastle, UK

- 1 A Further PAPR Reduction for pi/2-BPSK in 5G New Radio**  
Jubum Kim, Pohang University of Science and Technology (POSTECH); Yeo Hun Yun, Chanhong Kim, Samsung Electronics Co., Ltd.; Joon Ho Cho, Pohang University of Science and Technology (POSTECH)
- 2 A Novel Preamble Design for Time Synchronization in OFDM-based Multiple Numerologies**  
Hakkeon Lee, Hyunsoo Kim, University of Yonsei; Sungmook Lim, Korea National University of Transportation; Daesik Hong, Yonsei University
- 3 Adaptive Scaling Active Constellation Extension Scheme with Fast Convergence for PAPR Reduction in OFDM/OQAM Signals**  
Sandeep Kumar, Hoa Le Minh, Nauman Aslam, Northumbria University; Mohsin Raza, Middlesex University; Anh T. Pham, University of Aizu

- 4 Constellation Design for Complex Colour Shift Keying Aided Optical OFDM Systems**  
Zefeng Lin, Ming Jiang, Hong-Zhou Tan, Sun Yat-sen University
- 5 Overlap-Windowed-DFTs-OFDM with Overlap FFT Filter-Bank for Flexible Uplink Access in 5G and Beyond**  
Takahiro Okano, Masahiro Umehira, Xiaoyan Wang, Shigeki Takeda, Ibaraki University

*16:00-17:30 Boulevard C*

**6I: URLLC and IoT**

*Chair: Amnart Boonkajay, Tohoku University, Japan*

- 1 A Repetition Scheme for MBSFN Based Mission-Critical Communications**  
Alaa Daher, ETELM, Telecom ParisTech; M. Shabbir Ali, Orange Labs, Paris Region; Marceau Coupechoux, TELECOM Paris Tech; Philippe Godlewski, Telecom ParisTech; Pierre Ngouat, PNG-Technologies; Pierre Minot, ETELM
- 2 Large-Scale Grant-Free Sparse Chaos Code Multiple Access Scheme for 5G IoT**  
Eiji Okamoto, Naoto Horiike, Nagoya Institute of Technology; Tetsuya Yamamoto, Panasonic Corporation
- 3 Robust Scheduler Prioritizing UEs with Time-Variant Channels in Small-Delay Slots from Channel Estimation Timing for 5G Large-Scale MU-MIMO**  
Takashi Seyama, Shinya Kumagai, Teppei Oyama, Daisuke Jitsukawa, Takashi Dateki, FUJITSU LIMITED; Koji Matsuyama, FUJITSU LABORATORIES LTD.; Hiroyuki Seki, Morihiko Minowa, FUJITSU LIMITED
- 4 URLLC Services in 5G - Low Latency Enhancements for LTE**  
Thomas Fehrenbach, Fraunhofer Heinrich Hertz Institut (HHI); Rohit Datta, Fraunhofer IIS; Baris Göktepe, Tom Wirth, Cornelius Hellge, Fraunhofer Heinrich Hertz Institut (HHI)
- 5 Performance Optimization in Mobile-Edge Computing via Deep Reinforcement Learning**  
Xianfu Chen, VTT Technical Research Centre of Finland; Honggang Zhang, Zhejiang University; Celimuge Wu, The university of electro-communications; Shiwen Mao, Auburn University; Yusheng Ji, National Institute of Informatics; Mehdi Bennis, Oulu

*16:00-17:30 Normandie Lounge*

**6P: TVT Papers II**

- 1 Adaptive Detector Selection for Queue-Stable Word Error Rate Minimization in Connected Vehicle Receiver Design**  
Minseok Choi, Korea Advanced Institute of Science and Technology; Joongheon Kim, Chung-Ang University; Jaekyun Moon, Korea Advanced Institute of Science Technology
- 2 Cognitive Risk Control for Transmit-waveform Selection in Vehicular Radar Systems**  
Shuo Feng, Simon Haykin, McMaster University
- 3 Content Delivery Analysis in Multiple Devices to Single Device Communications**  
Asaad Daghah, University of Kent
- 4 Delay Performance of Two-Stage Access in Cellular Internet-of-Things Networks**  
Seong-Lyun Kim, Yonsei University; Dong Min Kim, Aalborg University; Hyun-Kwan Lee, Samsung Electronics; Jeemin Kim, SK Telecom
- 5 eNB selection for machine type communications using reinforcement learning based markov decision process**  
Yu-Jui Liu, Shin-Ming Cheng, Yu-Lin Hsueh, National Taiwan University of Science and Technology
- 6 Experimental Validation of Comprehensive Steady-State Analytical Model of Bidirectional WPT System in EVs Applications**  
Ahmed A S Mohamed, National Renewable Energy Laboratory
- 7 Interactive Control Paradigm based Robust Lateral Stability Controller Design for Autonomous Automobile Path Tracking with Uncertain Disturbance: A Dynamic Game Approach**  
Xuewu Ji, Tsinghua University
- 8 Physics-Based Co-Simulation Platform With Analytical and Experimental Verification for Bidirectional IPT System in EV Applications**  
Ahmed A S Mohamed, National Renewable Energy Laboratory
- 9 Simultaneous Wireless Information and Power Transfer Strategies in Relaying Network with Direct Link to Maximize Throughput**  
Nan Zhao, Jilin University; Fengye Hu, Zan Li, College of Communication Engineering, Jilin University; Yue Gao, Queen Mary University of London

## Thursday 30 August 2018

*11:00-12:30 Room 4A*

**7A: Network Protocols in IoT, M2M, Sensor Networks, and Ad-Hoc Networking**

*Chair: Anh T. Pham, The University of Aizu, Japan*

- 1 An Energy-conserving Depth-based Layering MAC Protocol for Underwater Sensor Networks**  
Faisal Alfouzan, Alireza Shahrabi, Seyed Mohammad Ghoreyshi, Tuleen Boutaleb, Glasgow Caledonian University
- 2 Free Access Distributed Queue Protocol for Massive Cellular-based M2M Communications with Bursty Traffic**  
Anh-Tuan Hoang Bui, University of Aizu; Chuyen T. Nguyen, Hanoi University of Science and Technology; Thang C. Truong, Anh T. Pham, University of Aizu
- 3 Hitchhiker: A Wireless Routing Protocol in a Delay Tolerant Network using Density-based Clustering**  
Sara Melvin, Naval Sea Systems Command; Jonathan Lin, Seungbae Kim, Mario Gerla, University of California, Los Angeles

**4 Reader Scheduling for Information Collection in Large-scale RFID Systems**

Michael Lee, San Francisco State University; Jie Wang, Dalian University of Technology; Hongning Li, Xidian University; Feng Ye, University of Dayton; Hao Yue, San Francisco State University

**5 QNGPSR: A Q-Network Enhanced Geographic Ad-Hoc Routing Protocol based on GPSR**

Niqi Lyu, Guanghua Song, Bowei Yang, Yining Cheng, Zhejiang University

*11:00-12:30 Room 4B*

**7B: Mobile Communications and Networking**

*Chair: Li Li, University of Delaware, USA*

- 1 BESS: BDP Estimation Based Slow Start Algorithm for MPTCP in mmWave-LTE Networks**  
Yanbing Liu, Xiaowei Qin, Ting Zhu, Xiaohui Chen, Guo Wei, University of Science and Technology of China

- 2 Orientation Model of Mobile Device for Indoor VLC and Millimetre Wave Systems**  
Zhihong Zeng, Mohammad Dehghani Soltani, The University of Edinburgh; Harald Haas, University of Edinburgh; Majid Safari, The University of Edinburgh
- 3 Payload-size and Deadline-aware Scheduling for Upcoming 5G Networks: Experimental Validation in High-load Scenarios**  
Stefan Monhof, Marcus Haferkamp, Benjamin Sliwa, Christian Wietfeld, TU Dortmund University
- 4 Proposal and Evaluation of SPF-DPS Scheduling for DPS-CoMP in LTE System**  
Hiroki Kotake, Takeshi Hattori, Masakatsu Ogawa, Sophia University

11:00-12:30 Room 4C

**7C: Connectivity Beyond Vehicular Networks**

Chair: *Fai Tila, University of Bristol, UK*

- 1 Analytical Model for Aircraft-to-Aircraft Link Probability over the North Atlantic Corridor**  
Christoph Petersen, Konrad Fuger, Andreas Timm-Giel, Hamburg University of Technology
- 2 Impulsive Noise Mitigation in Multicarrier Communication for High-speed Railway**  
Qiwei Zheng, Fanggang Wang, Bo Ai, Zhangdui Zhong, Beijing Jiaotong University
- 3 Localization of Scatterers in Railway Environments for Train-to-Train Propagation**  
Paul Unterhuber, Michael Walter, German Aerospace Center (DLR); Thomas Kürner, Technische Universität Braunschweig
- 4 Rate-Maximizing OFDM Pilot Patterns for UAV Communications in Nonstationary A2G Channels**  
Raghunandan M Rao, Virginia Tech; Vuk Marojevic, Mississippi State University; Jeffrey Reed, Virginia Tech
- 5 Waveform Design of UAV Data Links in Urban Environments for Interference Mitigation**  
Marko Jacovic, Oday Bshara, Kapil R. Dandekar, Drexel University

11:00-12:30 Room 4D

**7D: Recent Results: UAVs/Drones**

Chair: *Mihail L. Sichitiu, North Carolina State University, USA*

- 1 Latency-Aware Base Station Selection Scheme for Cellular-Connected UAVs**  
Yang Long, Tao Yang, Hui Feng, Bo Hu, Fudan University
- 2 Sum Rate Maximization for Mobile UAV-aided Internet of Things Communications System**  
Xuanxuan Wang, Tsinghua.edu.cn; Wei Feng, Tsinghua University; Yunfei Chen, University of Warwick; Ning Ge, Tsinghua University
- 3 UAV-Based in-band Integrated Access and Backhaul for 5G Communications**  
Abdurrahman Fouda, Florida International University; Ahmed S. Ibrahim, Florida International University; Ismail Guvenc, North Carolina State University; Monisha Ghosh, University of Chicago
- 4 Wireless Powered Communication Networks Aided by an Unmanned Aerial Vehicle**  
Junhee Park, Korea University; Hoon Lee, SUTD; Subin Eom, Inkyu Lee, Korea University
- 5 Impact of 3D Antenna Radiation Pattern on Air-to-Ground Drone Connectivity**  
Jianlin Chen, Devin Raye, North Carolina State University; Wahab Ali Gulzar, NCSU; Priyanka Sinha, Ismail Guvenc, North Carolina State University

11:00-12:30 Room 4E

**7E: Recent Results: Performance Evaluation II**

Chair: *Maqsood Ahamed Abdul Careem, University at Albany, USA*

- 1 Performance Evaluation of Constrained Application Protocol over TCP**  
Ilpo Järvinen, Laura Pesola, Iivo Raitahila, University of Helsinki; Zhen Cao, Huawei; Markku Kojo, University of Helsinki
- 2 TDOA-based Localization via Stochastic Gradient Descent Variants**  
Luis F. Abanto-Leon, Technische Universiteit Eindhoven; Arie Koppelaar, NXP Semiconductors; Sonia Heemstra de Groot, Eindhoven University of Technology
- 3 RSSI-Based Ranging for Pedestrian Localization**  
Mehdi Golestanian, University of Notre Dame; Hongsheng Lu, TOYOTA InfoTechnology Center USA; Christian Poellabauer, University of Notre Dame
- 4 SONS3: A Network Data Driven Simulation Framework for Mobility Robustness Optimization**  
Frans Laakso, Jani Puttonen, Janne Kurjenniemi, Biying Wang, Di Zhang, Magister Solutions Ltd; Furqan Ahmed, Elisa Corporation; Dr. Jarno Niemelä, Elisa
- 5 Low-complexity Symbol Detection for FTN Signaling by Combinatorial L1-Norm Relaxation**  
Shihao Lai, ShanghaiTech University; Mingqi Li, Shanghai Advanced Research Institute, CAS

11:00-12:30 Room 4F

**7F: Radio Resource and Mobility Management**

Chair: *Antonio De Domenico, CEA-LETI Minatoc, France*

- 1 Bandwidth Part Adaptation and Processing Time Evaluation with OpenAirInterface**  
Michael Einhaus, Mohamad Buchr Charaf, Igor Kim, Hochschule für Telekommunikation Leipzig; Paul Arnold, Deutsche Telekom AG
- 2 Bidirectional Mobile Offloading in LTE-U and WiFi Coexistence Systems**  
Shengli Liu, Jiaqi Zhang, Qimei Chen, Guanding Yu, Zhejiang University
- 3 Mobility Management for Hybrid LiFi and WiFi Networks in the Presence of Light-path Blockage**  
Xiping Wu, Cheng Chen, Harald Haas, University of Edinburgh
- 4 On the Resource Allocation in HetNets with Massive MIMO Wireless Backhaul**  
Rami Hamdi, École de Technologie Supérieure; Elmahdi Driouch, Université de Moncton; Wessam Ajib, University of Quebec at Montreal
- 5 Resource Allocation for Mixed Traffic Types in Distributed Antenna Systems Using NOMA**  
Marie Josepha Youssef, IMT Atlantique; Joumana Farah, Lebanese University; Charbel Abdel Nour, Catherine Douillard, IMT Atlantique

11:00-12:30 Room 4M

**7G: Multi-Carrier and OFDM Systems II**

Chair: *Fumiyuki Adachi, Tohoku University, Japan*

- 1 Improved PTS technique for the PAPR-Reduction of FBMC-OQAM Signals**  
Shaoliang Ni, Ming Lei, Minjian Zhao, Zhejiang University; Min Li, Macquarie University
- 2 Randomization Algorithm for Partial Transmit Sequence with Semidefinite Relaxation**  
Hirofumi Tsuda, Ken Umeno, Kyoto University
- 3 A Low-Complexity Phase Rotation Estimation using Fourth-power Constellation for Blind SLM**  
Amnart Boonkajay, Fumiyuki Adachi, Tohoku University

**4 Near-CAZAC Preamble Sequences for Initial Synchronization in Spectrally Compact OFDM**  
Char-Dir Chung, Wei-Chang Chen, Cheng-Chen Lin, National Taiwan University

**5 A Low-complexity and Flexible Implementation of Carrier Recovery for 4096-QAM Systems**  
Hao Wang, Nan Zhang, Xidian University; Hang Zhang, Science and Technology on Communication Networks Laboratory; Fengkui Gong, Xidian University

*11:00-12:30 Boulevard B*

**7H: Interference and Coexistence**

*Chair: Md Asaduzzaman, Staffordshire University, UK*

**1 Managing Interference through Discrete Modulation and Liquid Metal Antennas**  
Mirza Uzair Baig, Kareem S. Elassy, Anders Høst-Madsen, Aaron Ohta, Wayne Shiroma, University of Hawai'i; Aria Nosratinia, University of Texas at Dallas

**2 Measurements and Analysis of Aggregate Interference in Satellite-Terrestrial Spectrum Sharing**  
Kenneth Zdunek, Alan Wilson, Roberson and Associates, LLC; Brad Passwaiter, Globalstar, Inc.

**3 Optimal Auctions in Oligopoly Spectrum Market with Concealed Cost**  
Raouf Abozariba, Md Asaduzzaman, Staffordshire University; Mohammed N. Patwary, Birmingham City University

**4 Self-Triggered Control Plane for Cognitive Radio Networks**  
Zohaib Ijaz, Muhammad Tahir, Sahar Arshad, University of Engineering and Technology Lahore

**5 Underlay Cognitive Relay Network with Modulation Diversity**  
Muhammad Ajmal Khan, Ohio Northern University

*11:00-12:30 Boulevard C*

**7I: C-RAN and Edge Computing**

*Chair: Fai Tila, University of Bristol, UK*

**1 Distributed Uplink Reception for D2D Underlaid C-RAN Systems With Fronthaul Constraints**  
Junbeom Kim, Daesung Yu, Chonbuk National University; In-Kyeong Choi, Seung-Eun Hong, Electronics and Telecommunications Research Institute; Seok-Hwan Park, Chonbuk National University

**2 Joint Design of Power Control and Fronthaul Quantization Strategies for C-RAN and D2D Coexisting System**  
Junbeom Kim, Daesung Yu, Chonbuk National University; In-Kyeong Choi, ETRI; Seok-Hwan Park, Chonbuk National University

**3 Performance of Network-Centric Clustering for Coordinated Joint Transmission with Irregular Cluster Topology**  
Jou-Yi Chen, Kuang-Hao (Stanley) Liu, Szu-Lin Su, National Cheng Kung University

**4 Joint Cooperative Computation and Interactive Communication for Relay-Assisted Mobile Edge Computing**  
Xihan Chen, Qingjiang Shi, Yunlong Cai, Minjian Zhao, Zhejiang University

*14:00-15:30 Room 4A*

**8A: Vehicular and Satellite Systems**

*Chair: Dirk Stöck, EURECOM*

**1 An Ensemble FIR Filtering Framework for Inter-vehicular Range Estimation using GNSS Signals**  
Muhammad Tahir, Sayed Saad Afzal, Lahore University of Management Sciences; Khurram Ali, COMSATS University Islamabad, Lahore Campus

*11:00-12:30 Normandie Lounge*

**7P: Antenna Systems, Signals and Propagation**

**1 On Simple Scattering and Diffraction Models using Point Cloud Maps for Channel Model or Coverage Predictions**  
Jean-Frederic Wagen, University of Applied Sciences of Western Switzerland; Karol Kruzelecki, EPFL

**2 Path Loss Characteristics for Urban Street Canyon Environments from 0.75 to 24 GHz**  
Soon-Soo Oh, Jae-Won Choi, Hwa-Choon Lee, Chosun University; Young-Chul Lee, Mokpo National Maritime University; Byung-Lok Cho, Suchun National University; Il-Yong Lee, Jong-Hyuk Lim, Dae-Hwan Yoon, Sung Won Park, National Radio Research Agency

**3 Physical Layer Neural Network Framework for Training Data Formation**  
Kyle McClintick, Alexander Wyglinski, Worcester Polytechnic Institute

**4 A Novel Visible Light Communication Channel Compensation and Reconstruction Algorithm for Linear Decomposed CPM Signals**  
Xu Wen, Jie Zhong, Peiyao Xuan, Zhejiang University; Gaojie Chen, University of Leicester; Minjian Zhao, Zhejiang University

**5 Evaluation of Distributed Post-Detection Receive Diversity Combining Schemes for Reliable Wireless Communication over Arbitrarily Varying Channels**  
Christian Arendt, BMW Group, Technische Universität München; Janis Nötzel, Technische Universität Dresden; Holger Boche, Technische Universität München

**6 Hybrid-Duplex Systems for UAV Communications under Rician Shadowed Fading**  
Ernest Tan, A.S. Madhukumar, Rajendra Prasad Sirigina, Nanyang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd

**7 Iterative Channel Estimation with Data-aided Interference Cancellation for Non-Orthogonal Multiple Access**  
Sergey Sosnin, Gang Xiong, Yongjun Kwak, Intel Corporation

**8 Antenna Selection Based on User Velocity in FDD Massive MIMO System**  
Chenyang Wang, Jiancun Fan, Ying Zhang, Xi'an Jiaotong University

**9 Inter-beam Interference Reduction Technique for Millimeter-wave Cellular Systems Using Hybrid Beamforming**  
Sung Joon Maeng, Su Ho Park, Su Hyuk Moon, Yong Soo Cho, Chung-Ang University

**10 Investigation on Structure of Interference Canceller for IDMA-Based Random Access**  
Masayuki Kawata, Tokyo University of Science; Kiichi Tateishi, NTT DOCOMO, INC.; Kenichi Higuchi, Tokyo University of Science

**11 Pipeline A/D Converter Design for 5G OFDM Communications Systems.**  
Vicente Y. Ponce-Hinestroza, Josefina Castaneda-Camacho, Victor R. Gonzalez-Diaz, Gerardo Mino-Aguilar, Alejandro Garcia-Santiago, Benemérita Universidad Autónoma de Puebla

**2 Robust and Flexible Tracking of Vehicles Exploiting Soft Map-Matching and Data Fusion**  
Marouan Mizmizi, Politecnico di Milano; Silvio Mandelli, Nokia Bell Labs; Stephan Saur, Nokia; Luca Reggiani, Politecnico di Milano

**3 Joint Optimization of VNF Deployment and Routing in Software Defined Satellite Networks**  
Ziye Jia, Min Sheng, Jiandong Li, Runzi Liu, Kun Guo, Yu Wang, Xidian University; Dong Chen, Rui Ding, CAST

#### 4 On-Board Precoding in a Multiple Gateway Multibeam Satellite System

Vahid Joroughi, Bhavani Shankar, Sina Maleki, University of Luxembourg; Symeon Chatzinotas, SnT, University of Luxembourg; Joel Grotz, SES. S.A.; Bjorn Ottersten, University of Luxembourg

14:00-15:30 Room 4B

#### 8B: Practical Applications in IoT, M2M, Sensor Networks, and Ad-Hoc Networking

Chair: Xiaoyan Hong, University of Alabama, USA

##### 1 LPWAN Applications in the 2.4 GHz Band: A Viable Choice?

Felix Wunsch, Max Ströer, Marcus Müller, Holger Jäkel, Friedrich K. Jondral, Karlsruhe Institute of Technology

##### 2 Motion-Aware Clock Synchronization for Mobile Ad-Hoc Networks

Peixiang Cai, Yu Zhang, Xuesi Wang, Changyong Pan, Tsinghua University

##### 3 Sustain Vehicle-Crowds via Traffic Signal Adjustments

Meng Kuai, Pawan Subedi, Xiaoyan Hong, Alexander Hainen, The University of Alabama

##### 4 System Design of ATSC3.0 Broadcast Gateway Based on CPU-FPGA

Ding Jianhao, Dazhi He, Shuai Xiong, Yifan Liu, Wenjun Zhang, Kaikai Wang, Shanghai Jiao Tong University

##### 5 Dynamic security management of smart WoT infrastructures using SDN

Saad El Jaouhari, Ahmed Bouabdallah, IMT Atlantique

14:00-15:30 Room 4C

#### 8C: Traffic Management

Chair: Thomas Fehrenbach, Fraunhofer Heinrich Hertz Institut, Germany

##### 1 High Throughput Dynamic Vehicle Coordination for Intersection Ground Traffic

Mengqi Wang, Tingting Zhang, Lin Gao, Zhang Qinyu, Harbin Institute of Technology

##### 2 Non-stationary Traffic Flow Prediction Using Deep Learning

Arief Koesdwiady, Safaa Bedawi, Chaojie Ou, Fakhri Karray, University of Waterloo

##### 3 Virtual Traffic Lights: System Design and Implementation

Rusheng Zhang, Carnegie Mellon University; Frank Schmutz, Kyle Gerard, Aurélien Pomini, Louis Bassetto, Ben Hassen Sami, École polytechnique fédérale de Lausanne; Akihiro Ishikawa, Inci Ozgunes, Ozan Tonguz, Carnegie Mellon University

##### 4 Performance Comparison of Dynamic Vehicle Routing Methods for Minimizing the Global Dwell Time in Upcoming Smart Cities

Tim Vranken, University Duisburg-Essen; Benjamin Sliwa, Christian Wietfeld, TU Dortmund University; Michael Schreckenberger, University Duisburg-Essen

##### 5 A Mixed Integer Programming Approach for Autonomous and Connected Intersection Crossing Traffic Control

Qiang Lu, University of Denver; Kyoung-Dae Kim, Daegu Gyeongbuk Institute of Science and Technology

14:00-15:30 Room 4D

#### 8D: Energy Harvesting Communications

Chair: Xihan Chen, Zhejiang University, China

##### 1 Secondary Sensor Transmission with RF Energy Harvesting: Energy Statistics and Performance Analysis

Wen-Jing Wang, Hong-Chuan Yang, University of Victoria

##### 2 Network Utility Optimization in RF Energy Harvesting Wireless Sensor Networks via Fixed-trajectory Mobile Charging

Yinan Zhu, Zhejiang University of Technology

##### 3 Energy-Efficient Resource Allocation for Energy Harvesting-Powered D2D Communications Underlying Cellular Networks

Ke Wang, Wei Heng, Jinming Hu, Xiang Li, Jing Wu, Southeast University

##### 4 Optimal Placement of Baseband Functions for Energy Harvesting Virtual Small Cells

Dagnachew Azene Temesgene, CTTC/CERCA; Nicola Piovesan, Marco Miozzo, CTTC; Paolo Dini, CTTC/CERCA

14:00-15:30 Room 4E

#### 8E: Green Wireless Sensor Communications

Chair: Zhaoming Ding, Southeast University, China

##### 1 Energy-Efficient Relay Selection with Blockage for LOS Transmissions in Wireless Sensor Networks

Zhaoming Ding, Lianfeng Shen, Feng Yan, Weiwei Xia, Zhengquan Li, Southeast University; Song Xing, California State University

##### 2 Optimal Energy Transmission for Decentralized Detection in Wireless Powered Sensor Networks

Naveen K. D. Venkatesogowda, Norwegian University of Science and Technology; Himanshu B. Mishra, Indian Institute of Technology (ISM) Dhanbad

##### 3 DCVNS: A New Energy Efficient Transmission Scheme for Wireless Sensor Networks

Pratham Majumder, University of Calcutta; Koushik Sinha, Southern Illinois University; Bhabani P. Sinha, SOA University

##### 4 Exact Bit Error Rate Analysis of Ambient Backscatter Systems Under Fading Channels

Jaya Kartheek Devineni, Harpreet S. Dhillon, Virginia Tech

14:00-15:30 Room 4F

#### 8F: Recent Results: Energy Efficiency

Chair: Yousef R. Shayan, Concordia University, Canada

##### 1 Idle Mode Measurements to Enable Fast Small Cell Access without Compromising Energy Efficiency

Elena Virtej, Petteri Lundén, Nokia Bell Labs; Niko Kolehmainen, Magister Solutions Ltd.; Tero Henttonen, Lars Dalsgaard, Nokia Bell Labs and CTO; Esa Malkamäki, Sari Nielsen, Nokia Bell Labs

##### 2 Deep Learning for Radio-Frequency Energy Harvesting with Multiple Wireless Transmitters

Yuchen Qian, Yuan Xing, Liang Dong, Baylor University

##### 3 Energy Efficient Beamforming for Multi-cell MISO SWIPT Systems

Seokju Jang, Korea University; Hoon Lee, SUTD; Seowoo Kang, Taeseok Oh, Inkyu Lee, Korea University

##### 4 A Novel Energy Efficient Random Access Response for IoT networks

Eunhye Park, Jimin Bae, Korea Advanced Institute of Science and Technology; Yonghoon Choi, Chonnam National University; Youngnam Han, Korea Advanced Institute of Science and Technology

##### 5 Distributed Precoder Design Under Per-Small Cell Power Constraint

Maik Röper, University of Bremen; Patrick Svedman, ZTE Wistron Telecom AB; Armin Dekorsy, University of Bremen

14:00-15:30 Boulevard A

### 8G: Performance Evaluation and RF Design

Chair: *Oliver Holland, King's College London, UK*

- 1 Miniaturization of Slot Antenna Using Meander Slits**  
Khan Masood Parvez, Sayanti Sinha, SK. Moinul Haque, Aliah University
- 2 Sparse synthesis of concentric circular antenna array via multi-objective evolutionary computation**  
Geng Sun, Yanheng Liu, Zhaoyu Chen, Shuang Liang, Jilin University; Qianao Ju, Ying Zhang, Georgia Institute of Technology
- 3 Spatio-Temporal Recommender for V2X Channels**  
Maqsood Ahamed Abdul Careem, Aweek Dutta, University at Albany SUNY
- 4 Vehicular scenario simulation methodology to compute time-variant statistics for V2V channels**  
María Isabel Baena Amador, Ramón Parra Michel, CINVESTAV-IPN; Javier Vázquez Castillo, University of Quintana Roo
- 5 Verification and Calibration of Antenna Cross-Polarization Discrimination and Penetration Loss for Millimeter Wave Communications**  
Yunchou Xing, Ojas Kanhere, Shihao Ju, Theodore S. Rappaport, George R. MacCartney Jr., New York University

14:00-15:30 Boulevard B

### 8H: Recent Results: Wireless Connectivity

Chair: *Milica Markovic, California State University Sacramento, USA*

- 1 Constant Rate Ultra Short Probing (CRUSP) Measurements in LTE Networks**  
Vaclav Raida, Philipp Svoboda, Markus Rupp, Technische Universität Wien
- 2 Neural Network-based Channel Prediction and Its Performance in Multi-Antenna Systems**  
Wei Jiang, German Research Center for Artificial Intelligence; Hans Schotten, University of Kaiserslautern
- 3 Filter-Bank Based Joint Bit and Power Loading for Underlay Cognitive Radio**  
Nour Mansour, Dirk Dahlhaus, University of Kassel
- 4 Spectrum Occupancy Prediction for Land Mobile Radio Bands using a Recommender System**  
Kareem Emile Baddour, Amir Ghasemi, Humphrey Rutagemwa, Communications Research Centre Canada
- 5 Modeling of Overlay Mode for Device to Device Inband Communications**  
Helio de Paula Moura, Universidade Federal do Estado do Rio de Janeiro; Jefferson Elbert Simões, Carlos Alberto Vieira Campos, Federal University of the State of Rio de Janeiro

14:00-15:30 Boulevard C

### 8I: Fundamental Limits and Performance Analysis

Chair: *Behrooz Makki, Ericsson, Sweden*

- 1 On the Performance of FDD and TDD Systems in Different Data Traffic: Finite Block-length Analysis**  
Behrooz Makki, Ericsson; Mona Hashemi, Lei Bao, Mikael Coldrey, Ericsson Research
- 2 On the Average Secrecy Capacity for FSO Wiretap Channels with Nonzero Boresight Pointing Errors**  
Ruben Boluda-Ruiz, Texas A&M University at Qatar; Carmen Castillo-Vazquez, Beatriz Castillo-Vazquez, Antonio Garcia-Zambrana, University of Malaga; Khalid Qaraqe, TAMU

- 3 Optimized Signaling of Binary Correlated Sources over Gaussian Multiple Access Channels**  
Jian-Jia Weng, Fady Alajaji, Tamás Linder, Queen's University at Kingston
- 4 Outage Performance of Shared-Band On-Board Processing Satellite Communication System**  
Dong-Hyun Jung, Deock-Gil Oh, Electronics and Telecommunications Research Institute (ETRI)
- 5 A novel efficient wireless fronthaul (EWF) method for the common public radio interface (CPRI) signal transmission**  
Meng Cai, Qiao Liu, Hongli Jiang, Huawei technologies co. ltd.

14:00-15:30 Normandie Lounge

### 8P: Vehicular Communications and Networks

- 1 A Clustering-Based Collision-Free Multichannel MAC Protocol for Vehicular Ad Hoc Networks**  
Yue Zhang, Kai Liu, Shanzhi Liu, Jiaqi Zhang, Tao Zhang, Zhen Xu, Feng Liu, Beihang University
- 2 An Empirical Study on Performance of DSRC and LTE-4G for Vehicular Communications**  
Sheng Liu, Weidong Xiang, University of Michigan-Dearborn; M. Xavier, LG Electronics
- 3 Evaluation Of Interference-Cancellation Based MAC Protocol For Vehicular Communications**  
Kiran Kumar Gogineni Vishnu, Krishna Narayanan, Texas A&M University
- 4 Millimeter-Wave V2X Channels: Propagation Statistics, Beamforming, and Blockage**  
Chethan Kumar Anjinappa, Ismail Guvenc, North Carolina State University
- 5 Flexible Packet Generation Control for Multi-Application V2V Communication**  
Mohammad Irfan Khan, Eurecom; Jérôme Härrri, EURECOM
- 6 Efficient and Reliable Car-to-Cloud Data Transfer Empowered by BBR-enabled Network Coding**  
Johannes Pillmann, Benjamin Sliwa, Daniel Behnke, Matthias Priebe, Christian Wietfeld, Technische Universität Dortmund
- 7 Neighbor-Decoding-Based Data Propagation in Vehicular Networks**  
Hejun Jiang, Xiaolan Tang, Wenlong Chen, Capital Normal University; Juhua Pu, University in Shenzhen
- 8 QoS and Coverage Aware Dynamic High Density Vehicle Platooning (HDVP)**  
Yinan Qi, Tomasz Mach, Samsung R&D Institute UK
- 9 Simulation platform for a VANET using the TrueTime toolbox: further result toward Cyber-Physical Vehicle Systems**  
Alejandro Garcia-Santiago, Josefina Castaneda-Camacho, Jose F. Guerrero-Castellanos, Gerardo Mino-Aguilar, Vicente Y. Ponce-Hinestroza, Benemérita Universidad Autónoma de Puebla
- 10 Spectrum Resource Allocation Scheme for Alarm Information Delivery in V2V communication**  
Bosen Li, Dazhi He, Yijia Feng, Yin Xu, Shanghai Jiao Tong University; Hongjiang Zheng, Shanghai Botai Yuesheng Manufacturing Co., Ltd. China
- 11 The MEC-based Architecture Design for Low-latency and Fast Hand-off Vehicular Networking**  
Siyu Zhou, Prasad Prakash Netalkar, New York University; Yanan Chang, Central China Normal University; Yang Xu, Jonathan Chao, New York University

16:00-17:30 Room 4A

**9A: Hardware Impact and Secret Communications**

Chair: Andrew Nix, University of Bristol, UK

**1 LOS MIMO Design based on Multiple Optimum Antenna Separations**

Mario H. Castañeda Garcia, Marcin Iwanow, Richard A. Stirling-Gallacher, Huawei Technologies Duesseldorf GmbH

**2 Coordinated Beamforming for Multicell Multicast Secret Communications**

Ruixuan Han, Hongxiang Li, University of Louisville; Shenghui Wang, Beijing Jiaotong University; Huacheng Zeng, University of Louisville; Guomei Zhang, Xi'an Jiaotong University

**3 Impact of Reconfigurable Antennas on MU-MIMO over Measurements in a Reverberation Chamber**

Simon Begashaw, Xaime Rivas Rey, Kapil R. Dandekar, Drexel University

**4 OOP Analysis of TWR and OWR Systems with RF Impairments and Channel Estimation Error**

Anoop Kumar Mishra, Vellore Institute of Technology Amaravati, AP; Sindhu C. M. Gowda, Poonam Singh, National Institute of Technology Rourkela

**5 Performance Loss of Hybrid Beamforming with Imperfect Phase Shifters in Millimeter Wave Systems**

Wendi Wang, Huarui Yin, Xiaohui Chen, Weidong Wang, University of Science and Technology of China

16:00-17:30 Room 4B

**9B: Channel Selection and Performance Testing in Vehicular Networks**

Chair: Olav Laudy, Causality Link, USA

**1 Drone-assisted Multi-purpose Roadside Units for Intelligent Transportation Systems**

Nico Saputro, Kemal Akkaya, Ramazan Algin, Selcuk Uluagac, Florida International University

**2 Enhanced C-V2X Mode-4 Subchannel Selection**

Luis F. Abanto-Leon, Technische Universiteit Eindhoven; Arie Koppelaar, NXP Semiconductors; Sonia Heemstra de Groot, Eindhoven University of Technology

**3 Experimental Test-Bed For Bumblebee-Inspired Channel Selection in an Ad-hoc Network**

Kuldeep S. Gill, Kyle McClintick, Nivetha Kanthasamy, Jeffrey Tolbert, Duong Nguyen, Son Nguyen, Galahad Wernsing, Valerie Moore, Ian Gelman, Alexander O'Neil, Nicholas Schubert, Corey Coogan, Krysta Murdy, Brian Mahan, Sylvester Halama, Kevin N. Heath, Elizabeth F. Ryder, Robert J. Gegeer, Alexander Wyglinski, Worcester Polytechnic Institute

**4 Large Scale Active Vehicular Crowdsensing**

Xiru Zhu, Shabir Abdul Samadh, Tzu-Yang Yu, McGill University

**5 Performance Analysis of Sensing-Based Semi-Persistent Scheduling in C-V2X Networks**

Amr Nabil, Komalbir Kaur, Carl Dietrich, Virginia Tech; Vuk Marojevic, Mississippi State University

16:00-17:30 Room 4C

**9C: Distributed Performance Optimization in Next Generation Networks**

Chair: Amnart Boonkajay, Tohoku University, Japan

**1 Distributed approaches for Inter-cell Interference Coordination in UAV-based LTE-Advanced HetNets**

Simran Singh, North Carolina State University; Abhaykumar Kumbhar, Florida International University; Ismail Guvenc, Mihail L. Sichitiu, North Carolina State University

**2 Enhancing Transmission Performance in the LAA and WiFi Heterogeneous Network**

Chin-Ya Huang, National Taiwan University of Science and Technology; Chen-Hao Huang, Shiann-Tsong Sheu, Te-Wei Chiang, National Central University

**3 Power Allocation in Multi-cell Networks Using Deep Reinforcement Learning**

Yong Zhang, Canping Kang, Tengeng Ma, Yinglei Teng, Da Guo, Beijing University of Posts and Telecommunications

**4 Rate Optimization with Distributed Network Coordination of Multiuser MIMO Communications**

Tugba Erpek, Virginia Tech; Yalin Sagduyu, Intelligent Automation, Inc.; Yi Shi, Virginia Tech; Satya Ponnaluri, Intelligent Automation, Inc.

**5 Throughput Enhancement via Multi-Armed Bandit in Heterogeneous 5G Networks**

Ankur Vora, Kyoung-Don Kang, Binghamton University

16:00-17:30 Room 4D

**9D: Channel Coding and Iterative Detection**

Chair: Hammed Gbolahan Olanrewaju, Edinburgh University

**1 A Hybrid ARQ Scheme Based on Equivalent Puncturing Patterns of Polar Codes**

Yunmei Zhang, Kangjian Qin, Chunxu Jiao, Zhaoyang Zhang, Zhejiang University

**2 A Novel High-Rate Polar-Staircase Coding Scheme**

Bowen Feng, Jian Jiao, Liu Zhou, Shaohua Wu, Bin Cao, Zhang Qinyu, Harbin Institute of Technology

**3 Multi-RS Concatenated Polar Codes with Enhanced Interleaving and List Decoding**

Xiaoming Jiang, Shaohua Wu, Xijin Liu, Jian Jiao, Zhang Qinyu, Harbin Institute of Technology

**4 Polar Codes with Integrated Probabilistic Shaping for 5G New Radio**

Onurcan Iscan, Wen Xu, Huawei Technologies Duesseldorf GmbH

**5 Polar Coding for Arbitrary Channels Based on Gaussian Decomposition**

Kangjian Qin, Zhaoyang Zhang, Zhejiang University

16:00-17:30 Room 4F

**9F: Wireless Communications and Networking**

Chair: Li Li, University of Delaware, USA

**1 Cross-Layer Signaling for Wireless Video QoE**

Jonathan Ling, Nokia Bell Labs; Bongho Kim, Nokia

**2 Extending On-the-fly Network Coding by Interleaving for Avionic Satellite Links**

Daniel Stolpmann, Christoph Petersen, Vanessa Eichhorn, Andreas Timm-Giel, Hamburg University of Technology

**3 Traffic Differentiation in Dense WLANs with CSMA/ECA-DR MAC Protocol**

Seyedmohammad Salehi, Li Li, Chien-Chung Shen, Leonard Cimini, University of Delaware; John Graybeal, Cisco

**4 wBBR: a Bottleneck Estimation-Based Congestion Control for Multipath TCP**

Ting Zhu, Xiaowei Qin, Li Chen, Xiaohui Chen, Guo Wei, University of Science and Technology of China

16:00-17:30 Boulevard A

## 9G: Recent Results: Channel Measurements and Modeling

Chair: Jean-Frédéric Wagen, University of Applied Sciences and Arts of Western Switzerland, Switzerland

- 1 Error Performance of Cryptography Transmission in Wireless Fading Channels**  
Mustafa M Matalgah, University of Mississippi
- 2 Pilot-Aided Channel Estimation on SC-PAM Based Visible Light Communications**  
Omer Narmanlioglu, Ozyegin University; Bugra Turan, Koc University; Refik Caglar Kizilirmak, Nazarbayev University; Sinem Coleri Ergen, Koc University; Murat Uysal, Ozyegin University
- 3 Ray-Tracing based Validation of Spatial Consistency for Geometry-Based Stochastic Channels**  
Fjolla Ademaj, Stefan Schwarz, Technische Universität Wien; Ke Guan, Beijing Jiaotong University; Markus Rupp, TU Wien
- 4 Low-Cost Channel Sounder design based on Software-Defined Radio and OFDM**  
Yasser Samayoa, Markus Kock, Holger Blume, Jörn Ostermann, Gottfried Wilhelm Leibniz Universität Hannover
- 5 Performance of IDMA-based NOMA with NR-based Realistic Channel Estimation**  
Afshin Haghighat, InterDigital Communications Corporation; Loïc Canonne-Velasquez, InterDigital Canada; Prasanna Herath, InterDigital Inc.

16:00-17:30 Boulevard B

## 9H: Intelligent Transportation

Chair: Hongsheng Lu, Toyota Infotechnology Center, USA

- 1 Efficient EKF-SLAM Algorithm Based on Measurement Clustering and Real Data Simulations**  
Hyukjung Lee, Joohwan Chun, KAIST; Kyeongjin Jeon, Heedeok Lee, LG Electronics

- 2 Concept for a holistic energy management system for battery electric vehicles using hybrid genetic algorithms**  
Katharina Minnerup, Thomas Herrmann, Matthias Steinstraeter, Lienkamp Markus, Technical University of Munich
- 3 Delivery Management System based on Vehicles Monitoring and a Machine-learning Mechanism**  
Habault Guillaume, IMT Atlantique; Yuya Taniguchi, Naoaki Yamanaka, Keio University

16:00-17:30 Boulevard C

## 9I: Performance Analysis of Next Generation Networks

Chair: Hosseinali Jamal, University of South Carolina, USA

- 1 Dual-Polarization OFDM-OQAM Wireless Communication System**  
Hosseinali Jamal, David Matolak, University of South Carolina
- 2 Impact of Input Data Size on Received Power Prediction Using Depth Images for mmWave Communications**  
Kota Nakashima, Yusuke Koda, Koji Yamamoto, Hironao Okamoto, Takayuki Nishio, Masahiro Morikura, Kyoto University; Yusuke Asai, Ryo Miyatake, NTT Network Innovation Laboratories
- 3 Inter-cell Interference Analysis for ARQ-aided Cellular Networks with Dynamic Traffic**  
Tianyu Cao, Dingjie Xu, Chenchen Yang, Cheng Li, Zhiyong Chen, Bin Xia, Shanghai Jiao Tong University
- 4 The Analysis of Indoor Wireless Communications by a Blockage Model in Ultra-dense Networks**  
Hui Zheng, the University of Sheffield; Jiliang Zhang, Chalmers University of Technology; Haonan Hu, Jie Zhang, University of Sheffield

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