The 87th IEEE
Vehicular Technology Conference

Final Programme

VTC2018-Spring
PORTO
Defining the Future Mobile World

3 – 6 June 2018

Porto, Portugal

Welcome from the General Chair

It is my honor to welcome you to VTC2018-Spring, hosted in my hometown of Porto, Portugal! The largest city in the northwest region, it is a vibrant metropolis that attracts both tourists and corporations from diverse economic sectors: an exciting place to host VTC2018-Spring. The city's center was declared a UNESCO World Heritage Site and Porto has been honored as Best European Destination (2012, 2014, 2017). Please take an opportunity to explore: the Livraria Lello Bookstore, the long beaches, the 100-year-old São Bento Train Station, the Dom Luis I bridge, and fine dining along the Ribeira. You'll not want to miss this thriving city within a beautiful landscape!

The technical presentations will report on the latest research in wireless communications and networks, vehicular communications, future trends and emerging technologies, and many more topics that will help shape the future of the industry. Featured are 12 tracks,12 workshops, several tutorials, about 428 peer-reviewed papers and a series of world-class invited speakers.

VTC2018-Spring will feature top level executives from global companies, sharing their perspectives and hi-tech developments. This event gives an opportunity to network with some of the world's most distinguished industry leaders, and renowned researchers.

A successful event happens with tireless efforts of volunteers: many thanks to those who contributed. The commitment of the Organizing Committee truly was inspirational. Special recognition is due to Honorary Chair Augusto Albuquerque, TPC Chair Rui Dinis, and TPC Vice-chairs Witold Krzymień and Hideki Ochiai. Their energy and commitment has ensured an exciting and professional event.

J R Cruz
General Chair, IEEE VTC2018-Spring

Welcome from the TPC Chair & Vice-chairs

Our committee has put together an excellent technical program on the latest research developments in wireless systems and networks (emphasizing 5G cellular developments), autonomous and connected vehicles, intelligent transportation, and promising new emerging topics. The program is organized into 12 topical tracks, plus the Recent Results track.

We received 505 submissions (including 32 invited papers). Each paper has been reviewed by at least 3 independent reviewers, totaling 1878 reviews, resulting in 336 papers chosen for presentation. Papers are organized into 58 oral presentation sessions and 6 poster sessions to be held from 4–6 June. All papers presented will be published in the conference proceedings and in IEEE Xplore.

It is our great pleasure to offer you this high quality and comprehensive technical program, and we hope that you will find it inspiring for your own research. We thank all the authors that submitted their papers to the conference. We are genuinely obliged to the 38 track co-chairs for their leadership of and dedication to the paper review process and the organization of technical sessions. Furthermore, we would like to express our sincere gratitude to the 1050 TPC members and 841 other reviewers for their great effort to provide expert reviews of the papers, and to the 64 session chairs for ensuring effective paper presentation.

Rui Dinis
TPC Chair, IEEE VTC2018-Spring
Witold Krzymień and Hideki Ochiai
TPC Vice-chairs, IEEE VTC2018-Spring

Welcome from the VTS President

VTC2018-Spring is comprised of papers, tutorials, talks, and activities to facilitate knowledge exchange, enable professional development, and support networking with other attendees from around the world. The technical program is focused on millimeter wave communications, vehicular networking, UAVs, MIMO, 5G, cognitive radio, non-orthogonal multiple access (NOMA), connected and automated vehicles (CAV), and 5G communications. VTC2018-Spring includes an exciting line-up of keynotes and panels, with an excellent industry track: speakers from many companies will discuss 5G, CAV, Smart Cities and IoT. These activities will provide an invaluable professional development experience.

We are very fortunate that Porto is host to VTC2018-Spring, with its exciting history dating back over two millennia. Located on Rio Douro, Porto is also known as the City of Bridges, home to the Ponte D. Maria railway bridge designed by Gustave Eiffel and the Ponte Dom Luís I bridge. This city is also renowned for port wine, produced in the surrounding Douro Valley.

A world-class event like VTC2018-Spring involves a large and dedicated volunteer team; VTS is most thankful to you all! I would like to sincerely thank Honorary Chair Augusto Albuquerque, General Chair J. R. Cruz, Technical Program Chair Rui Dinis and

Co-chairs Witold Krzymień and Hideki Ochiai, Panels & Keynotes Co-chairs Luis M. Correia and Abbas Jamalipour, Industry Program Co-chairs Jim Budwey, David Soldani, Zoran Zvonar, and their panel chairs, Workshops Co-chairs Luís Bernardo, Marco Gomes, and Narcís Cardona, and Tutorials Chair Oliver Holland for their time, effort, and commitment!

Alex Wyglinski, *President*
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Registration

Registration will take place in the Level 0 Foyer area. Opening times are:

- Sunday 3 June 2018 7:00 - 17:30*
- Monday 4 June 2018 7:00 - 17:30
- Tuesday 5 June 2018 8:00 – 17:30
- Wednesday 6 June 2018 8:00 – 16:00

* After 18:00 on Sunday, you may pick up your badge and tickets at the reception – bags can be picked up on Monday.
(**Your registration receipt is required to pick up your registration at the reception.**)

Breaks

Coffee breaks will take place along with exhibits in the Level 1 Foyer.

Social Events

Lunches are included as part of the full registration and will be served in the Food Court. The welcome reception will be conducted on Sunday evening, 3 June 2018 in the Level 1 Foyer and Porto Foyer. The banquet on the evening of 5 June 2018 will be held at the Tres Séculos Winery. Busses leave at 18:00 from the front of hotel.

Lunches, the reception and banquet require admission tickets and these are included in your registration packet to gain entry. Be sure to present the correct day's lunch ticket or you will not be served. You also may purchase tickets for these events at the registration desk.

Monday Opening Keynote

Monday, 4 June 2018, 9:45–10:30 Porto Room

5G mmWave FWL Access: Challenges and Opportunities in Achieving High Bit Rates and Reliable Coverage

Reinaldo A. Valenzuela, *Nokia Bell Labs*

The increasing availability of exciting media rich content, advanced multimedia applications and the arrival of augmented and virtual reality ensure the continued explosive growth in the demand for high bit rates and reliable coverage. 5G is intended to address this need by opening up the vast spectrum available at mmWave frequencies. At the same time, services providers will need reliable RF planning tools to verify that the rates users demand are available in at least 90% of the intended coverage area with a high degree of confidence. I will describe the opportunities and challenges in this crucial topic with particular mention of the of appropriate channel sounder design, needed measurement campaigns. Then, I will review data already collected, corresponding models and preliminary systems RF system designs achieving the stated goals.

Reinaldo A. Valenzuela has a BSc from University of Chile and a PhD from Imperial College London. He is Director, Communication Theory Department, Distinguished Member of Technical Staff, Bell Laboratories, and is engaged in propagation measurements and models, MIMO/space time systems achieving high capacities using transmit and receive antenna arrays, HetNets, small cells and next generation air interface techniques and architectures. He is a Member National Academy of Engineering and a Fellow of the IEEE. He has received many awards including the IEEE Eric E. Sumner Award, Bell Labs Fellow, WWRF Fellow, 2014 IEEE CTTC Technical Achievement Award, 2015 IEEE VTS Avant Garde Award. He has published 190 papers and 44 patents. He has over 26,000 Google Scholar citations and is a 'Highly Cited Author' in Thomson ISI and a Fulbright Senior Specialist.

Monday Industry Track: Wireless Communication and 5G

Monday 4 June 2018, 11:00–12:30 Porto Room

Panel: 5G Slicing

Moderator:	**Xueli An**	*Huawei Technologies, German Research Center, Germany*
Panelists:	**Cinzia Sartori**	*NOKIA Bell Labs in Munich, Germany*
	Michele Zarri	*GSMA, UK*
	Cipriano Lomba	*Efacec Group, Portugal*
	Anders Wännström	*Ericsson Mobile Broadband Practise, Austria*

Network slicing is one of the fundamental features of 5G, which could enable mobile system to support variant vertical industry (e.g. automotive, manufacturing, energy, financial, healthcare and many others) use cases with very different requirements. This does not only enrich the ecosystem of the telecommunication sector by stimulating new business roles and opportunities, but also help the other industries to achieve their digital transformation vision. Network Slicing is a concept for running multiple logical networks as virtually independent business operations on a common physical infrastructure. Such logical networks could be customized according to vertical industries' variant requirements with guaranteed service level agreements (SLAs). Major standardization efforts (like 3GPP, ETSI, BBF, etc.) have their own working plan on network slicing that cover different technical domains. 3GPP Release 15 will be frozen in 2018, and 5G commercialization is already foreseen in 2019. Do you think industries are ready for network slicing? The following questions will be addressed: Technical challenges; Are there any gaps from the standardization? For vertical industry, what are the challenges or difficulties for operators to address this issue? New business opportunities and risks for operators? Business opportunities for vertical industries?

Xueli An is a Principal Researcher at Huawei Technologies, German Research Center. She received her Master and PhD degrees in Electrical Engineering from Delft University of Technology (TU Delft), The Netherlands, in 2005 and 2010, respectively. Within Huawei, she has the global responsibility on network slicing related industry development and innovation program that involve leading the cooperation with vertical industries like automotive, manufacturing, emerging media, etc. She also actively involves in network slicing related research, standardization and industry platform e.g. 3GPP, GSMA, 5GAA. She has over 50 international journal/conference publications and over 20 patent applications in the field of wireless communication, networking, etc.

Cinzia Sartori is a principal expert in the field of Mobile Network Architecture with focus on 5G at NOKIA Bell Labs in Munich. She is engaged in end-to-end 5G Network Architecture with special focus on Network Slicing, covering radio, transport, core networks as well as Slice Management and Orchestration. She looks at near term network and network slicing deployment as well as evolution in the longer term. In this field, she started since the early days, being one of the originators of H2020 5G NORMA project. Until mid-2013 she led the 'Self-Organizing Network (SON) Research and Standardization' project in Nokia Siemens Networks. Earlier she worked in the Network Telecom, O&M; RRM and SS7 in Nokia Siemens Networks, Siemens and GTE. She holds several international patents, contributed several conference papers and she is co-editor of "LTE Self-Organizing Network" book. She graduated as engineer in Pavia -Italy

Michele Zarri is a technical director in GSMA where he works on advanced technologies and 5G. Michele graduated in telecommunications engineering at University of Pisa (Italy) and completed his studies at King's College of London (UK). Prior joining the GSMA Michele worked for Deutsche Telekom where he accrued more than 15 years of experience in standardization of mobile technologies. Michele served as chairman of working groups both in 3GPP and GSMA.

Cipriano Lomba is now Technology and Innovation Coordinator at Efacec Group, Portugal. He has more than 20 years of experience, most of them leading R&D and Engineering teams developing and supplying integrated ICT solutions for different utility markets. Previously, he was Managing Director of Telecommunications and Signaling Business Division at Efacec for 10 years, after having been R&D Director of the same Business Division, as well as Business Developer Manager for international markets. He holds an Executive MBA from Porto Business School (Portugal), a PhD in Electrical Engineering, from University of Aveiro (Portugal) and an MSc from University of Wales (United Kingdom). He is author or co-author of about one dozen scientific research papers and has an extended track record of participation in international technological conferences, namely in the telecom, mobility and energy sectors. His main areas of interest are related with digital business transformation and the use of ICT technologies to improve operational performance management of critical infrastructures, namely in energy, environment and mobility systems.

Anders Wännström is a subject matter expert in LTE/IoT/5G in Ericsson's Mobile Broadband Practise in the Asia Pacific and Oceania region where he is intimately involved in the introduction and evolution of new technology for the most advanced mobile broadband networks. He has lived and worked for Ericsson in Sweden, Hungary, Australia and has spent the last seventeen years in the Asia Pacific region. Dr Wännström received his Ph.D. from Uppsala University in 1989 with research in atomic physics and before he joined Ericsson, he did research work in Sweden, the Netherlands and Australia. He has, in collaboration with other researchers, published some thirty peer reviewed articles.

Monday 4 June 2018, 14:00–15:30 Porto Room

Panel: 5G for URLLC: Niche or Mainstream Capability

Moderator:	**Jeffrey Owen**	*Head of RAN Strategy, Vodafone Hutchison, Australia*
Panelists:	**Andreas Mueller**	*Senior Expert & Project Manager, Robert Bosch GmbH, Germany*
	Erol Hepsaydir	*Head of RAN and Devices Strategy, Hutchison 3G, UK*
	Gustav Wikström	*Master Researcher, Ericsson Research, Malaysia*

URLLC has been identified as one of the three general categories of services for 5G. enhanced Mobile Broadband (eMBB) will continue to evolve from 4G focusing upon greater data rates whilst massive Machine Type Communication (mMTC) will do likewise whilst focusing upon achievable device density to distinguish itself from its predecessors. But what about Ultra-Reliable and Low Latency Comms? – These are really new classes of service without any precedent but they receive strong focus in standardization and from a 5G vision perspective. Will they become all pervasive and on-going categories that account for significant new sources of revenue? To what degree will they influence how operators think about their networks and businesses and will they impact eventually impact the daily lives of consumers.

Jeff Owen graduated from the University of Queensland in Australia in 1989 with a BSc and in 1990 with a B.E. (Hons) in Electronics and Communications. He commenced his career in the Australian Department of Defense in tactical fighter aircraft and became a member of teams undertaking pivotal Research & Development for guided weapons and airbourne radar. He graduated in 1994 with a B.Sc (Hons) in Mathematics from the University of Adelaide. He worked for GEC Marconi Systems contributing to the design of the Jindalee Operational Radar Network and following this held industrial consulting roles in radio product strategy and radio system design, before briefly returning to the defense industry. Jeff came to the cellular industry in 2000 being appointed as the National RF Engineering Manager of AAPT, and then in the same role for Hutchison Telecommunications Australia in 2001 where he was part of a pioneering team establishing Australia's first WCDMA network and 3G business. Since the merge with Vodafone locally he has been in the role of Head of RAN Strategy for Vodafone Hutchison Australia where he establishes a long-term technology roadmap with a recent focus upon 5G and beam-forming technology. He advocates a rigorous quantitative cost-benefit optimization approach and employs a pull-through framework to establish business cases for spectrum acquisition, technology adoption, and infrastructure investment.

Dr. Andreas Mueller is a Senior Expert and Project Manager within the Corporate Research Department of Robert Bosch GmbH in Stuttgart, Germany. In his current role, he is coordinating Bosch's research activities in the area of future industrial connectivity infrastructures, with a special focus on wireless communications and emerging 5G technologies. This is done in close collaboration with various business units and external partners in order to ensure a high practical relevance. Prior to joining Bosch, Andreas was a Research Staff Member at the Institute of Telecommunications of the University of Stuttgart, Germany, where he was contributing to the further development of the 3GPP Long Term Evolution towards LTE-Advanced. Additionally, he was working as a Systems Engineer for Rohde & Schwarz, developing a novel software-defined radio based communication system for the German Armed Forces. Andreas holds a German Diploma degree as well as a Ph.D. degree in Electrical Engineering (with distinction) and a M.Sc. degree in Information Technology, all from the University of Stuttgart, Germany.

Dr Erol Hepsaydir has been designing several mobile networks in various countries for 30 years. He is currently working for Hutchison 3G in the UK. He is responsible with the migration to 5G technology. He is also a Royal Academy of Engineering Visiting Professor at the University of Kent lecturing on Digital Communications and Mobile Networks. His main research areas are mobile positioning, next generation mobile networks, 5G and M2M communications.

Gustav Wikström is a Master Researcher at Ericsson Research in Stockholm, Sweden. He has a background in Experimental Particle Physics and received his Ph.D. from Stockholm University in 2009, after Master studies in Engineering Physics in Lund, Uppsala, and Rennes. After Post-doc studies in Geneva, he joined Ericsson Research in 2011. There he has been driving the evolution of network performance studies, simulator development, and worked with WLAN enhancements. Since 2015 he has been the driver of latency and reliability improvements (URLLC) in LTE and NR, working towards 3GPP 4G/5G standardization and developing new concepts for critical communication.

Monday 4 June 2018, 16:00–17:30 Porto Room

Panel: 5G: Architecture Options and Network Evolutions

Moderator:	**Riccardo Trivisonno**	*Principal Engineer, Huawei Technologies, Germany*
Panelists:	**Dirk Trossen**	*Senior Principal Engineer, InterDigital Europe, UK*
	Jorge Carapinha	*Senior Expert, Altice Labs, Portugal*
	Steve Tsang Kwong U	*Mobile Packet Core Architect, Orange Labs, France*
	Hans Joachim Einsiedler	*Head of Network Control Team, Deutsche Telekom*

Multiple architectures have been proposed by industry to deploy 5G networks, with various integration levels with a pre existing 4G network architecture. In the early standardization phase (early drop) under 3G PP Release 15, work has focused on the non standalone option (NSA), which allows smooth migration with a 4G core network being called upon to be involved in the management of the 5G connectivity. This option is targeted for early deployments, and will be later complemented with a Standalone option '(SA) based on a full 5G core. It may be anticipated that the choice of a deployment option depends on multiple parameters such as the legacy situation, the target service deployment and their QoS requirements. From that perspective, the panel will explore, amongst other things:

- the various options for deployment as addressed by 3G PPP and their characteristics; the migration scenario and the relevance of the various options for different operators types (4G legacy, new entrant, vertical, MVNO's)
- the migration scenarios towards cloud and SDN platforms and service oriented architectures; the potential for various deployment option to capture new businesses and to enable new business models, notably with vertical industries
- the currently missing architectural elements at standardization level that are considered key to facilitate 5G deployments for new business models; and
- the level of openness and open interfaces that should be provided to enable smooth integration and business with verticals.

Riccardo Trivisonno has been working as Principal Engineer at Huawei Technologies European Research Center since 2011, and he is now leading an R&D group within the Applied Communication Technology Lab (ACTL). The group, which focuses on End to End Communication System Architecture, Network Slicing and Verticals integration into mobile network ecosystem, is currently working on 5G technologies development, strategic IPRs, and technology transfer towards standardization bodies, mainly 3GPP Service and System Aspects (SA) working groups. Particular emphasis is given to vehicular communications, industry automation and massive IoT.

Together the whole group, since 2013, have also been involved in successful research oriented activities, including 5G-PPP flagship projects, laying the foundations for 5G system architecture, conceiving design principles currently reflected in the latest 5G standard specifications.

Riccardo has been working in R&D department within the Mobile Network industry for almost 20 years, serving as research engineer, senior system engineer, principal system architect and solution architect. He worked on RAN design and development, End to End QoS, Self-Organizing Networks, QoE and Customer Experience Management. He worked on many mobile communication systems developed since 1999, including GSM/EDGE, GPRS, UMTS, WiMAX, and LTE/EPC. He received his MSc (Laurea, with honors) and his PhD (Dottorato Di Ricerca) in Telecommunications Engineering from University Of Bologna in 2000 and 2005 respectively.

Dr. Dirk Trossen is a Senior Principal Engineer at InterDigital Europe, the European branch of InterDigital Inc. His main responsibility lies in establishing the European presence of InterDigital through engagements within the EU-funded Horizon 2020 work programme as well as within UK-funded efforts. Dirk has more than 15 years of experience in network architectures, services and wireless technology. He is currently technical lead on the European efforts POINT and RIFE as well the test bed efforts of the FLAME project. He is also an active contributor to European efforts in the 5G (PPP) space through contributions to ETP and 5GPPP whitepapers as well as main standardization bodies. Prior to joining InterDigital, Dirk was co-founder of TecVis LP, a UK-based software solution company in the mobile, context-aware solution space and he held prior positions as a Senior Researcher with Cambridge University, Chief Researcher with BT Research and as a Principal Scientist at Nokia Research. He is also a research affiliate with the Advanced Network Architecture group at MIT CSAIL. He holds a Ph.D. degree in Computer Science from Technical University of Aachen, Germany. He has published more than 80 peer-reviewed papers in international conferences and journals and has currently 32 international patents.

Jorge Carapinha graduated with a BS in Electrical and Computer Engineering (1984) from the University of Coimbra and received an MSc in Electronics and Telecommunications (1998) from the University of Aveiro. He has been with Altice Labs (formerly PT Inovação) since 1985, and has a long record of participation in international collaborative projects in the framework of European R&D programmes such as IST, ACTS, FP7 and H2020. He has vast experience in technical areas such as IP backbone technologies and architectures, MPLS and QoS. Currently, his main fields of interest are Network Virtualisation, Software Defined Networking, Cloud Networking, Network Slicing and 5G. He has authored or co-authored over 40 scientific papers in major journals and international conferences, as well as several book chapters.

Steve Tsang Kwong U graduated from Supélec and MSc from Polytechnique Montreal in 2000 and joined Orange Labs Network in 2002 as a mobile packet core network architect on 3G systems and working in particular on the IMS both in Orange and in 3GPP standards within the TSG-SA WG2 in charge of the network architecture. Since then, he has been involved in the different evolutions of the mobile packet core including 4G and 5G systems. In particular, he is currently involved in Orange 5G program and initiatives to develop Orange strategy for the deployment of the 5G system on the core network part. He is also still following the standardisation work in 3GPP as an Orange delegate in TSG-SA plenary, and has also been involved in NGMN 5G project where he led the E2E architecture group to develop the NGMN vision on Network Slicing and Edge Computing for 5G systems.

Hans Joachim Einsiedler, from Ravensburg, Germany, received the Dipl.-Ing. degree in Electrical Engineering from

the University in Stuttgart, Germany, in 1994. He worked at the IBM Research Laboratory in Zurich, at the Ecole Polytechnique Federale de Lausanne, and at the University of Bern in Switzerland. He joined Deutsche Telekom in 1999. Since then, he was leader of EU and EURESCOM R&D projects. He joined the Telekom Innovation Laboratories on May, 1st, 2004 and is responsible for the Seamless Network Control team within Deutsche Telekom AG/Technology Innovation. His topics of interests are next generation control platforms and Internet Protocol control plane. Hans is the Deutsche Telekom AG responsible for the European Technology Platform Networld2020, the ETNO R&D task force, the Future Internet and 5G Infrastructure Public-Private-Partnership initiative, and the 5G Association. Currently he is involved in NGMN and 3GPP SA2 activities related to the future converged control plane and the end-to-end architecture for 5G.

Tuesday Plenary Keynotes

Tuesday 5 June 2018, 9.00–9.15 Porto Room

Welcome Address by the Secretary of State for Industry

Ana Teresa Lehmann, *Secretary of State for Industry, Portugal*

Before taking office in July 2017, **Ana Lehmann**, Secretary of State for Industry of the Portuguese Government, developed a strongly focused international career of two decades spanning academia, public policy and executive positions in over twenty public and private organizations.

Her areas of specialization relate to the competitiveness of firms and industries, notably companies' internationalization, foreign direct investment attraction, innovation, industrial clusters and public policy.

She has been a consultant to leading international institutions (OECD, UNCTAD, European Commission, among others) and various national and regional governments in five continents. She held a variety of managerial responsibilities in several companies and foundations, as well as having founded several companies. She has been CEO of InvestPorto, Vice-President of the Regional Government Authority of Portugal's Northern Region, President of the Managing Authority of the Atlantic Area Transnational Program of the European Union, Pro-Rector for Strategic Planning/Enterprise Relations (U.Porto) and has been involved in setting up the Portuguese Investment Agency.

She is a Professor of Economics (FEP-University of Porto, Portugal) and has been Head of International Business (Porto Business School); has been Visiting Professor or Visiting Fellow in several US/European universities (e.g. Universities of Strathclyde, Reading, Glasgow, Columbia, among others), and President and one of the 20 Fellows of the European International Business Academy. She has a MSc and a PhD in Economics (University of Reading, UK) and a BSc in Management (U.Porto).

A regular speaker in top-level conferences, she has been an Editor of scientific journals and is an author widely published in her field. She is the author/editor of books such as Rethinking Investment Incentives: Trends and Policy Options (2016), Entrepreneurship in the Global Firm (2011) and Multinationals, Clusters and Innovation: Does Public Policy Matter? (2006). She has won several awards for scientific merit and career recognition.

Tuesday 5 June 2018, 9.50–10.30 Porto Room

From Connected Cars to Autonomous Vehicles: A Network Perspective

João Barros, *Founder and CEO, Veniam*

It is a well-known fact that today only a small fraction of the world's cars, roughly 6%, are connected to the Internet. This sCobering reality is about to change dramatically, as auto OEMs jump start the production of connected cars to reach more than 80 million units per annum by 2021. At the same time, the advent of artificial intelligence and the autonomous vehicle invites us to re-imagine the automobile as much more than a machine that carries people and goods. By generating and consuming massive amounts of data, the autonomous vehicle promises to re-shape not just the way we experience mobility but the means by which we enable cities to become smarter, more sustainable and more human. Whereas the challenge of teaching vehicles to drive themselves has drawn dozens of companies into a worldwide race, very few are addressing the key challenge of teaching the vehicles to form a wireless network and communicate with the cloud in a secure and scalable way. Drawing from more than 60 Million kms of real-world data and ongoing projects with the automotive industry, this keynote will highlight how the future mobility ecosystem forces us to rethink our communication platforms and find new ways for vehicles to become the network.

An award-winning wireless engineer, academic leader and passionate entrepreneur, **João Barros** loves to turn complex theorems and algorithms into products and services that can make a real difference in people's lives. After more than a decade developing new wireless networking technologies at Technische Universitaet Muenchen, Universidade do Porto, MIT, and Carnegie Mellon, João founded two venture-backed startups, Streambolico and Veniam, where he serves as board director and CEO respectively. His work has led to 160 science and technology papers, as well as feature articles by NPR, BBC, MIT Technology Review, The Atlantic, and TechCrunch. João Barros has received several awards, including the 2010 IEEE Communications Society Young Researcher Award for the Europe, Middle East and Africa region, the 2011 IEEE ComSoC and Information Theory Society Joint Paper Award, the 2012 BES National Innovation Award, the 2013 Building Global Innovators Grand Prize (ISCTE-IUL and MIT) and a state-wide best teaching award by the Bavarian State Ministry of Sciences, Research and the Arts.

João Barros has a Ph.D. degree in Electrical Engineering and Information Technology from the Technische Universitaet Muenchen (Germany), his undergraduate education in Electrical and Computer Engineering from the Universidade do Porto, Portugal and Universitaet Karlsruhe, Germany, and a performing arts degree in flute from the Music Conservatory of Porto, Portugal.

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

Tuesday 5 June 2018, 11:00–12:30 Porto Room

Panel: Pedestrian Safety: One Key Application of 5G

Moderator:	**Klaus David**	*Head Chair-ComTech, University of Kassel, Germany*
Panelists:	**Alin Stanescu**	*Director for Government Affairs, Qualcomm, Belgium*
	Antonio Fernández Barciela	*R&D Automobile connectivity, Peugeot, Spain*

Every year about a quarter of a million of VRUs (Vulnerable Road users, who are pedestrians and bicyclists) are killed in traffic accidents with cars and lorries. An even much larger number of VRUs gets injured. So far passive approaches (best possible design of an automobile, to be as best as possible less harmful in case of a collision) and approaches enabling cars to sense its environment (by using vision, LIDAR, infrared, radar) have been introduced and show encouraging improvements. To facilitate the vision of accident free traffic, a collaborative approach – where VRUs and cars are networked by 5G, is a very promising new approach. This approach is becoming more and more attractive, due to the advances of smartphone and mobile sensors, GPS and mobile networks (especially 5G) The panel speakers will provide an up to date overview about this exiting, new application area.

After studying physics at the University of Siegen for four years, **Prof. Dr.-Ing. Klaus David** (born in Frankfurt am Main) was a research assistant at IMEC in Gent (Belgium) and promoted to Dr.-Ing. At the University of Siegen.

In 1998, after six years of work at T-Mobile, he was appointed as Project and Group Leader at the Chair of Mobile Systems at the Technical University of Brandenburg. Here he also initiated lessup AG, which is still successful today and was Head of Division at the IHP. He spent five years abroad (UK, Belgium, USA and Japan). Since March 2000, Prof. David has been teaching and serving as the Chair of Communication Technology (ComTec) at the University of Kassel.

Prof. David has applied for ten patents, has written two books and has published more than 200 publications, and has worked in international organizations such as the Institute of Electrical and Electronics Engineers (IEEE) and the Wireless World Research Forum (WWRF) DFG), the German Federal Ministry of Education and Research (BMBF) and the EU. Research focuses on mobile applications and networks, context sensitivity and software (architectures). Areas of application are: automotive, future internet, e-learning and energy efficiency (home networking, smart grid).

Prof. David has been a co-founder and director of the ITeG (Scientific Center for Information Technology Design) since 2005. In 2010 he founded the Start-Up PhoneTec. In 2012, Prof. David took over the scientific management of the Department Communication & Software at the IdE Institute decentralized energy concepts. Since 2014 Prof. David has been the spokesman for the LOEWE focus "Social Link".

Alin Stanescu is Director for Government Affairs at Qualcomm. He supports European governments and regulatory bodies by providing technology expertise and market analysis on the internet of things and connected and autonomous driving amongst others. He represents Qualcomm in various trade organizations and regulatory bodies, such as the CEPT, OECD BIAC, 5GAA and Digitaleurope.

Alin has over 15 years of EU public affairs and communication experience in the ICT sector and beyond, having worked in the cabinet of EU Commissioner for Trade, Pascal Lamy and as a founding associate with The Centre. Alin holds a Masters from the College of Europe, Bruges, Belgium, as well as a Masters and a LL.M in International Trade and Finance Law from the Universities of Paris-Sorbonne and Cologne.

Antonio Fernandez Barciela is a Telecom engineer with long experience in mobile oriented projects and a strong IT background in network, security and protocols. Antonio has experience in voice and data architecture for corporate mobile environments. He led the pan European mobile contract for PSA group (20 countries and more than 10.000 lines) and was involved in R&D for connectivity projects. He is the PSA representative in 5GAA for the architecture working group, and was project leader and contributor in national and international granted projects (Autopilot, Towards5g, 5gCar, EC CONCORDA, Sat2Car), working closely with companies from the automotive and the IT industries.

Tuesday 5 June 2018, 14:00–15:30 Porto Room

Panel: Data Networking Challenge of the Autonomous Vehicle: An Industry Outlook

Moderator:	**Rui Costa**	*Chief Technology Officer, Veniam, Portugal*
Panelists:	**Gerhard Stanzl**	*Head of Pre-development Smart Mobility and Machine Learning AUDI AG, Germany*
	Raphael Meillat	*Corporate Strategy and Planning, Nissan, Europe*
	Luis Reis	*Mobility Manager, CEiiA, Portugal*

In today's increasingly mobile world, usage of wireless data is skyrocketing—not just by legions of mobile phone and tablet users but by vehicles themselves. Even traditional, driver-controlled vehicles, are increasingly connected to the cellular network for map downloads, streaming music, and software updates on the fly, but that's nothing compared to what autonomous vehicles will demand. Because of the vast array of sensors they rely on – GPS, lidar, radar, video cameras, and more – these cars collect, produce, and transmit a mountain of information that can currently total up to four terabytes per day. On top of that, we will have new services, business models, and redefined industries that will rely on a very high-demanding communications network and infrastructure. In this panel, we will explore how different stakeholders of the ecosystem look at the vehicle connectivity and challenge. From the technical innovations to new business models, we will explore how the automotive, telecom and smart city industries should start preparing today for the fast-paced, highly connected, reality ahead of the curve.

Rui Costa is the CTO of Veniam and Founder of IEEE Academic. Rui joined Veniam in 2013 as a Systems Engineer and later headed the company product effort, helping Veniam scale its technology and vision towards the mission of delivering the Internet of Moving Things,being the author of multiple patents held by the company. Rui was also responsible for setting up Veniam center for North America operations in New York City, building the team, and securing key strategic partnerships in the area of automotive and connected autonomous vehicles. In parallel, Rui is also passionate about open access education by being the founder of IEEE Academic, a web-based international project for the creation and dissemination of free educational multimedia content since 2012. Rui is also a co-founder of Kairos Society Portugal and the Startup Scholarship, and an active IEEE volunteer.

Gerhard Stanzl joined AUDI AG in 2011. As Head of Pre-development Smart Mobility and Machine Learning, he is currently responsible for innovative services of connected and automated cars. His initiatives include car2car/car2infrastucture services, usage of machine learning for the interior of the car as well as smart mobility solutions. Prior to his current role he served as Head of Business Development and IT Program Lead "Audi connect" at the AUDI AG. Responsible for defining new business areas for Audi outside conventional OEMs IT initiatives he designed sustainable, innovative revenue streams and strategic investments. In his role as IT Program Lead for "Audi connect", a program focusing mobile apps and services for the Audi online infotainment solutions, he directly reported to the CIO.

Prior to the AUDI AG, Gerhard served for 6 years as Head of Innovation at o2 Germany Telefonica in Munich/Madrid and as Head of Enterprise Architecture at o2 Germany in Munich. As Head of Innovation he implemented innovation projects in the business units in order to drive profitable growth in the core business fields. Furthermore he was responsible for the conception and implementation of a company-wide innovation process and a innovation prioritization for Latin America, Europe and Spain in order to focus innovation activities within the company. As Head of Enterprise Architecture he directly reported to the CTO and CIO and owned the o2 enterprise architecture as well as the customer oriented concept development to improve the o2 architecture and capabilities towards converged products and services.

Prior to that Gerhard was with Siemens Mobile Phones in Munich for 15 years. As Chief Technology Strategist he owned the global Siemens Mobile Phones chipset strategy and provided leadership for numerous international ´hot topics´ like fast assessment of development scenarios, technology scans, partnering investigations and in-house/ODM/supplier work split, reporting directly to the CTO. In his previous role as Leader Concept Engineering in R&D strategy he was responsible for the chipset specification and the single entry point for and suppliers of in-house solutions. In his role as Leader New Technologies in R&D strategy he headed the sectors concept engineering, pre-development coaching and controlling, optimization and definition of mobile phone platform and family concepts.

Raphael Meillat is responsible for Market Intelligence and Customer Insights for Nissan across Europe and Russia. His team supports a wide variety of internal stakeholders, from the very upstream activities (strategy, white space identification, trends) to downstream (operational excellence, post-experience feedback management, etc.) His 20 years of market research, sales, marketing and planning result from his work at a marketing agency responsible for the Ford's Motor Company entire brand portfolio (Ford, Volvo, Mazda, Jaguar, Land Rover and Aston Martin) to marketing research, strategic planning and customer experience etc. at two of the largest Canadian organizations, TELUS and Rogers Communications.

Raphael studied economics, marketing and finance at Paris XII University and ARCA'S business school in Fontainebleau and earned an Economics & Finance MA.

Luis Reis is Business Development Manager for Mobility at CEiiA. He is currently engaged in the development and internationalization of CEIIA's intelligent systems and solutions, in collaboration with a wide variety of partners. Formerly, as Director for Mobility at INTELI, Luis was responsible for the setup of the MOBI.E program in Portugal, in collaboration with the Portuguese Government, and for the management of the Portuguese electric mobility project and consortium, resulting on a national wide infrastructure and business eco-system for electric mobility in Portugal.

Luis is member of the board of the eMobility ICT Interoperability Innovation Group, eMI³, an open group of significant actors from the global Electric Vehicles market who joined forces to harmonize the ICT data definitions, formats, interfaces, and exchange mechanisms in order to enable a common language among all ICT platforms for Electric Vehicles and Vice-President of the Portuguese Electric Vehicles Association. Luis' academic background comprises a five-year degree in Chemical Engineering and a Master's Degree in Engineering and Technology Management, both at Instituto Superior Técnico, Lisboa.

Wednesday Plenary Keynotes

Wednesday 6 June 2018, 9:00–9:45 Porto Room

Smart Cities and ICT Enabling Technologies

Vladimiro Feliz, *Head of Smart Cities & ICT Director, CEiiA, Portugal*

Vladimiro Mota Cardoso Feliz is ICT Director and leads the Smart Cities Unit at CEiiA. He was born in December 1973 and is a graduate in Mechanical Engineering (Industrial Management and Engineering option) by Universidade do Porto.

He worked in the pre-sales department of the Instituto Electrotécnico Português and as Program Engineer at OGMA – Indústria Aeronáutica de Portugal. He was Executive President of Fundação para a Divulgação das Tecnologias de Informação and Chief Executive Officer of Fundação Porto Social.

At Porto Municipality he was Chief Information and Innovation Officer, City Councilor for Education, Youth and Innovation, City Councilor for Environment and Urban Management, City Councillor for Tourism and Leisure, held the guidance of Research & Planning Cabinet and be appointed by the Mayor, as Deputy Mayor of the city.

During his journey at Porto municipality we was the Chairman of several companies under municipal management/interests including Associação Porto Digital; CMPL - Porto Lazer – Empresa de Desporto e Lazer do Município do Porto, EEM; and Associação de Turismo do Porto, AR.

Wednesday 6 June 2018, 9:45–10:30 Porto Room

New Value Creation by 5G Future X Network

Simone Redana, *Head Mobile Network Arch. & Systems Research Group, Nokia Bell Labs, Germany*

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.

Simone 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 leaded relay concept design in various EU research projects (WINNER II, WINNER+ and ARTIST4G).

Simone 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.

Wednesday Industry Track: Connected World

Wednesday 5 June 2018, 11:00–12:30 Porto Room

Panel: Smart City – Living Labs

Moderator:	**Haris Gacanin**	*Nokia Bell Labs, Belgium*
Panelists:	**Kathleen Philips**	*Director IoT, imec, The Netherlands*
	Cristian Patachia-Sultanoiu	*Innovation Team Manager, Orange, France*
	Ljubco Jorguseski	*Senior Consultant, TNO IC, The Netherlands*
	Mythri Hunukumbure	*Principal Research Engineer, Samsung R&D Institute, UK*
	Yichao Jin	*Principal Research Engineer and Project Lead, Toshiba, UK*

A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently. This includes data collected from citizens, devices, and assets that is processed and analyzed to monitor and manage traffic and transportation systems, power plants, water supply networks, waste management, law enforcement, information systems, schools, libraries, hospitals, and other community services. The smart city concept integrates information and communication technology (ICT), and various physical devices connected to the network (the Internet of things or IoT) to optimize the efficiency of city operations and services and connect to citizens. ICT technology allows city, government and citizens to interact directly with communities and city infrastructure and to monitor what is happening in the city and how the city is evolving. The technology aims enhancing quality, performance and interactivity of urban services, to reduce costs and resource consumption and to increase contact between citizens and government. Smart city applications are developed to manage urban flows and allow for real-time responses.

Haris Gačanin received his Dipl.-Ing. degree in Electrical engineering from the University of Sarajevo in 2000. In 2005 and 2008, respectively, he received MSc and PhD from Tohoku University in Japan. He was with Tohoku University from 2008 until 2010 first as Japan Society for Promotion of Science postdoctoral fellow and later, as Assistant Professor. In 2010, he joined Alcatel-Lucent (now Nokia), where he is currently Department Head in Nokia Bell Labs. His professional interests are related to application of artificial intelligence with machine learning for autonomous networking, and design of mobile and wireless systems. He has 200+ scientific publications (journals, conferences and patent applications) 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).

Dr. Kathleen Philips is a director at imec, The Netherlands, leading the programs on next-generation IoT technologies. Her research includes roadmaps on state-of-the-art design for ultra-low power sensing, communication and localization; as well as new research tracks on learning, neuromorphic computing and data driven solutions. The imec innovations get validated in real-life use cases and as part of large-scale test beds for Smart City and Smart Building living labs. With over 60 papers at ISSCC and IEDM, and over 100 patents, this imec program has been at the forefront of IoT innovations, for over a decade.

Kathleen has joined imec in 2007 and has held positions as director IoT, program director for Perceptive Systems, program manager for ULP Wireless and as a principal scientist. Before that time, she was a research scientist at the Philips Research Labs for over 12 years. She holds a PhD in electrical engineering, has authored and co-authored over 60 papers and holds various patents.

Cristian Patachia-Sultanoiu is an experienced manager with over 17 years of experience in telecom industry, covering an extensive spectrum of technology, business development and innovation management. He received a B.Sc. degree in Electronics and Telecommunications at the Satellite and Mobile Communications department of the Politehnica University Bucharest in 2000 and also his M.Sc. degree in Optical Fiber, Fixed and Mobile Radio Communications at the Politehnica University of Bucharest in 2001. Cristian also has an Executive MBA in Finance from University of Sheffield and has been working for Orange Romania since 2000, currently managing the Development & Innovation team of the Engineering department. He is currently coordinating several research projects in the following areas: future internet networks, cybersecurity, smart city, Wi-Fi offload for cellular data networks, monetisation of network's APIs, mobile cloud computing and IoT/M2M. In addition, he is coordinating Orange Educational Program, Orange Fab Romania accelerator, Innovation Labs pre-accelerator and several

Horizon 2020 research and innovation projects on various topics such 5G PPP technologies and systems, next generation emergency services and critical infrastructure security.

Ljupco Jorguseski received a Dipl. Ing. degree in electrical engineering from Ss. Cyril and Methodius University, Skopje, Republic of Macedonia, in 1996 and a Ph.D. degree in 2008 from Aalborg University, Denmark. From 2003 he has been a senior consultant, wireless access at TNO (Netherlands Organization for Applied Scientific Research), in Delft, focusing on radio planning and self-optimization of wireless networks, including 3GPP standardization. He has co-authored more than 15 scientific papers and book chapters, and has patents pending.

Mythri Hunukumbure is a principal research engineer at Samsung R&D Institute UK, having joined them in 2015. He led the WP5 (on Multi antenna and Multi-node technologies) of the recently concluded EU project mmMAGIC, which researched the application of mm-wave technologies for 5G. Currently he is leading a work package in the phase II EU/5GPPP project ONE5G, which looks at end to end optimisations for 5G technologies. He also contributes actively to the 3GPP RAN1 standardisation, covering several topics in NR. During his 11 year span in the mobile communications industry, he contributed to, and later led, research on WiMAX and LTE standardisation, Green Wireless, Femto cell innovations, D2D adaptations for 5G and Phase noise compensation in mm-wave. He has secured more than 30 IPR and published more 30 papers in reputed IEEE journals and conferences.

Dr. Yichao Jin is a Chartered Engineer and a Principal Researcher at Toshiba Research Europe Ltd., Bristol, UK. He has 10 years' industrial R&D experience with Samsung, BT and Toshiba etc. He has authored more than 30 publications and 10 patents. His research interests including Low power wireless communication, Highly reliable industrial wireless monitoring and control systems, Low power wide area networks and other IoT mesh networking technologies. He is currently the project lead for a pilot smart city project, involving a deployment of IoT devices with cutting-edge wireless communication technologies in the City of Bristol, UK. He holds a PhD degree in Electronic Engineering from the University of Surrey.

Wednesday 5 June 2018, 14:00–15:30 Porto Room

Panel: IoT Technology and Business Models

Moderator:	**Kathleen Philips**	*Director IoT, imec, The Netherlands*
Panelists:	**Anuj Jain**	*Director of the Strategic Innovation Group, Cisco*
	Pieter Willems	*Sales and Marketing Manager Security Products, Silex Inside*
	Vikas Dhingra	*Senior Business Consultant, Bell Labs Consulting*
	Wouter Haerick	*Director Research Valorization, Imec IDLab*
	Stefan Brueck	*Dept. Director of Modem Technology Qualcomm Germany*

Beyond the hype, IoT is becoming a reality. IoT enables real-time dashboards of industrial processes or office infrastructure. It is bringing new capabilities towards autonomous driving, and much more is yet to come. Apart from driving the technology roadmaps, IoT is a game changer in terms of business models. New models for pay-per-use or maintenance subscriptions and aim at capturing more value beyond the traditional sales of silicon or connectivity. In this panel, industry experts from across the ecosystem reflect on the current status of IoT deployments, on the value of data, connectivity, security, silicon and R&D while providing insight in new business models to play a higher role in the value chain.

Dr. Kathleen Philips's bio appears on Page 21.

Anuj Jain is a Director in the Corporate Strategic Innovation Group of Cisco based in Switzerland. His main responsibility is to identify and incubate new growth initiatives for the company. He leads a team of experts in very diverse domains such as IoT, Fog Computing, Cloud, AI-ML, Cybersecurity, Networking etc... Prior to joining Cisco he worked for two start-ups, the last one was Palm/HP, where he was responsible for the launch of their new smartphones and setting up and managing the App store in Europe.

In his early years, he worked in different industries such as computer manufacturing (Silicon Graphics) and service provider (Orange) where he held various positions: strategy, product development & management, process, and quality.

Pieter Willems holds a master degree in micro-electronics. He started his career as an application engineer in the image sensor industry. He consequently held several marketing and product management positions in this market. As a strategic marketing and product manager, he did market analysis and product definitions for various companies, growing new products into multi-million euro businesses. This was achieved by doing direct sales as well as by setting up and managing a worldwide rep/distribution network. Since October 2016 he has taken up the role as the strategic sales and marketing manager for the security IP products at Silex Inside. Here he is responsible for transforming the embedded security IP business from a service oriented strategy to a product driven company

Vikas Dhingra is a Distinguished Member of Technical Staff and Senior Consultant at Bell Labs Consulting, Nokia. He has twenty years of experience in Telecommunications and has extensive experience on techno-economic analysis of advanced network technologies, cellular protocols standardization, Systems Engineering and Design.

Vikas currently focuses on modeling and analysis of 5G technologies, Internet of Things, LTE-Advanced cellular networks and Small Cells. He has worked on multitude of topics such as 5G deployment strategies, impact of Internet of Things (IoT) on Cellular networks, gains from 5G technologies for IoT and other use cases, Cloud RAN techno-economic analysis, service provider spectrum strategy, Cellular-Wi-Fi integration and identifying technology migration strategies for operators. Vikas represented Alcatel-Lucent in 3GPP standards for radio access protocols and has more than ten filed and granted patents in related areas.

After receiving his Master's degree in Electrical Engineering from the Ghent University (2001), **Wouter Haerick** started working in the telecommunication market and participated in various delivery projects at fixed and mobile operators in Europe. In 2004, he joined research group IBCN as a research assistant where he was involved in various European and national research project. In 2009 Wouter obtained a PhD in the field of Computer Science. In 2011, he became business developer for Ghent University (Industrial Research Fund). In this role, he has been involved at iMinds as CTO, Future Internet Technologies and currently as Director Research Valorization at IMEC. Wouter holds an MBA from Vlerick Leuven Management School and is alumni from London Business School. He is lecturer at Ghent University in the entrepreneurship program and co-founder at Harmoney NV and GrondBeheer Vlaanderen.

Stefan Brueck is Director of the Modem Technology department in Qualcomm Germany and General Manager of Qualcomm CDMA Technologies GmbH. He and his team are working on PHY receiver design for LTE-Advanced Pro, 5G NR and Wifi 11ac/11ax for Qualcomm's premium tier modems. In addition, he is adjunct lecturer for 4G/5G Mobile Communication Systems at Friedrich-Alexander University Erlangen-Nuremberg, Germany. Stefan Brueck started his career in Bell Labs, Lucent Technologies in 1999. Since then he held research and development positions in Alcatel-Lucent and Qualcomm focusing on PHY and MAC layer technologies for GSM, UMTS/HSPA, LTE and now NR. Stefan Brueck studied mathematics and electrical engineering at TU Darmstadt, Germany and Trinity College Dublin, Ireland. He received Dipl.-Math. and Dr.-Ing. degrees from TU Darmstadt in 1994 and 1999, respectively.

Tutorials

A range of tutorials will be held on Sunday 3 June given by experts from industry and academia.

Sunday 3 June 2018 8.30–12.00 Sabor

T5: Traffic Aware Interference Management for Flexible 5G Radio Access

Antti Tölli, University of Oulu; Juha Karjalainen, Nokia Bell-Labs

Dynamic or flexible time division duplexing (TDD) is an essential 5G ingredient, e.g., in the 3GPP New Radio (NR) specification. This tutorial provides a holistic view for the design of interference management in 5G and beyond networks based on dynamic traffic aware TDD, particularly addressing relevant technology components such as beamformer training, CSI acquisition, resource allocation and interference control. The methods discussed will account for variations in user traffic as well the associated overhead from adapting UL/DL resources. First, an overview of 3GPP NR physical layer aspects is provided. A special focus is given for key technology components enabling dynamic TDD operation in NR. The theoretical performance limits of dynamic TDD systems using scheduling and coordinated beamforming are then briefly explored. Subsequently, low complexity, near optimal distributed solutions that account for the users' traffic dynamics are considered. Particular emphasis is put on the iterative Forward-Backward (F-B) training based beamformer estimation mechanisms using precoded pilots, as well as, methods to compensate for pilot non-orthogonality and imperfect channel measurements. The feasibility of proposed schemes in the context of 5G radio access will be discussed. The tutorial concludes with some highlights for future research directions.

Antti Tölli (M'08, SM'14) received the Dr.Sc. (Tech.) degree in electrical engineering from the University of Oulu, Oulu, Finland, in 2008. Before joining the Centre for Wireless Communications (CWC) at the University of Oulu, he worked for 5 years with Nokia Networks as a Research Engineer and Project Manager both in Finland and Spain. In May 2014, he was granted a five year (2014-2019) Academy Research Fellow post by the Academy of Finland. He also holds an Adjunct Professor position with University of Oulu. During the academic year 2015-2016, he visited at EURECOM, Sophia Antipolis, France. He has authored more than 150 papers in peer-reviewed international journals and conferences and several patents all in the area of signal processing and wireless communications. His research interests include radio resource management and transceiver design for broadband wireless communications with a special emphasis on distributed interference management in heterogeneous wireless networks. He is an Associate Editor for IEEE Transactions on Signal Processing. http://www.cwc.oulu.fi/~atolli/Publications.pdf.

Juha Karjalainen (S'03, M'10) received his M.Sc.(Tech.) and Dr.Sc degree in electrical engineering from University of Oulu, Finland, in 2001 and 2011. Currently, he is working at Nokia Networks, Finland, as a Senior Specialist. Before he joined to Nokia Networks, he was working with Samsung Electronics as a Principal Standards Engineer. Prior to that, he was working at Renesas Mobile as a Principal Researcher, and with University of Oulu as a Research Scientist and Project Manager as well as Nokia Mobile Phones working as Senior Designer. His research interests include next generation mobile broadband communication systems, multi-antenna ransceiver schemes and interference management.

Sunday 3 June 2018 13.30–17.00 Tua

T6: 5G cellular localization: principles, opportunities and applications

Ronald Raulefs, German Aerospace Center; José A. del Peral-Rosado, Universitat Autònoma de Barcelona

Emerging 5G networks face tremendous challenges on the provision of high-accuracy positioning, as well as ultra-high throughput, low latency, high reliability, and long communication range, depending on the usage case. The mobile location information typically relies on global navigation satellite systems (GNSS), such as GPS. But, these systems fail to deliver the required positioning performance in indoor or urban canyons, which have led to an evolution of existing networks (GSM, UMTS and LTE) to provide network-based localization. Still, conventional cellular localization is not sufficient to fulfil the stringent positioning requirements in terms of accuracy and reliability demanded by mission-critical applications, such as with unmanned and autonomous vehicles. Thus, the disruptive technologies envisaged for 5G need to be exploited in order to support precise, secure and safe localization in future applications. Furthermore, geo-location information is identified as a useful input to enhance different communications layers, such as PHY, MAC or network management. We will survey the evolution of cellular localization, discuss the new 5G research opportunities and applications, such as 5G location-aware communications, and outline potential lessons to be learned for future cellular generations, as well as a timely status of cellular localization within the 5G standard.

Ronald Raulefs received the Dipl.-Ing. degree from the University of Kaiserslautern, Germany, in 1999 and the Dr.-Ing. (PhD) degree from the University of Erlangen-Nuremberg, Germany, in 2008. He is working as senior research member at the Institute of Communications and Navigation of the German Aerospace Center (DLR) in Oberpfaffenhofen, Germany. Ronald Raulefs initiated and lead the EU FP7 project WHERE and its successor project WHERE2 (www.ict-where2.eu) as well as the task on cooperative location and communications in heterogeneous networks. He has taught courses on the cooperation between wireless communications and positioning systems. He held tutorials at the VTC'09, Sarnoff Symposium (2010), Summer school of WHERE/WHERE2 (2010), European Wireless (2013), ICC'13, Winter school Newcom#/IC 1004 (2013). He authored and co-authored 80+ scientific publications in conferences and journals. Currently he is the rapporteur of the ETSI RRS WG1 work item on a feasibility study of a radio engine for future systems. His current research interests include various aspects of mobile radio communications and positioning, including cooperative positioning for future cellular communication systems.

José A. del Peral-Rosado (S'12–M'15) received the Ph.D. degree in telecommunications engineering from the Universitat Autònoma de Barcelona (UAB) in 2014. Since 2014, he has been a Post-Doctoral Researcher with the Department of Telecommunications and Systems Engineering, UAB. From 2014 to 2016, he was a Visiting Researcher with the European Space Research and Technology Centre (ESTEC) at the European Space Agency (ESA), holding a grant from the ESA under the NPI programme. He was the publication chair of the ICL-GNSS 2016 conference, and he has organised several seminars within the topic of LTE, hybrid and 5G localization at relevant European institutions, such as ESA, DLR and EC-JRC. He is actively involved in COST CA15104 IRACON action. His research interests are in signal processing with applications to communications and navigation, hybrid satellite and terrestrial localization, and synchronization techniques and positioning with GNSS, 4G LTE, and 5G systems.

Sunday 3 June 2018 13.30–17.00 Sabor

T10: AI-inspired Autonomous Networks

Haris Gacanin, Nokia Bell Labs

Shortcomings of contemporary rule-based optimization protocols requires re-thinking our approaches for boosting network performance. We envision truly autonomous future networks that exploit artificial intelligence (AI) concept enabling the network to understand how surrounding systems evolve, and build the necessary knowledge for adjusting its own behavior while taking user experience into account. To obtain this information, the network should be aware of the types of

requested applications and utilized devices to infer a quality of experience metric. The practical step in this direction is establishing an autonomous self-X (self-learning, self-sensing and self-optimizing) space - allowing nodes to adapt, communicate, and reshape its goals with customers' preferences and sensed activities. The network learns, tracks and exploits the behavior of both the individual user and device by means of information sensing. The network then can tailor its future goals and objectives based on the user's learnt preferences and feedback. Artificial intelligence (AI) and Machine Learning (ML) techniques will be necessary to design intelligence and abstract models from relevant data.

This tutorial explores challenges and future research directions related to AI-driven automation of future networks. We start with future network challenges and requirements toward contemporary optimization concepts and network organization (i.e., complex system-of-systems). We elaborate fundamental principles of artificial intelligence and end with case studies defining Self-X space such as self-deployment though real-life AI prototype implementation using commodity Wi-Fi access points.

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 in network optimization with focus on mobile/wireless/wireline physical (L1) and media access (L2) layer technologies and network architectures. He has more than 180 publications (journals, conferences and patens) 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).

Sunday 3 June 2018 8.30–12.00 Sousa

T11: Internet of Vehicles: when SDN, Edge Computing and Big Data Meet Intelligent Transport Systems

Yan Zhang, University of Oslo; Sabita Maharjan, Simula Research Laboratory; Zhenyu Zhou, North China Electric Power University

Internet of Vehicles (IoV) aims to exploit the state-of-the-art ICT to achieve sustainable and secure transport systems. The tutorial will cover the emerging area of Internet of Vehicles, including Software Defined Networks, Mobile Edge Computing and Big Data, and applications in Intelligent Transport Systems (ITS).

In this tutorial, we will present basic concepts related to Internet of Vehicles and key enabling technologies with respect to communications, computation, machine/deep learning and cyber-physical optimization. We will first introduce the main communication and computation techniques. Then, we will provide a thorough perspective on how software defined networking principle can be utilized for flexible resource management. Thereafter, we will talk about mobile edge computing concepts can be adapted for vehicular communication networks. This may become a very interesting research topic and a very promising application related to mobile edge computing. In this scenario, we will focus on resource allocation, models and optimization problems, and various offloading techniques. Finally, we will present our ideas on utilizing big data, machine learning and deep learning for content distribution and road traffic prediction in ITS. The approach and the solutions in this context will result in highly efficient interconnection and synergy among various types of components in the transport sector.

Professor Yan Zhang is at Department of Informatics at University of Oslo, Norway. He received a PhD degree from Nanyang Technological University, Singapore. He is an Associate Technical Editor of IEEE Communications Magazine, an Editor of IEEE Transactions on Green Communications and Networking, an Editor of IEEE Communications Surveys & Tutorials, and an Associate Editor of IEEE Access. He also serves as the guest editor for IEEE Communications Magazine, IEEE Wireless Communications Magazine, IEEE Network Magazine, IEEE Transactions on Smart Grid, IEEE Transactions on Dependable and Secure Computing, IEEE Transactions on Industrial Informatics, IEEE Systems Journal, and IEEE Internet of Things journal. He serves as chair positions in a number of conferences, including IEEE GLOBECOM 2017, IEEE PIMRC 2016, IEEE CCNC 2016, WICON 2016, IEEE SmartGridComm 2015, and IEEE CloudCom 2015. His current research interests include: next-generation wireless networks leading to 5G, reliable and secure cyber-physical systems (e.g., smart grid, healthcare, and transport), Internet-of-Things, economic approaches (e.g., game theory) for networks performance optimization. He is a VTS Distinguished Lecturer during 2016-2018.

Dr. Sabita Maharjan is a Senior Research Scientist in Simula Research Laboratory, Norway, and an Associate Professor in University of Oslo, Norway. Dr. Maharjan received her Ph.D. degree from University of Oslo, and Simula Research Laboratory, Norway, in 2013. She worked as a Research Engineer in Institute for Infocomm Research (I2R), Singapore in 2010. She was a Postdoctoral Fellow at Simula Research laboratory, Norway from 2014 to 2016. Her current research interests include wireless networks, machine-to-machine communications, vehicle safety, vehicular communication networks, software defined wireless networking, and network resilience. She serves as the guest editor for IET Cyber Physical Systems.

Dr. Zhenyu Zhou is an Associate Professor at School of Electrical and Electronic Engineering, North China Electric Power University, China. Dr. Zhou received his M.E. and Ph.D degree from Waseda University, Tokyo, Japan in 2008 and 2011 respectively. From April 2012 to March 2013, he was the chief researcher at Department of Technology, KDDI. His research interests include Internet of Things (IoT), vehicular networks, and smart grid communications. He served as Associate Editor for IEEE Access, Guest Editor for IEEE Communications Magazine, Guest Editor for Transactions on Emerging Telecommunications Technologies (ETT), workshop co-chair for IEEE ISADS 2015. He received the "Young Researcher Encouragement Award" from VTS in 2009, "Beijing Outstanding Young Talent" from Beijing Government, China, and IET Premium Award from IET Society in 2017.

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REPLACE WITH PAAG

Workshops

W1: The 7th International Workshop on High Mobility Wireless Communications (HMWC2018)

The vision of future mobile communication systems is to provide seamless high data rate wireless connections for anyone at anytime and anywhere, including the high mobility scenarios such as high speed trains and highway vehicles. High mobility results in rapidly time-varying channels, which pose significant challenges in the design of practical systems, including channel modeling, fast handover, location update, synchronization, estimation and equalization, anti-Doppler spread techniques, coding and network capacity, capacity-approaching techniques, dedicated network architectures, distributed antenna techniques and etc. With the development of connected vehicles, more rigorous performance requirements (e.g., ultra-low latency and ultra-high reliability) are also needed for advanced driving applications, such as platooning, full automated driving, collective perception of environment and so on, which adds more challenges for the research and development of mobile systems with high mobility. To deal with these challenges, the 7th international workshop on High Mobility Wireless Communications (HMWC) aims at fostering fruitful interactions among interested communication engineers, information theorists and system designers from all over the world, building successful collaborations and bridging the gap between theory and practice.

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Program

Sunday, 3 June 2018 8:30-10:00 Douro Sul

1: High Mobility Vehicular Communications

Chair: Yan Shi, Beijing University of Posts and Telecommunications

1 The Performance Comparison of LTE-V2X and IEEE 802.11p
Li Zhao, China Academy of Telecommunication Technology; Fang Jiayi, State Key Laboratory of Wireless Mobile Communications; Jinling Hu Yuanyuan Li, Lin Lin, Chenxin Li, China Academy of Telecommunication Technology; Yan Shi, Beijing University of Posts and Telecommunications

2 An Improved Coordinated Multichannel MAC Scheme by Efficient Use of Idle Service Channels for VANETs
Yongfu Ma, Liu Yang, Pingzhi Fan, Sangsha Fang, Yi Hu, Southwest Jiaotong University

3 Cooperative Downloading in Vehicular Networks: A Graph-based Approach
Yanglong Sun, Le Xu, Tang Yuliang, Xiamen University

4 Dynamic Virtual Resource Allocation in 5G Vehicular Communication Networks with Mixed SCMA/OFDMA
Liu Huifang, Gang Liu, Zheng Ma, Youhua Tang, Southwest Jiaotong University; Yuan Lin, Tegnergatan 23

Sunday, 3 June 2038 10:30-12:00 Douro Sul

Keynote

Chair: Pingzhi Fan, Southwest Jiaotong University

Channel Characteristics for Cooperative Vehicular Communication and Positioning
Fredrik Tufvesson, Lund University

Sunday, 3 June 2038 13:30-15:00 Douro Sul

2: High Mobility Channel Characteristics and PHY Design

Chair: Yu Liu, Shandong University

1 3D Non-Stationary GBSMs for High-Speed Train Tunnel Channels
Yu Liu, Shandong University; Liu Feng, Southwest Jiaotong University; Jian Sun, Wensheng Zhang, Shandong University; Cheng-Xiang Wang, Heriot-Watt University; Pingzhi Fan, Southwest Jiaotong University

2 Blind Channel Estimation Technique for OFDM Systems over Time Varying Channels
Lina Bariah, Khalifa University of Science and Technology; Arafat Al-Dweik, University of Western Ontario; Sami Muhaidat, University of Surrey

3 Channel Estimation for High Speed Macro-MIMO RRH LTE-R Systems in LOS and NLOS Environments
Xin Zhao, Xiaolin Zhou, Fudan University; Xiaocheng Jin, Bing Xu, Datang Wireless Mobile Innovation Center

4 Space-Frequency Shift Keying in Rapidly Time-Varying MIMO OFDM Channels
Zhenzhou Li, Jianping Zheng, Xidian University

Sunday, 3 June 2018 15:30-17:00 Douro Sul

3: High Mobility Transmission Schemes

Chair: Gang Liu, Southwest Jiaotong University

1 MIMO-OFDM-IM System for High Mobility Communications with Block Markov Superposition Transmission
Shengxiao Chen, Xiao Ma, Sun Yat-sen University

2 Design and Performance of the Polar Coded Modulation for High Mobility Communications
Peiyao Chen, B. Bai, Xidian University

3 Location-Fair Beamforming for High Speed Railway Communication Systems
Ximei Liu, East China Normal University

4 Resource Allocation in Non-Orthogonal Random Access for M2M Communications
Jin Bai, Ying Li, Xudong Guo, Xidian University

W2: Technology Trials and Proof-of-Concept Activities for 5G and Beyond 2018 (TPoC5G 2018)

The 5th generation (5G) cellular communication systems are going to be launched in a couple of years. In the 5G standard, key enabling technologies such as massive MIMO, beamforming, or a new radio access technology are to be specified, and the research and development of those key technologies have been carried out in many research entities. On top of that, new technology concepts for beyond 5G (B5G) have been currently investigated. In these regards, this workshop is aiming to provide opportunities to present the latest trials for 5G and the proof-of-concept activities for B5G. Through the discussion at the workshop, it also expected to promote the exchange of new ideas among researchers.

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Program

Sunday, 3 June 2018 8:30-10:00 Douro Norte

1: 5G I

Keynote: DOCOMO's System Trials for 5G Actualization
Yukihiko Okumura, NTT DOCOMO, INC.

1 Outdoor Experimental Trials of Advanced Downlink NOMA Using Smartphone-Sized Devices
Anass Benjebbour, Yoshihisa Kishiyama, Yukihiko Okumura, NTT DOCOMO, INC.; Chien-Hwa Hwang, I-Kang Fu, MediaTek Inc.

2 Field Trials on Spectral Efficiency Improvement in Massive MIMO systems
Jian Wang, Aixiang Jin, Dai Shi, Lei Wang, Liang Hu, Liang Gu, Huawei Technologies; Anass Benjebbour, NTT DOCOMO, Inc.

Sunday, 3 June 2018 10:30-12:00 Douro Norte

2: 5G II

1 Evaluation of Coverage and Mobility for URLLC via Outdoor Experimental Trials
Masashi Iwabuchi, Anass Benjebbour, Yoshihisa Kishiyama, NTT DOCOMO, INC.; Renguangmei, Chen Tang, Tingjian Tian, Liang Gu, Huawei Technologies Co., LTD; Terufumi Takada, Yang Cui, Huawei Technologies Japan K. K.

2 Outdoor Experimental Trials of Long Range Mobile Communications Using 39GHz
Anass Benjebbour, Masashi Iwabuchi, Yoshihisa Kishiyama, NTT DOCOMO, INC.; Wang Guangjian, Liang Gu, Huawei Technologies Co., LTD; Yang Cui, Terufumi Takada, Huawei Technologies Japan K.K.

3 Outdoor DL MU-MIMO and Inter Access Point Coordination Performance of Low-SHF-Band C-RAN Massive MIMO System for 5G
Yasushi Maruta, Kenichiro Yamazaki, Kohei Izui, Kanada Nakayasu, Toshifumi Sato, NEC; Tatsuki Okuyama, Jun Mashino, Satoshi Suyama, Yukihiko Okumura, NTT DOCOMO, INC.

4 Video Sending Rate Prediction Based on Communication Logging Database for 5G HetNet
Takumi Higuchi, Noriyuki Shimizu, Hideki Shingu, Takeshi Miyagoshi, Masaaki Endo, Hiroaki Asano, Panasonic Corporation; Yoshifumi Morihiro, Yukihiko Okumura, NTT DOCOMO, INC.

Sunday, 3 June 2018 13:30-15:00 Douro Norte

3: Signal Processing I

Keynote: Making 5G Happen: from Concept to Reality
Andreas Maeder, Nokia Bell Labs

1 **PAPR Reduction in OFDM Systems Considering Hardware Impairments**
Hua Wang, Keysight Laboratories

2 **Experimental Study of Inter-terminal Communications for Terminal Collaborated MIMO Reception Using Higher-frequency Band in Vehicle**
Masahiro Arai, Hidekazu Murata, Kyoto University

Sunday, 3 June 2018 15:30-17:00 Douro Norte

4: Signal Processing II

1 **Low-Complexity Sphere Decoding For Quadrature Spatial Modulation**
Lina Gou, Jianhua Ge, Yue Cao, Xidian University

2 **Throughput Performance of Adaptive Frequency Offset Selection for Amplify-and-Forward Relay in Multiuser Environment**
Takayuki Shiba, Yukitoshi Sanada, Keio University

3 **Control Overhead Reduction Method Employing Frequency Correlation for MU-MIMO-OFDM THP with User Scheduling**
Yukiko Shimbo, Nobuhiro Hiruma, Hirofumi Suganuma, Fumiaki Maehara, Waseda University

4 **Robust Channel Estimation Methods for Spectrally Efficient FDM Systems**
Hedaia Ghannam, Izzat Darwazeh, University College London

W3: Sixth International Workshop on Cloud Technologies and Energy Efficiency in Mobile Communication Networks (CLEEN2018)

This workshop explores novel concepts to allow for flexibly centralised radio access networks using cloud-processing based on open IT platforms, in coordination with network functions virtualization technologies and MEC (Multi-Access Edge Computing), that are recognized as key enablers for the definition of future 5G systems. The aim is to allow for a guaranteed high quality of experience for mobile access to cloud-processing resources and services, and to allow a future network evolution focused on energy efficiency and cost-effectiveness. In fact, all future innovative network solutions will be conceived and deployed with a long term perspective of sustainability, both in terms of energy consumption of mobile network (and related interoperability with terminals) and cost efficiency of the different deployment and management options. This requires new concepts for the design, operation, and optimization of radio access networks, backhaul networks, operation and management algorithms, and architectural elements, tightly integrating mobile networks and cloud-processing. This workshop will cover technologies across PHY, MAC, and network layers, technologies which translate the cloud-paradigm to the radio access and backhaul network, and will analyse the network evolution from the energy efficiency perspective. It will study the requirements, constraints, and implications for mobile communication networks, and also potential relationship with the offered service, both from the academic and the industrial point of view.

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Miltiadis Filippou, INTEL
Muhammad Imran, University of Glasgow
Nicola Di Pietro, CEA LETI
Panagiotis Vlacheas, WINGS ICT Solutions
Ranga Rao Venkatesha Prasad, EWI, TUDelft
Tapio Rautio, VTT
Vincenzo Mancuso, IMDEA networks
Vincenzo Sciancalepore, NEC Eurolabs
Zdenek Becvar, CTU in Prague

Program

Sunday, 3 June 2018 8.30-10.00 Corgo

Session 1

1 **Welcome**
Dario Sabella, Intel

2 **Keynote: Merging New Cloud and Air-Interface Capabilities to Meet Requirements of Emerging Use Cases from Verticals in 5G**
Thomas Haustein, Fraunhofer Institute for Telecommunications, HHI

3 **Operating Systems for 5G services infrastructures**
Antonio Manzalini, Telecom Italia Mobile; Francesco Marino, Scuola Superiore Sant'Anna

Sunday, 3 June 2018 10.30-12.00 Corgo

Session 2

1 **Energy-Efficient Beamforming and Time Allocation in Wireless Powered Communication Networks**
Miaomaio Fu, Chongtao Guo, Shengli Zhang, Daquan Feng, Gongbin Qian, Shenzhen University

2 **FFR Based Interference Coordination Scheme in the Next Generation WLAN**
Putao Sun, Ronghui Hou, Xiaoyao Ma, Hongyan Li, Xidian University

3 **Joint Transceiver Design in Full-Duplex MISO Wireless Powered Communication Networks with User Cooperation**
Cai Rongting, Lihua Li, Zhi Wang, Xin Su, Beijing University of Posts and Telecommunications

Sunday, 3 June 2018 13.30-15.00 Corgo

Session 3

1 Keynote: MEC: Building a Bridge to 5G
Rui Frazao, Vasona Networks

2 Minimizing power consumption in virtualized cellular networks
Giovanni Nardini, Antonio Virdis, University of Pisa; Niccolò Iardella, University of Florence; Antonio Frangioni, Laura Galli, Giovanni Stea, University of Pisa

3 A Hierarchical MEC Architecture: Experimenting the RAVEN Use-Case
Dario Sabella, Intel Deutschland GmbH; Navid Nikaein, Eurecom; Anta, Huang; Jetmir, Xhembulla; Giovanni, Malnati; Salvatore, Scarpina

4 The ONE5G approach towards the challenges of multi-service operation in 5G systems
Frank Schaich, Nokia; Marie-Helene Hamon, Orange; Mythri Hunukumbure, Samsung Electronics UK; Javier Lorca, Telefónica I+D, RAN Innovation and Standards, gCTIO; Klaus Pedersen, Nokia; Martin Schubert, HUAWEI; Evangelos Kosmatos, WINGS ICT solutions; Gerhard Wunder, Khan Reaz, Freie Universitaet Berlin

Sunday, 3 June 2018 15:30-17:00 Corgo

Panel

MEC and V2X: The Role of Edge Computing in Automotive Use Cases

Moderator: Dario Sabella, Intel
Panelists: Thomas Haustein, Fraunhofer Institute for Telecommunications, HHI
. Rui Frazao, CTO, Vasona Networks
. Leonardo Gomes Baltar, WG1 Vice-chair in 5G Automotive Association (5GAA), Intel
Frank Schaich, One5G Project Coordinator, Nokia Bell Labs

W4: 1st International Workshop of Recent Advancements of Non-Orthogonal Multiple Access Techniques for 5G Communications (RAMAT 2018)

With the evolution of fifth generation (5G) networks and increasing demand of high data rates and higher connectivity, new solutions are being investigated in both academia and industry. Recently the technology that has received considerable attention is non orthogonal multiple access (NOMA), which is considered to be one of the key 5G enabling technologies. NOMA is the new addition to the class of multiple access techniques, in which the user multiplexing is done in the power domain, such that the strong users having better channel conditions transmit with low power and the weak users having worse channels transmit with high power, while sharing the same spectral resources. NOMA increases the spectral efficiency further as compared to orthogonal multiple access (OMA) schemes by allowing different users to use the same spectral resources but with different power levels. The NOMA concept forms a general framework, where recently proposed 5G multiple access schemes, such as power domain NOMA, sparse code multiple access (SCMA), bit division multiplexing, multi-user shared access (MUSA), interleave division multiple access (IDMA), lattice partition multiple access (LPMA), and pattern division multiple access (PDMA) can be regarded as special cases.

This workshop will provide a platform to showcase the latest research and innovations in NOMA technologies as well as their applications, and will bridge the gap between theory and practice in the design of 5G multiple access. The recent advancement in NOMA has boosted the development of a new generation of highly-efficient mobile networks. This workshop will highlight the recent developments in this evolving area. It will provide a platform for exchanging new ideas and research collaboration.

General Chairs:
Dushantha Nalin K. Jayakody, National Research Tomsk Polytechnic University
Rui Dinis, Universidade Nova de Lisboa
Derrick Wing Kwan Ng, University of New South Wales
TPC Chair:
Sandeep Narayan, King's College London

Program

Sunday, 3 June 2018 8.30-10.00 Lima

Session 1

1 Keynote

2 Active User Detection of Uplink Grant-Free SCMA in Frequency Selective Channel
Feilong Wang, Yuyan Zhang, Hui Zhao, Hanyuan Huang, Li Jing, Beijing University of Posts and Telecommunications

3 A Novel Transceiver Architecture for Highly Dispersive NOMA Channels
Gokhan Muzaffer Guvensen, Yalcin Tanik, Ali Ozgur Yilmaz, Middle East Technical University (METU)

4 A Study of Non-Orthogonal Multiple Access in Underwater Visible Light Communication Systems
Callum Geldard, John Thompson, Wasiu Popoola, University of Edinburgh

Sunday, 3 June 2018 10.30-12.00 Lima

Session 2

1 Blind Multi-user Detection for Autonomous Grant-free High-overloading Multiple-access without Reference Signal
Zhifeng Yuan, Yuzhou Hu, Weimin Li, Jianqiang Dai, ZTE Corporation

2 Distributed Power Allocation for the Downlink of a Two-cell MISO-NOMA System
Yaru Fu, City University of Hong Kong; Lou Salaun, Nokia Bell Labs; Chi Wan Sung, City University of Hong Kong; Chung Shue Chen, Bell Labs, Nokia

3 FTN-based MIMO Transmission as a NOMA Scheme for Efficient Coexistence of Broadband and Sporadic Traffics
Ameha Tsegaye Abebe, Chung G. Kang, Korea University

4 Joint Relay-and-Antenna Selection in Relay-based MIMO-NOMA Networks
Jian Zhang, Jianhua Ge, Xidian University; Qiang Ni, Lancaster University

Sunday, 3 June 2018 13.30-15.00 Lima

Session 3

1 Large system analysis of linear precoding in massive MIMO relay systems
Yang Liu, Beijing University of Posts and Telecommunications; Zhiguo Ding, Lancaster University; Jia Shi, University of Surrey; Weiwei Yang, PLA University of Science and Technology; Ping Zhong, University of Wuhan; University of Waterloo

2 Low-Complexity Detectors for Uplink SCMA: Symbol Flipping and Dynamic Partial Marginalization-Based MPA
Li Wei, Bo Huang, Jianping Zheng, Xidian University

3 Non-Orthogonal Multiple Access with Phase Rotation Employing Joint MUD and SIC
Yuyuan Chang, Kazuhiko Fukawa, Tokyo Institute of Technology

4 Recent Advances and Future Research Challenges in Non-Orthogonal Multiple Access for 5G Networks
Udara Samaratunge, Dushantha Nalin K. Jayakody, Sanjay K. Biswash, National Research Tomsk Polytechnic University; Rui Dinis, Universidade Nova de Lisboa

W5: 5G for a Variety of Services

5G wireless is fundamentally transforming radio network from pure wireless connectivity to a network for services. Mobile wireless access technologies have gone through several generations of evolutions and access spectral efficiency is approaching Shannon capacity. However, there are enormous opportunities on support of various services. 5G wireless will enable new services and applications, in particular, enhanced mobile broadband (eMBB), massive machine-type communications (mMTC) and ultra-reliable low-latency communications (URLLC). Network slicing and machine learning are going to be part of radio network architecture as well. The goal of the workshop is to bring together researchers from industry and academia, cellular service providers, and industrial partners to explore various ways for 5G to more efficiently support a variety of services. The focus of the workshop will be on the evolution of cellular network to efficiently support varieties of services, related to end-to-end network architecture and requirements, cloud technology including end-to-end network slicing, use cases, field experiments, and performance results. The workshop will offer keynote speeches by prominent figures from industry and research sides, as well as technical presentations on the latest research and development in 5G for services, including deployment related results using real-world examples and scenarios.

Organizers:
Jin Yang, Verizon Communications Inc
Amitava Ghosh, Nokia
Tong Wen, Huawei Technologies Canada
Rose Qingyang Hu, Utah State University

Program

Sunday, 3 June 2018 8.30-10.00 Minho

Session 1

1 **Keynote**
Erik Dahlman, Ericsson

2 **Soft Air Interface to Support 5G Services and Requirements**
Zhenfei Tang, Junchao Li, Javad Abdoli, Zhiheng Guo, Huawei Technologies Co., Ltd.

3 **A Hybrid Approach for Efficient Wireless Information and Power Transfer in Green C-RAN**
Xu Li, Zhao Chen, Aurobinda Laha, Ziru Chen, Yu Cheng, Lin Cai, Illinois Institute of Technology

4 **Enhanced Uplink Transmission Performance Based on WFRFT for Future Communication Systems**
Xiaolu Wang, Lin Mei, Harbin Institute of Technology; Fabrice Labeau, McGill University; Zhenduo Wang, Xuejun Sha, Harbin Institute of Technology

5 **A Relay Selection Scheme to Prolong Connection Time for Public Safety Communications**
Jiaqi Huang, Dongfeng Fang, University of Nebraska-Lincoln; Feng Ye, University of Dayton; Rose Qingyang Hu, Utah State University; Yi Qian, University of Nebraska-Lincoln

Sunday, 3 June 2018 10.30-12.00 Minho

Session 2

1 **NR - The new 5G radio-access technology**
Erik Dahlman, Stefan Parkvall, Ericsson

2 **An Optimized Circulant Measurement Matrix Construction Method Used in Modulated Wideband Converter for Wideband Spectrum Sensing**
Jian Yang, Min Jia, Xuemai Gu, Qin Guo, Harbin Institute of Technology

3 **Comparing the Performance of Wi-Fi Fingerprinting using the 2.4 GHz and 5 GHz Signals**
Doan Duong, Yaqian Xu, Klaus David, University of Kassel

4 **Heterogeneous Feature Machine Learning for Performance-enhancing Indoor Localization**
Lingwen Zhang, Ning Xiao, Beijing Jiaotong University; Jun Li, New York University; Wenkao Yang, Beijing Jiaotong University

5 **A D2D based Clustering Scheme for Public Safety Communications**
Sohan Gyawali, Shengjie Xu, University of Nebraska-Lincoln; Feng Ye, University of Dayton; Rose Qingyang Hu, Utah State University; Yi Qian, University of Nebraska-Lincoln

W6: 4th International Workshop on Research Advancements on Future Internet Architectures (RAFNET 2018)

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 of 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 regard 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 modern technologies are being applied in other networking domains as well, including VANETs, Smart Grid, Smart Cities, Internet of Things, Big Data, etc.

RAFNET aims to bring together researchers working on selected areas of future internet architectures along with 5G implications, applications, such as smart cities, smart communities, smart automotive driving, etc.

Organizers:
Syed Hassan Ahmed, University of Central Florida, USA
Waleed Ejaz, Ryerson University, Canada
Ejaz Ahmed, National Institute of Standards and Technology (NIST), USA
Danda B. Rawat, Howard University, USA
Publicity Co-Chairs:
Al-Sakib Khan Pathan, Southeast University, Bangladesh
Zhiwei Yan, China Internet Network Information Center, China
Ali Kashif Bashir, University of the Faroe Islands, Denmark
Steering Committee:
Mohsen Guizani, University of Idaho, USA
Hassnaa Moustafa, Intel Corporation, USA
Guo Song, Hong Kong Polytechnic University, Hong Kong
Claudia Campolo, University in Reggio Calabria, Italy
Ravi Ravindran, Huawei Corp., USA
Tanveer Zia, Charles Sturt University, Australia
Houbing Song, Embry-Riddle Aeronautical University, USA

Jaime Lloret, UPV, Spain
Safdar Hussain Bouk, DGIST, Korea
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
Murad Khan, Sarhad University
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, SEECS, NUST Pakistan

Program

Sunday, 3 June 2018 13.00-15.10 Minho

Session 1

Chair: Sajid Saleem, NUST, Islamabad, Pakistan

1 **Keynote: Dependable Vehicular Communications: Why and How**
Joaquim Ferreira, Instituto de Telecomunicações, Universidade de Aveiro

2 **An Outdoor Localization System based on SigFox**
Guilherme, Ribeiro; Luan Felipe de Lima, Luiz Oliveira, Joel Rodrigues, Carlos N. M. Marins, Guilherme A. B. Marcondes, National Institute of Telecommunications (Inatel)

3 **Effective Caching for the Secure Content Distribution in Information-Centric Networking**
Muhammad Bilal, Korea University; Shin-Gak Kang, Electronics and Telecommunications Research Institute; Sangheon Pack, Korea University

4 **Energy Prediction based MAC layer Optimization for Harvesting Enabled WSNs in Smart Cities**
Madiha Amjad, Hassaan Khaliq Qureshi, National University of Sciences and Technology (NUST), Pakistan; Marios Lestas, Frederick University, Nicosia, Cyprus; Shahid Mumtaz, Institute of Telecommunication, Aveiro; Joel Rodrigues, National Institute of Telecommunications (Inatel)

5 **Evaluating Factors Affecting Communication in Wearable Internet of Things for Near Field**
Razi Iqbal, American University in the Emirates; Sheraz Ahmad, Al-Khawarizmi Institute of Computer Science; Mustafa Hashim, American University in the Emirates

6 **Experimental Performance Analysis of Network Coding in Wireless Systems**
Shahzaib Qazi, National University of Sciences and Technology; Syed Muhammad Zain Zafar, Atif Salman, National University of Sciences and Technology (NUST); Syed Ali Hassan, National University of Sciences and Technology; Dushantha Nalin K. Jayakody, National Research Tomsk Polytechnic University

Sunday, 3 June 2018 15.40-17.30 Minho

Session 2

Chair: Moneeb Gohar, Bahria University, Islamabad, Pakistan

1 **Extension of Localized Routing to PMIP-SAE based Mobile Networks**
Moneeb Gohar, Muhammad Muzammal, Arif Ur Rahman, Bahria University; Jin-Ghoo Choi, Yeungnam University; Seok-Joo Koh, Kyungpook National University

2 **Indoor Motion Classification Using Passive RF Sensing Incorporating Deep Learning**
Saad Iqbal, Usman Iqbal, National University of Sciences and Technology (NUST), Pakistan; Syed Ali Hassan, Sajid Saleem, National University of Sciences and Technology

3 **MOT : A Compatible Transport Mechanism of Mobile Edge Computing and Conventional Traffic**
Zhaoxu Wang, Huachun Zhou, Bohao Feng, Wei Quan, Beijing Jiaotong University

4 **Persistent Interests in Named Data Networking**
Philipp Moll, Sebastian Theuermann, Hermann Hellwagner, Alpen-Adria-Universität Klagenfurt

5 **Towards ITS Vision Assisted Cooperative Perception**
Wajdi Farhat, João Rufino, Bruno Fernandes, João Almeida, Instituto de Telecomunicações - Aveiro; Muhammad alam, Xi'an Jiaotong-Liverpool University (XJTLU); Chokri~Souani, University of Sousse; Joaquim Ferreira, Instituto de Telecomunicações / ESTGA

6 **Closing Remarks**

W7: First International Workshop on Research Advances in Cooperative ITS Cyber Security and Privacy (C-ITSec)

Security and privacy are attractive research topics in the field of Cooperative Intelligent Transportation Systems (C-ITS). Recent attacks on security and privacy, which disrupt the C- ITS, create several challenges that have to be addressed by the research community. Example of these challenges are robust misbehavior detection and reporting, lightweight and agile security schemes, robust cryptographic algorithms, etc. At the standardization level, many efforts have been also made to speed up the deployment of security and privacy architectures and solutions.

C-ITSec will provide an international technical forum for discussing and presenting recent research results on any aspects of cyber security defense techniques, recent C-ITS attacks and latest Enhancing Privacy Technologies for C-ITS. It aims at bringing together experts from industry and academia to share ideas and present research results on challenging issues related to cyber security and privacy in vehicular communication. Papers may present theories, techniques, applications, or practical experiences related to that.

Organizers:
Ines Ben Jemaa, IRT SystemX, France
Brigitte Lonc, Renault, France
Pierpaolo Cincilla, IRT SystemX, France
Arnaud Kaiser, IRT SystemX, France
Hichem Sedjelmaci, IRT SystemX, France
Technical Program Committee:
Adriano Fagiolini, Université Palerme, Italy
Alexis Olivereau, CEA, France
Andre Weismerkirch, Lear Corporation, USA
Anis Laouiti, IMT, France
Arnaud Kaiser, IRT SystemX, France
Aymen Boudguiga, IRT SystemX, France
Benedikt Brecht, CAMP, VolksWagen, USA
Brigitte Lonc, Renault, France

Dusit Niyato, NTU, Singapour
Frank Kargl, Ulm University, Germany
Gianmarco Baldini, European Commission, JRC, Belgium
Hichem Sedjelmaci, IRT SystemX, France
Houda Labiod, IMT, France
Ines Ben Jemaa, IRT SystemX, France
Jonathan Petit, On Bord Security, USA
Mounira Msahli, IMT, France
Nouha Oualha, CEA, France
Oyunchimeg Shagdar, Vedecom, France
Paul Muhlethaler, Inria, France
Pierpaolo Cincilla, IRT SystemX, France
Reza Samavi, Mc Master, Canada
Sidi-Mohamed Senouci, Université Bourgogne, France
Yacine Ghamri Doudane, Université de la Rochelle, France

Program

Sunday, 3 June 2018 8.30-10.00 Cávado

Session 1

1 Welcome

2 Anomaly Detection in Vehicle-to-Infrastructure Communications
Michele Russo, Maxime Labonne, Alexis Olivereau, Mohammad Rmayti, Commissariat Energie Atomique C.E.A

3 Feasibility Study of Misbehavior Detection Mechanisms in Cooperative Intelligent Transport Systems (C-ITS)
Joseph Kamel, Arnaud Kaiser, Ines ben Jemaa, Pierpaolo Cincilla, IRT-SystemX; Pascal Urien, Télécom paristech

4 Keynote

Sunday, 3 June 2018 10.30-12.00 Cávado

Session 2

1 Artificial-Noise-Aided Transmit Optimization for Service Integration in MIMO-OFDM Systems
Shiyu Chen, Zhi Chen, University of Electronic Science and Technology of China; Weidong Mei, National University of Singapore; Shaoqian Li, University of Electronic Science and Technology of China

2 C-ITS use cases: study, extension and classification methodology
Farah Haidar, Arnaud Kaiser, IRT SystemX; Brigitte Lonc, Renault; Pascal Urien, Télécom paristech; Richard Denis, Valeo

3 Autonomic Vehicular Networks: Safety, Cybersecurity, Privacy and Societal Issues
Gerard Le Lann, INRIA

4 Panel

W8: First Workshop on Enabling Energy Internet via Machine type Wireless Communications

The Internet of Things (IoT) has already changed not only key aspects of our daily lives but also the way several industries work. Such IoT revolution is built upon ubiquitous wireless connectivity, which includes both human- and machine-type communications. The latter, also known as MTC, involves a wide range of heterogeneous applications, ranging from simple daily electricity metering to advanced real-time frequency control of power grids. In this configuration, MTC shall work through two distinct modes related to the specific application under consideration. These modes are: massive MTC (mMTC) and ultra-reliable low-latency communications (URLLC). While MTC deployments are becoming widespread, energy systems are also changing towards decentralization, in a trend similar to the one experienced by communication systems during the last decades. In this particular context, the Energy Internet concept emerges as a decentralized way of managing the future energy systems (such as the communication internet), while integrating the most advanced communication tools enabled by IoT and MTC.

This workshop aims at state-of-the-art advances and innovations in the theoretical foundations of machine-type wireless communications in energy systems, IoT-enabled energy management, and applications communication theory in energy systems.

Organisers:

Hirley Alves, Lappeenranta University of Technology
Pedro Nardelli, Lappeenranta University of Technology

Program

Sunday, 3 June 2018 13.30-14:15 Cávado

Keynote I

Ari Pouttu, University of Oulu

Sunday, 3 June 2018 14.15-15:00 Cávado

Poster Session

1 An Agent-based IoT System for Intelligent Energy Monitoring in Buildings
Luis Gomes, Filipe Sousa, Zita Vale, GECAD - ISEP/IPP

2 Energy Efficiency of an Unlicensed Wireless Network in the Presence of Retransmissions
Iran Ramezanipour, Hirley Alves, University of Oulu; Pedro J. H. Nardelli, Lappeenranta University of Technology; Ari Pouttu, University of Oulu

3 Event-based Electricity Metering: An Autonomous Method to Determine Transmission Thresholds
Mauricio Tomé, University of Oulu; Pedro J. H. Nardelli, Lappeenranta University of Technology; Hirley Alves, University of Oulu

4 Peer-to-Peer Energy Trading and Grid Control Communications Solutions and Feasibility Assessment based on Key Performance Indicators
Jussi Haapola, Samad Ali, University of Oulu; Charalampos Kalalas, Centre Tecnolol̀ogic de Telecomunicacions de Catalunya; Juho Markkula, Nandana Rajatheva, Ari Pouttu, University of Oulu; José Manuel Martín Rapún, Iván Lalaguna, Inycom; Francisco Vazquez-Gallego, Jesus Alonso-Zarate, Centre Tecnolol̀ogic de Telecomunicacions de Catalunya; Geert Deconinck, KU Leuven ESAT-ELECTA/EnergyVille; Hamada Almasalma, ESAT-ELECTA, KU Leuven; Jianzhong Wu, Chenghua Zhang, Cardiff University; Eloisa Porras Muñoz, Endesa S.A.; Francisco David Gallego, Regenera Levante

5 Performance Analysis of Uplink Traffic for Machine Type Communication in Wireless Sensor Networks
Plinio Santini Dester, Unicamp; Francisco, Federal University of Ceará; Paulo Cardieri, UNICAMP - State University of Campinas

6 Secure Statistical QoS Provisioning for Machine-type Wireless Communication Networks
Hirley Alves, University of Oulu; Pedro Juliano Nardelli, University of oulu; Carlos H. M. de Lima, UNESP-SJBV

Sunday, 3 June 2018 13.30-14:15 Cávado

Keynote II

Zita Vale, Instituto Superior de Engenharia do Porto

Sunday, 3 June 2018 16:10-17:00 Cávado

Panel

Energy Internet in Europe, Brazil and China

Panelists: Pedro Nardelli, Lappeenranta University of Technology
Ari Pouttu, University of Oulu
Luiz da Silva, Unicamp
Zhenyu Zhou, North China Electric Power University

W9: C-ITS Evaluation and Assessment Workshop (C-Roads)

C-Roads is a European platform created for the deployment of C-ITS – day one services – in Europe based on a common service definition and the harmonization of the respective C-ITS messages with a standard profiling at Road Infrastructure site throughout Europe.

The first part of the workshop is to discuss this common evaluation methodology for C-ITS services with scientific experts and engineering practitioners in this area. In the second part of the workshop the participating C-Roads partners can elaborate their evaluation plans and aspects to test and validate in their pilot implementations in their countries, and compare the selected approaches, but also the emerging data sets for future assessment of the service implementations. This second part of the workshop will have contributions from several C-Roads partners with pilot implementations in 2018/2019 and discussions of the main aspects to validate in this project phase.

The outcome of the workshop is a publicly presented and discussed methodology for evaluation of C-ITS services in Europe and a comparison of this methodology with the selected approaches and evaluation plans in several European pilot implementations before the roll out of C-ITS services.

Organizers:
Luca Studer, Politecnico di Milano
Gary Crockford, Department for Transport UK
Alexander Froetscher, AustriaTech

Program

Sunday, 3 June 2018 13.30-15:00 Sousa

Session 1

Welcome
Luca Studer, Politecnico di Milano

1 **C-Roads: Elements of C-ITS service evaluation to reach interoperability in Europe within a wide stakeholder network**
Alexander Froetscher, Bernhard Monschiebl, AustriaTech

2 **Establishing a Common Approach to Evaluating the InterCor C-ITS Pilot Project**
Gary Crockford, Department for Transport U.K.; Paul Wadsworth, Capita UK; Bart Netten, TNO Netherlands

3 **Evaluation approach and first evidence of combined implementation of Day 1 C-ITS Services, Truck Platooning and Highway Chauffeur in C-Roads Italy**
Luca Studer, Giovanna Marchionni, Paolo Gandini, Marco Ponti, Valeria Paglino, Serio Agriesti, Politecnico di Milano

Sunday, 3 June 2018 15.30-17:00 Sousa

Session 2

1 **Presentation of the Evaluation and Assessment Plan (Guidelines for evaluating C-ITS Services) defined by C-Roads Project**
Luca Studer, Politecnico di Milano

2 **Discussion on C-ITS Services Specification & Evaluation**
Moderators: Gary Crockford, Department for Transport U.K.; and Alexander Froetscher, AustriaTech

W10: International Workshop on Connected, Automated and Autonomous Vehicles (Ca2V)

The aim of the Ca2V workshop is to bring together researchers, professionals, policy makers, stakeholders and experts in vehicular technologies, communications and intelligent transportation systems to discuss current and future challenges of autonomous and instrumented/automated vehicles, interoperability of on-board and infrastructure-based units (OBUs / RSUs), test-cases and scenarios for deployment of connected and automated vehicles (CAV), intelligent and connected infrastructure, cybersecurity in vehicular communications, advances in AI-based systems for ITS and connected cars, emerging technologies in the automotive industry, and the role of governance and regulations on driverless vehicles.

Organizers:
Cristiano Premebida, University of Coimbra
Jose Eugenio Naranjo, Universidad Politécnica de Madrid
Fawzi Nashashibi, Inst. National de Recherche en Informatique et en Automatique (INRIA)
Co-Organizers:
Alireza Asvadi, University of Coimbra
Mohammad AbuAlhoul, INRIA

Technical Program Committee:
Cristiano Premebida, University of Coimbra
Jose Eugenio Naranjo, UPM, INSIA
Fawzi Nashashibi, INRIA
Felipe Jiménez, UPM
Alireza Asvadi, University of Coimbra,
Mohammad AbuAlhoul, INRIA
Oyunchimeg Shagdar, VEDECOM
Ahmed Soua, VEDECOM
Vitor Silva, UC
Fernando Garcia, UC3M
Mustafa Al-bado, University College Cork
Rui Dinis, Universidade Nova de Lisboa

Program

Sunday, 3 June 2018 9.00-10:00 Tâmega

Morning Session 1

1 **Invited Talk**
Rodrigo Castiñeira, INDRA

2 **CANDY: A Social Engineering Attack to Leak Information from Infotainment System**
Gianpiero Costantino, Antonio La Marra, Fabio Martinelli, Ilaria Matteucci, IIT-CNR

Sunday, 3 June 2018 10.30-12:00 Tâmega

Morning Session 2

1 **Invited Talk**
Luis Reis, CEiiA

2 **A Dynamic Transmission Opportunity Allocation Scheme to Improve Service Quality of Vehicle-to-Vehicle Non-Safety Applications**
Mohammed Amine Togou, Gabriel-Miro Muntean, Dublin City University

3 **An Adaptive Clustering Technique based on Image-based Traffic Identification for Real-Time V2V Communication**
Surekha Ananthapalli, Hrishikesh Venkataraman, Indian Institute of Information Technology (IIIT) Sricity

4 **Coexistence of Decentralized Congestion Control Algorithms for V2V Communication**
Chetan Belagal Math, Eindhoven University of Technology; Hong Li, NXP Semiconductors; Luis F. Abanto-Leon, Technische Universiteit Eindhoven; Sonia Heemstra de Groot, Eindhoven University of Technology; Ignas Niemegeers, Technische Universiteit Eindhoven

5 **Performance of Car to Car safety broadcast using Cellular V2V and IEEE 802.11p**
Jayashree Thota, Nor Fadzilah Abdullah, Angela Doufexi, Simon Armour, University of Bristol

Sunday, 3 June 2018 13.30-15:00 Tâmega

Afternoon Session 1

1 **Invited Talk**
Francisco Sanchez, CTAG

2 **SAE-DCC Evaluation and Comparison with Message Rate and Data Rate Based Congestion Control Algorithms of V2X Communication**
Yongyi Wei, NXP Semiconductors; Chetan Belagal Math, Eindhoven University of Technology; Hong Li, NXP Semiconductors; Sonia Heemstra de Groot, Eindhoven University of Technology

3 **Impact of Quantized Side Information on Subchannel Scheduling for Cellular V2X**
Luis F. Abanto-Leon, Technische Universiteit Eindhoven; Arie Koppelaar, NXP Semiconductors; Chetan Belagal Math, Sonia Heemstra de Groot, Eindhoven University of Technology

4 **Improving Handover Decisions for Better Multimedia Services Transmission in V2I**
Salwa Saafi, Soumaya Hamouda, Higher School of Communication of Tunis, Sup'Com; Sondes Khemiri Kallel, Versailles Sacley University

5 **Passenger Localization for In-vehicle Personalization using BLE Beacons**
Robin Emmanuel, Anjana P Das, Sandhya B, Melbin Thomas, Anshul Tripathi, Tata Elxsi Ltd

Sunday, 3 June 2018 15.30-17:00 Tâmega

Afternoon Session 2

1 **Invited Talk**
Mohammad Y. Abualhoul, INRIA, RITS

2 **Validation Experiences on Autonomous and Connected Driving in AUTOCITS Pilot in Madrid**
Jose Eugenio Naranjo, Felipe Jiménez, José Javier Anaya, David Romero, Universidad Politécnica de Madrid; Rodrigo Castiñeira, Mauro Gil, INDRA

3 **Cooperative ITS Challenges: AUTOCITS Pilot in Lisbon**
Cristiano Premebida, Institute of Systems and Robotics, University of Coimbra; Pedro Serra, Laboratory for Automation and Systems (LAS-IPN); Alireza Asvadi, Institute of Systems and Robotics, University of Coimbra; Alberto Valejo, Laboratory for Automation and Systems (LAS-IPN); Lara Moura, A-to-Be (BRISA Group)

4 **Tactical Safety Reasoning. A Case for Autonomous Vehicles.**
Alexandru Constantin Serban, Erik Poll, Radboud University; Joost Visser, Software Improvement Group

W11: THz Communication Technologies for Systems Beyond 5G

Although 5G seems more than willing to embrace several game changing design principles, such as densification, virtualization and softwarization, in order to enhance scalability, flexibility and efficient resources utilization, it can be easily understood that fundamental performance limitations related to available bandwidth, transmission and processing delay and cost and energy consumption still define the envelope. To break these technological barriers networks beyond 5G will need to bring little explored wireless resources and technologies to validation and exploitation by directing research towards de-risking technological concepts, components, architectures and systems concepts. THz communications is an attractive candidate technology, especially when compared to the less flexible and more costly optical fiber connections and to the lower data rate wireless technologies, such as for example visible light communication, microwave links, and wireless fidelity (WiFi). As a consequence, the THz band, for wireless access and the supporting backhaul network infrastructure, is expected to influence the main technology trends in wireless networks within the next ten years and beyond. The implementation of THz frequency based wireless networks is expected to take advantage of breakthrough novel technological concepts, such as the joint design of baseband signal processing for the complete optical and wireless link, the development of broadband and highly spectrally efficient radio frequency (RF) frontends operating at frequencies higher than 275 GHz, and new standardized electrical-optical (E/O) interfaces. Associated to the extremely large bandwidths and the propagation properties of the THz regime, improved channel modeling and the design of appropriate waveforms, multiple-access schemes and antenna array configurations will be required for the successful introduction of THz communications. Motivated by the potential of THz technologies to transform the future of ICT, this workshop aspires to reveal and discuss the critical technology gaps as well as the appropriate enablers, in terms of baseband processing RF frontend, channel models and waveforms, signals and coding, beam-patterns and medium access schemes.

Organizers: ***Angeliki Alexiou, Colja Schubert, Thomas Merkle, Markku Juntti, Kristaps Dobrajs, Francisco Rodrigues, Nelson José Valente da Silva and Dimitrios Kritharidis***

Program

Tuesday, 5 June 2018 14:00-15:30 Sousa

Session 1

1 **5G Journey & Path Forward (Invited Paper)**
Shilpa Talwar, Wireless Communications Research Lab, Intel

2 **Statistical Characteristics Study of Human Blockage Effect in Future Indoor Millimeter and Sub-millimeter Wave Wireless Communications**
Bile Peng, Sebastian Rey, Dennis M. Rose, Sören Hahn, Thomas Kürner, Technische Universitaet Braunschweig

3 Ultra-Massive MIMO Channel Modeling for Graphene-Enabled Terahertz-band Communications
Chong Han, Shanghai Jiao Tong University; Josep Miquel Jornet, University at Buffalo; Ian F. Akyildiz, Georgia Institute of Technology

4 Optical Characteristics Analysis of Resonant Tunneling Diode Photodetector based Oscillators
Weikang Zhang, Scott Watson, Jue Wang, University of Glasgow

Tuesday, 5 June 2018 16:00-17:30 Sousa

Session 2

1 Joint of Radar and Communication Systems for Beyond 5G (Invited Paper)
Paulo Monteiro, IT-Aveiro, Portugal

2 Stochastic Geometry Analysis for Band-Limited Terahertz Band Communications
Joonas Kokkoniemi, Janne Lehtomäki, Markku Juntti, University of Oulu

3 Performance Evaluation of THz Wireless Systems Operating in 275 - 400 GHz Band
Alexandros-Apostolos A. Boulogeorgos, Evangelos N. Papasotiriou, University of Piraeus; Joonas Kokkoniemi, Janne Lehtomäki, University of Oulu; Angeliki Alexiou, University of Piraeus; Markku Juntti, University of Oulu

4 Panel Discussion

Sunday, 3 June 2018, 8:30 - 17:00 Porto Room

W12: 2nd IEEE 5G and Beyond Testbed

This second edition of the series will build on the achievements of the first, held as part of VTC2017-Fall in Toronto, and will focus on experimental testbeds on 5G and Beyond. The objective of this workshop is to bring together developers, practitioners, technical experts and researchers to share experiences and advance the state of the art in all aspects of 5G systems prototyping, evaluation and testing. Given the increased complexity of next generation of communication systems and skyrocketing development costs, the importance of publicly available testbeds is quickly becoming critical for researchers and developers to get access to state-of-the-art infrastructures, in order to prototype and validate their ideas.

In addition to informing the community on the capabilities and usage modalities of existing testbeds, the workshop also aims to solicit contributions and promote discussion on the future experimental platforms as well as to facilitate discussions on co-development and co-deployment of experimental platforms. Of particular interest are ideas on extending publicly available testbeds with 5G-related technologies as they become available, and how they can be used to address common technological and scientific problems that are related to advanced wireless systems. The workshop will offer a spectrum of distinguished speakers from all over the world, who will share their experiences about building testbed and experimental results.

VTC2018-Spring Technical Papers

Monday 4 June 2018

Monday, 4 June 2018 11:00-12:30 Douro Sul

1A: mm-Wave and 5G Channels

Chair: David Matolak, University of South Carolina

1 Dynamic Double Directional Propagation Channel Measurements at 28 GHz
Celalettin Umit Bas, Rui Wang, Seun Sangodoyin, University of Southern California; Sooyoung Hur, Samsung; Kuyeon Whang, Jeongho Park, Samsung Electronics; Jianzhong Charlie Zhang, Samsung Research America; Andreas F. Molisch, University of Southern California

2 Large-Area Super-Resolution 3D Digital Maps for Indoor and Outdoor Wireless Channel Modeling
Qianyu Zhang, Guanchong Niu, Simon Pun, The Chinese University of Hong Kong, Shenzhen

3 Narrow Beam Channel Characteristics Measured on an 5G NR Grid-of-Beam Test-bed
Magnus Thurfjell, Arne Simonsson, Ericsson Research; Oscar Lundberg, Luleå University of Technology; Olle Rosin, Ericsson Research

4 Beamforming Impact on Time Dispersion Assessed on Measured Channels
Arne Simonsson, Henrik Asplund, Jonas Medbo, Karl Werner, Ericsson Research

5 Validation of a Real-Time Geometry-Based Stochastic Channel Model for Vehicular Scenarios
Markus Hofer, Zhinan Xu, AIT Austrian Institute of Technology; Dimitrios Vlastaras, Lund University; Bernhard Schrenk, David Löschenbrand, AIT Austrian Institute of Technology; Fredrik Tufvesson, Lund University; Thomas Zemen, AIT Austrian Institute of Technology

Monday, 4 June 2018 11:00-12:30 Douro Norte

1B: MIMO Systems I

Chair: Christos Masouros, University College London

1 Low Complexity Decoders for Spatial and Quadrature Spatial Modulations
Ibrahim Al-Nahhal, Octavia A. Dobre, Memorial University; Salama Ikki, Lakehead University

2 A Low-Complexity Iterative Transmit Precoding Algorithm for Spatial Modulation Systems
Xuechao Wang, Xudong Zhu, Ziyuan Sha, Tsinghua University

3 A MPSK Sources Direction Finding Method by Exploiting the Property of Signal Sources
Congmin Wen, Yuehua Ding, Cong Fu, South China University of Technology; Yide Wang, Université de Nantes

4 Dual Polarized UCA-based OAM Multi-mode Transmission with Inter-mode Spreading
Gye-Tae Gil, Ju Yong Lee, Dong-Ho Cho, Seungjae Jung, Joonhyuk Kang, KAIST

5 Fast Widely Symbol Detection for MIMO Systems
Ruo-Ya Huang, Hsien-Seng Hung, Hoang-Yang Lu, National Taiwan Ocean Unversity

Monday, 4 June 2018 11:00-12:30 Tâmega

1C: Modulation and Coding

Chair: Seong-Lyun Kim

1 An ICI-aware Approach for Physical-layer Network Coding in Time-frequency-selective Vehicular Channels
Zhenhui Situ, Ivan Wang-Hei Ho, The Hong Kong Polytechnic University; Taotao Wang, Soung Chang Liew, The Chinese University of Hong Kong

2 **Demodulation of Double Differential PSK in Presence of Large Frequency Offset and Wide Filter**
Siavash Safapourhajari, André B. J. Kokkeler, University of Twente

3 **On the Performances of POPS-PHYDYAS waveforms**
Zeineb Hraiech, Fatma Abdelkefi, Mohamed Siala, Rafik Zayani, SUP'COM

4 **A Suboptimal Algorithm for SCMA Codebook Design over Uplink Rayleigh Fading Channels**
Lining Tian, Zhejiang University

5 **Performance of High Order QAM Under Transmit Nonlinearities**
Ziya Gulgun, Middle East Technical University; Ali Ozgur Yilmaz, Middle East Technical University (METU)

Monday, 4 June 2018 11:00-12:30 Corgo

1D: HetNets I

Chair: Alister Burr, Uniersity of York

1 **Capacity Efficient Resource Allocation Strategy in Heterogeneous Networks with Hybrid Access Model**
Xu Yang, Xiaohui Li, Wenjuan Pu, Danfeng Meng, Xidian University

2 **Combined shared and dedicated resource allocation for D2D Communication**
Pavel Mach, Zdenek Becvar, Mehyar Najla, Czech Technical University in Prague

3 **Heterogeneous Statistical-Delay QoS and Security Provisioning for D2D Underlay Cellular Networks**
Wenwen Xu, Yichen Wang, Xi'an Jiaotong University

4 **Outage Analysis for D2D enhanced Heterogeneous Cellular Network under Maximum Power Constraint**
Jing Han, Jing Zhang, Qingjie Zhou, Yajie Diao, Huazhong University of Science and Technology

5 **Cell Range Expansion with Geometric Information of Pico-Cell in Heterogeneous Networks**
Taesung Jung, Iickho Song, Seungwon Lee, Seungjae Jung, Seokho Yoon, Joonhyuk Kang, TechnologYoon

Monday, 4 June 2018 11:00-12:30 Minho

1E: Wireless Connectivity I

Chair: Temitope Alade, University of Worcester

1 **The role of WiFi in LiFi hybrid networks based on Blind Interference Alignment**
Ahmad Adnan Qidan, Maximo, Morales Cespedes; Ana García-Armada, Universidad Carlos III de Madrid

2 **Modeling and Analysis of Intra-Frequency Multi-Connectivity for High Availability in 5G**
David Öhmann, Technische Universität Dresden, Intel Deutschland GmbH; Ahmad Awada, Nokia Bell Labs; Ingo Viering, Nomor Research GmbH; Meryem Simsek, Gerhard P. Fettweis, Technische Universität Dresden

3 **Performance Comparison of Multi-Connectivity with CoMP in 5G Ultra-Dense Network**
Xinran Ba, Yafeng Wang, Beijing University of Posts and Telecommunications

4 **Selection between Radio Frequency and Visible Light Communication Bands for D2D**
Zdenek Becvar, Mehyar Najla, Pavel Mach, Czech Technical University in Prague

5 **5G NR Test-bed 3.5 GHz Coverage Results**
Björn Halvarsson, Ericsson AB; Arne Simonsson, Ericsson Research; Anders Elgcrona, Ranvir Chana, Paulo Machado, Ericsson AB; Henrik Asplund, Ericsson Research

Monday, 4 June 2018 11:00-12:30 Lima

1F: UAV Relaying

Chair: David Matolak, University of South Carolina

1 **Using Multiple UAVs as Relays for Reliable Communications**
Yunfei Chen, University of Warwick; Xiaonan Liu, Nan Zhao, Dalian University of Technology; Zhiguo Ding, Lancaster University

2 **Joint Power Allocation and Beamforming for UAV-enabled Relaying Systems with Channel Estimation Errors**
Qingheng Song, Southeast University; Shi Jin, Southern University; Fu-Chun Zheng, Southeast University

3 **Energy-Aware 3D Aerial Small-Cell Deployment over Next Generation Cellular Networks**
Shih-Fan Chou, National Taiwan University; Ya-Ju Yu, National University of Kaohsiung; Ai-Chun Pang, National Taiwan University; Tzu-An Lin, Industrial Technology Research Institute

4 **Mobility Challenges for Unmanned Aerial Vehicles Connected to Cellular LTE Networks**
Jedrzej Stanczak, Nokia; István Z. Kovács, Nokia Bell Labs; Dawid Kozioł, Nokia; Jeroen Wigard, Nokia Bell Labs; Rafhael Amorim, Huan Cong Nguyen, Aalborg University

5 **Uplink Resource Allocation in Cellular Networks with Energy-constrained UAV Relay**
Sixing Yin, Zhaowei Qu, Lihua Li, Beijing University of Posts and Telecommunications

Monday, 4 June 2018 11:00-12:30 Cávado

1G: Electric Vehicles & Vehicular Communication

1 **GECM: A Novel Green Wave Band Based Energy Consumption Model for Electric Vehicles**
Pengfei Huang, Changle Li, Quyuan Luo, Yao Zhang, Bing Xia, Xidian University

2 **G-MACO: A Multi-Objective Route Planning Algorithm on Green Wave Effect for Electric Vehicles**
Anqi Liu, Changle Li, Bing Xia, Wenwei Yue, Zhifang Miao, Xidian University

3 **Deployment and Performance of Infrastructure to Assist Vehicular Collaborative Sensing**
Yicong Wang, Gustavo de Veciana, The University of Texas at Austin; Takayuki Shimizu, Hongsheng Lu, TOYOTA InfoTechnology Center USA

4 **Real-time Scheduling using Reinforcement Learning Technique for the Connected Vehicles**
Seongjin Park, Younghwan Yoo, Pusan National University

5 **Network-assisted Two-hop Vehicle-to-Everything Communication on Highway**
Lianghai Ji, Wang Donglin, Andreas Weinand, Hans Schotten, University of Kaiserslautern

Monday, 4 June 2018 11:00-12:30 Foyer-1

1P: TVT Papers I

1 **A Low-Complexity Full-Duplex Radio Implementation With a Single Antenna**
Ozgur Gurbuz, Muhammad Sohaib Amjad, Sabanci University; Haq Nawaz, Sabanci University,Istanbul,Turkey; Kerem Ozsoy, Antsis Electronics; İbrahim Tekin, Sabanci University

2 **ASER Analysis of Hexagonal and Rectangular QAM Schemes in Multiple-Relay Networks**
Nagendra Kumar, Praveen Kumar Singya, Vimal Bhatia, Indian Institute of Technology Indore

3 **Carrier Frequency Offset Estimation in Uplink OFDMA Systems: An Approach Relying on Sparse Recovery**
Min Huang, Lei Huang, Chongtao Guo, Peichang Zhang, Jihong Zhang, Shenzhen University; Lie-Liang Yang, University of Southampton

4 **Characterization of Radio Links at 60 GHz Using Simple Geometrical and Highly Accurate 3-D Models**
Vasilii, Aalto University; Dmitrii Solomitckii, Tampere University of Technology; Reza Naderpour, Aalto University; Sergey Andreev, Yevgeni Koucheryavy, Tampere University of Technology; Antti V. Räisänen, Aalto University

5 **Selection Combiner Output Distributions of Multivariate Equally-Correlated Generalized-Rician Fading for Any Degrees of Freedom**
Khoa Le, Western Sydney University

6 **Effective Capacity in MIMO Channels with Arbitrary Inputs**
Marwan Hammouda, Sami Akin, Leibniz Universität Hannover; M. Cenk Gursoy, Syracuse University; Juergen Peissig, Leibniz Universität Hannover

7 **Effects of Relay Selection Strategies on the Spectral Efficiency of Wireless Systems with Half- and Full-duplex Nodes**
Carlos H. M. de Lima, UNESP-SJBV; Hirley Alves, University of Oulu; Pedro J. H. Nardelli, Lappeenranta University of Technology; Matti Latva-aho, University of Oulu

8 **Hierarchical Hypothesis and Feature-Based Blind Modulation Classification for Linearly Modulated Signals**
Rahul Gupta, Indian Institute of Technology Patna

9 **Joint Encoding and Grouping Multiple Node Pairs for Physical-Layer Network Coding With Low-Complexity Algorithm**
Zhaolong Ning, Xiaojie Wang, Dalian University of Technology

10 **Narrow-Band Interference Mitigation Using Compressive Sensing for AF-OFDM Systems**
Hanan Al Tous, Imad Barhumi, United Arab Emirates University; Naofal Al-Dhahir, University of Texas at Dallas

11 **Performance Analysis for Lossy-Forward Relaying over Nakagami-m Fading Channels**
Shen Qian, Japan Advanced Institute of Science and Technology; Xiaobo Zhou, Tianjin University; Xin He, Anhui Normal University; Jiguang He, Markku Juntti, University of Oulu; Tadashi Matsumo,, Japan Advance Institute of Science and Technology

12 **Probabilistic MIMO Symbol Detection with Expectation Consistency Approximate Inference**
Javier Céspedes, Universidad Carlos III de Madrid

Monday, 4 June 2018 14:00-15:30 Douro Sul

2A: Channel Modeling and Measurements

Chair: Claude Oestges, UC Louvain

1 **Definition and Analysis of Quasi-Stationary Intervals of Mobile Radio Channels**
Matthias Pätzold, University of Agder; Carlos A. Gutierrez, Universidad Autonoma de San Luis Potosi

2 **A Framework for Activity Monitoring and Fall Detection Based on the Characteristics of Indoor Channels**
Ahmed Abdelgawwad, Matthias Pätzold, University of Agder

3 **Radio Propagation Analysis of Industrial Scenarios within the Context of Ultra-Reliable Communication**
Dereje Assefa Wassie, Ignacio Rodriguez, Gilberto Berardinelli, Fernando Tavares, Troels B. Sørensen, Preben Mogensen, Aalborg University

4 **CQI Mapping Optimization in Spatial Wireless Channel Prediction**
Samira Homayouni, Stefan Schwarz, Technische Universität (TU) Wien; Markus Rupp, TU Wien

5 **Stochastic Geometry Based Coverage Estimation Using Realistic Urban Shadowing Models**
Charles Wiame, Luc Vandendorpe, Claude Oestges, Université catholique de Louvain

Monday, 4 June 2018 14:00-15:30 Douro Norte

2B: Massive MIMO I

Chair: Daniel Massicotte

1 **A Low-Complexity Linear Precoding Algorithm Based on Jacobi Method for Massive MIMO Systems**
Juan Carlos Minango Negrete, Celso de Almeida, Unicamp

2 **Complexity Reduction Schemes for Gibbs Sampling MIMO Detection with Maximum Ratio Combining**
Yukitoshi Sanada, Keio University

3 **Graph Coloring-based Pilot Reuse with AOA and Distance in D2D Underlay Massive MIMO**
Haruhi Echigo, Tomoaki Ohtsuki, Keio University

4 **Improved Soft Pilot Reuse Combined with Time-Shifted Pilots in Massive MIMO Systems**
Xin Jin, Jiangtao Wang, Yongchao Wang, University of Xidian

5 **Uplink Pilots for Multi-User MIMO with Mixed Grant Free and Grant Based Transmissions**
Nassar Ksairi, Mérouane Debbah, Huawei Technologies

Monday, 4 June 2018 14:00-15:30 Tâmega

2C: Channel Coding I

Chair: Jinho Choi, Gwangju Institute of Science and Technology

1 **A Design of Non-Binary Turbo Codes over Finite Fields Based on Gaussian Approximation and Union Bounds**
Toshiki Matsumine, Hideki Ochiai, Yokohama National University

2 **Analysis of 5G LDPC Code Rate-matching Design**
Fatemeh Hamidi-Sepehr, Intel Corporation

3 **Interleaved CRC for Polar Codes**
Dennis Hui, Ericsson Research; Michael Breschel, Yufei Blankenship, Ericsson AB

4 **Polarization Weight Family Methods for Polar Code Construction**
Yue Zhou, Rong Li, Huazi Zhang, Hejia Luo, Jun Wang, Huawei Technologies Co. Ltd.

5 **Investigation of Polarization Weight – An Efficient Construction for Polar codes**
Ying Chen, Gongzheng Zhang, Rong Li, Xiaocheng Liu, Hejia Luo, Huazi Zhang, Chen Xu, Jian Wang, Jun Wang, Yue Zhou, Huawei Technologies Co., Ltd.

Monday, 4 June 2018 14:00-15:30 Corgo

2D: Vehicular Networks I

Chair: Alexander Wyglinski , Worcester Polytechnic Institute

1 **Effect of Fog and Rain on the Performance of Vehicular Visible Light Communications**
Mohammed Elamassie, Mehdi Karbalayghareh, Farshad Miramirkhani, Refik Caglar Kizilirmak, Nazarbayev University; Murat Uysal, Ozyegin University

2 **Evaluating RaptorQ-based content broadcasting strategies in vehicular environments**
Sergio Ortiz, Universitat Politècnica de València; Carlos T. Calafate, Juan-Carlos Cano, Pietro Manzoni, Polytechnic University of Valencia

3 **On The Capacity Bounds For Bumblebee-Inspired Connected Vehicle Networks Via Queuing Theory**
Kuldeep S. Gill, Alexander Wyglinski, Kevin N. Heath, Robert J. Gegear, Elizabeth F. Ryder, Worcester Polytechnic Institute

4 **Novel Self-Calibration Procedures for Channel Characterization of Automotive Communication Cables in the GHz Range**
Sebastian Wagner, Reinhard Stolle, Augsburg University of Applied Sciences

5 **A hybrid cooperative spectrum sensing scheme based on spatial-temporal correlation for CR-VANET**
Xi Li, Tiecheng Song, Yueyue Zhang, Guojun Chen, Jing Hu, Southeast University

Monday, 4 June 2018 14:00-15:30 Minho

2E: Wireless Connectivity II

Chair: Young Jin Chun, Queen's University Belfast

1 **Mobile Computation Offloading Strategy Based on Static Information and Dynamic Partition**
Lei Yan, Ruizhe Zhang, Zhuo Han, Mian Qin, Shouyi Yang, Zhengzhou University

2 Testbed Analysis of Supporting IP Services using 2-Hop IEEE 802.11s Network under Mobility
Adnan Noor Mian, Tayyaba Liaqat, Abdul Hameed, Information Technology University, Lahore

3 Inflight Connectivity: Deploying Different Communication Networks Inside an Aircraft
Tezcan Cogalan, Stefan Videv, Harald Haas, University of Edinburgh

4 A Multi-Purpose Automated Vehicular Platform with Multi-Radio Connectivity Capabilities
Jani Urama, Mikhail Gerasimenko, Tampere University of Technology; Martin Stusek, Pavel Masek, Brno University of Technology; Sergey Andreev, Tampere University of Technology; Jiri Hosek, Brno University of Technology; Yevgeni Koucheryavy, Tampere University of Technology

5 Increasing the Throughput of an Unlicensed Wireless Network through Retransmissions
Iran Ramezanipour, University of Oulu; Pedro J. H. Nardelli, Lappeenranta University of Technology; Hirley Alves, Ari Pouttu, University of Oulu

Monday, 4 June 2018 14:00-15:30 Lima

2F: Cooperative and Cognitive Networks

Chair: Fumiyukii Adach, Tohoku University

1 A Distributed Caching Scheme in Dense Small Cell Network with Cooperative Transmission
Ronghui Hou, Shuaiyuan Sun, Xidian University; King-Shan Lui, The University of Hong Kong; Hongyan Li, Xidian University

2 Decision-feedback Prediction Channel Estimation for MIMO Cooperative Transmission
Fumiyuki Adachi, Amnart Boonkajay, Tohoku University

3 Cooperative Consensus Algorithm for Clock Synchronization in Wireless Sensor Networks
Sajith Mohan Chakkedath, Mary Ann Weitnauer, Georgia Institute of Technology

4 Sum-Rate Maximization in Non-Orthogonal Multiple Access Relay Networks
Zakir Hussain Shaik, P. Ubaidulla, International Institute of Information Technology (IIIT), Hyderabad

5 Non-Orthogonal Multiple Access in Cognitive Relay Networks
Zakir Hussain Shaik, P. Ubaidulla, International Institute of Information Technology (IIIT), Hyderabad

Monday, 4 June 2018 14:00-15:30 Foyer-1

2P: Resource Allocation and Scheduling

Chair: João Guerreiro, UAL

1 Preemptive Scheduling of Latency Critical Traffic and its Impact on Mobile Broadband Performance
Klaus I. Pedersen, Nokia - Bell Labs; Guillermo Pocovi, Jens Steiner, Nokia Bell Labs

2 Resource Isolation in RAN Part While Utilizing Ordinary Scheduling Algorithm for Network Slicing
Daisuke Nojima, Yuki Katsumata, Takuya Shimojo, Yoshifumi Morihiro, Takahiro Asai, Akira Yamada, Shigeru Iwashina, NTT DOCOMO, Inc.

3 A Novel Routing and Scheduling Algorithm for Multi-hop Heterogeneous Wireless Networks
charles Jumaa Katila, university of Bologna; Chiara Buratti, University of Bologna

4 Optimal Sequential and Parallel UAV Scheduling for Multi-Event Applications
Hakim Ghazzai, Abdullah Kadri, Qatar Mobility Innovations Center; Mahdi Ben Ghorbel, University of British Columbia; Hamid Menouar, Qatar Mobility Innovations Center

5 Joint Power Control and Topology-Transparent Scheduling in Mobile Multi-hop Networks under Physical Interference Model
Yiming Liu, Chinese Academy of Electronics and Information Technology; Long Zhang, CAEIT

6 Stackelberg Game-Based Optimal Power Allocation in Heterogeneous Network
Zhiqiang Qi, Tao Peng, Jiaqi Cao, Wenbo Wang, Beijing University of Posts and Telecommunications

7 Minimum Latency and Optimal Traffic Partition in 5G Small Cell Networks
Kien Nguyen, Mirza Golam Kibria, Jing Hui, Kentaro Ishizu, Fumihide Kojima, National Institute of Information and Communication Technology

8 Optimal Cross-Layer Design for Decentralized Multi-Packet Reception Wireless Networks
António Furtado, Rodolfo Oliveira, Luis Bernardo, Rui Dinis, Universidade Nova de Lisboa

9 Enhanced Handover Signaling through Integrated MME-SDN Controller Solution
Akshay Jain, Elena Lopez-Aguilera, Ilker Demirkol, Universitat Politecnica de Catalunya

Monday, 4 June 2018 16:00-17:30 Douro Sul

3A: Resource Allocation I

Chair: Xiaoli Chu, The University of Sheffield

1 Modeling and Optimization of Renewable-Energy Sharing among Base Stations as a Minimum-Cost-Maximum-Flow Problem
Doris Benda, Xiaoli Chu, University of Sheffield; Sumei Sun, Institute for Infocomm Research; Tony Q.S. Quek, Singapore University of Technology and Design; Alastair Buckley, University of Sheffield

2 Resource Allocation for Uplink Grant-Free Ultra-Reliable and Low Latency Communications
Zhiyi Zhou, Northwestern University; Rapeepat Ratasuk, Nokia Bell Labs; Nitin Mangalvedhe, Amitava Ghosh, Nokia

3 Power Allocation and Rate Adaption for NOMA-Based Layer-Aware Multicasting Systems
Haining Duan, Yu Zhang, Jian Song, Tsinghua University

4 Periodic Radio Resource Allocation to Meet Latency and Reliability Requirements in 5G Networks
Yishu Han, Orange Labs; Salah Eddine Elayoubi, CentraleSupélec; Ana Galindo-Serrano, Orange Labs.; Vineeth S. Varma, CRAN; Malek Messai, Orange Labs

Monday, 4 June 2018 16:00-17:30 Douro Norte

3B: mm-wave Communications

Chair: Thomas Kürner, TU Braunschweig

1 Adaptive Beam-Frequency Allocation Algorithm with Position Uncertainty for Millimeter-Wave MIMO Systems
Rafail Ismayilov, University of Goettingen; Megumi Kaneko, National Institute of Informatics; Takefumi Hiraguri, Nippon Institute of Technology; Kentaro Nishimori, Niigata University

2 Cost/Revenue Trade-off of Small Cell Networks in the Millimetre Wavebands
Emanuel Teixeira, Fernando J Velez, Instituto de Telecomunicações-DEM, Universidade da Beira Interior

3 Multi-Beam Power Allocation for mmWave Communications under Random Blockage
Sungoh Kwon, University of Ulsan; Joerg Widmer, Imdea

4 Performance Evaluation of 5G mmWave Edge Cloud with Prefetching Algorithm
Hiroaki Nishiuchi, Khanh Tran Gia, Kei Sakaguchi, Tokyo Institute of Technology

5 Spectrum Allocation for mmWave Backhaul Networks: An Approach based on Matching Game
Wenjuan Pu, Xidian university; Xiaohui Li, Xu Yang, Danfeng Meng, Xidian University

Monday, 4 June 2018 16:00-17:30 Tâmega

3C: Full-Duplex Systems

Chair: Markku Juntti, University of Oulu

1 Interference Management in Full-Duplex Wireless Cellular Networks via Fractional Programming
Kaiming Shen, Wei Yu, University of Toronto

2 Joint Beamforming and Resource Allocation for Multi-user Full-duplex Wireless Powered Communication Networks
Derek Kwaku Pobi Asiedu, Sumaila Mahama, Kyoung-Jae Lee, Hanbat National University

3 Full-Duplex MIMO Small-Cells: Secrecy Capacity Analysis
Ayda Babaei, Abdol Hamid Aghvami, King's College London; Arman Shojaeifard, Kai-Kit Wong, University College London

4 Analog Self-Interference Cancellation with Automatic Gain Control for Full-Duplex Transceivers
Visa Tapio, Univ. Oulu; Marko Sonkki, Markku Juntti, University of Oulu

5 Full-Duplex Decode-and-Forward Cooperative Non-Orthogonal Multiple Access
Turki E A Alharbi, Daniel K C So, University of Manchester

Monday, 4 June 2018 16:00-17:30 Corgo

3D: Vehicular Networks II

Chair: Carlos Calafete, Universidad Politécnica de Valencia

1 Coordinated Scheduling for Aircraft In-Cabin LTE Deployment Under Practical Constraints
Tezcan Cogalan, Stefan Videv, Harald Haas, University of Edinburgh

2 Location-Based Scheduling for Cellular V2V Systems in Highway Scenarios
Richard Fritzsche, Fraunhofer IVI; Andreas Festag, Technische Hochschule Ingolstadt (THI)

3 Network-Assisted Resource Allocation with Quality and Conflict Constraints for V2V Communications
Luis F. Abanto-Leon, Technische Universiteit Eindhoven; Arie Koppelaar, NXP Semiconductors; Sonia Heemstra de Groot, Eindhoven University of Technology

4 Optimal Scheduling for Multi-Hop Video Streaming with Network Coding in Vehicular Networks
Yumeng Gao, Xiaoli Xu, Nanyang Technological University; Yong Zeng, National University of Singapore; Guan Yong Liang, Nanyang Technological University

5 Radio Resource Allocation for Reliable Out-of-coverage V2V Communications
Taylan Sahin, Mate Boban, Huawei Technologies Duesseldorf GmbH, German Research Center

Monday, 4 June 2018 16:00-17:30 Minho

3E: PAPR Reduction

Chair: Fumiyuki Adachi, Tohoku University

1 A Technique to Reduce PAPR for OFDM-IM using Multiple Mapping Rules for IM
Hanseong Jo, Yonggu Lee, Sangin Jeong, Jinho Choi, Gwangju Institute of Science and Technology

2 Optimization of Impulsive Noise Mitigation Scheme for PAPR Reduced OFDM Signals Over Powerline Channels
Kelvin Anoh, Bamidele Adebisi, Khaled Rabie, Manchester Metropolitan University; Haris Gacanin, Nokia Bell Labs

3 Unused beam reservation for PAPR reduction in Massive MIMO system
Andrey Ivanov, Artyom Volokhatyi, Dmitry Lakontsev, Dmitry Yarotsky, Skolkovo Institute of Science and Technology

4 Performance of Subcarrier-index-modulation OFDM with Partial Transmit Sequences for PAPR reduction
Lilin Dan, Qianli Ma, Fan LI, Yue Xiao, University of Electronic Science and Technology of China

5 Software Defined Radio Implementation of SOCC-based OFDM System with Low PAPR
Tomoki Yokokawa, Hideki Ochiai, Yokohama National University

Monday, 4 June 2018 16:00-17:30 Lima

3F: Positioning Techniques I

Chair: Luís Bernardo, Universidade Nova de Lisboa

1 3GPP NB-IoT coverage extension using LEO satellites
Sylvain Cluzel, Institut Supérieur de l'Aéronautique et de l'Espace; Laurent Franck, IMT Atlantique; José Radzik, Institut National Supérieur de l'Aéronautique; Sonia Cazalens, CNES; Mathieu Dervin, Cédric Baudoin, Thales Alenia Space; Daniela Dragomirescu, CNRS, LAAS

2 A Low Communication Rate Distributed Inertial Navigation Architecture with Cellular Signal Aiding
Joshua Morales, Zaher Kassas, University of California, Riverside

3 Cellular Network Positioning Performance Improvements by Richer Device Reporting
Henrik Ryden, Sara Modarres Razavi, Fredrik Gunnarsson, Ericsson Research; Ivar Olofsson, Student

4 Localization of static remote devices using smartphones
Dário Pedro, FCT, Universidade NOVA de Lisboa; Slavisa Tomic, ISR-IST, Universidade Nova de Lisboa; Luis Bernardo, Universidade Nova de Lisboa / Instituto de Telecomunicações; Marko Beko, ULHT, UNINOVA, ISR-IST; Rodolfo Oliveira, Rui Dinis, Paulo Pinto, Universidade Nova de Lisboa

5 High-Accuracy Three-Dimensional Visible Light Positioning Systems using image sensor
Peixi Liu, Rui Jiang, Ruowen Bai, Tsinghua University; Tianqi Mao, Tsinghua National Laboratory for Information Science and Technology; Jinguo Quan, Zhaocheng Wang, Tsinghua University

Monday, 4 June 2018 16:00-17:30 Foyer-1

3P: MIMO Systems II

Chair: Maximo Morales-Cespedes, Universidad Carlos III de Madrid

1 Iterative MRC and EGC Receivers for MIMO-OFDM Systems
Andreia Pereira, Pedro Bento, Marco Gomes, Instituto de Telecomunicações - University of Coimbra; Rui Dinis, Universidade Nova de Lisboa; Vitor Silva, University of Coimbra

2 On the MIMO Capacity with Multiple Linear Transmit Covariance Constraints
Thuy M. Pham, Ronan Farrell, Maynooth University; Holger Claussen, Bell Labs Nokia; Mark Flanagan, Le-Nam Tran, University College Dublin

3 Optimal Precoder for MIMO Schemes in Indoor Wireless VLC Systems
Vangala Aditya Srinivas, Yalagala Naresh, A. Chockalingam, Indian Institute of Science, Bangalore

4 Extended Receive Spatial Modulation MIMO scheme for Higher Spectral Efficiency
Ali Mokh, Maryline Helard, Matthieu Crussière, Institut d'Electronique et de télécommunication de Rennes

5 Opportunistic Matrix Precoding for Non-Separable Wireless MIMO-NOMA Networks
Hsiao-Ting Chiu, Rung-Hung Gau, National Chiao Tung University

6 The Effect of Antenna Correlation in Single-Carrier Massive MIMO Transmission
Nader Beigiparast, Ender Ayanoglu, University of California, Irvine

7 Feature Extracted DOA Estimation Algorithm Using Acoustic Array for Drone Surveilliance
Xianyu Chang, Chaoqun Yang, Xiufang Shi, Pengfei Li, Zhiguo Shi, Jiming Chen, Zhejiang University

8 A Low-Complexity Air Interface With Transmit Diversity for Low Power Wide Area Networks
Felix Wunsch, Holger Jäkel, Friedrich K. Jondral, Karlsruhe Institute of Technology

Tuesday 5 June 2018

Tuesday, 5 June 2018 11:00-12:30 Douro Norte

4B: Millimeter-Wave and 5G

Chair: Fredrik Rusek, Lund Univ.

1 Angular Based Beamforming and Power Allocation Framework in a Multi-User Millimeter-Wave Massive MIMO System
Mohamed Shehata, Maryline Helard, INSA de Rennes; Matthieu Crussière, Institute of Electronics and Telecommunications of Rennes; Antoine Roze, INSA de Rennes; Charlotte Langlais, IMT Atlantique, Lab-STICC, UBL

2 Hybrid Beamforming for Broadband Millimeter Wave Massive MIMO Systems
Rui Chen, Hui Xu, Changle Li, Lina Zhu, Jiandong Li, Xidian University

3 Implementation of a Multi-Core Data Link Layer Processor for THz communication
Lukasz Lopacinski, Mohamed Eissa, Goran Panic, Marcin Brzozowski, IHP; Alireza Hasani, Brandenburg University of Technology Cottbus-Senftenberg; Rolf Kraemer, IHP

4 The Application of Machine Learning in mmWave-NOMA Systems
Jingjing Cui, Southwest Jiaotong University; Zhiguo Ding, Lancaster University; Pingzhi Fan, Southwest Jiaotong University

5 Low Complexity Random Access Detection for 5G Millimeter Wave Communications
Ting Wang, Intel Research Center

Tuesday, 5 June 2018 11:00-12:30 Tâmega

4C: Communication Theory

Chair: Hu Jin, Hanyang University

1 On Closed Form Capacities of Discrete Memoryless Channels
Thuan Nguyen, Thinh Nguyen, Oregon State University

2 On The Capacities of Discrete Memoryless Thresholding Channels
Thuan Nguyen, Yu-Jung Chu, Thinh Nguyen, Oregon State University

3 Optimal Power Allocation for Amplify and Forward Relaying with Finite Blocklength Codes and QoS Constraints
Yulin Hu, RWTH Aachen; Mustafa Cenk Gursoy, Syracuse University; Anke Schmeink, RWTH Aachen University

4 Information-Optimum Discrete Signal Processing for Detection and Decoding
Gerhard Bauch, Jan Lewandowsky, Maximilian Stark, Peter Oppermann, Hamburg University of Technology

5 Ergodic Capacity Analysis of Wireless Transmission over Generalized Multipath/Shadowing Channels
Paschalis C. Sofotasios, Tampere University of Technology/Aristotle University of Thessaloniki; Seong Ki Yoo, Queen's University Belfast; Sami Muhaidat, University of Surrey; Simon L. Cotton, Michail Matthaiou, Queen's University Belfast; Mikko Valkama, Tampere University of Technology; George Karagiannidis, Aristotle University of Thessaloniki

Tuesday, 5 June 2018 11:00-12:30 Corgo

4D: Vehicular Networks III

Chair: Takamasa Higuchi, Toyota InfoTechnology Center

1 ADePt: Adaptive Distributed Content Prefetching for Information-Centric Connected Vehicles
Dennis Grewe, Sebastian Schildt, Marco Wagner, Robert Bosch GmbH; Hannes Frey, University Koblenz-Landau

2 Empowering Infotainment Applications:A Multi-Channel Service Management Framework for Cognitive Radio Enabled Vehicular Ad Hoc Networks
Rajith C. Abeywardana, Kevin W. Sowerby, Stevan M. Berber, The University of Auckland

3 Local End-to-End Paths for Low Latency Vehicular Communication
Apostolos Kousaridas, Chan Zhou, Huawei Technologies, German Research Center

4 Low-cost Radar for Object Tracking in Autonomous Driving: A Data-Fusion Approach
Ryan Aldrich, Autoliv Active Safety; Thanuka Wickramarathne, University of Massachusetts Lowell

Tuesday, 5 June 2018 11:00-12:30 Minho

4E: Antennas and Power Amplifiers

Chair: Philipp Berlt, Technische Universität Ilmenau

1 A Novel Digital Predistortion of 5G Wideband Power Amplifier with Narrow Bandwidth ADC
Ning Guan, Hua Wang, Kenan Li, Beijing Institute of Technology

2 Iterative Learning Control Assisted Neural Network for Digital Predistortion of MIMO Power Amplifier
Kenan Li, Ning Guan, Hua Wang, Beijing Institute of Technology

3 Leveraging Antenna Side-lobe Information for Expedited Neighbor Discovery in Directional Terahertz Communication Networks
Qing Xia, Josep Miquel Jornet, University at Buffalo

4 MCMC Sampling based Signal Detection in Multiuser Load Modulated Arrays
Sandeep Bhat, A. Chockalingam, Indian Institute of Science, Bangalore

5 Reliable derivation of automotive antenna gain patterns from LTE communication parameters
Philipp Berlt, Frank Wollenschläger, Christian Bornkessel, Matthias A. Hein, Technische Universität Ilmenau

Tuesday, 5 June 2018 11:00-12:30 Lima

4F: Energy Efficiency I

Chair: John Thompson, University of Edinburgh

1 Energy Efficiency of Massive MIMO: Cell-Free vs. Cellular
Hong Yang, Bell Labs, Nokia; Thomas L. Marzetta, New York University

2 Delay-aware Energy Efficient Computation Offloading for Energy Harvesting Enabled Fog Radio Access Networks
Xiangyu He, Yue Chen, Kok Keong Chai, Queen Mary University of London

3 Energy-Spectral Efficiency Tradeoff of Downlink NOMA System with Fairness Consideration
Dadong Ni, Li Hao, Xiaomin Qian, Southwest Jiaotong University; Quang Thanh Tran, University of Transport and Communications, Hanoi, Vietnam

4 A Novel Energy-Efficient Resource Allocation Approach in Limited Fronthaul Virtualized C-RANs
Thi Thu Phuong Luong, Charles Despins, Francois Gagnon, Ecole de Technologie Superieure; Le-Nam Tran, University College Dublin

5 Energy Efficient Resource Allocation for Secure NOMA Networks
Haijun Zhang, Ning Yang, Keping Long, University of Science and Technology Beijing; Miao Pan, University of Houston; George K. Karagiannidis, Aristotle University of Thessaloniki; Arumugam Nallanathan, King's College London

Tuesday, 5 June 2018 11:00-12:30 Cávado

4G: VLC

Chair: Paschalis Sofotasios, Khalifa Univ. of Science and Technology

1 On the Performance of NOMA-enabled Spectrally and Energy Efficient OFDM (SEE-OFDM) for Indoor Visible Light Communications
Galymzhan Nauryzbayev, Mohamed Abdallah, Hamad Bin Khalifa University; Hany Elgala, State University of New York at Albany

2 Optical Asymmetric Modulation for VLC Systems
Hanaa Marshoud, Khalifa University; Sami Muhaidat, University of Surrey; Paschalis Sofotasios, Khalifa University; Muhammad Ali Imran, University of Glasgow; Bayan S. Sharif, Khalifa University of Science and Technology; George Karagiannidis, Aristotle University of Thessaloniki

3 Optimized Diagonal and Pseudo-random Phase Precoding Schemes for MIMO VLC Systems
Ashok D. R., A. Chockalingam, Indian Institute of Science, Bangalore

4 Performance of Imaging Receivers using Convex Lens in Indoor MIMO VLC Systems
K. V. S. Sai Sushanth, A. Chockalingam, Indian Institute of Science, Bangalore

5 Precoding technique for ill-conditioned massive MIMO-VLC system
Rangeet Mitra, IIIT SriCity; Vimal Bhatia, Indian Institute of Technology Indore

Tuesday, 5 June 2018 11:00-12:30 Foyer-1

4P: TVT Papers II

1 Analytical Solution to Energy Management Guaranteeing Battery Life for Hybrid Trucks
Thinh Pham, TNO Powertrains, Helmond, the Netherlands

2 A Novel Approach for Model-Based Control of Smooth and Lossless Gear Shifts
Johannes Rumetshofer, Virtual Vehicle Research Center

3 A secure approach for caching contents in wireless ad hoc networks
Mohsen Karimzadeh Kiskani, University of California Santa Cruz

4 CAIS: A Copy Adjustable Incentive Scheme in Community-Based Socially Aware Networking
Zhaolong Ning, Xiaojie Wang, Dalian university of technology

5 Energy-Delay Tradeoff in Ultra-Dense Networks Considering BS Sleeping and Cell Association
Li Pei, Jiang Huilin, Pan Zhiwen, Xiaohu You, Southeast University

6 Pilot Reuse and Interference-aided MMSE Detection for D2D Underlay Massive MIMO
Xinxin Liu, Yunzhou Li, Tsinghua University; Xueru Li, Huawei Technologies; Limin Xiao, Jing Wang, Tsinghua University

7 Predictive Communication and its Application to Vehicular Environments: Doppler-Shift Compensation
Roman Alieiev, Hehn, Thorsten, Andreas Kwoczek, Volkswagen AG; Thomas Kürner, Technische Universitaet Braunschweig

8 Reliable Adaptive Resource Management for Cognitive Cloud Vehicular Networks
Danilo Amendola, Nicola Cordeschi, Sapienza University of Rome

9 Transmission Experiment of Bandwidth Compressed Carrier Aggregation in a Realistic Fading Channel
Tongyang Xu, Izzat Darwazeh, University College London

10 Uplink Scheduling and Power Allocation for M2M Communications in SC-FDMA-Based LTE-A Networks with QoS Guarantees
Fayezeh Ghavimi, National Cheng Kung University

11 Vertical-Edge-Based Car-License-Plate Detection Method
Abbas M. Al-Ghaili, Universiti Tenaga Nasional (UNITEN)

12 Cooperative Wireless Powered Communication Networks with Interference Harvesting
Wonjae Shin, Busan National University; Mojtaba Vaezi, Princeton University; Jungwoo Lee, Seoul National University; H. Vincent Poor, Princeton University

Tuesday, 5 June 2018 14:00-15:30 Douro Norte

5B: Massive MIMO II

Chair: Claude Oestges, UC Louvain

1 A Low Complexity ML Detection for Uplink Massive MIMO Systems with One-Bit ADCs
Yo-Seb Jeon, Namyoon Lee, Pohang University of Science and Technology (POSTECH); Song-Nam Hong, Ajou University; Robert W. Heath Jr., The University of Texas at Austin

2 Impact of User Number on Massive MIMO with a Practical Number of Antennas
Wael Boukley Hasan, Paul Harris, Angela Doufexi, Mark Beach, University of Bristol

3 Phase-only OFDM Communication for Downlink Massive MIMO Systems
Fred Wiffen, University of Bristol; Mohammud Z. Bocus, Toshiba Telecommunications Laboratory; Angela Doufexi, Andrew Nix, University of Bristol

4 Structured Random Codebook Design for GaBP Iterative Detection in Massive SCMA
Inagaki Keisuke, Takumi Takahashi, Shinsuke Ibi, Seiichi Sampei, Osaka University

5 Turbo Multi-User Detection for SC-FDE Massive MIMO Systems
João Madeira, Universidade Nova de Lisboa - Faculdade de Ciências e Tecnologias; João Guerreiro, Instituto de Telecomunicações; Rui Dinis, Universidade Nova de Lisboa

Tuesday, 5 June 2018 14:00-15:30 Tâmega

5C: Wireless Systems

Chair: Zhiguo Ding, Lancaster University

1 A Latency Reducing Method for TDD-based High-Speed Train Communications
Junhyeong Kim, Electronics and Telecommunications Research Institute; Bing Hui, ETRI; Ilgyu Kim, Electronics and Telecommunications Research Institute; Youngnam Han, Korea Advanced Institute of Science and Technology

2 A Machine Learning-based Aerial Traffic Monitoring System
Haoran Niu, Nuria Gonzalez-Prelcic, Robert W. Heath Jr., The University of Texas at Austin

3 Low-Complexity Slot-Based Bit Loading for Multicarrier Wireless Systems
Youssef Iraqi, Arafat Al-Dweik, Khalifa University; Mohammed Kalil, IBM Canada

4 Optimal Numerology in OFDM Systems Based on Imperfect Channel Knowledge
Ljiljana Marijanovic, Stefan Schwarz, Markus Rupp, Technische Universität Wien

5 Reducing CQI Feedback Overhead by Exploiting Spatial Correlation
Samira Homayouni, Stefan Schwarz, Martin Müller, Markus Rupp, Technische Universität Wien

Tuesday, 5 June 2018 14:00-15:30 Corgo

5D: Vehicular Networks IV

Chair: Richard Fritzsche, Fraunhofer IVI

1 **A multi-radio, multi-hop ad-hoc radio communication network for Communications-Based Train Control (CBTC) with optimized frequency separation**
Jahanzeb Farooq, Siemens A/S; Lars Bro, nyantec UG; Rasmus Thystrup Karstensen, Siemens A/S; Jose Soler, DTU Fotonik

2 **Efficient Machine-type Communication using Multi-metric Context-awareness for Cars used as Mobile Sensors in Upcoming 5G Networks**
Benjamin Sliwa, Thomas Liebig, Robert Falkenberg, Johannes Pillmann, Christian Wietfeld, TU Dortmund University

3 **On the Analysis of Content Dissemination through Real Vehicular Boards**
Gonçalo Pessoa, Miguel Luís, Lucas Guardalben, Susana Sargento, Instituto de Telecomunicações - Universidade de Aveiro

4 **Vehicular Networking in the Recursive InterNetwork Architecture**
Torsten Braun, University of Bern; Davide Careglio, UPC; Ibrahim Matta, Boston University

5 **Wireless Hybrid Positioning Based on Surface Modeling with Polygon Support**
Torbjörn Wigren, Ericsson AB

Tuesday, 5 June 2018 14:00-15:30 Minho

5E: Security I

Chair: Francois Chan, Royal Military College of Canada

1 **Learning-Based Defense Against Malicious Unmanned Aerial Vehicles**
Minghui Min, Liang Xiao, Dongjin Xu, Liangfen Huang, Xiamen University; Mugen Peng, Beijing University of Posts & Telecommunications

2 **LTAMA-Algorithm: Light and Trust Anonymous Mutual Authentication Algorithm for IoT**
Sarra Jebri, Mohamed Abid, Hatem Bettahar Irescomath Unit; Ammar Bouallegue, National Engineering School of Tunis

3 **RASI: Relay-Assisted Physical-Layer Key Generation in Unmanned Aerial Vehicles**
Harshan Jagadeesh, Harshith Nagubandi, Indian Institute of Technology Delhi

4 **Reliable and Privacy-preserving Task Recomposition for Crowdsensing in Vehicular Fog Computing**
Biying Wang, Zheng Chang, University of Jyväskylä; Zhenyu Zhou, North China Electric Power University; Tapani Ristaniemi, University of Jyväskylä

5 **A Distributed User Authentication Mechanism for IETF 6TiSCH Protocol**
Hakan Aydin, Sedat Gormus, Karadeniz Technical University; Yichao Jin, Toshiba Research Europe Ltd

Tuesday, 5 June 2018 14:00-15:30 Lima

5F: Energy Efficiency II

Chair: Christos Masouros, University College London

1 **Energy Efficient Transmitter with Low Resolution DACs for Massive MIMO with Partially Connected Hybrid Architecture**
Evangelos Vlachos, Aryan Kaushik, John Thompson, University of Edinburgh

2 **Sharing the Network End-to-End Energy Consumption among Service Categories**
Wilfried Yoro, Télécom Sudparis; Mamdouh El Tabach, Taoufik Ennajjary, Orange Labs; Azeddine Gati, Orange; Tijani Chahed, Institut Mines-Telecom; Telecom SudParis

3 **Analysis of Energy and Cost Savings in Hybrid Base Stations Power Configurations**
Ali El Amine, IMT Atlantique; Hussein Al Haj Hassan, Lebanese University; Loutfi Nuaymi, IMT Atlantique

4 **An Empirical NB-IoT Power Consumption Model for Battery Lifetime Estimation**
Mads Lauridsen, Rasmus Krigslund, Aalborg University; Marek Rohr, Germán Madueno, Keysight Technologies

5 **Backhaul Aware Energy Efficiency Analysis of Cache-enabled Cellular Networks**
Congshan Fan, Zhimin Zeng, Tiankui Zhang, Beijing University of Posts and Telecommunications; Yue Chen, Queen Mary University of London

Tuesday, 5 June 2018 14:00-15:30 Cávado

5G: Wireless Services and Applications

Chair: Tomoaki Ohtsuki, Keio University

1 **Preliminary Analysis of Mobile Internet Shopping Behaviors**
Bo Zhao, GWDG and University of Goettingen; Hong Huang, Huazhong University of Science & Technology / University of Goettingen; Xinggang Wang, Xiaoming Yao, China Telecom; Jar-Der Luo, Tsinghua University; Ramin Yahyapour, GWDG and University of Goettingen; Zhenxuan Wang, Xiaoming Fu, University of Goettingen

2 **Fulfillment of Service Level Agreements via Slice-Aware Radio Resource Management in 5G Networks**
Behnam Khodapanah, Technische Universität Dresden; Ahmad Awada, Nokia Bell Labs; Ingo Viering, Nomor Research GmbH; David Öhmann, Technische Universität Dresden, Intel Deutschland GmbH; Meryem Simsek, Gerhard P. Fettweis, Technische Universität Dresden

3 **QoE-aware Video Streaming Transmission Optimization Method for Playout Threshold Adjustment in LTE**
Yan Qi, Tomoaki Ohtsuki, Keio University

4 **TAG: Real-time Immersive Content Delivery in Ultra Dense Networks with Wireless Mesh Backhaul**
Chin-Ya Huang, National Taiwan University of Science and Technology; Kaihuan Shen, National Central University

5 **WiPi: A Low-Cost Heterogeneous Wireless Testbed for Next Generation Applications**
Abdelhamid Attaby, Egypt-Japan University of Science and Technology; Moustafa Youssef, Egypt-Japan University of Science and Technology and Alexandria University

Tuesday, 5 June 2018 14:00-15:30 Foyer-1

5P: Propagation Models & Spectrum Management

Chair: Mary Weitnauer, Georgia Tech

1 **Hierarchical Fair Spectrum Sharing in CRSNs for Smart Grid Monitoring**
Sabrine Aroua, University of La Rochelle; Inès El Korbi, University of Manouba; Yacine Ghamri-Doudane, University of La Rochelle; Leila Azouz Saidane, ENSI

2 **Insights on Spectrum Sharing in Heterogeneous Networks with Small Cells**
Bruno C. Silva, Sofia Sousa, Emanuel Teixeira, Fernando J Velez, Instituto de Telecomunicações-DEM, Universidade da Beira Interior

3 **Spectrum Utility: a Novel Metric for Efficient Spectrum Usage in Next-generation Networks**
Faouzi Bouali, Klaus Moessner, University of Surrey; Michael Fitch, BT Research

4 **A Spectral Efficiency Guaranteed Caching Scheme in Small Cell Networks**
Huilin Xie, Ronghui Hou, Xidian University; King-Shan Lui, The University of Hong Kong; Hongyan Li, Xidian University

5 **A Reputation-Based Cooperative Spectrum Sensing in the Presence of Malicious Byzantine Users**
Francesco Benedetto, Pietro Coronas, Gaetano Giunta, Antonio Tedeschi, University of Roma Tre

6 **An Empirical Study of Propagation Models for Wireless Communications in Open-pit Mines**
Erika P. L. Almeida, INDT, Aalborg University; George Caldwell, Ektrum; Ignacio Rodriguez, Aalborg University; Robson. D. Vieira,

Ektrum; Troels B. Sørensen, Preben Mogensen, Aalborg University; Luis Guilherme Uzeda Garcia, Vale Institute of Technology (ITV)

7 **Propagation Model for Evaluating the Interference Between Neighboring Indoor Micro Operators**
Kimmo Hiltunen, Marja Matinmikko-Blue, University of Oulu

8 **Long-Term Performance Studies of a LoRaWAN-based PM2.5 Application on Campus**
Shie-Yuan Wang, Ji-Jhe Zou, Yo-Ru Chen, Chun-Chia Hsu, Yu-Hsiang Cheng, Chia-Hung Chang, National Chiao Tung University

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6B: Cloud RAN

Chair: Felip Riera-Palou, Universitat de les Illes Balears

1 **Cooperative Access Networks: Optimum Fronthaul Quantization in Distributed Massive MIMO and Cloud RAN**
Alister Burr, Manijeh Bashar, Dick Maryopi, University of York

2 **Energy Efficient Robust F-RAN Downlink Design for Hard and Soft Fronthauling**
Di Chen, University of Rostock

3 **Evaluation of Nonlinear Effects in a RoF SpatialMux MIMO-LTE Fronthaul System**
Carlos Mateo, Pedro L. Carro Ceballos, Paloma Garcia-Ducar, Jesus de Mingo, Iñigo Salinas, University of Zaragoza

4 **Fast phase synchronization with clustering and one-bit feedback for distributed beamforming in a wireless sensor network**
Jonghyoek Lee, Sungbok Lee, Jaehyun Park, Pukyong National University

5 **User Rate and Energy Efficiency of HetNets Based on Poisson Cluster Process**
Jiang Xinqi, Harbin Institute of Technology; Fu-Chun Zheng, Harbin Institute of Technology & The University of York

Tuesday, 5 June 2018 16:00-17:30 Tâmega

6C: Channel Coding II

Chair: Osamu Muta, Kyushu Univ.

1 **Quantized Viterbi Algorithm: Maximum Likelihood Sequence Detection for SIMO ISI Channels with Low-Precision ADCs**
Hyowon Lee, Yo-Seb Jeon, Namyoon Lee, Pohang University of Science and Technology (POSTECH)

2 **Median Based Adaptive Quantization of Log-Likelihood Ratios**
Liu Xiaoran, Jian Wang, Fanglin Gu, Jun Xiong, Jibo Wei, National University of Defense Technology

3 **Sequential use of Block Codes and Convolutional Codes in a Real-Time Multi-hop Network**
Jonas Hansen, Aalborg University; Jan Østergaard, Aalborg Universitet; Johnny Kudahl, John Hammer Madsen, Bang & Olufsen A/S

4 **Exploiting Gaussian Approximation for Non-Orthogonal Coded Access**
Yejian Chen, Bell Labs, Nokia

5 **On Superregular Matrices and Convolutional Codes with Finite Decoder Memory**
Jonas Hansen, Aalborg University; Jan Østergaard, Aalborg Universitet; Johnny Kudahl, John Hammer Madsen, Bang & Olufsen A/S

Tuesday, 5 June 2018 16:00-17:30 Corgo

6D: Vehicular Networks V

Chair: Nuria Gonzalez-Prelcic, Universidade de Vigo

1 **Forwarding Strategies for Future Mobile Smart City Networks**
Rodrigo Almeida, Rúben Oliveira, Miguel Luís, Carlos Senna, Instituto de Telecomunicações; Susana Sargento, IT - Universidade de Aveiro

2 **Cloud MIMO for Smart Parking System**
Andrey Ivanov, Stanislav Kruglik, Dmitry Lakontsev, Skolkovo Institute of Science and Technology

3 **How to Keep a Vehicular Micro Cloud Intact**
Takamasa Higuchi, Toyota InfoTchnology Center; Falko Dressler, Paderborn University; Onur Altintas, Toyota InfoTchnology Center

4 **itsSAFE: an Intelligent Transportation System for Improving Safety and Traffic Efficiency**
Allan Souza, University of Campinas; Lehilton Lelis Chaves Pedrosa, UNICAMP; Leonardo Botega, UNIVEM; Leandro Villas, Institute of Computing - University of Campinas

5 **tinyLTE: Lightweight, Ad-Hoc Deployable Cellular Network for Vehicular Communication**
Fabian Eckermann, Philipp Gorczak, Christian Wietfeld, TU Dortmund University

Tuesday, 5 June 2018 16:00-17:30 Minho

6E: Cognitive Radio

Chair: Junhui Zhao, Beijing Jiaotong Univ.

1 **Energy efficient cognitive spectrum sharing scheme based on inter-cell fairness for integrated satellite-terrestrial communication systems**
Min Jia, Ximu Zhang, Xuemai Gu, Qin Guo, Harbin Institute of Technology

2 **Performance Evaluation of Covariance Tapering for Coverage Mapping**
Ahmad Mahbubul Alam, Sana Ben Jemaa, Orange Labs; Thomas Romary, Mines Paristech

3 **Joint Bandwidth and Power Allocation of Hybrid Spectrum Sharing in Cognitive Radio**
Junhui Zhao, Qiuping Li, Beijing Jiaotong University; Yi Gong, South University of Science and Technology of China

4 **Secondary Transceiver Design for Secure Primary Transmission**
Yang Cao, Nan Zhao, Dalian University of Technology; F. Richard Yu, Carleton University; Minglu Jin, Dalian University of Technology; Yunfei Chen, University of Warwick; Victor C. M. Leung, The University of British Columbia

5 **Micro operators for ultra-dense network deployment with network slicing and spectrum micro licensing**
Marja Matinmikko-Blue, University of Oulu; Seppo Yrjölä, Nokia; Matti Latva-aho, University of Oulu

Tuesday, 5 June 2018 16:00-17:30 Lima

6F: Sensor Networks

Chair: Fumiaki Maehara, Waseda University

1 **Broadcast Cost Reduction in Wireless Sensor Networks With Instantly Decodable Network Codes**
Yimin Zhao, Song Xiao, Xidian University

2 **Change Detection of a Subset of High-dimensional Time Series Data in Sensor Networks**
Ido Nevat, TUMCREATE; Sai Ganesh Nagarajan, Singapore University of Technology and Design (SUTD), Singapore; Pengfei Zhang, Department of Engineering Science, University of Oxford, UK

3 **Iterative Message Alignment for Quantized Message Passing between Distributed Sensor Nodes**
Maximilian Stark, Jan Lewandowsky, Gerhard Bauch, Hamburg University of Technology

4 **Performance Analysis of UAVs Assisted Data Collection in Wireless Sensor Network**
Shuhang Liu, Zhiqing Wei, Zijun Guo, Xin Yuan, Feng Zhiyong, Beijing University of Posts and Telecommunications

5 **Wake-up control adapting to destination's active/sleep state for on-demand wireless sensor networks**
Naoki Tamura, Hiroyuki Yomo, Kansai University

Tuesday, 5 June 2018 16:00-17:30 Cávado

6G: Driving Assistance

Chair: Suleman Mazhar, Information Technology University

1 **Robust Detection of Anomalous Driving Behavior**
Matthias Matousek, Ulm University; Mahmoud Yassin, German University in Cairo; Ala'a Al-Momani, Rens van der Heijden, Frank Kargl, Ulm University

2 **Detecting Driver's Distracted Behaviour from Wi-Fi**
Muneeba Raja, Aalto University; Viviane Ghaderi, BMW Group Research; Stephan Sigg, Aalto University

3 **On the Use of 3-D Accelerometers for Road Quality Assessment**
Thanuka Wickramarathne, Varun Garg, University of Massachusetts Lowell; Peter Bauer, University of Notre Dame

4 **Real-time Road Anomaly Detection Using an on-board Data Logger**
Hadia Hameed, Suleman Mazhar, Naufil Hassan, Information Technology University

5 **Reduce Cognitive Burden on Drivers Through Contextualising Environments**
Daniel Cunnington, Geeth de Mel, Darren Shaw, IBM Research

Tuesday, 5 June 2018 16:00-17:30 Foyer-1

6P: mmWave Systems and Networks

Chair: Ana Garcia Armada, Universidad Carlos III de Madrid

1 **Anti-blockage Beam Training for Massive MIMO Millimeter Wave Systems**
Zhaoqiang Li, Beijing University of Posts and Telecommunications, P.R. China; Danpu Liu, Xiaoyong Wu, Beijing University of Posts and Telecommunications; Feng Yu, Huawei

2 **Ray-Based Evaluation of Dual-Polarized MIMO in (Ultra-)Dense Millimeter-Wave Urban Deployments**
Dmitrii Solomitckii, Vitaly Petrov, Tampere University of Technology; Hosein Nikopour, Mustafa Akdeniz, Intel Labs; Oner Orhan, Intel Corporation; Nageen Himayat, Intel Labs; Shilpa Talwar, Intel Corporation; Sergey Andreev, Yevgeni Koucheryavy, Tampere University of Technology

3 **Multi-User Hybrid Precoding and Decoding Design for mm-Wave Large Antenna Systems**
Osama Alluhaibi, University of Kent; Qasim Ahmed, University of Huddersfield

4 **An Experimental Demonstration of 28 GHz Band Wireless OAM-MIMO (Orbital Angular Momentum Multi-input and Multi-output) Multiplexing**
Doohwan Lee, Hirofumi Sasaki, Hiroyuki Fukumoto, Yasunori Yagi, Takana Kaho, Hiroyuki Shiba, Takashi Shimizu, NTT

5 **Positioning Data-Rate Trade-off in mm-Wave Small Cells and Service Differentiation for 5G Networks**
Gourab Ghatak, Remun Koirala, CEA Leti; Antonio De Domenico, CEA-Leti; Benoît Denis, CEA-Leti Minatec; Davide Dardari, University of Bologna; Bernard Uguen, IETR / CNRS / Université Rennes-I

6 **An energy-saving scheme with multi-hop transmission for mmWave backhaul networks**
Danfeng Meng, Xiaohui Li, Wenjuan Pu, Xu Yang, Dantao Li, Xidian University

7 **Using Coalition Games for QoS Aware Scheduling in mmWave WPANs**
Yali Chen, Yong Niu, Bo Ai, Zhangdui Zhong, Beijing Jiaotong University; Dapeng (Oliver) Wu, University of Florida

Wednesday 6 June 2018

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7A: OFDM

Chair: Jinho Choi, Gwangju Institute of Science and Technology

1 **Performance of Interleaved OFDM-IM over Frequency-Selective Fading Channels**
Jinho Choi, Gwangju Institute of Science and Technology

2 **Precoding for Spread OFDM IM**
Thien Van Luong, Youngwook Ko, Queen's University Belfast; Jinho Choi, Gwangju Institute of Science and Technology

3 **Universal Filtered OFDM with Filter Shift Keying**
Selahattin Gökceli, Ertugrul Basar, Gunes Kurt, Istanbul Technical University

4 **Reducing the Interference by Adapting the Power of OFDM for mMTC**
Kun Chen-Hu, Raquel Pérez Leal, Ana García-Armada, Universidad Carlos III de Madrid

5 **Frequency Domain Channel Estimation Schemes for PDM-Coherent Optical OFDM-QPSK-based Communication Systems**
Olutayo O. Oyerinde, University of the Witwatersrand

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7B: Cooperative Communications

Chair: Sanam Moghaddamnia

1 **Constructive Interference Beamforming for Cooperative Dual-Hop MIMO Relay Systems**
Ang Li, Christos Masouros, University College London

2 **An Angular Soft Forwarding Scheme for Wireless Cooperative Relay Networks**
Dushantha Nalin K. Jayakody, National Research Tomsk Polytechnic University; Marwa Qaraqe, Hamad Bin Khalifa University; Rui Dinis, Universidade Nova de Lisboa

3 **A Relay Selection for Dual-User Amplify-and-Forward Systems in a Dense Relay Environment**
Alberto Zanella, Alessandro Bazzi, Barbara M. Masini, CNR-IEIIT

4 **Precoder Design for Cooperative Multi-User Downlink MISO Channels with Finite Side-Link Capacity**
Krishna Chitti, Fredrik Rusek, Lund University; Tumula V. K. Chaitanya, Huawei Technologies Sweden AB

5 **Diverse Communication Modes in Cooperative Downlink Non-orthogonal Multiple Access**
Nan Li, Ming Xiao, Lars Rasmussen, KTH Royal Institute of Technology

Wednesday, 6 June 2018 11:00-12:30 Tâmega

7C: Cellular and D2D Networks

Chair: Xiaoli Chu, University of Sheffield

1 **Preference-Aware Caching Deployment Based on Cooperative Game for D2D Communication Networks**
Hongmei Fan, Tiankui Zhang, Beijing University of Posts and Telecommunications; Jonathan Loo, University of West London; Dantong Liu, Cisco Systems; Liwei Yang, China Agricultural University

2 **Indoor Distributed Antenna Systems for Multi-storey Buildings**
Temitope Alade, University of Worcester; Jiangzhou Wang, University of Kent

3 **New Topology Management Scheme in LTE and 5G Networks**
Ricardo Marco Alaez, Enrique Chirivella-Perez, Jose M. Alcaraz Calero, Qi Wang, University of the West of Scotland

4 **CDF-Based Scheduling for Uplink Non-Orthogonal Multiple Access**
Gao, Zhanyang, Waqas Tariq Toor, Hu Jin, Hanyang University

5 **Interference Analysis in Dynamic TDD System Combined or not With Cell Clustering Scheme**
Jalal Rachad, Ridha Nasri, Orange Labs; Laurent Decreusefond, Telecom Paristech

Wednesday, 6 June 2018 11:00-12:30 Corgo

7D: Vehicular Networks VI

Chair: Onur Altintas, Toyota InfoTechnology Center USA

1 **Geometry Based Channel Models with Cross- And Autocorrelation for Vehicular Network Simulations**
Christian Nelson, Lund University; Nikita Lyamin, Alexey Vinel, Halmstad University; Carl Gustafson, Fredrik Tufvesson, Lund University

2 **Coverage Expansion through Dynamic Relay Vehicle Deployment in MmWave V2I Communications**
Akihito Taya, Takayuki Nishio, Masahiro Morikura, Koji Yamamoto, Kyoto University

3 **Roadside Units Deployment in Hybrid VANETs with Synchronous Communication**
Taís Rocha Silva, João Fernando Sarubbi, Flávio Vinicius Cruzeiro Martins, Centro Federal de Educação Tecnológica de Minas Gerais

4 **Stochastic Playback Delay Upper Bounds of Vehicular Video Content Delivery Networks with Cache-Enabled RSUs**
Sangsha Fang, Pingzhi Fan, Zahid Khan, Southwest Jiaotong University

5 **Vehicle-to-Vehicle Real-time Video Transmission through IEEE 802.11p for Assisted-Driving**
João Pereira, IT - Universidade de Aveiro; Miguel Díaz-Cacho, University of Vigo; Susana Sargento, André Zúquete, IT - Universidade de Aveiro; Lucas Guardalben, Miguel Luís, Instituto de Telecomunicações

Wednesday, 6 June 2018 11:00-12:30 Minho

7E: Security II

Chair: Glauber Brante, Federal University of Technology

1 **Advanced Analytics for Connected Car Cybersecurity**
Matan Levi, Aryeh Kontorovich, Ben Gurion University of the Negev; Yair Allouche, IBM

2 **Joint Power Allocation and Match Access for Physical Security of Heterogeneous Cellular Networks**
Shiwei Yan, Yong Shang, Zhang Xiguang, Ming Zhang, Peking University

3 **Secure Communications in Hybrid Cooperative Satellite-Terrestrial Networks**
Chen Chen, Lingyang Song, Peking University

4 **Moving Relays in Downlink Multiuser Networks – a Physical-Layer Security Perspective**
Xiaowei Wang, Shanghai Maritime University

5 **Physical Layer Security Through Secure Channel Estimation**
Fawad Ud Din, Fabrice Labeau, McGill University

Wednesday, 6 June 2018 11:00-12:30 Lima

7F: Positioning Techniques II

Chair: Francesco Guidi, University of Bologna

1 **AOA Estimation with EM Lens-Embedded Massive Arrays**
Francesco Guidi, University of Bologna

2 **An Improved Method of Step Length Estimation with Inertial Sensors**
Qian Zhao, Genming Ding, Tian Jun, Lili Xie, Fujitsu Research and Development Center Co., Ltd.

3 **Gaussian Message Passing Based Passive Localization in the Presence of Receiver Detection Failures**
Weijie Yuan, Qiaolin Shi, Nan Wu, Beijing Institute of Technology; Qinghua Guo, University of Wollongong; Xiaojing Huang, University of Technology Sydney

4 **The Influence of the Fading Effect and Heterogeneous Device Problem to Wi-Fi Fingerprinting**
Doan Duong, Yaqian Xu, Klaus David, University of Kassel

5 **Using Convolutional Neural Networks for Distance Estimation between DSRC Equipped Vehicles**
Gerti Tuzi, Zeljko Medenica, Radovan Miucic, Changan US R&D Center, Inc.

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7G: Internet of Things

Chair: Shinsuke Ibi, Osaka University

1 **A New Distributed Localization Algorithm Using Social Learning based Particle Swarm Optimization for Internet of Things**
Ashish Rauniyar, Paal Engelstad, University of Oslo; Jonas Moen, Norwegian Defense Research Establishment Norway

2 **Downlink Scheduling for Narrowband Internet of Things (NB-IoT) Systems**
Ya-Ju Yu, National University of Kaohsiung; Sheng-Chia Tseng, Institute for Information Industry

3 **Guard-Time Design for Symmetric Synchronization in IEEE 802.15.4 Time-Slotted Channel Hopping**
Rasool Tavakoli Najafabadi, Majid Nabi, Twan Basten, Kees Goossens, Eindhoven University of Technology

4 **Location-Partition-Based Resource Allocation in D2D-Supported Vehicular Communication Networks**
Meiyan Wu, Chao Wang, Ping Wang, Yi Ren, Tongji University; Yusheng Ji, National Institute of Informatics

5 **Joint Autonomous Resource Selection and Scheduled Resource Allocation for D2D-based V2X Communication**
Xiaoshuai Li, Harbin Institute of Technology & Macquarie University; Rajan Shankaran, Mehmet Orgun, Macquarie University; Lin Ma, Yubin Xu, Harbin Institute of Technology

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8A: Performance Evaluation and RF Design

Chair: Michael Walter

1 **Experimental Evaluation of the Performance of CoMP Systems for Closely-Located Users Including Users' Body Influence**
Ahmad Shekhan, Sakib Bin Redhwan, Lund University; Ghassan Dahman, École de technologie supérieure (ETS); Jose Flordelis, Fredrik Tufvesson, Lund University

2 **Experimental Investigation of the Impact of BMI on Ultrawideband MIMO Body-to-Body Networks**
Seun Sangodoyin, Andreas F. Molisch, University of Southern California

3 **The Density of Millimeter Wave Access Points in Dense Urban Areas and its Effect On Link Availability in the Presence of Blocking**
Lutz Ewe, Hardy Halbauer, Nokia Bell Labs

4 **Total Array Gains of Millimeter-Wave Mobile Phone Antennas Under Practical Conditions**
Katsuyuki Haneda, Mikko Heino, Aalto University; Jan Järveläinen, Premix Group Oy

5 **Aviation Multicarrier Communication System Performance in Several 5 GHz Band Air-Ground Channels**
David Matolak, Hosseinali Jamal, University of South Carolina

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8B: mm-wave MIMO Communications

Chair: Maximo Morales-Cespedes, Universidad Carlos III de Madrid

1 **Digital Compensation Wideband Analog Beamforming for Millimeter-Wave Communication**
zhiqiang Wang, Long Cheng, Guangrong Yue, Jun Wang, University of Electronic Science and Technology of China

2 **Efficient Robust Beamforming for Downlink Transmission in Massive MIMO Systems**
Malcolm Sande, Sunil Maharaj, University of Pretoria

3 **Multi-User Frequency-Selective Hybrid MIMO Demonstrated Using 60 GHz RF Modules**
Steve Blandino, KU Leuven; Claude Desset, imec; Cheng-Ming Chen, KU Leuven; Andre Bourdoux, imec; Sofie Pollin, KU Leuven

4 **Performance Evaluation of Coordinated Multipoint Transmission at 28 GHz Frequency using 3D Ray Tracing**
Muhammad Usman Sheikh, Ritayan Biswas, Jukka Lempiainen, Tampere University of Technology

5 **Performance of Millimeter Wave Massive MIMO with the Alamouti Code**
Mohamed Alouzi, Francois Chan, Royal Military College

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8C: Detection and Channel Estimation

Chair: Fu-Chun Zheng, Southeast University

1 **Channel Estimation for Uplink SCMA Systems with Reduced Training Blocks**
Jehyun Heo, Insik Jung, Taehyung Kim, Hyunsoo Kim, Daesik Hong, Yonsei University

2 **Detection of Generalized Media-based Modulation Signals using Multi-layered Message Passing**
Manu Krishnan K., Indian Institute of Science, Bangalore; Swaroop Jacob, Cisco Systems India Private Limited; A. Chockalingam, Indian Institute of Science, Bangalore

3 **Experimental SEFDM Pipelined Iterative Detection Architecture with Improved Throughput**
Waseem Ozan, Paul Anthony Haigh, University College London; Bo Tan, Coventry University; Izzat Darwazeh, University College London

4 **LTE-Advanced Downlink Channel Estimation Under Minimum Resource Allocation With DM-RS**
Yi-Hsiang Lin, David Lin, National Chiao Tung University

5 **Performance Analysis of Single Carrier Coherent and Noncoherent Modulation under I/Q Imbalance**
Bassant Selim, Khalifa University; Sami Muhaidat, University of Surrey; Paschalis Sofotasios, Bayan S. Sharif, Thanos Stouraitis, Khalifa University; George Karagiannidis, Aristotle University of Thessaloniki; Naofal Al-Dhahir, University of Texas at Dallas

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8D: D2D and Vehicular Communications

Chair: Francois Gagnon

1 **A joint multiplexing and resource allocation algorithm for asynchronous underlay D2D communications**
Mylene Pischella, Rostom Zakaria, Didier Le Ruyet, CNAM Paris

2 **Effective Capacity Analysis of Equal Gain Diversity Combiners over Generalized Fading Channels**
K. Denia Kanellopoulou, University of Athens; Kostas Peppas, National Centre for Scientific Research 'Demokritos; P. Takis Mathiopoulos, University of Athens

3 **Markov Chain Monte Carlo Methods for a Low Complexity LTE-Advanced Joint Detector**
Rodrigo Alberto Justavino Castillo, Jan Tannich, Melanie Falk, Gerhard Bauch, Technische Universität Hamburg-Harburg

4 **On maximum D2D multiplexing in asynchronous communications**
Mylene Pischella, Rostom Zakaria, Didier Le Ruyet, CNAM Paris

5 **PDF based Exact Performance of Structured Symmetric CIODs in Generalized-K Fading MIMO Channels**
Chanho Yoon, Seungkwon Baek, ETRI

Wednesday, 6 June 2018 14:00-15:30 Minho

8E: Edge/Cloud Networking

Chair: Fernando Velez, UBI

1 **Cloudification and Autoscaling Orchestration for Container-based Mobile Network toward 5G: Experimentation, Challenges and Perspectives**
Duc-Hung Luong, Huu-Trung Thieu, Abdelkader Outtagarts, Nokia Bell-Labs France; Yacine Ghamri-Doudane, University of La Rochelle

2 **Coalition and Pricing based Data Offloading in Mobile Edge Computing**
Tian Zhang, Shandong Normal University

3 **Energy-Efficient Multicast/Unicast Edge Caching for Dense Small Cell Networks with Graph Theory**
Safa Mrad, University Tunis El Manar; Soumaya Hamouda, University of Carthage; Sunil Maharaj, University of Pretoria

4 **Full-Duplex Enabled Cloud Radio Access Network**
Arman Shojaeifard, Kai-Kit Wong, University College London; Wei Yu, University of Toronto; Gan Zheng, Loughborough University; Jie Tang, South China University of Technology

5 **Latency-Optimal Task Offloading for Mobile-Edge Computing System in 5G Heterogeneous Networks**
Guoxuan Chi, Yumei Wang, Xiang Liu, Yiming Qiu, Beijing University of Posts and Telecommunications

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8F: Energy Harvesting and Wireless Power Transfer I

Chair: Xiaoli Chu, The University of Sheffield

1 **Optimal Time Allocation in Relay Assisted Backscatter Communication Systems**
Bin Lyu, Zhen Yang, Tianyi Xie, Guan Gui, Nanjing University of Posts and Telecommunications; Fumiyuki Adachi, Tohoku University

2 **Feature Selection Framework for Multi-source Energy Harvesting Wireless Sensor Networks**
Marwa Kazdoghli Lagha, Fayçal Ait Aoudia, Matthieu Gautier, University of Rennes 1, IRISA, France; Olivier Berder, University of Rennes 1 / IRISA

3 **Layered Learning Radio Resource Management for Energy Harvesting Small Base Stations**
Marco Miozzo, Paolo Dini, CTTC/CERCA

4 **New Reconfigurable Nonlinear Energy Harvester: Boosting Rate-Energy Tradeoff**
Jong Ho Moon, Jong Jin Park, Dong In Kim, Sungkyunkwan University

5 **Throughput Maximization for UAV-Enabled Wireless Powered Communication Networks**
Lifeng Xie, Jie Xu, Guangdong University of Technology; Rui Zhang, National University of Singapore

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8G: UAVs

Chair: Benjamin Sliwa, TU Dortmund University

1 **Autonomous Power Line Inspection based on Industrial Unmanned Aerial Vehicles: An Energy Efficiency Perspective**
Zhenyu Zhou, Fei Xiong, Chen Xu, North China Electric Power University; Zheng Chang, University of Jyväskylä; Shahid Mumtaz, Institute of Telecommunication, Aveiro; Jonathan Rodriguez, University of South Wales

2 **Potential Field Based Inter-UAV Collision Avoidance Using Virtual Target Relocation**
Hasini Viranga Abeywickrama, Beeshanga Abewardana Jayawickrama, Ying He, Eryk Dutkiewicz, University of Technology Sydney

3 **Mobile relay for LTE: proof of concept and performance measurements**
Tanguy Kerdoncuff, IMT Atlantique; Thomas Galezowski, Société du Grand Paris; Xavier Lagrange, IMT Atlantique, IRISA, UBL

4 **On the Performance Analysis of Hybrid-Duplex Systems for Aeronautical Communications**
Ernest Tan, Rajendra Prasad Sirigina, Nanyang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd; A.S. Madhukumar, Nanyang Technological University

5 **Power Control and Trajectory Design for UAV-assisted Communications**
Sixing Yin, Jing Tan, Lihua Li, Zhaowei Qu, Beijing University of Posts and Telecommunications

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8P: Wireless Networks and Multiple Access

Chair: Pedro Bento, Instituto de Telecomunicações, Coimbra

1 **Design of Coordinated HeNB Deployments**
Rui R. Paulo, Fernando J Velez, Instituto de Telecomunicações-DEM, Universidade da Beira Interior; Giuseppe Piro, Politecnico di Bari

2 **A Simple Pseudo-Bayesian Backoff Algorithm for Unsaturated Slotted CSMA Systems**
Jie Liu, Miao Qu, Hu Jin, Hanyang University

3 **Optimization of irregular CoMP-aided OFDMA networks with SFR: a multiobjective approach**
Javier Pastor-Pérez, Felip Riera-Palou, Guillem Femenias, University of the Balearic Islands

4 **Regularized weighted gradient VFFRLS algorithm-based CSI Estimator for OFDM-IDMA Systems**
Olutayo O. Oyerinde, University of the Witwatersrand

5 **Wireless Fronthaul Allocation for Downlink Coordinated Transmission in Cloud Radio Access Network**
Ying Sun, Yang Wang, Harbin Institute of Technology; Ying Zhao, Guangzhou Power Supply Co.Ltd

6 **A Blind Retransmission Scheme for Ultra-Reliable and Low Latency Communications**
Renato Barbosa Abreu, Gilberto Berardinelli, Thomas Jacobsen, Aalborg University; Klaus I. Pedersen, Nokia - Bell Labs; Preben Mogensen, Aalborg University,Nokia Bell Labs

7 **Performance Analysis of Network Diversity Multiple Access with Sequential Terminal Detection and Non-Orthogonal Training Sequences**
Ramiro Robles, ISEP

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9A: Resource Allocation II

Chair: Temitope Alade, University of Worcester

1 **Spectral Efficiency and Energy Efficiency Trade-off in Cellular Networks operating over kappa-mu Shadowed Fading Channels**
Young Jin Chun, Simon L. Cotton, Queen's University Belfast; Harpreet S. Dhillon, Virginia Tech

2 **Computation Offloading with Virtual Resources Management in Mobile Edge Network**
Chuanhao Sun, Jizhe Zhou, Jingrong Liuliang, Jiaxin Zhang, Xing Zhang, Wenbo Wang, Beijing University of Posts and Telecommunications

3 **Handover Probability of Hybrid LiFi/RF-based Networks with Randomly-Oriented Devices**
Ardimas Andi Purwita, Mohammad Dehghani Soltani, Majid Safari, Harald Haas, University of Edinburgh

4 **Linear UCB for Online SON Management**
Tony Daher, Sana Ben Jemaa, Orange Labs; Laurent Decreusefond, Telecom Paristech

5 **Minimizing the impact of prediction errors during anticipatory resource allocation**
Ilaria Malanchini, Vinay Suryaprakash, Nokia Bell Labs

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9B: Multiple Access

Chair: Kenichi Higuchi, Tokyo University of Science

1 **NOMA and IDMA in Random Access Systems**
Yang Hu, City University of Hong Kong; Chongbin Xu, Fudan University; Li Ping, City University of Hong Kong

2 **Coexistence of Contention-Based General Authorized Access Networks in 3.5 GHz CBRS Band**
Reem Karaki, Amitav Mukherjee, Ericsson Research

3 **Comparison of one-shot and handshaking systems for MTC in 5G**
Jin Young Lee, Hyunjong Noh, Kyungjun Lee, Jinho Choi, Gwangju Institute of Science and Technology

4 **Half-Duplex ALOHA Systems for Low Power Wide Area Networks**
Jun-Bae Seo, Swades De, Indian Institute of Technology Delhi; Seung-Yeon Kim, Korea University

5 **Segmented Framed Slotted Aloha (SFSA) with Capture and Interference Cancellation**
Fulvio Babich, Massimiliano Comisso, University of Trieste

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9C: Experimental Analysis

Chair: Takahiro Asai, NTT DOCOMO, INC.

1 **Experimental Evaluation of Starved AP Identification and Management Schemes in Mobile Cooperative WLAN System Toward 5G**
Akiyoshi Inoki, Hirantha Abeysekera, Munehiro Matsui, Kenichi Kawamura, Yasushi Takatori, NTT; Akira Kishida, Yoshifumi Morihiro, Takahiro Asai, Yukihiko Okumura, NTT DOCOMO, INC.

2 **Experimental Validations on Self Interference Cancelled Non-Orthogonal SEFDM Signals**
Tongyang Xu, Izzat Darwazeh, University College London

3 **IEEE 802.11ax: On Hardware Impairments and Mitigation Schemes for OFDM Uplink Multi-User MIMO PHY**
Roger Hoefel, Federal University of Rio Grande do Sul

4 **Experimental Evaluation of Cryptography Overhead in Automotive Safety-Critical Communication**
Edilson Augusto Silva Junior, Paulo Freitas de Araujo-Filho, Universidade Federal de Pernambuco - UFPE; Divanilson R. Campelo, Universidade Federal de Pernambuco

5 **An Experimental Study of Factor Analysis over Cellular Network Data**
Feyzullah Kalyoncu, Engin Zeydan, Türk Telekomunikasyon A.S.; Ahmet Yildirim, Bogazici University; Ibrahim Onuralp Yigit, Türk Telekomunikasyon A.S.

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9D: HetNets II

Chair: Matthias Pätzold, Universitetet i Agder

1 **An Innovative EPC with Not Only Stack for beyond 5G Mobile Networks**
Binwei Wu, University of Electronic Science and Technology of China; Lu Ge, Jie Zeng, Tsinghua University; Xiangyun Zheng, Kuang Yujun, University of Electronic Science and Technology of China; Xin Su, Jing Wang, Tsinghua University

2 **Effect of Idle Mode Cells on the Ultra-Dense Dynamic TDD Networks**
Rui Yang, Xi Dian University; Hongguang Sun, Min Sheng, Yan Zhang, Xidian University; Jia Liu, National Institute of Informatics; Jiandong Li, Xidian University

3 **Hybrid Wired-Wireless Backhaul Solutions for Heterogeneous Ultra-Dense Networks**
Onel Luis Alcaraz López, Hirley Alves, University of Oulu; Richard Demo Souza, UFSC

4 **Pilot Allocation for Interference Coordination in Two-tier Massive MIMO Heterogeneous Network**
Wanming Hao, Osamu Muta, Kyushu University; Haris Gacanin, Nokia Bell Labs

5 **Uplink Resource Allocation for Shared LTE and SCMA IoT Systems**
Naveen Mysore Balasubramanya, Sohail Payami, Mathini Sellathurai, Heriot-Watt University

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9E: Security III

Chair: Marco Gomes, University of Coimbra

1 **DQN-based Power Control for IoT Transmission against Jamming**
Ye Chen, Yanda Li, Dongjin Xu, Liang Xiao, Xiamen University

2 **Relay Selection for Improved Security in Cognitive Relay Networks with Artifical Noise**
Shaobo Jia, Jiayan Zhang, Honglin Zhao, Yao Xu, Harbin Institute of Technology

3 **Secure Throughput Optimization of Selective Decode-and-Forward with Finite Blocklength**
Jamil Farhat, Federal University of Technology - Paraná; Glauber Brante, UTFPR; Richard Demo Souza, UFSC

4 **Secure Transmission for GPQSM System Exploiting Artificial Noise and Signal Space Diversity**
Jing Xu, Ya Zhang, Pinyi Ren, Zhenzhen Gao, Xi'an Jiaotong University

5 **Testbed Implementation and Evaluation of Interleaved and Scrambled Coding for Physical-Layer Security**
César Martins, Telmo Fernandes, Marco Gomes, João Vilela, Instituto de Telecomunicações - University of Coimbra

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9F: Energy Harvesting and Wireless Power Transfer II

Chair: Arman Shojaei Fard, University College London

1 **Intercept Probability Analysis of Wireless Powered Relay System in $kappa$-mu fading**
Furqan Jameel, Zheng Chang, Tapani Ristaniemi, University of Jyväskylä

2 **Dual Mode SWIPT: Waveform Design and Transceiver Architecture with Adaptive Mode Switching Policy**
Jong Jin Park, Jong Ho Moon, Kang-Yoon Lee, Dong In Kim, Sungkyunkwan University

3 **Secrecy Spectral Efficiency Fairness Among Multi-Cells in SWIPT-Enabled Cooperative NOMA Transmissions**
Xin Hu, Kaizhi Huang, NDSC; Jun Li, Zhongxing Telecommunication Equipment Corporation; Yajun Chen, Yunjia Xu, National Digital Switching System Engineering and Technological Center

4 **MPC for Online Power Control in Energy Harvesting Sensor Networks**
Hanan Al Tous, Imad Barhumi, Al Ain, United Arab Emirates University

5 **Performance Analysis of Wireless Powered Cellular Networks with Downlink SWIPT**
Tewodros A. Zewde, Wichita State University; Mustafa Cenk Gursoy, Syracuse University

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9G: Emerging Solutions for Vehicular Networks

Chair: Marco Miozzo

1 **A Data Analysis Methodology for Obtaining Network Slices Towards 5G Cellular Networks**
Feyzullah Kalyoncu, Engin Zeydan, Ibrahim Onuralp Yigit, Türk Telekomunikasyon A.S.

2 **Towards Semantic Object Discovery for Vehicular Named Data Networks**
Dennis Grewe, Marco Wagner, Sebastian Schildt, Arne Nordmann, Robert Bosch GmbH; Jeroen Laverman, Bosch Software Innovations GmbH

3 **Directory Service for Connected Vehicles**
Ved P. Kafle, Yusuke Fukushima, Pedro Martinez-Julia, Hiroaki Harai, National Institute of Information and Communications Technology

4 **An Adaptive Iteratively Weighted L_(1/2) Regularized Algorithm for Compressive Recovery in Vehicular Systems**
Yunyi Li, Fei Dai, Jie Zhang, Jie Yang, Guan Gui, Hikmet Sari, Nanjing University of Posts and Telecommunications

5 **On Building Realistic Reference Scenarios for IEEE 802.11p/LTE-based Vehicular Network Evaluations**
Nils Dreyer, Andreas Möller, Johannes Baumgarten, Technische Universität Braunschweig; Zeeshan Hameed Mir, Higher Colleges of Technology Fujairah; Thomas Kürner, Technische Universitaet Braunschweig; Fethi Filali, Qatar Mobility Innovations Center

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9P: Sensor Networks and Performance Analysis

Chair: Tomoaki Ohtsuki, Keio University

1 **A PCLR-GIST Algorithm for Fast Image Retrieval In Visual Indoor Localization System**
Xiliang Yin, Lin Ma, Xuezhi Tan, Harbin Institute of Technology

2 **A Novel Geometry-Based Model for Localization Based on Received Signal Strength**
Zhihe Li, Xiaofeng Zhong, Tsinghua University; Jie Wei, Beijing Jiaotong University

3 **Wireless One-Shot Polling of a Cluster of Sensors using Transmit Diversity**
Farhan Nawaz, SEECS, NUST, Islamabad, Pakistan.; Alper Akanser, Georgia Institute of Technology; Syed Ali Hassan, National University of Sciences and Technology; Mary Ann Weitnauer, Georgia Institute of Technology.

4 **Performance Analysis of Flow Assisted Diffusion based Molecular Communication for D-MoSK**
Mahendra Singh Thakur, Vimal Bhatia, Indian Institute of Technology Indore

5 **Energy Efficient Data Collection for Wireless Sensors using Drones**
Mahdi Ben Ghorbel, University of British Columbia; David Rodriguez-Duarte, Universidad Nacional de Colombia; Hakim Ghazzai, Qatar Mobility Innovations Center (QMIC); Md. Jahangir Hossain, University of British Columbia; Hamid Menouar, Qatar Mobility Innovations Center

6 **A Novel Multimedia Streaming System for Urban Rail Environments Using Wi-Fi Peer-to-Peer Technology**
Justas Poderys, Technical University of Denmark; Jahanzeb Farooq, Siemens A/S; Jose Soler, DTU Fotonik

7 **On The Construction of Neural Networks via Wireless Ad Hoc Networks**
Zhiqing Wei, Zijun Guo, Jiteng Ma, Feng Zhiyong, Beijing University of Posts and Telecommunications

8 **Optimal Energy Management of a Parallel Hybrid Truck for Fuel Consumption Comparative Study**
Bao-Huy Nguyen, University Lille 1; University of Sherbrooke; Joao Pedro Trovao, University of Usherbrooke; Ronan German, University of Lille / MEGEVH Network; Alain Bouscayrol, Université Lille1; Yves Goulet, ENER6 Inc