2020 91st IEEE
Vehicular Technology Conference

Final Program

VTC2020-Spring
ANTWERP
AI Revolution Beyond 5G Horizon

25 – 28 May 2020

Online Virtual Conference
Welcome from the General Chair

With greetings on behalf of the IEEE VTC2020-Spring Organizing Committee, I welcome you to IEEE VTC2020-Spring, and for those few who are local, to Antwerp! As you are well aware, due to the extraordinary situation produced by COVID-19, we have decided to prepare our conference in a virtual format to best keep you physically safe while still profiting from the stimulating, intellectual developments that we have in store.

Notwithstanding, communication technology today plays a critical role in our business and daily lives. Even more, it seems to be reenergized and moving ahead again at increasing pace. As we have recently observed, 5G technology has now truly taken off and we get to experience the importance of both wireless and networking technologies anew. Businesses and people have rapidly changed the way they operate and communicate with each other. This opens the door for greater potential in new research directions both by industry and by academia to address challenges that we may face in the future.

Thus, the organization of IEEE VTC2020-Spring as a virtual event will serve as a starting point for our technical discussions to continue to overcome the current difficulties during this challenging time. We will come together to focus our attention so as to inform and provide the latest research results among our community. This will be reflected in the 540+ papers, multiple keynote sessions, highly relevant tutorials, and cutting edge workshops at this conference.

The IEEE VTC event has a long and fulfilling history. Over the past many years, IEEE VTC has become well established as one of the premier conferences in the world on wireless communications. Now, IEEE VTC2020-Spring – the 91st VTC – is making digital history on its own: it will be first ever VTC to be held virtually.

Once again, welcome to our conference, and I hope you will enjoy this first ever virtual VTC!

Haris Gačanin
General Chair, IEEE VTC2020-Spring

Welcome from the TPC Co-chairs

On behalf of the Technical Program Committee, we would like to welcome you to the 91st IEEE Vehicular Technology Conference (VTC2020-Spring) that will be, for the sake of safety and health of all participants, organized in a virtual online format.

This first fully virtual edition of VTC has been able to attract an exciting technical program ranging across the latest areas of research in wireless systems and networks, connected and autonomous vehicles, both manned and unmanned, emerging trends in applications of machine learning and artificial intelligence in wireless communications, and many other emerging topics. The technical program consists of 347 outstanding papers that will be presented in 70 regular sessions as part of 12 conference tracks that comprise the IEEE VTC2020-Spring technical program. In addition, our Recent Results track attracted a large number of submissions out of which 121 high-quality contributions will be also presented, adding 25 recent results sessions to the conference program. In addition to the regular and recent results sessions, the conference will feature 12 topical workshops, 9 tutorials delivered by the leading experts in the field, and 5 extraordinary keynote speakers, four of which come from industry while one comes from the academic domain.

We would like to use this opportunity to thank all the excellent track chairs and co-chairs of the 13 tracks. They all managed to get at least 3 reviews for each paper in a short time frame, and the decision process went extremely smoothly. We would like to thank the members of the IEEE VTC2020-Spring organizing committee for their great responsiveness and support during the entire period of technical program preparation and development.

Finally, we would like to thank the authors, who always stood by in difficult times, waiting for last-minute changes and updates for the conference organization. We hope you are proud to have your work as part of this virtual edition, and still enjoy the virtual networking. We encourage you all to maximally dive into the program, and to engage with the many experts that will gather virtually. Let’s learn, interact, and enjoy!

Sofie Pollin, Dejan Vukobratovic, Osamu Muta
TPC Co-chairs, IEEE VTC2020-Spring
Welcome from the VTS President

On behalf of the IEEE Vehicular Technology Society, it is truly an honor and a pleasure to welcome all of you to our society’s semi-annual flagship conference, the 2020 IEEE 91st Vehicular Technology Conference – VTC2020-Spring. The conference also marks our first ever VTC to be held virtually.

This year’s Spring 2020 edition of the Vehicular Technology Conference series will provide attendees with a superb collection of technical paper presentations, tutorials, plenary talks, and workshops, all in a virtual format. With the current COVID-19 global health crisis, the VTS Board of Governors has decided to convert IEEE VTC2020-Spring in Antwerp, Belgium, to a fully virtual conference for the original date, 25 – 28 May 2020. We do realize that this formula will not allow to reproduce the professional networking environment that you are used to, but it will allow VTC2020-Spring to still attain a portion of its objectives. Please know that our thoughts are with those affected by the COVID-19 outbreak. The health and safety of our members, conference attendees, and volunteers is the utmost priority of our society.

It is always our intention to be flexible and helpful to everyone during this time of difficulty. VTS is fully supportive of IEEE’s mission statement and we wish you and all people success in dealing with any local challenges you may be facing. We have thus relaxed standard requirements for onsite presentation of papers for authors and provided some financial adjustments to the cost of conference attendance. VTS understands the fact that conferences are an important factor in publications of papers by graduate students and academics, in dissemination of new product and services by industry and government agencies, and in providing a networking platform for the profession. We therefore decided to make sure that we can still publish papers accepted in our major conferences so the students can graduate, and our researchers can register their novel ideas and outcomes.

Organizing a world-class conference event such as VTC2020-Spring in normal times involves a large and highly dedicated team of volunteers, and with the change from a physical to virtual conference that has even become more challenging. We are very thankful to everyone making this conference an outstanding success! I would like to sincerely thank General Chair Haris Gacanin, Technical Program Co-chairs Sofie Pollin, Dejan Vukobratovic, Osamu Muta, and the rest of the conference organizing team for their time, effort, dedication, and commitment for making VTC2020-Spring one of the premier “virtual” international conference events in vehicular technology!

I am looking forward to the end of pandemic and seeing all of you at VTC2020-Fall in Victoria, Canada, where we will be Connecting the Mobile World! Stay safe.

Abbas Jamalipour, President
IEEE Vehicular Technology Society

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Keynotes

What is Beyond 5G?
Miguel Dajer, Director, New Jersey R&D Center, Futurewei Technologies Inc

Researchers have already turned their attention to what’s beyond the current 5G standards and have started to present visions and challenges driven by perceived deficiencies of the current 5G system and by the need to continue to advance the types of services and solutions that humanity needs over the next decade. In this talk we argue that 6G will be about Cyber-Physical Systems and the need for some fundamental changes in how we approach research by increasing the dimensionality of the solutions, and focusing not just on communications research, but as important, on other non-traditional domains needed to achieve this vision.

Miguel A. Dajer is a veteran of the telecom industry having spent the last 30+ years working in different wireless technologies at Bell Laboratories, Lucent, Alcatel-Lucent and Futurewei. Mr. Dajer is currently the USA wireless R&D VP for Futurewei Technologies and Director or the Futurewei’s NJ Research Center. Mr. Dajer worked at Bell Laboratories, Lucent Technologies and Alcatel Lucent for the 25 years prior to joining Futurewei Technologies. During his tenure at the wireless labs he occupied several key positions in RAN Hardware and Software product development and life cycle management, basestation platform development, systems engineering and architecture and technology introduction of wireless products.

Envisioning Smart Mobility Society in the Connected Future
Muriel Desaeger, Technical General Manager of Technology Trend Analysis, Toyota Motor Europe, Belgium

The automotive industry is changing faster today than it has in 100 years and must reconsider what our society and customers expect from us - as automotive companies. It is not only a shift from a car manufacturing & sales company to a mobility company but also a convergence of electrification, connectivity and artificial intelligence. With these exciting advances, it is our mission to provide new mobility society. The main objectives of this session are: (1) the current state of vehicle connectivity, showing connected vehicles in major regions and how to utilize big data, and (2) our vision of the smart mobility society of the future, which is the key to realize seamless and comfortable transportation through connected vehicles with the Vehicle Control Interface and the Mobility Service Platform (MSPF).

Dr. Muriel Desaeger is currently acting as General Manager at the R&D center of Toyota Motor Europe. She is leading the Strategic Division called Technology Trends Analysis Division. This division is navigating Toyota’s Research & Innovation, deliver European originated solutions using EU knowhow, networks & anticipation of trends. Scope on which the division is acting is Big Data, Connected cars, Mobility, Decarbonisation & Societal changes. Recommendations and implementation plans are managed taking into account R&D potentials, market status and customer viewpoints. She has 25 year experience with Toyota and before acting in the current position she was General Manager of New Business Strategy, Advanced Technology Divisions and Material Engineering Division. In these positions, she developed several contacts with the European Commission, Automotive & Telecoms suppliers and also several Universities.

Key focus point has always been to enhance the complementarities between European and Japanese know-how. She is graduated as Material Science Engineer of the University of Louvain-la-Neuve and got her PhD in the field of Composite Materials at the Katholieke Universiteit Leuven (Belgium).

Edge Intelligence: The Convergence of Humans, Things, and AI
Schahram Dustdar, TU Wien, Austria

Edge AI and Human Augmentation are two major technology trends, driven by recent advancements in Edge computing, IoT, and AI accelerators. As humans, things, and AI continue to grow closer together, systems engineers and researchers are faced with new and unique challenges. In this talk, we analyze the role of Edge computing and AI in the evolution of cyber-human partnerships, and identify challenges that Edge computing systems will consequently be faced with. We take a closer look at how a cyber-physical fabric will be complemented by AI operationalization to enable seamless end-to-end Edge intelligence systems.

Prof. Schahram Dustdar is Full Professor of Computer Science heading the Research Division of Distributed Systems at the TU Wien, Austria. He also holds several honorary positions: Monash University in Melbourne, Shanghai University, Macquarie University in Sydney, and University of Groningen (RuG), The Netherlands (2004-2010). From Dec 2016 until Jan 2017 he was a Visiting Professor at the University of Seville, Spain and from January until June 2017 he was a Visiting Professor at UC Berkeley, USA. From 1999 - 2007 he worked as the co-founder and chief scientist of Caramba Labs Software AG in Vienna (acquired by Engineering NetWorld AG), a venture capital co-funded software company focused on software for collaborative processes in teams. Caramba Labs was nominated for several awards: World Technology Award in the category of Software (2001); Top-Startup companies in Austria (Cap Gemini Ernst & Young) (2002); MERCUR Innovation award of the Austrian Chamber of Commerce (2002). He is founding co-Editor-in-Chief of the new ACM Transactions on Internet of Things (ACM TIoT) as well as Editor-in-Chief of Computing (Springer). He is an Associate Editor of IEEE Transactions on Services Computing, IEEE Transactions on Cloud Computing, ACM Transactions on the Web, and ACM Transactions on Internet Technology. Dustdar is recipient of the ACM Distinguished Scientist award (2009), the IBM Faculty Award (2012), an elected member of the Academia Europaea: The Academy of Europe, where he is chairman of the Informatics Section, as well as an IEEE Fellow (2016).
5G for the Industrial IoT – What’s Next?
Andreas Mueller, Head of Communication and Network Technology, Robert Bosch, Germany

After years of research and standardization, 5G finally has become a reality. While it starts in a rather evolutionary manner – supporting mainly established consumer applications – it is widely believed that its true economic potential lies in the many new application domains being addressed by 5G, such as manufacturing, automotive, agriculture or healthcare. In this respect, the Industrial IoT is particularly promising as 5G may unlock unprecedented degrees of flexibility, productivity, versatility and usability in industrial production. With 3GPP Release 16, many important aspects required for the Industrial IoT have already been addressed, such as ultra-reliable low-latency communication, native support for LAN services, time-sensitive communication or non-public networks. Therefore, the research community should increasingly focus on the further evolution of 5G on the way to 6G. This keynote will give an overview of some of the remaining challenges in the context of 5G for the Industrial IoT and outline various directions for further improvements. This includes aspects like AI/ML for communications, a more holistic joint optimization of the communication system and the actual applications, new approaches to network management and finally the utilization of even higher frequency bands up to THz communication.

Dr. Andreas Mueller is the Head of Communication and Network Technology in the Corporate Research Department of Robert Bosch GmbH in Stuttgart, Germany. In addition to that, he is coordinating the industrial 5G activities of Bosch across the different business units. Andreas also serves as Chairman of the Board of the “5G Alliance for Connected Industries and Automation” (5G-ACIA), which has been established in order to make sure that 5G for the industrial domain becomes a success. This is done by providing a global forum for discussing related technical, regulatory and business aspects and by bringing all relevant stakeholders together. Andreas holds a German Diploma degree in Electrical Engineering as well as a M.Sc. degree in Information Technology, both from the University of Stuttgart, Germany. Furthermore, he received a Ph.D. degree in Electrical Engineering from the same university (with distinction). His Ph.D. research has focused on wireless communications and particular the further development of 4G LTE towards LTE-Advanced. During this time, he also had two extended stays as a visiting researcher at the City University of Hong Kong. In 2010, he joined Rohde & Schwarz as a Systems Engineer, developing a novel software-defined radio-based communication system for the German Armed Forces. Since 2011, he has been with Bosch in various roles, always dealing with research and innovation activities. Andreas is a frequent keynote speaker at international conferences and events, an advisor to various Federal Ministries, organizations and startups and has been one of the early pioneers of industrial 5G.

Commercial Deployment and Future of 5G
Takehiro Nakamura, General manager of 5G Laboratories, NTT DOCOMO, Japan

5G commercial deployments have been started in 2019-2020, globally. NTT DOCOMO has launched Pre-5G Commercial service from September 20, 2019 in Japan and plans to launch 5G commercial service in spring of 2020. In this presentation, overviews on network deployment, services and use cases provided in the Pre-5G and to be provided in 5G commercial are explained. Studies for requirements and technologies for further evolution of 5G including 6G has been started, already, in our industry and academia. NTT DOCOMO’s views and activities on these topics are also provided.

Takehiro Nakamura joined NTT Laboratories in 1990. He is now SVP and General Manager of the 5G Laboratories in NTT DOCOMO, Inc. Mr. Nakamura has been engaged in the standardization activities for the W-CDMA, HSPA, LTE/LTE-Advanced and 5G at ARIB in Japan since 1997. He has been the Acting Chairman of Strategy & Planning Committee of 5G Mobile Communications Promotion Forum(SGMF) in Japan since October 2014. Mr. Nakamura has also been contributing to standardization activities in 3GPP since1999, including as a contributor to 3GPP TSG-RAN as chairman from April 2009 to March 2013. He is also very active in standardization of C-V2X/Connected Car in ARIB and ITS Info-communications Forum in Japan. He is now a leader of Cellular System Task Group of ITS Info-communications Forum.

Edge Computing: The Driver Behind the Wheel of 5G-Connected Cars
Dario Sabella, Senior Manager Standards and Research, Intel

The talk will start from an overview of Multi-access edge computing (MEC) technology, from standards to open source and industry groups, with focus on automotive perspective. Special attention will be dedicated to Intel perspective and activities in 5GAA (5G Automotive Association), with particular reference to recent demonstration activities and delivery of predictive-QoS information through MEC, as key enabler for many advanced C-V2X services.

Dario Sabella works for Intel as Senior Manager Standards and Research, acting also as company delegate of the 5GAA (5G Automotive Association). In his role within Next Generation Standards division, Dario is driving new technologies and edge cloud innovation for the new communication systems, involved in ecosystem engagement and coordinating internal alignment on edge computing across SDOs and industry groups, in support of internal and external stakeholders/customers. In 2019 he has been appointed as ETSI MEC vice-chairman. Previously he was serving as MEC Secretary and Lead of Industry Groups, and from 2015 as Vice Chairman of ETSI MEC (Mobile Edge Computing) IEG. Prior to February 2017 he worked in TIM (Telecom Italia group), in the Wireless Access Innovation division, as responsible in various TIM research, experimental and operational activities on OFDMA technologies (WiMAX, LTE, 5G), cloud technologies (MEC) and energy efficiency (for energy saving in TIM’s mobile network). From 2006 he was involved in many international projects and technological trials with TIM’s subsidiary companies (ETECSA Cuba, TIM Brasil, Telecom Argentina). Since joining TIM in 2001, he has been involved in a wide range of internal and external projects (including FP7 and H2020 EU projects), often with leadership roles. Author of several publications (40+) and patents (20+) in the field of wireless communications, radio resource management, energy efficiency and edge computing, Dario has also organized several international workshops and conferences.
Tutorials

A range of tutorials will be held given by experts from industry and academia.

T1: Computing in Communication Networks
Fabrizio Granelli, University of Trento, Italy, Frank H. P. Fitzek, Technische Universität Dresden, Germany

A big step lies ahead, when moving from today's 4G cellular networks to tomorrow's 5G network. Today, the network is used for content delivery, e.g., voice, video, data. Tomorrow, the 5G network (and possibly beyond that) will be fully softwareized and programmable, with new degrees of freedom. The aim of the tutorial is to illustrate how the emerging paradigms of Software Defined Networking and Network Function Virtualization will impact on the development of future systems and networks, both from the theoretical/formal as well as from the practical perspective. The tutorial will provide a comprehensive overview of the individual building stones (software-defined networking; network function virtualization; information-centric networks) enabling the concept of computing in future networks, starting from use cases and concepts over technological enablers (Mininet; Docker) and future innovations (machine learning; network coding; compressed sensing) to implementing all of them on personal computers. Practical hands-on activities will be proposed, with realistic use cases to bridge theory and implementation by several examples, through the usage of a pre-built Virtual Machine (ComNetEmu) that can be easily extended for new experiments. The instructions to download the Virtual Machine will be provided to the attendees in advance of the event. The main objective of the tutorial will be to expose attendees to the most recent technologies in the field of networking and teach them how to use them in a real setup in the "hands-on" session. A related book written by the two presenters “Computing in Communication Networks” will be published in 2020 by Elsevier, and provide in-depth description of the concepts and hands-on activities presented in the tutorial, to enable interested attendees to learn additional details and more examples on the reviewed technologies.

Fabrizio Granelli is Associate Professor at the Dept. of Information Engineering and Computer Science (DISI) of the University of Trento (Italy). From 2012 to 2014, he was Italian Master School Coordinator in the framework of the European Institute of Innovation and Technology ICT Labs Consortium. He was Delegate for Education at DISI in 2015-2016 and he is currently member of the Executive Committee of the Trentino Wireless and Optical Testbed Lab. He was IEEE ComSoc Distinguished Lecturer for 2012-15 and IEEE ComSoc Director for Online Content in 2016-17. Prof. Granelli is IEEE ComSoc Director for Educational Services for 2018-19 and coordinator of the research and didactical activities on computer networks within the degree in Telecommunications Engineering. He was advisor of more than 80 B.Sc. and M.Sc. theses and 8 Ph.D. theses. He is author or co-author of more than 200 papers published in international journals, books and conferences in networking, with particular reference to performance modeling, cross-layering, wireless networks, cognitive radios and networks, green networking and smart grid communications.

Frank H. P. Fitzek is a Professor and chair of the communication networks group at Technische Universität Dresden coordinating the 5G Lab Germany. He received his diploma (Dipl.-Ing.) degree in electrical engineering from the University of Technology - Rheinisch-Westfälische Technische Hochschule (RWTH) - Aachen, Germany, in 1997 and his Ph.D. (Dr.-Ing.) in Electrical Engineering from the Technical University Berlin, Germany in 2002 and became Adjunct Professor at the University of Ferrara, Italy in the same year. In 2003 he joined Aalborg University as Associate Professor and later became Professor. He co-founded several start-up companies starting with acticom GmbH in Berlin in 1999. He has visited various research institutes including Massachusetts Institute of Technology (MIT), VTT, and Arizona State University. In 2005 he won the TRP award for the work on MIMO MDC and received the Young Elite Researcher Award of Denmark. He was selected to receive the NOKIA Champion Award several times in a row from 2007 to 2011. In 2008 he was awarded the Nokia Achievement Award for his work on cooperative networks. In 2011 he received the SAPERAUDEyeResearch grant from the Danish government and in 2012 he received the Vodafone Innovation price. His current research interests are in the areas of wireless 5G communication networks, mobile phone programming, network coding, cross layer as well as energy efficient protocol design and cooperative networking.

T2: Sensing and Communications for Vehicular Systems
Nuria Gonzalez Prelicc, University of Vigo, Spain and University of Texas, Austin, USA

Automated driving exploits multiple sensing modalities including millimeter wave radar, computer vision, not to mention wireless communication and satellite navigation. The objective of this tutorial is to provide an overview of sensing and communications in vehicular systems. The perspective taken is that of signal processing and physical layer communications. The emphasis will be placed on (1) explaining the role for communications as vehicular automation levels increase (2) describing the operations of radar, lidar, and cameras, and fusion including mention of classic algorithms and the state-of-the-art (3) describing efforts such as SGAA and 3GPP, and technical challenges related to millimeter wave vehicular communications. There will be high level introductions to important concepts in vehicular systems coupled with specific examples of how signal processing and communication tools are used to solve key problems. References to classic work and state-of-the-art algorithms will be included to provide perspective on open problems.

Nuria Gonzalez Prelicc is an Associate Professor in the Signal Theory and Communications Department, University of Vigo, Spain (on leave) and a visiting professor at the Electrical Computing Engineering Department, The University of Texas at Austin. Her main research interests include signal processing theory and signal processing for wireless communications: filter banks, compressive sampling and estimation, multicarrier modulation, channel estimation, and MIMO processing for millimeter wave communications, including 5G at millimeter wave. In the last 4 years she has published around 70 papers in the topics of compressed sensing theory and its applications to millimeter wave and massive MIMO communications. She is an Editor for the IEEE Transactions on Wireless Communications and an Area Editor for the IEEE Signal Processing Magazine. She is a member of the IEEE Sensor Array and Multichannel Signal Processing Technical Committee. She has been the founder director of the Atlantic Research Center for Information and Communication Technologies (atlantTICs) at the University of Vigo from July 2008 to January 2017. She is the assistant director of UT SAVES, a research center that addresses the challenges of wireless, networking, and sensing in vehicular systems.

T4: Drone Cellular Communications: From Theory to Real Networks
Giovanni Geraci, Universitat Pompeu Fabra, Spain

As we head towards a pervasive digital transformation aiming at more efficient, automated, and flexible processes, a growing number of tasks are being delegated to machines. Drones—a.k.a. UAVs—, the most mobile of them all, are the logical candidates to take over many such missions.

What will it take for drones—and the whole associated ecosystem—to take off? Arguably, infallible command and control channels for safe and autonomous flying, and high-throughput links for multi-purpose live video streaming. Meeting these aspirations may entail a full cellular support, provided through 5G-and-beyond hardware and software upgrades by both operators and UAV manufacturers.

Will current cellular networks suffice to meet the demanding UAV communication link requirements? Or should the operators, primarily catering to ground users, implement substantial upgrades? In this one-of-a-kind industrial tutorial, well founded answers to such—and many other—key questions will unfold as we discuss:

- Outside the classroom: a fresh look at the 3GPP standardization status, field measurements, and exciting videos of UAVs
- Enabling 5G-and-beyond network-connected UAVs through massive MIMO, cell-free, and ultra-dense small cell deployments: lessons learnt and essential guidelines
- UAV-to-UAV communications in the sky, what will it take?

Giovanni Geraci is an Assistant Professor at UPF Barcelona (Spain), where he leads a research project on drone communications. He earned a Ph.D. from the UNSW Sydney in 2016, and the Telecom and Computer Science (DISI) of the University of Trento in 2011, the Young Elite Researcher Award of Denmark. He was awarded the Vodafone Innovation price. His current research interests are in the areas of wireless 5G communication networks, mobile phone programming, network coding, cross layer as well as energy efficient protocol design and cooperative networking.
T5: Ambient Backscatter Communication: State-of-the-Art and Beyond
Riku Jantti, Aalto University, Finland

The Internet of Things (IoT) is now arguably one of the most heavily discussed and researched topics in the technology industry, and has the potential of completely revolutionizing how we work and how we live. Future success and sustainability of IoT depends greatly on the ability of devices to communicate using very little power without incurring additional costs on wireless energy. This issue has driven significant attention towards (ambient) backscatter communication systems, as a possible solution to leverage green IoT applications and to increase capacity for future wireless networks. This tutorial contains two parts in order to provide participants with broad and comprehensive overviews of ambient backscatter communication technology which has been considered as one of the emerging and breakthrough wireless technologies. The first half of the tutorial covers the motivation, basic principles, the state-of-the-art of (ambient) backscatter communications, and modulation schemes. The second half covers the receiver design issues, fundamental performance limits, and future works.

Riku Jantti is an Associate Professor (tenured) in Communications Engineering and the head of the Department of Communications and Networking at Aalto University School of Electrical Engineering. He received his M.Sc. (with distinction) in Electrical Engineering in 1997 and D.Sc. (with distinction) in Automation and Systems Technology in 2001. Prior to joining Aalto (TKK) in August 2006, he was professor pro term at the Department of Computer Science, University of Vaasa. Currently, he still holds docentship at University of Vaasa. Prof. Jantti is a senior member of IEEE, an associate editor of IEEE Transactions on Vehicular Technology, and an IEEE Vehicular Technology Society Distinguished Lecturer (Class 2016). The research interests of Prof. Jantti include radio resource control and optimization for machine type communications, cloud based radio access networks, spectrum and co-existence management, RF Inference, ambient backscatter communication, and quantum communications.

T6: Security and Privacy for V2X Communications
Yi Qian, University of Nebraska-Lincoln, USA

In recent years, vehicular networks have been considered as a promising solution to achieve better traffic management and to improve driving experience of a driver. Vehicular networks can provide many services to facilitate road safety for vehicles and traffic management, e.g., on-road traffic information exchange and location based services. Dedicated Short Range Communications (DSRC) are specifically designed for vehicle-to-everything (V2X) communications in vehicular networks, and recently the cellular network has shown great potential to support vehicular networks with better performance and more applications. Due to the wireless nature of V2X communications, how to secure V2X communications and guarantee privacy of users are great challenges which hampered the implementation of vehicular networks. Many solutions have been proposed by researchers in last two decades. In this tutorial, we present a comprehensive survey on the state-of-the-art solutions concerning security and privacy for V2X communications. For security, detailed discussions on cryptography based schemes and trust based schemes are provided. For privacy, we summarize and compare general solutions in preserving identity privacy and location privacy. As another candidate for vehicular networks, cellular based V2X communications have shown many advantages over DSRC, and the oncoming fifth generation cellular technology are going to provide more possibilities to vehicular networks. Thus, security architectures and solutions for cellular based communications are also illustrated and discussed. Finally, we summarize the remaining challenges and point out future research directions.

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

Prof. Qian received the Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award in 2011, the Holling Family Distinguished Teaching Award in 2012, the Holling Family Distinguished Teaching/Advising/Mentoring Award in 2018, and the Holling Family Distinguished Teaching Award for Innovative Use of Instructional Technology in 2018, all from University of Nebraska-Lincoln. In the recent years, he has been a frequent speaker on many topics in his research areas in various venues and forums, as a keynote speaker, a tutorial presenter, and an invited lecturer.

T7: Reinforcement Learning for Optimization of Wireless Systems: Methodology, Exploration and Optimization
Haris Gacanin, Nokia Bell Labs, Belgium

This tutorial discusses technology and opportunities to embrace artificial intelligence (AI) in the design of autonomous wireless systems. We aim to provide readers with motivation and general AI methodology of autonomous agents in the context of self-organization and information unifying sensing, perception, reasoning and learning. We discuss differences between training-based and training-free AI methodology for both matching and dynamic problems, respectively. Finally, we introduce the conceptual functions of autonomous agent with knowledge management. Finally, a practical case study is given to illustrate the applicability and potential gains.

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 physical (L1) and media access (L2) layer technologies and network architectures. He has more than 200+ publications (journals, conferences and patents) and invited/tutorial talks, to achieve and hosted several tutorials and industry panels at IEEE conferences. He is VTS distinguished lecturer and senior member of the IEEE and IEICE.

T8: NOMA: Rate-Splitting and Robust Interference Management
Bruno Clerckx, Imperial College London, UK

This tutorial argues that to efficiently cope with the high throughput, reliability, heterogeneity of Quality-of-Service (QoS), and massive connectivity requirements of future multi-antenna wireless networks, multiple access and multiuser communication system design need to depart from the two extreme interference management strategies, namely fully treat interference as noise (as commonly used in 5G, MU-MIMO, CoMP, Massive MIMO, millimetre wave MIMO) and fully decode interference (as in NOMA).

In this tutorial, we depart from those two extremes and introduce the audience to a general and powerful transmission framework based on Rate-Splitting (RS). RS relies on the split of messages and the non-orthogonal transmission of common messages decoded by multiple users, and private messages decoded by their corresponding users. This enables RS to partially decode interference and partially treat the remaining interference as noise, and therefore softly bridge and reconcile the two extreme strategies of fully decode interference and treat interference as noise. As a result, RS provides a unified and flexible framework for the design and optimization of non-orthogonal transmission, multiple access, and interference management strategies.
This tutorial is dedicated to the theory, design, optimization and applications of RS and demonstrates the significant benefits in terms of spectral/energy efficiencies, reliability and robustness to Channel State Information imperfections over conventional strategies used in 5G (multi-user MIMO, massive MIMO, CoMP, mmwave MIMO) and NOMA, in a wide range of deployments, network loads (underloaded, overloaded), services (unicast, multicast) and systems (terrestrial and satellite).

The tutorial will give the audience a comprehensive introduction of the state-of-the-art development in rate splitting theory and applications in the wireless communication and signal processing society.

Bruno Clerckx is a Reader, the Head of the Wireless Communications and Signal Processing Lab, and the Deputy Head of the Communications and Signal Processing Group, within the Electrical and Electronic Engineering Department, Imperial College London, London, U.K. He received the M.S. and Ph.D. degrees in applied science from the Université Catholique de Louvain, Louvain-la-Neuve, Belgium, in 2000 and 2005, respectively. From 2006 to 2011, he was with Samsung Electronics, Suwon, South Korea, where he actively contributed to 4G (3GPP LTE/LTE-A and IEEE 802.16m) and acted as the Rapporteur for the 3GPP Coordinated Multi-Point (CoMP) Study Item. Since 2011, he has been with Imperial College London, first as a Lecturer from 2011 to 2015, then as a Senior Lecturer from 2015 to 2017, and now as a Reader. From 2014 to 2016, he also was an Associate Editor with Korea University, Seoul, South Korea. He also held various long or short-term visiting research appointments at Stanford University, EURECOM, National University of Singapore, The University of Hong Kong, Princeton University and The University of Edinburgh.

He has authored two books, 180 peer-reviewed international research papers, and 150 standards contributions, and is the inventor of 75 issued or pending patents among which 15 have been adopted in the specifications of 4G standards and are used by billions of devices worldwide. His research area is communication theory and signal processing for wireless networks. He has been a TPC member, a symposium chair, or a TPC chair of many symposia on communication theory, signal processing for communication and wireless communication for several leading international IEEE conferences. He is an elected member of the IEEE Signal Processing Society SPCom Technical Committee. He served as an editor for the IEEE Transactions on Communications from 2011 to 2015 and the IEEE Transactions on Wireless Communications from 2014 to 2018, and is currently an editor for the IEEE Transactions on Signal Processing. He has also been a (lead) guest editor for special issues of the EURASIP Journal on Wireless Communications and Networking, the IEEE Access and the IEEE Journal on Selected Areas in Communications. He was an editor for the 3GPP LTE-Advanced Standard Technical Report on CoMP.


Marco Di Renzo, CNRS & CentraleSupelec, France

Small cells, massive MIMO, millimeter-wave communications are three fundamental technologies that will spearhead the emergence of 5G wireless networks – Their advantages are undeniable. The question is, however, whether these technologies will be sufficient to meet the requirements of future wireless networks that integrate communications, sensing, and computing in a single platform.

Wireless networks, in addition, are rapidly evolving towards a software-defined design era, where every part of the network can be configured and controlled via software. In this optimization process, however, the wireless environment itself – the medium or channel – is generally assumed uncontrollable and often an impediment to be reckoned with. For example, signal attenuation limits the network connectivity, multi-path propagation results in fading phenomena, reflections and refractions from objects are a source of uncontrollable interference.

Recently, a new concept called reconfigurable intelligent surfaces (RISs) has emerged wherein every environmental object is coated with man-made intelligent surfaces of configurable electromagnetic materials. These materials would contain integrated electronic circuits and software that enable control of the wireless medium. Thus, RISs enable communication operators to sculpt the very medium that comprises the network. With the aid of RISs, wireless networks will not be designed anymore to adapt themselves to the environment, but the environment will become part of the optimization space. As such, RISs have the potential to fundamentally change how wireless networks are designed and usher in that hoped-for wireless future. But, RISs are not currently well-understood.

Marco Di Renzo was born in L’Aquila, Italy, in 1978. He received the Laurea (cum laude) and Ph.D. degrees in electrical engineering from the University of L’Aquila, Italy, in 2003 and 2007, respectively, and the Habilitation a Diriger des Recherches (Doctor of Science) degree from University Paris-Sud, France, in 2013. Since 2010, he has been with the French National Center for Scientific Research (CNRS), where he is a CNRS Research Director (CNRS Professor) in the Laboratory of Signals and Systems (L2S) of Paris-Saclay University – CNRS, CentraleSupelec, Unîv Paris Sud, Paris, France. He serves as the Editor-in-Chief of IEEE Communications Letters, and as an Editor of IEEE Transactions on Communications, and IEEE Transactions on Wireless Communications. He is a distinguished lecturer of the IEEE Vehicular Technology Society and IEEE Communications Society, and a senior member of the IEEE. He is a recipient of several awards, including the 2013 IEEE–COMSOC Best Young Researcher Award for Europe, Middle East and Africa, the 2010 NoE-NEWCOM+ Best Paper Award, the 2014–2015 Royal Academy of Engineering Distinguished Visiting Fellowship, the 2015 IEEE Jack Neubauer Memorial Best System Paper Award, the 2015–2018 NSERC Award for Excellence in Research and P&.D. Supervision, the 2016 MSCA Global Fellowship (declined), the 2017 SEE–IEEE Alain Glavieux Award, the 2018 IEEE/COMSOC Young Professional in Academia Award, and 8 Best Paper Awards at IEEE conferences (2012 and 2014 IEEE CAMAD, IEEE VTC2013–Fall, 2014 IEEE-ATC, 2015 IEEE ComManTel, 2017 IEEE SigTelCom, EAI 2018 INDSCOM, IEEE ICC 2019). He is a highly cited researcher according to Clarivate Analytics (2019).

The following tutorials have been cancelled:

T3: Internet of Vehicles: When Edge Computing and Learning Meet Intelligent Transport Systems

Yan Zhang, University of Oslo, Norway

Workshops

W1: Terahertz Communication for Future Wireless Systems

We are now entering the beyond fifth generation (B5G) mobile communications era. It is widely agreed that B5G network should achieve greater system capacity (> 1000 times) in terms of data rate (terabits per second) and user density (the Internet of Things and Nano-Things). Also, it is generally accepted that there are three major ways to obtain several orders of increase in throughput gain, those being extreme densification of infrastructure, large quantities of new bandwidth, and a large number of antennas, allowing a throughput gain in the spatial dimension. These processes are complementary in many respects. Among others, in the search for more bandwidth beyond microwave and millimeter-wave (mmWave) systems, we are moving toward higher frequencies, especially in the promising terahertz (THz) frequency range. THz-band communication is envisioned as a key wireless technology to satisfy real-time traffic demand for mobile heterogeneous network (MHN) systems by diminishing the spectral scarcity and capacity limitations of current wireless systems. The THz band is the spectral band that spans the frequencies between 0.1 THz and 10 THz. Although the
frequency regions immediately above and below this band (the microwaves and the far-infrared regime, respectively) have been considerably investigated, this is still one of the least explored frequency bands for MHNs, mainly due to the lack of THz technology. However, many recent advancements are enabling practical THz communications systems; thus, it is time for the wireless research community to conquer THz.

Organizer:
Kazi Huq, University of South Wales

Technical Program Committee:
Christos Politis, Kingston University
Tasos Dagiuklas, University Of Patras
Valerio Frascolla, Intel

Anwer Al-Dulaimi, EXFO
Muddesar Iqbal, London South Bank University
Jonathan Rodriguez, Instituto de Telecomunicacoes
Shahid Mumtaz, Instituto de Telecomunicacoes
Ifiok Otung, University of South Wales
Zhenyu Zhou, North China Electric Power University

Papers

1250274
1 Hybrid Precoding Techniques for THz Massive MIMO in Hotspot Network Deployment
Sherif Busari, Shahid Mumtaz, Instituto de Telecomunicacoes, Aveiro; Jonathan Rodriguez, University of South Wales

1249386
2 Indoor-to-Outdoor Path Loss Measurements in an Aircraft for Terahertz Communications
Johannes M. Eckhardt, Tobias Doeker, Thomas Kürner, Technische Universität Braunschweig

1249600
3 SHINE (Strategies for High-frequency INdoor Environments) with Efficient THz-AP Placement
Rohit Singh, Douglas Sicker, Carnegie Mellon University

W2: Emerging Blockchain Technology Solutions for Real-world Applications (EBTSA)

This workshop opens a forum to present the recent research work related to blockchain-based technologies, e.g. smart contracts, threat and attack models, and incentive mechanisms. Moreover, research on other aspects inherently present in blockchain-based applications, like the Internet of Things, smart grid, e-health, logistics, etc. are also invited in this workshop.

This workshop has papers focusing on theoretical analysis, emerging applications, novel system architecture construction and design, experimental studies, and social impacts of blockchain.

General Co-chairs:
Ramesh Ramadoss, Co-Chair of IEEE Blockchain Initiative
Keping Yu, Waseda University, Japan

Steering Committee:
Raja Jurdak, Queensland University of Technology
Qun Jin, Waseda University
Zhong Chen, Peking University
William Zhang, Lead Security Architect of World Bank Group
Chunming Rong, Chair of IEEE CS STC on Blockchain, University of Stavanger

Keynote & Panel Co-chairs:
Claudio Lima, Co-Founder of Blockchain Engineering Council
Nicolas Herbaud, Paris 1 Panthéon-Sorbonne University

Publicity Co-chairs:
Keping Yu, Waseda University
Di Zhang, Zhengzhou University

TPC Co-chairs:
Andreas Veneris, University of Toronto
Min Luo, Ernst & Young
Cyril Onwubiko, Chair, IEEE UK & Ireland Blockchain Group
Zhen Wen, Waseda University
Zhenyu Zhou, North China Electric Power University

Papers

1249868
1 A Blockchain-based Trusted Service Mechanism for Crowdsourcing System
Tan Liang, Huan Xiao, Xinglin Shang, Sichuan Normal University; Yong Wang, University of Ottawa; Feng Ding, State University of New York Albany; Wenjuan Li, The Hong Kong Polytechnic University/Technical University of Denmark

1249728
4 Blockchain based Power Transaction Asynchronous Settlement System
Xin Qi, Keping Yu, Zheng Wen, San Hlaing Myint, Yutaka Katsuyama, Toshio Sato, Kiyohito Tokuda, Takuro Satoh, Waseda University

1249954
5 Blockchain-based Content-oriented Surveillance Network
Xin Qi, Keping Yu, Zheng Wen, San Hlaing Myint, Yutaka Katsuyama, Toshio Sato, Kiyohito Tokuda, Takuro Satoh, Waseda University
Adverse road weather conditions and air pollution are challenging for human drivers, urban population and for automated vehicles. To reach the safety, comfort and efficiency benefits of Cooperative, Connected and Automated Mobility, vehicles need to sense road conditions and see beyond the fog and/or rain wall. In addition, existing solutions for road weather services are limited in their scope and are mostly limited by: i) scalability, ii) their offline nature, and iii) high latencies. Therefore, there is the need of integrated solutions that can take the most benefits from a real-time analysis of the data gathered from weather and pollution sensing technologies and provide an on-time appropriate reaction to the end user and/or to the automated vehicles. This objective requires a higher level of intelligence to be integrated into the sensing and communication infrastructures, with decentralized aggregation and decision for robust and timely decisions to be taken.

The recent development of C-ITS standards based on a common ITS station communication architecture is an opportunity for a new generation of solutions, taking advantage of the integration of roadside units and road weather/pollution stations, vehicle’ data, road weather sensors and ultimately the mobile device data from each handheld device from the road’ users. Dedicated sensors embedded in vehicles can also report pollution level to build high-resolution dynamic maps accounting both weather and pollution, besides all other data already available in such maps.

**Workshop Organisers:**
*Andrei Birdici, Oana Orza, Adrian Pasat, Beia Consult International*
*Laurent Morin, François Bodin, IRISA - University of Rennes 1; Emilie Germetz, Neovia Innovation*
*Nadjib Aitsaadi, Université de Versailles Saint-Quentin-en-Yvelines, France*

**Program**

**Keynotes**
- **1 Security In Connected Vehicle Deployments**
  William Whyte, Senior Director, Technical Standards at Qualcomm Technology Inc, USA
- **2 Vehicular Data for Real-Time Road Weather Services**
  Peter Hellinckx, University of Antwerp – imec, Belgium
- **3 Upgrading Road Weather Forecasts Using Car Sensor Data**
  Sylvain Watelet, with Joris Van den Bergh and Maarten Reyniers, Royal Meteorological Institute, Belgium

**Papers**

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<td>1249552</td>
<td>Air Quality and MObility Extensible Sensor Platform</td>
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<td>1249477</td>
<td>Intelligent Transport Systems - Road weather information and forecast system for vehicles</td>
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<td>1249412</td>
<td>PMs concentration forecasting using ARIMA algorithm</td>
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<tr>
<td>1249003</td>
<td>Towards Detection of Road Weather Conditions using Large-Scale Vehicle Fleets</td>
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**W4: Artificial Intelligence Driven Emerging Solutions, Protocols and Technologies for Reliable, Scalable and Energy-efficient Future Generation Networks**

It is expected that there will be an expansion of traffic volume due to the increased number of connected devices, i.e., 50 billion internet-connected devices by the year 2020. The fifth generation (5G) wireless communication networks is currently attracting extensive research interest from both industry and academia. It is widely agreed that in contrast to 4G, 5G should achieve 1000 times the system capacity, 10 times the spectral efficiency, higher data rates (i.e., the peak data rate of 10 Gb/s and the user experienced rate of 1Gb/s), 25 times the average cell throughput, 5 times reduction in end-to-end (E2E) latency and 100 times connectivity density. Meanwhile, International Telecommunication Union (ITU) has classified 5G services into enhanced mobile broadband (MB), ultra-reliable and low-latency communications (URLLC), and massive machine type communications (MTC) with a high variability of their performance attributes. The Exabyte flood is further complemented with the challenges of provisioning robust and reliable interconnectivity for MTCs. The demand for such machine type communication is fueled through the emerging need of all-connected societies to derive innovative transformations across various vertical sectors.

The 5G and beyond networks aims to combine several unique technological solutions such as: Higher frequency communications (mmWave), Massive MIMO systems, device/user and content centric communication, M2M communication, energy harvesting and wireless power transfer, cooperative communications and network coding. These underline key targets can be achieved via appropriate combination of these technological ingredients. These emerging areas brings the promise of enabling flexible, scalable, highly configurable and reliable network functions as well as complete solutions for future 5G mobile networks. These enabling technologies
can support massive peak data rates, however, delivering these data rates for E2E services while maintaining reliability and ultra-low-latency to support emerging applications and use cases will require rethinking all layers of the protocol stack as outlined in the recent activities of the third generation partnership project (3GPP).

**Workshop Organisers:**
- Haris Pervaiz, Lancaster University
- Muhammad Ali Imran, University of Glasgow
- Christos Politis, Kingston University
- Anish Jindal, Lancaster University
- Deepak G C, Kingston University
- Yusuf Sambo, University of Glasgow

**Technical Program Committee:**
- Toktam Mahmoodi, Kings College London
- Jonathan Rodriguez, Instituto de Telecomunicaciones
- Ayman Radwan, Instituto de Telecomunicaciones
- Qammer Abbasi, University of Glasgow
- Zilong Liu, University of Surrey
- Syed Ali Raza Zaidi, University of Leeds

**Papers**

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<tr>
<td>1249098</td>
<td>1 Deep Learning Based Diversity Combining for Generic Noise and Interference</td>
<td>Imtiaz Ahmed, Evan Allen, Marshall University</td>
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<td>1249050</td>
<td>2 Optimal Beam Separation in Auxiliary Beam Pair-based Initial Access in mmWave D2D Networks</td>
<td>Sadaf Nawaz, Syed Ali Hassan, NUST</td>
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<tr>
<td>1248810</td>
<td>3 Optimal Resource Allocation via Machine Learning in Coordinated Downlink Multi-Cell OFDM Networks under Imperfect CSI</td>
<td>Yunan Guo, Harbin Institute of Technology (Shenzhen); Fu-Chun Zheng, Harbin Institute of Technology (Shenzhen) &amp; The University of York; Jingjing Luo, Harbin Institute of Technology (Shenzhen); Xiaoming Wang, Nanjing University of Posts and Telecommunications</td>
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**W5: Technology Trials and Proof-of-Concept Activities for 5G Evolution & Beyond 5G 2020 (TPoC5GE 2020)**

The 5th generation (5G) cellular communication systems are just launched in 2019. New technology concepts for the next generation mobile communications including 5G Evolution and Beyond 5G (B5G) are about to be investigated in many research entities. On top of that, research and development activities are about to be initiated. In these regards, this workshop is aiming to provide opportunities to present the latest trials and the proof-of-concept activities for next generation mobile communications. Distinguished speakers from industry as well as from academia will present their latest research and development results and will prove their perspective regarding the new directions of mobile communications. Through the discussion at the workshop, it is also expected to promote the exchange of new ideas among researchers.

**Workshop Organiser:**
- Tomoaki Ohtsuki, Keio University

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<tr>
<td>1249630</td>
<td>2 Two Millimeter-Wave Base Station Cooperation Technologies in High-Mobility Environments for 5G Evolution</td>
<td>Tatsuki Okuyama, Satoshi Suyama, Nobuhide Nonaka, Yukihiko Okamura, Takahiro Asai, NTT DOCOMO, INC.</td>
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<td>1249138</td>
<td>3 Spectrum Occupancy Prediction Exploiting Time and Frequency Correlations Through 2D-LSTM</td>
<td>Mehmet Ali Aygül, Mahmood Nazal, Istanbul Medipol University; Ali Riza Ekti, Balikesir University; Ali Gorcin, Yildiz Technical University; Daniel Benedix da Costa, Federal University of Ceara (UFF); Hasan Fehmi Ateş, Huseyin Arslan, Istanbul Medipol University</td>
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**Program**

**Session I**
- Chair: Tomoaki Ohtsuki, Keio University
- Keynote: 5G Evolution and Beyond
  - Erik Dahlman, Ericsson Research

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**Session II**
- Chair: Yukitoshi Sanada, Keio University

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<th>Paper ID</th>
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2 Field Experimental Trial of Dynamic Mode Switching for 5G NR-V2X Sidelink Communications towards Application to Truck Platooning
Manabu Mikami, Yoshikazu Ishida, Kohei Serizawa, Kohei Moto, Hideya Nishiyori, Hiwo Yoshino, SoftBank Corp.

3 Low Latency Interference Cancellation for Uplink URLLC Repetition Transmission
Osamu Nakamura, Yasuhiko Hamaguchi, Sharp Corporation; Takumi Takahashi, Seiichi Sanpe, Osaka University

4 Performance of FDE Using Partial LDPC Coding with Double Gray Mapping for Single-Carrier LOS-MIMO
Kana Aono, Bin Zheng, Mamoru Sawahashi, Tokyo City University; Norifumi Kamiya, NEC Corporation

W7: Ultra-Dense Heterogeneous Wireless Networks for Beyond 5G Applications
Nowadays, the rapid growth of various wireless communication services has led to an explosion of wireless data traffic. For the beyond 5G applications, the continued progress in user companion devices equipped with advanced computational intelligence and rich communication capabilities, such as smart phones, high-end wearables, connected vehicles is required to effectively serve the exponentially growing demand in the future wireless networks. Today, in order to satisfy these requirements, the ultra-dense heterogeneous wireless networks which refers to the idea of densifying both the mobile devices and base stations (BSs), where the density of BSs may exceed that of mobile devices is one of the promising architectures. Beyond 5G wireless networks will have greatly increased density and scale compared to current networks, resulting in massive interaction between nodes. The conventional networking paradigm will be severely limited by interference in these scenarios, greatly reducing efficiency. Centralized resource and interference management approaches might cause a huge overhead. Therefore, the novel solutions are demanded in ultra-dense heterogeneous wireless networks to satisfy the traffic requirements of the extremely high number of nodes for beyond 5G applications.

Workshop Organisers:

Papers

Keynote:
WPNC for Massive MIMO: Benefits and Challenges
Leila Musavian, The University of Essex, United Kingdom

1 End-to-End Energy Efficiency Evaluation for BSG Ultra Dense Networks
Yu Fu, Heriot-Watt University; Mohammad Dehghani Soltani, Hamada Alshaer, University of Edinburgh; Cheng-Xiang Wang, Southeast University; Majid Safari, The University of Edinburgh; Stephen McLaughlin, Heriot-Watt University, Harald Haas, University of Edinburgh

2 Frequency Allocation Based on Angle-of-Arrival for Downlink User Selection in 5G MU-MIMO Heterogeneous Network
Ahmad Fadel, IRISA

3 Layer division multiplexing for 5G DL transmission within ultra-dense heterogeneous networks
Md Shantanu Islam, Mohammad N. Patwary, Roger Tait, Birmingham City University; Evtim Peytchev, Nottigham Trent University

4 Learning-Based Joint User-AP Association and Resource Allocation in Ultra Dense Network
Zhipepeng Cheng, Xiamen University; Minghui Li Wang, University of Western Ontario; Ning Chen, Hongyue Lin, Zhibin Gao, Lianfen Huang, Xiamen University

5 Non-Recursive Channel Prediction for TDD Massive MIMO Systems
Yasser Ahmed, Cairo University

6 Performance Analysis for NOMA with M-QAM Modulation
Huawei Jia, Leila Musavian, University of Essex

7 PHY-MAC MIMO Precoder Design for Sub-6 GHz Backhaul Small Cell
Abdelrah Chehr, University of Ottawa

8 Variational Auto-encoders application in wireless Vehicle-to-Everything communications
Mutaseem Q. Hamdan, Khaiham Hamdi, University of Manchester

W8: The 9th International Workshop on High Mobility Wireless Communications (HMWC) 2020
Future mobile communication systems aim at providing very high-rate data transmission, even under high speed 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 management, synchronization, estimation and equalization, anti-Doppler spread techniques, coding and network capacity, capacity-approaching techniques, dedicated network architectures, distributed antenna techniques etc. In addition, with the development of vehicular networks, more rigorous performance requirements (e.g., ultra-low latency and ultra-high reliability) are also required for advanced driving applications such as platooning, full automated driving, collective perception of environment and so on, which makes the research and development of wireless systems more challenging. The aim of the International Workshop on High Mobility Wireless Communications (HMWC) is to foster fruitful interactions among communication engineers, information theorists, and system designers interested in high mobility wireless communications, building successful collaborations and bridging the gap between theory and practice.

Organisers:
Pingzhi Fan, Southwest Jiaotong University
Shanzhi Chen, China Information Communication Technologies

Technical Program Committee Co-chairs:
Bo Yang, Shanghai Jiaotong University
Ning Zhang, Texas A&M University at Corpus Christi
Monica Barbara Nicoli, Politecnico di Milano
Papers

1250066
1 A Cluster-based Data Offloading Strategy for High Definition Map Application
Yunzhu Wu, Yan Shi, Zixuan Li, Beijing University of Posts and Telecommunications; Shanzhi Chen, China Academy of Telecommunication Technology (CATT)

1249790
2 A Cooperative RSU Caching Policy for Vehicular Content Delivery Networks in Two-Way Road with a T-junction
Sangshia Fang, Zahid Khan, Pingzhi Fan, Southwest Jiaotong University

1249750
3 A Decentralized Car-Sharing Control Scheme Based on Smart Contract in Internet-of-Vehicles
Qihao Zhou, Yang Zhe, Beijing University of Posts and Telecommunications; Kuan Zhang, University of Nebraska–Lincoln; Kan Zheng, Jie Liu, Beijing University of Posts and Telecommunications

1249780
4 A Distributed Driving Decision Scheme Based on Reinforcement Learning for Autonomous Driving Vehicles
Jie Liu, Long Zhao, Kan Zheng, Qihao Zhou, Beijing University of Posts and Telecommunications

1249686
5 A Semi-Distribution Congestion Control Algorithm for Event-Driven M2M Communications
Liu Yang, Southwest Jiaotong University; Heng Liu, Key Lab of Information Coding and Transmission; Pingzhi Fan, Li Hao, Cong Ouyang, Southwest Jiaotong University

1249842
6 A Sequence-based Automatic Gain Control mechanism for the Physical Channels in NR-V2X
Shilei Zheng, Rui Zhao, Li Zhao, Xiaotao Ren, Jinling Hu, China Academy of Telecommunication Technology; Yan Shi, Beijing University of Posts and Telecommunications

1249866
7 A Vehicle Density based Two-Stage Resource Management Scheme for 5G-V2X Networks
Fakhar Abbas, Gang Liu, Pingzhi Fan, Zahid Khan, Muhammad Saleh Bute, Southwest Jiaotong University

1249722
8 Analysis for Rank Distribution of BATS Codes under Time-Variant Channels
Lin Tang, Southwest Jiaotong University; Heng Liu, Key Lab of Information Coding and Transmission; Liu Yang, Zheng Ma, Southwest Jiaotong University; Ming Xiao, KTH

1249856
9 Design and Evaluation of Synchronization Signals for NR-V2X Sidelink
Jinling Hu, Xiaotao Ren, Rui Zhao, Li Zhao, Shilei Zheng, China Academy of Telecommunication Technology (CATT); Yan Shi, Beijing University of Posts and Telecommunications

1250066
10 Design of Conformance Testing System for C-V2X Standard Protocol
Yuming Ge, China Academy of Information and Communications Technology; Qingsong Xie, Chongqing University; Rundong Yu, China Academy of Information and Communications Technology; Jianchao Ma, Neusoft Corporation; Qingwen Han, Chongqing University; Qian Zhang, Neusoft Corporation

1249850
11 Double-Layer Game Based Wireless Charging Scheduling for Electric Vehicles
Tian Wang, Bo Yang, Cailian Chen, Shanghai Jiao Tong University

1249732
12 Energy Efficient Relay in UAV Networks Against Jamming: A Reinforcement Learning Based Approach
Weihang Wang, Xiaozhen Lu, Sichong Liu, Liang Xiao, Xiamen University; Bo Yang, Shanghai Jiao Tong University

1250074
13 EP-based Detection for Uplink OFDM-IDMA with Carrier Frequency Offsets
Yun Chen, Yue Xiao, University of Electronic Science and Technology of China

1249692
14 Multi-Armed Bandit Based Task Offloading By Probabilistic V2X Communication in Vehicle Edge Cloud System
Jiayou Xie, Qi Si, Tang Yuliang, Xiamen University

1249698
15 Network Selection in Heterogeneous Vehicular Network: A One-to-Many Matching Approach
Qi Si, Zhipeng Cheng, Yuhui Lin, Lianfen Huang, Tang Yuliang, Xiamen University

1249010
16 Repair Delay Performance Analysis of Mobile Caching Systems Using Erasure Codes
Wancheng Lu, Harbin Institute of Technology (Shenzhen)

1249474
17 Sensor and Map-Aided Cooperative Beam Tracking for Optical V2V Communications
Matija Brambilla, Dario Tagliaferri, Monica Barbara Nicoli, Umberto Spagnolini, Politecnico di Milano

1249700
18 UAV-assisted Online Video Downloading in Vehicular Networks: A Reinforcement Learning Approach
Zheng Ke, Yanglong Sun, Lin Zhiping, Tang Yuliang, Xiamen University

1249726
19 Wireless Resource Pre-allocation for Cellular V2I Low-Latency Communications
Mingyu Zhang, Jianxin Zhang, Xing Tang, Tang Yuliang, University of Xiamen
W9: 6th International Workshop of CorNer: Communication for Networked Smart Cities

The aim of this workshop is to bring together a group of experts with interest in emerging smart cities related areas. The recent advancement in smart cities has boosted the development of a new generation of highly-efficient mobile networks. This workshop will highlight the recent developments in this evolving area.

Organisers:
Syed Ali Hassan, National University of Sciences and Technology, Pakistan
Dushantha Nalin K Jayakody, Tomsk Polytechnic University, Russia
Rui Dinis, Universidade Nova of Lisbon, Portugal

Technical Program Committee:
Syed Hassan Ahmed, University of Central Florida
Tadashi Matsumo, Japan Advance Institute of Science and Technology
Des McLernon, University of Leeds
Keivan Navaei, Lancaster University
Aamir Mehmood, Mid Sweden University
Ali Imran, Okanagan University
Sajid Saleem, National University of Sciences and Technology

Papers
1249756
1 A Cost Efficient Fair Pricing Scheme for LowEnergy Consumers of Networked Smart Cities
Syed Muhammad Mohsin, COMSATS University Islamabad, Pakistan; Nouman Ashraf, Waterford Institute of Technology; Sheraz Aslam, Cyprus University of Technology; Hassaan Khalil Qureshi, NUST; Iqra Mustafa, Cork Institute of Technology; Muhammad Asaad Cheema, NUST; Muhammad Bilal Qureshi, SZABIST

1249716
2 An energy-aware distributed open market model for UAV-assisted communications
Rafay Iqbal Ansari, Kingston University; Nouman Ashraf, Waterford Institute of Technology; Christos Politis, Kingston University

1246998
3 Budget Feasible Roadside Unit Allocation Mechanism in Vehicular Ad-Hoc Networks
Xiaohua Xu, Kennesaw State University; Shubing He, Zhejiang University; Meng Han, Reza M. Parizi, Kennesaw State University; Gautam Srivastava, Brandon University

1249358
4 Community-based “Piggy-back Network” utilizing Local Fixed & Mobile Resources supported by Heterogeneous Wireless & AI-based Mobility Prediction
Yozo Shoji, Wei Liu, Yoshito Watanabe, NICT

W10: 1st IEEE Workshop on Spectrum Access in Autonomous Vehicle Ecosystem (SAVE 2020)

The technical community is quickly coming to the realization that wireless connectivity is a necessary ingredient for the future of autonomous vehicles in terms of this revolutionary technology to reach the level of reliability and functionality needed to operate on public streets and highways en masse. Many of the future road applications that will be based on autonomous vehicles, such as platooning, will absolutely require wireless connectivity in order to support the control loop, sensors information sharing, and inter-car communications need to successfully achieve complex operations. However, it is unclear whether sufficient wireless spectral bandwidth exists to support these sort of communications, which could potentially require hundreds of megahertz of frequency; in the United States and other countries around the world, only 75 MHz of licensed vehicular communications spectrum exists at 5.9 GHz, which may suffer extreme channel congestion, especially with high density road traffic and significant wireless connectivity. The workshop will bring together experts in Vehicular Dynamic Spectrum Access (VDSA), experts in autonomous vehicle technology, and individuals interested in learning more about this cutting-edge topic to address a range of practical issues with respect to wireless connectivity for autonomous vehicles and provides insights on how to resolve this problems in order to create a viable VDSA network for the autonomous vehicle ecosystem.
Workshop Organisers:
Alexander Wyglinski, Worcester Polytechnic Institute
Adrian Kliks, Poznań University of Technology
Pawel Sroka, Poznań University of Technology
Pawel Kryszkiewicz, Poznań University of Technology

Papers

Keynote Talk
Omar Altintas, Toyota North America R&D

1  Autonomous Vehicles in Underground Mines, Where We Are, Where We Are Going?
Abdellah Chehri, University of Ottawa

2  Capacity and Coverage Analysis of High Altitude Platform (HAP) Antenna Arrays for Rural Vehicular Broadband Services
Kayode Popoola, David Grace, Tim Clarke, University of York

3  Distributed Vehicular Dynamic Spectrum Access for Platooning Environments
Pawel Sroka, Pawel Kryszkiewicz, Michal Sybis, Adrian Kliks, Poznan University of Technology; Kuldeep S. Gill, Alexander Wyglinski, Worcester Polytechnic Institute

1249672 4  Effects of Interference on Beamforming-Enabled Vehicular Networks in Multipath Propagation Environments
Nivetha Kanthasamy, Alexander Wyglinski, Raghvendra V. Cowlagi, Worcester Polytechnic Institute

1249784 5  Influence of Sensor Inaccuracies and Acceleration Limits on IEEE 802.11p-Based CACC Controlled Platoons
Michal Sybis, Marcin Rodziewicz, Krzysztof Wesołowski, Poznan University of Technology

1248750 6  Spectrum Sensing Based on Parallel CNN-LSTM Network
Mingdong Guo, Zhendong Yin, Mingyang Wu, Zhilu Wu, Yanlong Zhao, Zhenlei Gao, Harbin Institute of Technology

W11: STRIVE 2020: Third Intl. Workshop on Safety, security, and privacy in automotive systems

The introduction of Information and Communications Technologies (ICT) systems into vehicles make them more prone to cyber-security attacks. Such attacks may impact on vehicles capability and, consequently, on the safety of drivers, passengers. Indeed, the strong integration between dedicated ICT devices, the physical environment, and the networking infrastructure, leads to consider modern vehicles as Cyber-Physical Systems. This workshop aims at providing a forum for researchers and engineers in academia and industry to foster an exchange of research results, experiences, and products in the automotive domain from both a theoretical and practical perspective. Its ultimate goal is to envision new trends and ideas about aspects of designing, implementing, and evaluating innovative solutions for the Cyber-Physical Systems with a particular focus on the new generation of vehicles. Indeed, the automotive domain presents several challenges in the fields of vehicular network, Internet of Things, Privacy, as well as, Safety and Security methods and approaches. The workshop aims at presenting the advancement on the state of art in these fields and spreading their adoption in several scenarios involving main stockholders of the automotive domain.

Workshop Organiser:
Gianpiero Costantino, Italian National Research Council

Program

Session I: Cybersecurity
Chair: Gianpiero Costantino

Opening Welcome from the Workshop Organizers
Paul Duplys

Keynote: Automotive Safety and Security Automation: Challenges and Opportunities
Paul Duplys

1  ANTARES – Anonymous Transfer of vehicle Access Rights from External cloud Services
Adriana Berdich, Alfred Anistoroaei, Bogdan Groza, Horatiu Gurban, Stefan Murvay, Daniel Iercan, Politehnica Timisoara

2  Evaluation of Cyber Security in Digital Avionic Systems
Klaus Kainrath, Martin Frühmann, Klaus Gebeshuber, University of Applied Sciences; Erich Leitgeb, Technical University of Graz; Mario Gruber, FH Joanneum Graz, University of Applied Sciences

1249134 3  Early Analysis of Security Threats by Modeling and Simulating Power Attacks in SystemC
Josef Treus, Paula Herber, University of Münster

Closing by the Workshop Organizers

W12: Decentralized Technologies and Applications for IoT (D’IoT) 2020

The D’IoT workshop 2020 will focus on technology advancements and applications of the decentralized technologies aka blockchain for IoT and big data, including theories and applications of Big Data Analytics for IoT, Decentralized applications for Healthcare informatics under IoT, security and privacy in IoT using decentralized techniques, next generation decentralized applications for IoT, Decentralized IoT applications in Smart cities, Decentralized applications for FoG and Edge computing driven IoT, Visions on Decentralized Trustless Systems for IoT, and others. The workshop is concerned with inter-disciplinary and cross-domain studies spanning a variety of areas in computer science including
enriched IoT data management on Blockchain, mobile computing, information extraction and retrieval, and security, as well as other disciplines such as management information science.

Organisers:

Sandeep Pirbhulal, University of Beira Interior, Portugal  
Wei Xiang, James Cook University, Australia  
Ali Hassan Sodhro, Linkoping University, Sweden

Keynote Speakers:

Nuno M. Garcia, University of Beira Interior  
Azzedine Boukerche, University of Ottawa

Technical Program Committee:

Luo Zongwei, Southern University of Science and Technology  
Gunasekaran Manogaran, University of California, Davis  
Nuno Pombo, University of Beira Interior  
Neeraj Kumar, Thapar Institute of Engineering and Technology  
Muhammad Muzammal, Bahria University, Islamabad  
Eshrat e alahi, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

Papers

1249734  
1 Towards QoE Optimization in Medical Multimedia Services for Decentralized IoT-based Applications  
Ali Hassan Sodhro, Linkoping University

1247686  
2 Multithread Optimal Offloading Strategy Based on Cloud and Edge Collaboration  
Yifan Zhu, Zhanyang Wang, Zhuo Han, Nana Li, Shouyi Yang, Zhengzhou University

1247484  
3 Optimal Cloud Resource Scheduling in Smart Grid: A Hierarchical Game Approach  
Hang Gao, Weiwei Xia, Feng Yan, Lianfeng Shen, Southeast University

1249008  
4 Degraded Read Coding Scheme in Heterogeneous Distributed Cloud Storage System for Internet of Things Data  
Xianfan Sun, Harbin Institute of Technology, Shenzhen

1249146  
5 LABVS: Lightweight Authentication and Batch Verification Scheme for Universal Internet of Vehicles (UIoV)  
Himani Sikarwar, Ankur Nahar, Debasis Das, Indian Institute of Technology Jodhpur Rajasthan

1249682  
6 Exploring Lattice-based Post-Quantum Signature for JWT Authentication: Review and Case Study  
Abdolmaged Alkhulaifi, El-Sayed M. El-Alfy, King Fahd University of Petroleum and Minerals

1250124  
7 Non-Cooperative Spectrum Allocation Based on Game Theory in IoT-Oriented Narrowband PLC Networks  
Abdellah Chehri, University of Ottawa

VTC2020-Spring Program

Track 1: Signal Processing for Wireless Communications

1A: 5G Networks and Systems

1245494  
1 A Low Complexity Baseband Signal Compression for Data Transport in LTE-A and NR Systems  
Sungyoon Cho, Joohyun Do, Inhyoung Kim, Min Goo Kim, Samsung Electronics

1250116  
2 Frequency and Time Spreading for Uplink URLLC Transmission  
Shang-Ho Tsai, Chia-Hsin Lai, National Chiao Tung University; Xu-Sheng Li, MediaTek Inc.

1247562  
3 Interference Distribution Prediction for Link Adaptation in Ultra-Reliable Low-Latency Communications  
Alessandro Brighente, Università degli studi di Padova; Jafar Mohammadi, Paolo Baracca, Bell Labs, Nokia

1247350  
4 Modulated Spur Interference Cancellation for LTE-A/5G Transceivers: A System Level Analysis  
Christian Motz, Thomas Paireder, Mario Huemer, Johannes Kepler University Linz

1249798  
5 Pilot Spacing Adaptation in OFDM for a Flexible Next Generation Waveform  
Zaid Khan, Center for Advanced Research in Engineering; Muhammad Danish Nisar, Center for Advanced Studies in Engineering (CASE)

1B: OFDM

1249030  
1 Constant-Amplitude OFDM for Wireless Communication Systems  
Yuyuan CHANG, Yingqing Liu, Kazuhiko Fukawa, Tokyo Institute of Technology

1249788  
2 Iterative Cancellation for Inter-Block-Interference on LDPC coded MIMO-OFDM Systems  
Masakazu Kizawa, Tetsushi Ikegami, Meiji University

1249802  
3 Parallelly Processed Peak Cancellation Signal-Based PAPR Reduction Method Using Null Space in MIMO Channel for MIMO-OFDM Signals  
Taku Suzuki, Mikihito Suzuki, Tokyo University of Science; Yoshihisa Kishiyama, NTT DOCOMO, INC.; Kenichi Higuchi, Tokyo University of Science

1250378  
4 Spectral Encapsulation to Block the Out-of-Band Emission of OFDM Signals for Future Communications  
Myungsup Kim, Do Young Kwak, KAIST; Ki-Man Kim, Korea Maritime and Ocean University; Wan-Jin Kim, Agency for Defence Development; Jiwon Jung, Korea Maritime and Ocean University

1C: Detection and Channel Estimation

1250224  
1 Expectation Maximization (EM)-based Joint Channel Estimation and Symbol Detection in Doubly Selective Block Transmission Systems  
Manjeer Majumder, IIT Kanpur; Amrita Mishra, DSPM International Institute of Information Technology; Aditya K. Jagannatham, Indian Institute of Technology Kanpur
1247490
2 Iterative Reweighted Approach for Multiuser Detection with Multiple Measurement Vector in MTC Communications
Xiaoxa Zhang, Li Hao, Pingzhi Fan, Southwest Jiaotong University; Jiaqi Liu, Linxiaoa Yang, University of Electronic Science and Technology of China
124874
3 Loopback Transceiver Self-Calibration Design for Wideband RF Impairments
Juin-Horng Deng, Chia-Fang Lee, Yuan Ze University
1247392
4 LDPC Coded Non-Recursive GMSK System with Quasi-Coherent Demodulation
Mengmeng Liu, Zhongyang Yu, Qingya Lu, B. Bai, Min Zhu, Xidian University
1248828
5 Self-interference Cancellation Utilizing Superposition Modulation Technique for Single Carrier Full-duplex System
Shuzhi Liu, Keichi Mizutani, Kyoto University; Takeshi Matsumura, National Institute of Information and Communications Technology; Hiroshi Harada, Kyoto University
1D: Modulation and Coding
1250002
1 Differential Modulation for Buffer-Aided Cooperative Relaying using Priority-Based Link Selection
Ashish Kant Shukla, Indian Institute of Technology Delhi; Manav R Bhattacharya, IIT Delhi
1249392
2 Implementation of MCS Incorporating 1024-QAM and Beam-Based Transmission in 3D-BF
Yuji Omura, Fumiyuki Kemmochoi, Kento Fujisawa, Hiroyuki Otaka, Kogakuin University
1249182
3 Practical Polar Code Construction Over Memoryless Impulse Noise Channels
Der-Feng Tseng, Ying-Dai Lin, National Taiwan University of Science and Technology
1249220
4 Spinal Codes over BSC: Error Probability Analysis and the Puncturing Design
Aimin Li, Harbin Institute of Technology(Shenzhen); Shaohua Wu, Harbin Institute of Technology; Ying Wang, Jian JIAO, Harbin Institute of Technology (Shenzhen); Zhang Qinyu, Harbin Institute of Tech.
1249714
5 Soft Decision Decoding in Mod Pulse Telemetry System
Andrey Ivanov, Dmitry Lakontsev, Skolkovo Institute of Science and Technology; Alexey Fisenko, Alexander Ushakov, IIS Geomash
1E: MIMO Systems I
1246864
1 A State-space Approach for MIMO Channel Tracking in SC-FDE Transmissions
Pedro Pedrosa, Instituto de Telecomunicações; Daniel Castanheira, University of Aveiro; Adão Silva, DETI / Instituto de Telecomunicações / University of Aveiro; Rui Dinis, Universidade Nova de Lisboa; Attilio Gameiro, Universidade Aveiro
1247340
2 Non-coherent rate-splitting for multibeam satellite forward link: practical coding and decoding algorithms
Nele Noels, Ghent University/IMEC; Marc Moeneclaey, UGent; Tomás Ramírez, UVigo; Carlos Mosquera, University of Vigo, Spain; Marius Caus, Adriano Pastore, CTC
1248524
3 Nonlinearities Impact on Massive MIMO Millimeter Wave Hybrid Systems
Sara Teodoro, Universidade de Aveiro; Adão Silva, DETI / Instituto de Telecomunicações / University of Aveiro; Rui Dinis, Universidade Nova de Lisboa; Attilio Gameiro, Universidade Aveiro
1249906
4 Robust Non-Coherent Beamforming for FDD Downlink Massive MIMO
François Rottenberg, Ming-Chun Lee, Thomas Choi, University of Southern California; Charlie Zhang, Samsung; Andreas F. Molisch, University of Southern California
1F: MIMO Systems II
1247644
1 Damping Factor Learning of BP Detection with Node Selection in Massive MIMO using Neural Network
Junta Tachibana, Tomoaki Ohtsuki, Keio University
1248666
2 Spatial Interference Alignment Relying on Limited Precoding Matrix Feedback Indices
Steven Peng, Central China Normal University; Wei-Lv, Air Force Early Warning Academy; Liang–Zhong, China University of Geoscience; Zhengmin–Kong, Wuhan University
1248480
3 Doppler Resilient Orthogonal Time-Frequency Space (OTFS) Systems Based on Index Modulation
Yu Liang, Lingjun Li, Pingzhi Fan, Southwest Jiaotong University; Guan Yong Liang, Nanyang Technological University
1247342
4 MIMO Full-Duplex Transceiver Design In The Presence of Phase Noise
Xin Quan, Southwest Jiaotong University; Ying Liu, University of Electronic Science and Technology of China; Pingzhi Fan, SWJTU; Youxi Tang, University of Electronic Science and Technology of China
1247922
5 Transceiver Design for Large-scale DAS with Network Assisted Full Duplex
Xinjiang Xia, Pengcheng Zhu, Jiamin Li, Dongming Wang, Southeast University; Yuanxue Xin, Hohai University; Xiaohu You, Southeast University
1G: MIMO Systems III
1249456
1 Data-Aided LS Channel Estimation in Massive MIMO Turbo-Receiver
Alexander Osinsky, Andrey Ivanov, Dmitry Lakontsev, Roman Bychkov, Dmitry Yarotsky, Skolkovo Institute of Science and Technology
1249676
2 High Performance Interference Suppression in Multi-User Massive MIMO Detector
Andrey Ivanov, Alexander Osinsky, Dmitry Lakontsev, Dmitry Yarotsky, Skolkovo Institute of Science and Technology
1249298
3 High Reliability Downlink MU-MIMO: NewOSTBC Approach and Superposition Modulated Side Information
Nora Boulaïouane, Nandana Rajatheva, Matti Latva-aho, University of Oulu
1249916
4 Memory-assisted Statistically-ranked RF Beam Training Algorithms for Sparse MIMO
Krishan Kumar Tiwari, Fraunhofer IZM, Berlin; John Thompson, University of Edinburgh; Eckhard Grass, IIHP, Germany and HU, Berlin
1249984
5 MIMO User Rate Balancing In Multicell Networks with Per Cell Power Constraints
Imène Ghannia, Dirk T.M. Slock, EURECOM; Yi Yuan-Wu, Orange Labs
6 Precoder Design Algorithm using Spatial Signal Synthesis with Multiple Antenna Subset Selection for Hybrid MIMO System
Daichi Tamate, Yukitoshi Sanada, Keio University

1H: mmWave Systems I

1245886
1 A Multi-User High Accuracy Beam Training Algorithm For MmWave Communication
Quan Wan, Jun Wang, Zihan Tang, Tsinghua University

1245128
2 A novel approach to emulate and detect packet loss on surveillance radar channels
Roman Raekow, Deutsche Flugsicherung GmbH; Michael Kuhn, University of Applied Sciences Darmstadt; Bernd Ludwig Wenning, Cork Institute of Technology

1248082
3 Hybrid Precoding and Combining Algorithm for Reduced Complexity and Power Consumption Architectures in mmWave Communications
João Pedro Pavia, Nuno Souto, Marco Ribeiro, Instituto de Telecomunicações/ISCTE-IUL; Joao Silva, ISCTE; Rui Dinis, Universidade Nova de Lisboa

1247782
4 Impact of Wrong Beam Selection on Beam Pair Scanning Method for User Discovery in mmWave Systems
Edith Ghunney, Georgia Institute of Technology; Syed Ali Hassan, National University of Sciences and Technology; Mary Ann Wettnauer, Georgia Institute of Technology.

1248230
5 Performance Analysis of Adaptive Modulation for Millimeter Wave Cellular Systems
Khaled Humadi, Wei-Ping Zhu, Concordia University; Wessam Ajib, University of Quebec at Montreal

1L: mmWave Communications

1247944
1 A PLNC Approach for K-pair-user Exchanging in Two-Tier HetNets with mmWave Wireless Backhaul
Weixia Zou, Sixuan Chen, Beijing University of Posts and Telecommunications

1248848
2 An Initial Access Optimization Algorithm for millimeter Wave 5G NR Networks
Indika Perera, Manoshka Kappuruhanny Badalage, Nandana Rajatheva, Matti Latva-aho, University of Oulu

1249550
3 Cross-Bearing based Positioning as a Feature of 5G Millimeter Wave Beam Alignment
Karsten Heimann, Janis Tiemann, Stefan Boecker, Christian Wietzfeld, TU Dortmund University

1250130
4 mmWave Radar-based Hand Gesture Recognition using Range-Angle Image
Jih-Tsun Yu, Li Yen, Po-Hsuan Tseng, National Taipei University of Technology

1249674
5 Transmitter IQ Imbalance Pre-Compensation for mm-wave Hybrid Beamforming Systems
Rachit Mahendra, Saif Khan Mohammed, Ranjan K. Mallik, IIT Delhi

1J: Multicarrier Systems

1247196
1 Highly efficient TIBWB-OFDM waveform for broadband wireless communications
Filipe Conceição, Marco Gomes, Instituto de Telecomunicações - University of Coimbra; Vitor Silva, University of Coimbra; Rui Dinis, Universidade Nova de Lisboa

1247024
2 Impact of Interference on OFDM based Radars
Hasan Can Yildirim, Université Libre de Bruxelles; Jerome Louveaux, Université Catholique de Louvain; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles

1248722
3 Multiple Objective Optimization of OSBE and ISI for Cyclic Prefix Free DFT-s-OFDM Systems
Shih-Sheng Wei, Jen-Ming Wu, National Tsing Hua University

1247348
4 Pilot Allocation Based on Simulated Annealing for Sparse Channel Estimation in UWB OFDM Systems
Taoyong Li, Nele Noels, Ghent University/IMEC; Heidi Steendam, Ghent University

1244872
5 Precoder Design for Transmitter Preprocessing Aided Spatial Modulated QPSK Systems using One-bit DACs and Quantized Phase Shifters
Chiao-En Chen, National Chung Cheng University; Hsin-Ching Yang, National Chung Cheng University; Kelvin Kuang-Chi Lee, Tamkang University, New Taipei City; Yuan-Hao Huang, National Tsing Hua University

1K: Multi-Service Network Optimization

1244856
1 Optimization for Multicarrier MIMO SWIPT Systems Under MSE QoS Constraint
Xingxiang Peng, Peiran Wu, Minghua Xia, Sun Yat-sen University

1243720
2 Optimized linear precoding for biased 2-ASK modulation in multi-user SWIPT with integrated receiver
Erica Debels, Marc Moeneclaey, UGent

1244104
3 Performance of Hybrid ARQ over Power Line Communications Channels
Aashish Mathur, Indian Institute of Technology Jodhpur; Yun Ai, Michael Cheffena, Norwegian University of Science and Technology; Manav R Bhatnagar, IIT Delhi

1246636
4 Phase Retrieval via Difference of Convex Programming
Jinglian He, Min Fu, Kaiqiang Yu, Yuanming Shi, ShanghaiTech University

1246956
5 Power allocation for BER minimization in an uplink MUSA scenario
Wissal Ben Ameur, Orange; Philippe Mary, INSA Rennes; Marion Dumay, Orange; Jean-François Helard, INSA Rennes; Jean Schworer, Orange Labs

1L: NOMA Systems I

1247682
1 A Fading Prediction method using DL-OFDM signals for Precise TPC in TDD-UL-NOMA systems
Masafumi Moriyama, Kenichi Takizawa, Hayato Tezuka, Fumihide Kojima, National Institute of Information and Communications Technology

1247570
2 Capacity Characterization of Uplink NOMA in Multi-UAV Networks
Ernest Tan, A.S. Madhukumar, Rajendra Prasad Sirigina, Nanang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd

1247556
3 Complexity Reduction of MPA Detection Using Joint IQ Factor Graph in SCMA
Hiroto Hirama, Takahiko Saba, Chiba Institute of Technology
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<th>Paper ID</th>
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<tr>
<td>1247572</td>
<td>Impact of Cellular Interference on Uplink UAV Communications</td>
<td>Ernest Tan, A.S. Madhukumar, Rajendra Prasad Sirigina, Nanyang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd</td>
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<td>1248994</td>
<td>MIMO-NOMA with Linear Precoding Techniques in Indoor Downlink VLC Systems</td>
<td>Virendra Singh Rajput, Ashok D. R., A. Chockalingam, Indian Institute of Science, Bangalore</td>
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<td>1247752</td>
<td>An antenna switching based NOMA scheme for IEEE 802.15.4 concurrent transmission</td>
<td>Xianjun Jiao, Muhammad Aslam, Wei Liu, Ingrid Moerman, Ghent University - imec</td>
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<td>1245138</td>
<td>Multiuser Detector based on Fused Amended Orthogonal Matching Pursuit and Subspace Pursuit Algorithms for Uplink Grant-Free NOMA Wireless Communication Systems</td>
<td>Otayo O. Oyerinde, University of the Witwatersrand</td>
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<td>1248938</td>
<td>On the Receiver Design for Nonlinear NOMA-OFDM Systems</td>
<td>João Guerreiro, Universidade Autónoma de Lisboa, Instituto de Telecomunicações; Rui Dinis, Universidade Nova de Lisboa; Paulo Carvalho, FCT- Universidade Nova de Lisboa; Miguel Campos, PDM FC</td>
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<td>1247410</td>
<td>Outage Analysis of Cooperative NOMA for Millimeter Wave Vehicular Networks at Intersections</td>
<td>Baha Eddine Youcef Belmekki, IRIT/ENSEEIHT; Abdelkrim Hamza, USTHB; Benoit Escrig, Universite de Toulouse</td>
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2 Approximate Symbolic Explanation for Neural Network Enabled Water-Filling Power Allocation
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4 Enhancing Least Square Channel Estimation Using Deep Learning
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4 Radio Frequency Interference Detection using Deep Learning
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1 Autoencoder based Robust Transceivers for Fading Channels using Deep Neural Networks
Sandesh Rao Mattu, Indian Institute of Science; Lakshmi Narasimhan, IIT Palakad; A Chockalingam, Indian Institute of Science

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3 Low Complexity Autoencoder based End-to-End Learning of Coded Communications Systems
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4 Uncertainty Propagation in Neural Network Enabled Multi-Channel Optimisation
Chen Li, Schyler Chengyao Sun, Saba Al-Rubaye, Antonios Tsourdos, Weisi Guo, Cranfield University

1 Deep Reinforcement Learning Based Power Allocation for D2D Network
Zhengnan Bi, Wenan Zhou, Beijing University of Posts and Telecommunications

2 Machine Learning for QoS-Aware Fairness of a D2D Network
Xian Liu, University of Arkansas at Little Rock; Changcheng Huang, Carleton University

3 Machine Learning assisted Handover and Resource Management for Cellular Connected Drones
Amin Azarizadeh, KTH Royal Institute of Technology; Fayezeh Ghavimi, Aalto University; Mustafa Ozger, KTH Royal Institute of Technology; Riku Jäntti, Aalto University; Cecck Cavad, KTH Royal Institute of Technology

4 Energy Consumption Optimization for CSMA/CAProtocol Employing Machine Learning
MSc Paolo Barbosa, Bruna Silva, Universidade Federal de Pernambuco (UFPE); Cleber Zanchettin, Federal University of Pernambuco; Renato Mariz de Moraes, Federal University of Pernambuco (UFPE)

5 QMORA: A Q-Learning based Multi-objective Resource Allocation Scheme for NFV Orchestration
Jing Chen, Jia Chen, Renkun Hu, Hongke Zhang, Beijing Jiaotong University

1 Increasing Situational Awareness in Vehicular Networks: Passive Traffic Sensing Based on Machine Learning
Halti Bugra Tulay, The Ohio State University; Ron Burton, Transportation Research Center Inc; Columbus, OH; Frank Barickman, John Martin, Sugosh Rao, The National Highway Traffic Safety Administration; Can Emre Koksal, The Ohio State University

2 QoS Predictability in V2X Communication with Machine Learning
Darlan Cavalcante, GTEL - Federal University of Ceará; Igor Guerreiro, GTEL - Wireless Telecommunications Research Group; Wanlu Sun, Ericsson Research; Charles Casimiro Cavalcante, Universidade Federal do Ceará; Diego A. Sousa, Federal University of Ceará

3 Intelligent Task Offloading Algorithm for Mobile Edge Computing in Vehicular Networks
Yaping Cui, Yingjie Liang, Ruyan Wang, Chongqing University of Posts and Telecommunications

4 A CNN-LSTM Model for Traffic Speed Prediction
Miaomiao Cao, Victor O.K. Li, University of Hong Kong; Vincent W.S. Chan, Massachusetts Institute of Technology

5 Machine Learning based Network Planning in Drone Aided Emergency Communications
Jian He, Shanghai Aerospace Electronic Technology Institute; Jiangzhou Wang, H. Zhu, Nathan J. Gomes, University of Kent; Wenchi Cheng, Peng Yue, Xiang Yi, Xidian University

1 Virtual Development and Validation of a Function for an Automated Lateral Control using Artificial Neural Networks and Genetic Algorithms
Xiaobo Liu-Henke, Or Aviv Yarom, Soeren Scherler, Ostfalia University of Applied Sciences

2 Dynamic Spectrum Access with Reinforcement Learning for Unlicensed Access in 5G and Beyond
Susanna Mosleh, Yao Ma, Jacob D. Rezac, Jason B. Coder, NIST

3 An Access Control Mechanism Based on Risk Prediction for the IoV
Yuanmi Liu, Man XIAO, Yanyan Zhou, Chongqing University of Posts and Telecommunications; Di Zhang, Zhongzhou University; Jianhui Zhang, NationalDigitalSwitchingSystemEngineering & Technological R&D Center; Haris Gacanin, Nokia Bell Labs, Antwerp, Belgium; Jianli Pan, University of Missouri-Sanit Louis

4 Slice Management in Radio Access Network via Deep Reinforcement Learning
Behnam Awada, Nokia Bell Labs; Ingo Viering, Nomor Research GmbH; Andre Noll Barreto, Barkhausen Institut; Meryem Simsek, Gerhard P. Fettweis, Technische Universität Dresden

5 VIW: A Deep Learning Dataset Framework for Vision-Aided Wireless Communications
Muhammad Alarshebay, Andrew Hredzak, Zhenhao Liu, Ahmed Alkateeb, Arizona State University
Track 3: Antenna Systems, Propagation, and RF Design

3A: 5G Propagation & Measurement
   Piotr Gorniak, Poznan University of Technology

2. A mmWave Bridge Concept to Solve the Cellular Outdoor-to-Indoor Challenge
   Adrian Schumacher, Ruben Merz, Swisscom (Switzerland) Ltd.; Andreas Burg, EPFL

3A: 5G Propagation & Measurement

3. Experimental Characterization of Non-Stationary V2I Radio Channel in Tunnels
   Marwan Yusuf, Ghent University

4. Measurement Based Statistical Channel Characterization of Air-to-Ground Path Loss Model at 446MHz for Narrow-Band Signals in Low Altitude UAVs
   Burak Ede, Istanbul Technical University; Serhan Yarkan, Istanbul Ticaret University; Ali Riza Ekti, Balikesir University; Tuncer Baykas, Medipol University; Hakan Ali Çırpın, Istanbul Technical University; Ali Gorcin, Yıldız Technical University

   Maximilian James Arpaio, Enrico Maria Vitucci, Marina Barbieri, Vittorio Degli-Esposito, Diego Masotti, Franco Fuschini, University of Bologna

3B: Channel Modeling & Measurements

1. 3D Beamforming based Dynamic TDD Interference Mitigation Scheme
   Jalal Rachad, Ridha Nasri, Orange Labs; Laurent Decreusefond, Telecom ParisTech

2. An Efficient Calibration of a Fully-Switched MIMO Channel Sounder with Internal Crosstalk
   Junseok Kim, Eun Ae Lee, Pohang University of Science and Technology (POSTECH); Chung-Sup Kim, Young-Jun Chong, Electronic Telecommunications Research Institute (ETRI); Joon Ho Cho, Pohang University of Science and Technology (POSTECH)

3. Antenna Selections for Multi-Target Detection of Vehicular mmWave Radar with Large Antenna Arrays
   Kai-Rey Liu, Sau-Hsuan Wu, National Chiao Tung University; Prof. Lie-Liang Yang, University of Southampton

3C: Channel Modeling & EMF

1. Exposure Modelling and Minimization for Multi-antenna Communication Systems
   Fabien Heliot, Muhammad Ali Jamshed, Tim W. C. Brown, University of Surrey

   Luca Chiaraviglio, Cristiano di Paolo, Giuseppe Bianchi, University of Rome Tor Vergata; Nicola Blefari Melazzi, University of Rome Tor Vergata & CNIT

3. Measurement Campaign with Synchronized Distributed Receivers and Mobile Emitter at 3.75 GHz in Urban Scenarios
   Julia Bauer, Fraunhofer Institute for Integrated Circuits IIS; Carsten Andrich, Institute for Information Technology, Technische Universität Ilmenau; Michael Döbereiner, Fraunhofer Institute for Integrated Circuits IIS; Steffen Schiefer, James Myint, Alexander Illov, Christian Schneider, Reiner Thomä, Technische Universität Ilmenau; Giovanni Del Galdo, Fraunhofer Institute for Integrated Circuits IIS

4. The Multipath Characteristic of an Intra-Vehicle Channel under the Non-Line-of-Sight Condition
   Irfan Yusoff, Xiaohong Peng, Aston University

5. Will the Proliferation of 5G Base Stations Increase the Radio-Frequency “Pollution”? 
   Luca Chiaraviglio, Giuseppe Bianchi, University of Rome Tor Vergata; Nicola Blefari Melazzi, University of Rome Tor Vergata & CNIT; Marco Fiore, IEIIT - CNR

Track 4: Cognitive Radio and Dynamic Spectrum Access

4A: Cellular & Cognitive Radio Networks

1. Antenna Selection and Resource Allocation in Downlink MISO OFDMA Femtocell Networks
   Jalal Jalali, Ghent University; Ata Khalili, Amirkabir University of Technology; Heidi Steendam, Ghent University

2. Relaying techniques based outage analysis for mobile users in cognitive radio networks
   Samuel Okegbile, Sunil Maharaj, University of Pretoria; Attahiru Alfa, University of Manitoba & University of Pretoria

3. Symbol Error Rate with Receiver Nonlinearity
   Jennifer Dsouza, Virginia Tech University; Hossein Mohammadi, Mississippi State University; Aditya Padaki, Virginia Tech; Vuk Marojevic, Mississippi State University; Jeffrey Reed, Virginia Tech

   Alex Shenfield, Sheffield Hallam University; Zaher Khan, University of Oulu; Hamed Ahmadi, University College Dublin

4B: Dynamic Spectrum Access

1. Dynamic Spectrum Access Using Artificial Intelligence
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR

2. Dynamic Spectrum Access with Artificial Intelligence
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR

4C: Cognitive Radio Networks

1. Cognitive Radio Networks
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR

2. Cognitive Radio Networks
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR

4D: Cognitive Radio Systems

1. Cognitive Radio Systems
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR

2. Cognitive Radio Systems
   Benjamin Koo, Virginia Tech University; Marco Fiore, IEIIT - CNR
Mduduzi Comfort Hlophe, Sunil Maharaj, University of Pretoria

4B: Spectrum Sensing & Sharing

1 A Ruin Theory-Inspired Co-primary Spectrum Sharing Mechanism for 5G
Zaw Htike, Fumihide Kojima, National Institute of Information and Communications Technology

2 Capacity Evaluation of LTE Network in Dynamic Spectrum Access and Interference Analysis
Raphael B. Evangelista, Wireless Telecommunications Research Group; Carlos Filipe Moreira e Silva, Yuri Silva, Federal University of Ceará

Track 5: Multiple Antenna Systems and Cooperative Communications

5A: Beamforming and Hybrid Beamforming

1 Baseband Codebook Design with Long-term Information for Hybrid Beamforming Systems
Gaozheng Liu, Li Chen, Weidong Wang, Xiaohui Chen, University of Science and Technology of China

2 Hybrid Precoding for Millimeter Wave Multiuser Massive MIMO Systems with Low-Resolution DACs
Yajing Guo, Yunliang Zhang, Shuaifei Chen, Jiakang Zheng, Jiayi Zhang, Beijing Jiaotong University

3 Low Complexity Channel Estimation for Hybrid Beamforming Systems
Yanru Tang, Samsung; Hongbing Cheng, Samsung Electronics; Kee-Bong Song, Samsung Semiconductors Inc.

4 Simultaneous Beamforming and Nullforming for Covert Wireless Communications
Justin Kong, Fikadu Dagefu, Brian M. Sadler, U. S. Army Research Laboratory

5 Subchannel Gain Product based Frequency Selective Hybrid Beamforming with Limited Feedback
Hyanwoo Nam, Girim Kwon, Namshik Kim, Hyuncheol Park, Korea Advanced Institute of Science and Technology (KAIST)

5B: Estimation, Allocation, and Performance Analysis

1 Bayesian CRLB for Joint AoA, AoD, and Channel Estimation Using UPA in Millimeter-wave Communications
Imtiaz Ahmed, Marshall University; Ramesh Annamavajjala, Draper Labs; Laxminarayana S Pillulda, Intel Corporation

2 Low Complexity Quasi-MLM Modulation Classification based Optimal Overloaded MU-MIMO Receiver
Sairaj Desai, K Giridhar, IIT Madras

3 Optimum Resource Allocation in MU-MIMO OFDMA Wireless Systems
Chandra S. Bontu, Ameer El-Keyi, Ericsson Canada; Jagadish Ghimire, Ericsson

5C: Heterogeneous and Cooperative Communication

1 Performance Analysis of HAPS-Based Relaying for Hybrid FSO/RF Downlink Satellite Communication
Swaminathan R, Indian Institute of Technology Indore, India; Shubha Sharma, A.S. Madhukumar, Nanyang Technological University

2 Performance Comparison of Adaptive Terminal Selection Schemes for Terminal Collaborated MIMO Reception Using Actual Received Signals
Mampei Kasai, Hidekazu Murata, Kyoto University

3 Performance Evaluation of Adaptive Cooperative NOMA Protocol at Road Junctions
Baha Eddine Youcef Belmekki, IRIT/ENSEEIHT; Abdelkrim Hamza, USTHB; Benoit Escrig, Universite de Toulouse

5D: Relaying

1 Addressing Reliability Needs of Industrial Applications in 5G NR with Network Coding
Stefano Paris, Petteri Kela, Daniela Laselva, Qiyang Zhao, Nokia Bell Labs
2 Cooperative AF-based 3D Mobile UAV Relaying for Hybrid Satellite-Terrestrial Networks
Pankaj Kumar Sharma, National Institute of Technology Rourkela; Deepika Gupta, S P M IIT, Naya Raipur, India; Dong In Kim, Sungkyunkwan University
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3 Full-Duplex Spoofing Relays for Wireless Surveillance With Inter-Relay Interference Suppression
Jihwan Moon, Korea University; Hoon Lee, Pukyong National University; Changick Song, Korea National University of Transportation; Seowoo Kang, Minseok Kim, Inkyu Lee, Korea University
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Peixi Liu, Wei Jiang, Wu Luo, Peking University; Tiansheng Zhang, Keysight Technologies Inc.

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Guo Li, Xiao Zhang, Xidian University
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Christian Schmidt, Universidad Nacional del Sur; Matthieu Crussière, Institute of Electronics and Telecommunications of Rennes; Jean-François Helard, INSA Rennes
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3 Massive MIMO Indoor Localization with 64-Antenna Uniform Linear Array
Bin Liu, Andrea Guevara, Sibren De Bast, Qing Wang, Sofie Pollin, KU Leuven
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4 Parameter Optimization for Energy Efficient Indoor-Massive MIMO Small Cell Networks
Chen Chen, Yan Jiang, Jiliang Zhang, Xiaoqi Chu, Jie Zhang, University of Sheffield
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5 Power Allocation and Cooperation in Cell-Free Massive MIMO Systems with Energy Exchange Capabilities
Rami Handi, Marwa Qaraqe, Hamad Bin Khalifa University

5F: mmWave Systems II
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1 A Blind Beam Tracking Scheme for Millimeter Wave Systems
Steve Blandino, KU Leuven; Thibault Bertrand, UC Louvain; Claude Desset, Andre Bourdoux, imec; Sofie Pollin, KU Leuven; Jerome Louiseux, Universite Catholique de Louvain

Track 6: Radio Access Technology and Heterogeneous Networks

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1 A Unified Analytical Approach to Multi-Cell LBT-Based Spectrum Sharing Systems
Yao Ma, Susanna Mosleh, Jason B. Coder, National Institute of Standards and Technology

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2 Ergodic Energy Efficiency of mmWave System Considering Insertion Loss Under Dynamic Subarray Architecture
Ji-Chong Guo, Qiyue Yu, Weixiao Meng, Harbin Institute of Technology; Wei Xiang, James Cook University
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3 Fixed mmWave Multi-User MIMO: Performance Analysis and Proof-of-Concept Architecture
Achiel Colpaert, Evgenii Vinogradov, Sofie Pollin, KU Leuven
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4 STS Adaptation for Beamforming Training of Asymmetric Links in IEEE 802.11ay-based Dense Networks
Yena Kim, NIST; SuYoung Lee, Yonsei University; Tanguy Ropitault, NIST
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5 Systematic Beam Management in mmWave Network: Tradeoff Among User Mobility, Link Outage, and Interference Control
Honghao Ju, Yan Long, Xuming Fang, Rong He, Southwest Jiaotong University

5G: Vehicular Communications IV
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1 A Novel Decentralized and Flexible Policy for Flow Mobility Management
Edivaldo P. Valentini, Federal Institute of São Paulo; Daniel L. Guidoni, Federal University of São João del-Rei; Leandro Villas, Instituto of Computing - University of Campinas; Robson De Grande, Brock University; Rodolfo I. Meneguette, Federal Institute of São Paulo
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2 Adaptive Power Control with Vehicular Trellis Architecture for Vehicular Communication Systems
Akinsola Akinsanya, Manish Nair, H. Zhu, Jiangzhou Wang, University of Kent
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3 Joint Vehicle-Beam Allocation for Reliability and Coverage in Vehicular Communication Systems
Akinsola Akinsanya, University of Kent; Manish Nair, The University of Kent; H. Zhu, Jiangzhou Wang, University of Kent
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4 Power-and-Index based Multiple Access for V2X Networks
Sunyaong Lee, Mahrdad Dianati, University of Warwick; Youngwook Ko, University of York; Alexandros Mouzakitis, Jaguar Land Rover
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5 Self-Interference Cancellation and Beamforming in Repeater-assisted Full-duplex Vehicular Communication
Ahmed S. Ibrahim, Florida International University

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2 Cache-Aided Device-to-Device Non-Orthogonal Multiple Access
Kevin Zhaohan Shen, Turki E A Alharbi, Daniel K C So, University of Manchester
3 Cloud-based Queuing Model for Tactile Internet in Next Generation of RAN
Narges Gholipoor, University of Tarbiat Modares; Saeedeh Parsaeefard, Iran Telecommunication Research Center; Mohammad R. Javan, Shahrood University; Nader Mokari, Hamid Saeedi, Tarbiat Modares University; Hossein Pishro-Nik, University of Massachusetts, Amherst

4 Coordinated Scheduling and Power Control for Non-Orthogonal Multiple Access (NOMA) enabled H-CRAN
Rupesh Singh Rui, H. Zhu, Jiangzhou Wang, University of Kent

5 Design of PDMA Pattern Matrix in 5G Scenarios
Jiaying Sun, Tsinghua University; Chang, Wang; Jie Zeng, Xin Su, Tsinghua University; Tiejun Lv, Beijing University of Posts and Telecommunications

6B: Heterogeneous Networks II

1 Flexible Soft Frequency Reuse for Interference Management in the Networks with Flying Base Stations
Md Sakir Hossain, Zdenek Beccvar, Czech Technical University in Prague

2 Full Coverage with 3GPP technologies - On the feasibility of providing full rural coverage
Niklas Jalden, Juha Lui, Pal Fringer, Anders Furuskar, Sathya Venkatasubramanian, Elmar Trojer, Ericsson AB

3 Hierarchical Scheduling with FPGA-based Accelerator for Flexible 5G Mobile Networks
Yuki Arikawa, Takeshi Sakamoto, Satoshi Shigematsu, NTT Corporation

4 How to Associate Users with Access Points in a Small Cell Network?
Hong Yang, Bell Labs, Nokia

5 Improved Frequency Domain Resource Allocation Indication
Kittipong Kittichokechai, Mattias Andersson, Robert Baldemair, Ericsson Research; Yufei Blankenship, Ericsson AB

6C: Heterogeneous Networks III

1 Integration of Dimming into LiFi Systems
Trang Nguyen, Mohamed Islam, Harald Haas, University of Edinburgh

2 Interference Control of LTE-LAA using Q-learning with HARQ
Kenshiro Wada, Tomoaki Ohitsu, Keio University

3 Lightweight Comprehensive Evaluation Method for Wireless User Perception Based on Random Forest
Kaixuan Zhang, Guanghui Fan, Jun Zeng, Guan Gui, Nanjing University of Posts and Telecommunications

4 Measurement based FHSS-type Drone Controller Detection at 2.4GHz: An STFT Approach
Batuhan Kaplan, Istanbul Technical University; Ibrahim Kahraman, Bogaziçi University; Ali Gorcin, Yildiz Technical University; Hakan Ali Cırgan, Istanbul Technical University; Ali Riza Ekti, Balıkesir University

5 Memory-affecting Network Selection in Next Generation HetNets
Shaohan Feng, Dusit Niyato, Nanyang Technological University; Xiao Lu, University of Alberto; Ping Wang, Nanyang Technological University; Dong In Kim, Sungkyunkwan University

6D: Heterogeneous Networks IV

1 Next Generation Wi-Fi Mesh for Indoor Residential Deployments
Lester Ho, Adrian Garcia-Rodriguez, Lorenzo Galati Giordano, David Lopez Perez, Nokia Bell Labs

2 Next Generation Wi-Fi: Deployment Guidelines and Benefits of Massive MIMO for the Enterprise
Lorenzo Galati Giordano, Adrian Garcia-Rodriguez, Lester Ho, David Lopez Perez, Nokia Bell Labs

3 On the Design of BSG Multi-Beam LEO Satellite Internet of Things
Jianhang Chu, Xiaoming Chen, Qiao Qi, Caijun Zhong, Zhejiang University; Hai Lin, Osaka Prefectural University; Zhaoyang Zhang, Zhejiang University

4 Physical Cell ID Detection Probability Using Synchronization Signals of NB-IoT Radio Interface in 28-GHz Band
Daisuke Inoue, Kyogo Ota, Mamoru Sawahashi, Tokyo City University; Satoshi Nagata, NTT DOCOMO, INC.

5 Prediction of V2V channel quality under double-Rayleigh fading channels
yifan Chen, Zheng Dou, Lin Qi, Ying Li, Harbin Engineering University

6E: Intelligent Communications I

1 Cell-Free Massive MIMO with Few-bit ADCs/DACs: AQNM versus Bussgang
Yao Zhang, Haotong Cao, Meng Zhou, Xu Qiao, Shengchen Wu, Longxiang Yang, Nanjing University of Posts and Telecommunications

2 Cellular Network Performance using Machine Learning based Quantitative Association Rule Mining Method
Guanghui Fan, Juan Wang, Kaixuan Zhang, Jun Zeng, Guan Gui, Nanjing University of Posts and Telecommunications

3 Convolutional Neural Network Aided Signal Modulation Recognition in OFDM Systems
Sheng Hong, Hao Gu, Yu Wang, Nanjing University of Posts and Telecommunications; Yuwen Pan, Sain-tech Communications Limited; Miao Liu, Jie Yang, Guan Gui, Nanjing University of Posts and Telecommunications

4 En-route Multilateration System Based on ADS-B and TDOA/AOA for Flight Surveillance Systems
Dongxu Zhao, Jinlong Sun, Guan Gui, Nanjing University of Posts and Telecommunications

5 Large Intelligent Reflecting Surface Enhanced Massive Access for BSG Cellular Internet of Things
Guanghua Yu, Xiaoming Chen, Caijun Zhong, Zhejiang University; Hai Lin, Osaka Prefectural University; Zhaoyang Zhang, Zhejiang University

6F: Intelligent Communications II

1 Modulation Classification Method based on Deep Learning under Non-Gaussian Noise
Minghuan Ma, Zheng Li, Yuan Lin, Harbin Engineering University; Lei Chen, College of Engineering and Computing; Sun Wang, Harbin Engineering University
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2 Real-Time Routing for Wireless Relay Fronthaul with Vehicle-Mounted Radio Units
Yu Nakayama, Tokyo University of Agriculture and Technology; Yoko Hara-Azumi, Anh Hoang Ngoc Nguyen, Tokyo Institute of Technology; Daisuke Hisano, Osaka University; Takayuki Nishio, Kyoto University; Kazuki Maruta, Chiba University
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3 Research on RF Fingerprint Feature Selection Method
Ying Li, Yun Lin, Zheng Dou, Yifan Chen, Harbin Engineering University
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4 User Association to Overcome Human Blockage at mmWave Cellular Networks
Yuva Kumar, Tomotsuki Ohitsuuki, Keio University
6G: Networks
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1 An Energy-Efficient IEEE 802.11ad Mesh Network for Seismic Acquisition
Varun Amar Reddy, Georgia Institute of Technology; Gordon Stüber, Georgia Tech; Suhail I. Al-Dharrab, Ali Hussein Musaibel, Wessam Mesbahi, King Fahad University of Petroleum and Minerals
1249372
2 Cooperative Edge Caching in Small Cell Networks with Heterogeneous Channel Qualities
Tao Nie, Jingjing Luo, Harbin Institute of Technology (Shenzhen); Lin Gao, Harbin Institute of Technology; Fu-Chun Zheng, Harbin Institute of Technology (Shenzhen) & The University of York; Li Yu, Huazhong University of Science and Technology
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3 Dynamic Multi-RAT Access for Ultra Dense 5G and Beyond: A Mean Field Perspective
Nadir Sami, Hassan I University of Settat; Essaid Sabir, Hassan II University of Casablanca; Halima Elbiaze, University of Quebec a Montreal; Abdelkrim HAQIQ, Hassan 1st University, Faculty of Sciences and Techniques, Settat
1249850
4 LOC: A Mobile Q&A System with Multimodal Motivation Scheme for Local Intent Questions in Dynamic Social Networks
Imad Ali, Academia Sinica and National Tsing Hua University; Ronald Y. Chang, Academia Sinica; Cheng-Hsin Hsu, National Tsing Hua University; Chi-Han Lee, National Taiwan University of Science and Technology
1249746
5 Socio-Cellular Network: A Novel Social Assisted Cellular Communication Paradigm
Swati Agarwal, BITS Pilani Goa Campus; Rahul Thakur, Utkarsh Yadav, IIT Roorkee; Hemant Rathore, BITS Pilani Goa Campus
6H: Radio Access I
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1 5G and LTE-TDD Synchronized Coexistence with Blind Retransmission and Mini-Slot Uplink
Abdelrahim Mohamed, Atta Quddus, Pei Xiao, Bernard Hunt, Rahim Tafazolli, University of Surrey
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2 Achievable Rate of Multi-Cell Downlink Massive MIMO Systems with D2D Underlay
Ashraf Al-Rimawi, Birzeit University; Laith Ibrahim, Al-Quds Open University; Wessam Ajib, University of Quebec at Montreal
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3 Antenna-Resource-Based SCMA in Downlink Multiuser Transmission Systems
Yipeng Zhang, Qiyue Yu, Zijing Liu, Yongkang Zhou, Weixiao Meng, Harbin Institute of Technology
1246058
4 Asynchronous Scrambled Coded Multiple Access for 5G Non-Orthogonal Multiple Access: System Level Performance
Rohit Iyer Seshadri, Hughes; Neal Becker, Mustafa Eroz, Hughes Network Systems, LLC; Lin-nan Less, Hughes Network Systems; Chit-Kuo Jao, Ting-Yu Yeh, Industrial Technology Research Institute; Chun-Yen Wang, ITRI
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5 Coordinated Passive Beamforming for Distributed Intelligent Reflecting Surfaces Network
Jinglian He, Kaisiqiang Yu, Yuanming Shi, ShanghaiTech University
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6 Correlated Placement of Small Cell Base Stations: A Coverage Enriched HetNet with Massive MIMO
Bihan Banerjee, Robert Elliott, Witold Krzymien, University of Alberta; Jordan Melzer, TELUS Communications
6I: Radio Access II
1249610
1 Full-Duplex Cooperative Non-Orthogonal Multiple Access System With Feasible Successive Interference Cancellation
Turki E A Alharbi, Kevin Zhaohan Shen, Daniel K C So, University of Manchester
1248860
2 Reconfigurable Intelligent Surface Assisted Non-Orthogonal Unicast and Broadcast Transmission
Qiaochu An, Yuanming SHI, Yong Zhou, ShanghaiTech University
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3 Uplink SCMA with STBC in Fading Channels
Huangyi Li, Zijing Liu, Qiyue Yu, Harbin Institute of Technology; Wei Xiang, James Cook University; Fumiyuki Adachi, Tohoku University
6J: WiFi
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1 Experimental evaluation of the two-ray model for nearshore WiFi-based network systems design
Miguel Gutiérrez Gaitán, Pedro M. Santos, CISTER Research Centre; Luis R. Pinto, IFPN, Instituto Superior Técnico, Lisboa; Luis Almeida, FEUP - Universidade do Porto, Portugal
1249312
2 IEEE 802.11ax (Wi-Fi 6): DL and UL MU-MIMO Channel Sounding Compression Schemes Impaired with IQ Imbalance and CFO
Roger Hoefel, Federal University of Rio Grande do Sul
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3 openwifi: a free and open-source IEEE802.11 SDR implementation on SoC
Xiajun Jiao, Wei Liu, Michael Meheri, Muhammad Aslam, Ingrid Moerman, Ghent University - imec
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4 Reinforcement Learning Approach for Hybrid WiFi-VLC Networks
Abdulmajed Alenezi, Khairi Hamdi, University of Manchester
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5 WiHAS: From Wi-Fi Channel State Information to Unobtrusive Human Activity Recognition
Muhammad Muazzaaz, Ali Chelli, Matthias Pätzold, University of Agder
6K: Resource Allocation I
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1 Optimal Resource Allocation and Placement for Terrestrial and Aerial Base Stations in Mixed RF/FSO Backhaul Networks
Ja-Hyung Lee, Korea University; Ki-Hong Park, Mohamed-Slim Alouini, King Abdullah University of Science and Technology; Young-Chai Ko, Korea University
2 Resource Allocation for Non-Orthogonal Multiple Access with Coordinated Multipoint Support
Jung-Chun Kao, National Tsing Hua University

3 Resource-Efficient Dual Connectivity for Ultra-Reliable Low-Latency Communication
Marco Centenaro, Aalborg University; Daniela Laselva, Jens Steiner, Nokia Bell Labs; Klaus Pedersen, Nokia; Preben Mogensen, Aalborg University

4 Security Provision for Vehicular Fog Computing
Jiaqi Huang, Yi Qian, University of Nebraska-Lincoln; Rose Qingyang Hu, Utah State University

5 Sequential Bargaining Game for Reuse of Radio Resources in D2D Communication in Dedicated Mode
Mehyar Najla, Zdenek Becvar, Pavel Mach, Czech Technical University in Prague

6L: Resource Allocation II

1 An Interference-Aware Optimal Data Collection Scheduling for Wi-SUN Advanced Metering Infrastructure Network
Amnart Boonkajay, Peng Hui Tan, Lee Kee Goh, Syed Naveen Altaf Ahmed, Samei Sun, Institute for Infocomm Research

7A: Green Communications I

1 An Autonomous Error-Tolerant Architecture Featuring Self-reparation for Convolutional Neural Networks
Lizheng Liu, Yuxiang Huan, Zhuo Zou, Fudan University; Xiaoming Hu, Royal Institute of Technology (KTH); Lirong Zheng, Fudan University

2 Constructions of Flexible-Size Deterministic Measurement Matrices Using Protograph LDPC Codes and Hadamard Codes
Kangjian Chen, Yi Fang, Guangdong University of Technology; Pingqin Chen, Fuzhou University; Guofa Cai, Xiamen University; Jun Zhang, Guojun Han, Guangdong University of Technology

3 Energy-efficient Distributed Estimation Using Wireless Sensor with Wake-up Receivers
Hitoshi Kawakita, Hiroyuki Yomo, Kansai University; Petar Popovski, Aalborg University

4 Learning-Based Energy-Efficient Channel Selection for Edge Computing-Empowered Cognitive Machine-to-Machine Communications
Haijun Liao, Zhenyu Zhou, North China Electric Power University; Bo Ai, Beijing Jiaotong University; Mohsen Guizani, Qatar University

5 Noncooperative Resource Optimization for NOMA Based Fog Radio Access Network
Qu Yu, Haijun Zhang, Keping Long, University of Science and Technology Beijing; Victor C. M. Leung, The University of British Columbia

7B: Green Communications II

1 Cell Association for Energy Efficient Resource Allocation in Decoupled 5G Heterogeneous Networks
Humayun Zubair Khan, Mudassar Ali, Imran Rashid, Abdul Ghafoor, National University of Sciences and Technology, Pakistan; Muhammad Naeem, Ryerson University

2 Energy Efficiency Maximization in Green Energy Aided Heterogeneous Cloud Radio Access Networks
Naveed Ahmad Chughtai, Mudassar Ali, Saad Qaisar, Muhammad Imran, National University of Sciences and Technology, Pakistan; Muhammad Naeem, Ryerson University

3 Priority-based Access Strategy for Multi-transmitter Multi-receiver Ambient Backscatter Communication System
Qian Chen, Xing Zhang, Jing Li, Jizhe Zhou, Beijing University of Posts and Telecommunications

4 Resource Allocation Strategy for MEC System Based on VM Migration and RF Energy Harvesting
Peng Fang, Yisheng Zhao, Zhichao Liu, Jincheng Gao, Zhonghui Chen, Fuzhou University

5 UAV-Assisted Time Division Power Allocation Strategy Based on RF Energy Harvesting
Zhichao Liu, Yisheng Zhao, Peng Fang, Jincheng Gao, Zhonghui Chen, Fuzhou University

7C: Green Communications III

1 Beam and User Selection Technique in Millimeter Wave Communications
Irem Cumali, Berna Ozbek, Izmir Institute of Technology; Alexander Pyatudev, YL-VERKOT OY
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8A: Cellular IoT
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1 Burst error analysis of scheduling algorithms for 5G NR URLLC periodic deterministic communication
Johannes Demel, Carsten Bockelmann, Armin Dekorsy, University of Bremen
1247314
2 Jitter Suppression for Very Low Latency Feedback Control Over NR
Torbjörn Wigren, Ying Sun, Ericsson AB; Ramon A Delgado, Katrina Lau, Richard H Middleton, University of Newcastle, Australia
1245170
3 Multi-RAT Random Access Scheme Utilising Combined Licensed and Unlicensed Spectrum for Massive Machine-Type Communications
Che-Wei Hsu, Khalil Das, Ljupco Jorguseski, TNO
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4 NR-WLAN Aggregation: Architecture for Supporting URLLC in 5G IoT Networks
Yoichio Ohta, Ryuichi Takeki, Fujitsu Limited; Hiroki Takahashi, Ryu Atsuta, Mobile Techno Corp.
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5 Optimized 3D Drone Placement and Resource Allocation for LTE-Based M2M Communications
Ahmed Fahim, Yasser Gadallah, The American University in Cairo

8B: Sensor Networks
1245804
1 A Novel Cross-layer Mobile Data-gathering Protocol for Underwater Sensor Networks
Faisal Alfouzan, Glasgow Caledonian University; Seyed Mohammad Ghereyshi, University of Southampton; Ali Reza Shahrabi, Mahsa Sadeghi Ghahroudi, Glasgow Caledonian University
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2 Cost-efficient Underwater Acoustic Sensor Networks for Internet of Underwater Things
Yujie Song, Korea Institute of Ocean Science and Technology; HuiCheol Shin, Korea Maritime and Ocean University
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3 Experimental Demonstration of AoA Estimation Uncertainty for IoT Sensor Networks
Shaghayegh Monfared, Université Libre de Bruxelles; Trung-Hien Nguyen, Université libre de Bruxelles; Thomas Van der Vorst, Université libre de Bruxelles and Sorbonne Université; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles
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4 Stochastic Encoding based Distributed Blind Estimation for Deterministic Vector Signal
Wentao Zhang, Li Chen, Weidong Wang, University of Science and Technology of China
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5 Voronoi-Based Cooperative Node Deployment Algorithm in Mobile Sensor Networks
Mahsa Sadeghi Ghahroudi, Ali Reza Shahrabi, Tuleen Boutaleb, Glasgow Caledonian University

7E: Green Communications V
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1 A Light Blockchain-Powered Privacy-Preserving Organization Scheme for Ride Sharing Services
Mohamed Baza, Mohamed Mahmoud, Tennessee Tech University; Gautam Srivastava, Brandon University; Waleed Alasmary, Um Al-Qura University; Mohamed Younis, University of Maryland
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2 Association and Scheduling in Energy Harvesting Networks: Age of Information and Fairness Trade-off
Zoubeir Mlika, Oussam Khalifeh, Wessam Ajb, Université du Québec a Montréal
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3 Energy-Efficient Precoder Design for URLLC-Enabled Downlink Multi-User MISO Networks Using Finite Blocklength Codes
Keshav Singh, University College Dublin; Meng-Lin Ku, National Central University; Mark Flanagan, University College Dublin

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Furqan Jameel, University of Jyväskylä; Mohammad Ali Jamshed, University of Surrey; Zheng Chang, University of Jyväskylä; Riku Jännti, Aalto University; Haris Pervaiz, Lancaster University
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2 Packet Scheduling and Computation Offloading for Energy Harvesting Devices without CSIT
Ibrahim Fawaz, CEa; Mireille Sarkiss, Telecom SudParis; Philippe Ciblat, Telecom ParisTech

5 Optimized 3D Drone Placement and Resource Allocation
Ahmed Fahim, Yasser Gadallah, The American University in Cairo
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1 A Reliability-Aware Adaptive Greedy-Multicast Routing Protocol for 3D Highly Dynamic Networks
Su Wang, Changle Li, Pengfei Huang, Shuhua Liu, Pincan Zhao, Yuchuan Fu, Xidian University
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2 Age-Energy Tradeoff of Short Packet Based Transmissions in Multicast Networks with ARQ
Mangang Xie, Sun Yat-sen University; Jie Gong, SUN YAT-SEN UNIVERSITY; Xiao Ma, Sun Yat-sen University
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Yousef, Cister research center; Kai Li, CISTER Research Unit; Eduardo Tovar, Cister research center
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4 Energy-Efficient Task Offloading for Vehicular Edge Computing: Joint Optimization of Offloading and Bit Allocation
Youngsu Jang, Jinypeo Na, KAIST; Seonghah Jeong, Kyungpook National University; Joohnyuk Kang, KAIST
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Zhibin Wang, Yuanming Shi, Yong Zhou, Shangh haiTech University

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Ahmed Abdel Ghany, University of Rennes; Bernard Uguen, IETR / CNRS / Université Rennes-I; Dominique Lemur, Université Rennes-I
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2 A Probabilistic Octree Fusion Model for Analytical-Based Observer Fault Detection in LSAs
Abdal Raouf, Osama AlIhaibi, Stewart Burrell, Matthew Higgins, University of Warwick; Simon Brewerton, Arrirgo/RDM Group
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3 Anchor Selection in Angle-of-Arrival estimation-based localization using Polynomial Chaos Expansions
Thomas Van der Vorst, Université libre de Bruxelles and Sorbonne Université; Trung-Hien Nguyen, Université libre de Bruxelles; Shaghayegh Monfared, Université Libre de Bruxelles; Aziz Benlarbi-Delal, Julien Sarrazin, Sorbonne Université; Francois Horlin, Philippe De Doncker, Université Libre de Bruxelles
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Takahiro Yamamoto, Shigemi Ishida, Ryota Kimoto, Kyushu University; Shigeki Tagashira, Kansai University; Akira Fukuda, Kyushu University
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5 Kalman Filtering-Aided Hybrid Indoor Positioning System with Fingerprinting and Multilateration
Angela Cristina Eynig, Olara Kerususkaas Rayel, Elder Oroski, Federal University of Technology-Paraná; João Luiz Rebelatto, UTFPR

8E: Multiple Access I
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1 A Scheduling Scheme for Channel Hopping in Wi-SUN FAN Systems toward Data Throughput Enhancement
Robby Wayong, Ryota Okumura, Keichii Mizutani, Hiroshi Harada, Kyoto University
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2 An Efficient NPUSCH Receiver Design for NB-IoT System
Aoxiang Qin, Peiran Wu, Sun Yat-sen University; Ruibo Tang, CETC No. 7 Research Institute; Minghua Xia, Sun Yat-sen University
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3 Efficient Decoding of Synchronized Colliding LoRa Signals
Samira Aboubad, Université Clermont Auvergne; Nancy El Rachkidy, University Clermont-Auvergne; Alexandre Guittion, Université Clermont Auvergne
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4 Performance Analysis for the CMSA/CA Protocol in UAV-based IoT network
Xianzhen Guo, Bin Li, Kebang Liu, Northwestern Polytechnical University
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5 Station Grouping Method for Non-uniform Station Distribution in IEEE 802.11ah based IoT Networks
Maki Shimokawa, Kosuke Sanada, Hiroyuki Hatano, Kazuo Mori, Mie University

8F: Multiple Access II
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Pai Liu, Chan Wang, Ming Lei, Min Li, Minjian Zhao, Zhejiang University
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2 CCA Threshold Impact on the MAC Layer Performance in IoT Networks
Abderrahman Ben Khalifa, Razvan Stanica, INSA Lyon
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3 IoT via Satellite: Asynchronous Random Access for the Maritime Channel
Federico Clazzer, German Aerospace Center (DLR); Andrea Munari, Institute of Communications and Navigation, DLR
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4 Optimizing Non-Orthogonal Multiple Access in Random Access Networks
Ziru Chen, Illinois Institute of Technology; Yong Liu, South China Normal University; Sami Khairy, IIT; Lin Cai, Yu Cheng, Illinois Institute of Technology; Ran Zhang, Miami University
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5 Random Interleaving Multiplexing based Random Access in IoT-Oriented Satellite Networks
Jingrui Su, Guangliang Ren, Huining Zhang, Xidian University

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Zhangnan Wang, Yichen Wang, Lu Wang, Tao Wang, Dongyang Xu, Xi'an Jiaotong University

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3 Initial Evaluation of Transmission Timing Control Scheme using Wireless LAN for Smart Factory
Tatsuya Yoshioka, Shinji Yamaguchi, Hiroshi Aoki, Akio Hasegawa, Advanced Telecommunications Research Institute International
4 Open Monitoring Platform for Mobile Broadband
Wolfgang Hofer, TU Wien

5 Recent Advances in Intent-Based Networking: A Survey
Engin Zeydan, CTTC; Yekta Turk, Mobile Network Architect, Istanbul, Turkey

9B: Advances in Communications II
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Ahmed Abdelgawwad, University of Agder; Andreeu Catala, Universitat Politècnica de Catalunya (UPC); Matthias Pätzold, University of Agder
1249576
2 Influence of Access Point Location on Dynamic Indoor Radio Channel at 60 GHz
EL HAJJ Marwan, Gheorghe Zaharia, INSa de Rennes; Ghais El Zein, IETR/INSa de Rennes; Hanna Farhat, Sawsan Sadek, Lebanese University
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3 Statistical Characterization of Wireless Interference Signal Based On UWB Spectrum Sensing
Ramoni Adeogun, Gilberto Berardinelli, Aalborg University; Preben Mogensen, Aalborg University, Nokia Bell Labs; Ignacio Rodriguez, Aalborg University
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Xing Wei, Chenzhang Yang, BeiHang University

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Ryohei Yamaguchi, Hideki Ochiai, Junji Shikata, Yokohama National University
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2 A SDN/NFV-based Core Network Slicing for Secure Mobile Communication
Nan Ma, Tsinghua University
1249840
3 A Secure Transmission Scheme at The Receiver for Eavesdropping Prevention
Sinuk Choi, DGIST; Sungmin Han, VSI Inc., Ltd.; Ji-Woong Choi, Daegu Gyeongbuk Institute of Physics and Technology
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Ruimeng Gan, Yue Xiao, Jinliang Shao, University of Electronic Science and Technology of China; Xiaotian Zhou, The No. 54 Research Institute of CETC; Wei Xiang, James Cook University
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5 Reporting Spectrum Misbehaviour using the IEEE 1609 Security Credential Management System
Hamed Noori, University of British Columbia; David Michelson, The University of British Columbia; Kevin Henry, ESCRYPIT

9D: URLLC
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1 Adaptive Repetition Control Using Terminal Mobility for Uplink Grant-Free URLLC
Shinichi Ozaku, Yukiko Shimbo, Hirofumi Sakanuma, Fumiaki Maehara, Waseda University
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2 Admission Control in 5G Networks for the Coexistence of eMBB-URLLC Users
Nipunj Gimgie, Manosha Kapuruhamy Badalge, Nandana Rajatheva, Matti Latva-aho, University of Oulu
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3 Channel Quality Feedback Enhancements for Accurate URLLC Link Adaptation in 5G Systems
Guillermo Pocovi, Ali Esswie, Nokia Bell Labs; Klaus I. Pedersen, Nokia - Bell Labs
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4 On URLLC Downlink Transmission Modes for MEC Task Offloading
Jinfyi Wang, Mr; Yi Ma, Na Yi, Rahim Tafazolli, University of Surrey

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Vaclav Raida, Philipp Svoboda, Markus Rupp, TU Wien

4 Physical Layer Security in Vehicular Networks with Reconfigurable Intelligent Surfaces
Abubakar Makarfi, Khaled Rabie, Manchester Metropolitan University; Omprakash Kandivali, Nottingham Trent University; Xingwang Li, Henan Polytechnic University; Rupak Kharel, Manchester Metropolitan University

5 QoS Enhancements for V2X Services in 5G Networks
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Himani Sikarwar, Ankur Nahar, Debasis Das, Indian Institute of Technology Jodhpur Rajasthan

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Jiguang He, University of Oulu; Henk Wymeersch, Chalmers University of Technology; Long Kong, University of Luxembourg, Luxembourg; Olli Silven, Markku Juntti, University of Oulu

2 Statistical Beam Information for mmW Positioning
Ramon A Delgado, University of Newcastle, Australia; Torbjörn Wigren, Ericsson AB; Katriona Lau, Richard H Middleton, University of Newcastle, Australia; Iana Siomina, Ericsson AB

3 Intersymbol Interference Cancellation on Ultra-wideband Impulse Radio Positioning
Xufang Wang, Fujian Normal University; Feng Lin, Fuzhou Institute for Data Technology; Wen-Kang Jia, Fujian Normal University

4 Metropolitan Field Trial of Fingerprint-based Localization Utilizing Residual of Received-Signal-Strength
Jun Sakai, NEC; Takaftumi Yanaga, Kohta Sugaya, NEC Platforms Ltd; Shinya Kurumata, NEC

5 Fast Loop Closures Detection Method for Geomagnetic Signal and Lidar Fusion
Beihang Chen, University of Chinese Academy of Sciences; Li Huiyun, Shenzhen Institutes of Advanced Technology, CAS

6 Reliable Graph-Slam Framework to Generate 2D LIDAR Intensity Maps for Autonomous Vehicles
Mohammad Anno Aldibaja, Kanazawa University

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2 Practical Evaluation of Smartphone-based Multi-Floors Indoor Positioning System using Enhanced Pedestrian Dead Reckoning and Map Calibration
Jing-Wen Liu, Jun-Bang, Jiang, Shao-Yung Huang, Kuan-Wu Su, Min-Chieh Yu, Jenq-Shiou Leu, National Taiwan University of Science and Technology

3 Bag-of-Visual Words based Improved Image Retrieval Algorithm for Vision Indoor Positioning
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4 A method of Monocular Visual Odometry Combining Feature points and Pixel Gradient for Dynamic Scene
Panwei Li, University of Chinese Academy of Sciences

5 Visible Light Indoor Positioning Algorithm Base on the Fruit Fly Modified DV-hop Method
Yuezex Zhang, Shengwang Yin, Jiachen Jin, Beijing Information Science and Technology University

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Laurent Storrer, Hasan Can Yildirim, Université Libre de Bruxelles; Claude Desset, imec; Marc Bauduin, IMEC; Francois Horlin, Université Libre de Bruxelles; Andre Bourdoux, IMEC
2 IP3/DR - A low-cost precise and robust GNSS/INS integrated navigation system for land vehicles
Hongzhou Yang, Haiyu Lan, Fei Liu, Yang Gao, Naser Elsheimy, Profound Positioning Inc.

3 Iterative Bayesian-based Localization Mechanism for Industry Verticals
Henrique Hillesheim, Carlos Lima, Hirley Alves, Matti Latva-aho, University of Oulu

4 Relative Positioning of Autonomous Systems using Signals of Opportunity
Nicolas Souli, University of Cyprus; Panayiotis Kolios, KIOS Research and Innovation Center of Excellence; George Ellinas, University of Cyprus

5 Sector Fitting - A Novel Positioning Algorithm for Sectorized Transmitters
Simon Sundberg, Johan Garcia, Karlstad University

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Nestor Hernandez, Jonas Gabs Fugl Nørby, Rune Hylsberg Jacobsen, Aarhus University

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Hui Wang, Changle Li, Yao Zhang, Zhao Liu, Xidian University; Yilong Hui, Shanghai University; Guoqiang Mao, University of Technology, Sydney

2 A Stereo Perception Framework for Autonomous Vehicles
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3 GAN-CRT: A Novel Range-Doppler Estimation Method in Automotive Radar Systems
Yun-Han Pan, National Chiao Tung University, Taiwan, R.O.C.; Chia-Hung Lin, Ta-Sung Lee, National Chiao Tung University

4 Model Predictive Motion Planning for Autonomous Vehicle in Mid-high Overtaking Scene
Yang Xiaoyu, Li Huiyun, Shenzhen Institutes of Advanced Technology, CAS

5 On-Road Object Identification with Time Series Automotive Millimeter-wave Radar Information
Takashi Nakamura, Keio University; Kentaroh Toyoda, Singapore Institute of Manufacturing Technology, A*STAR; Tomoaki Ohtsuki, Keio University

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Ziran Zhang, Toyota Motor North America, InfoTech Labs; Xishun Liao, Xuanpeng Zhao, University of California, Riverside; Kyungtae Han, Prashant Tiwari, Toyota Motor North America, InfoTech Labs; Matthew J. Barth, Guoyuan Wu, University of California, Riverside

2 An Optimization Method for the Gateway Station Deployment in LEO Satellite Systems
Chaoyi Zhu, Yitao Li, Mansing Zhang, Qi Wang, Zhou Wuyang, University of Science and Technology of China

3 A Study on Signal Band Division Interference Canceller for HAPS Feeder Links with Multi-Gateways
Takahumi Fujii, Yoshichika Ohta, Teruya Fujii, Softbank Corp.

4 Ka-band Based Channel Modeling and Analysis in High Altitude Platform (HAP) System
Jiarui Zhao, Qi Wang, Yitao Li, University of Science and Technology of China; Jiaxi Zhou, the 38th Research Institute of China ETGC; Zhou Wuyang, University of Science and Technology of China

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Florian Alexander Schiegg, Shuo Li, Nikolay Mikhaylov, Robert Bosch GmbH

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Merve Yldirim, Hasan Kürüm, University of Fartat

3 Estimating Environmental Parameters in Connected Electric Powertrains using Set-Membership Filtering
Arian Ahmadi, University of Notre Dame
4 Simulation of an electric vehicle to study the impact of cabin heating on the driving range
David Ramsey, Alain Bouscaut, Université de Lille; Loïc Boulon, Université du Québec à Trois-Rivières (Canada); Alexandre Vaudrey, University of Lyon

5 SoC estimation of LFP Battery Based on EKF Observer and a Full Polynomial Parameters-Model
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Jizheng Liu, Zhenpo Wang, Lei Zhang, Beijing Institute of Technology

2 Benchmarking Alternative Technologies for providing Voice Services onboard Trains
Herman Mikkelsen, Rikhard Reinlægen, Mats Karlsson, ICONERA; Claes Beckman, KTH Center for Wireless Systems, Wireless@KTH

3 Electric Vehicles Charging Scheduling Optimization for Total Elapsed Time Minimization
Liping Qian, Xin Yue Zhou, Ning Qing Yu, Zhejiang University of Technology; Yuan Wu, University of Macau

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Kushagra Bhargava, Matthew David Higgins, Paul Jennings, University of Warwick; Kum Wah Choy, Costain Ltd.

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Pedro Río, Rodolfo Oliveira, Universidade Nova de Lisboa/Instituto de Telecomunicações

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3 P2C2: Peer-to-Peer Car Charging
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Yue Ma, China Aerodynamics Research and Development Center Co., Ltd., Beijing; Qian Zhao, Fujitsu Research and Development Center Co., Ltd.

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Takuya Mori, Suhua Tang, Sadao Obana, The University of Electro-Communications

3 Full-Duplex Store-Carry-Forward scheme for Intermittently Connected Vehicular Networks
Ali Siddig, American University of Sharjah; Ahmed S. Ibrahim, Florida International University; Mahmoud H. Ismail, American University of Sharjah

4 Virtual Subcarrier Aided Channel Estimation Schemes for Tracking Rapid Time Variant Channels in IEEE 802.11p Systems
Seungho Han, Jinsu Park, Changik Song, Korea National University of Transportation

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2 A New Mode Selection and Resource Reuse Strategy for V2X in Future Cellular Networks
Haider, Student; Jordi Pérez-Romero, Universitat Politècnica de Catalunya

3 Codebook Performance Evaluation of mmWave in Train Communications
Stavros Typos, Vaia Kalokidou, Simon Armour, Angela Doufexi, Evangelos Mellios, Andrew Nix, University of Bristol

4 Conception and Realization of a Mobile HiL Test Bench for V2X Communication
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5 Empirical Investigation of SDR-based DSRC Communication
Steven Knowles Flanagan, Xiaohong Peng, Jianhua He, Irfan Yusoff, Aston University

6 Impacts of Channel Loss and Electromagnetic Interference on Intra-Vehicle Wireless Communications
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2 Neural Network Equalisation and Symbol Detection for 802.11p V2V Communication at 5.9GHz
Scott Stainton, Newcastle University; Waseem Ozan, UCL; Martin Johnston, Satnam Dlay, Paul Anthony Haigh, Newcastle University

3 Performance comparison between LTE-V2X and ITS-G5 under realistic urban scenarios
Moona Karoui, Antonio Freitas, University Clermont Auvergne; Gérard Challoub, Université Clermont Auvergne

4 QoS Evaluation and Prediction for C-V2X Communication in Commercially-Deployed LTE and Mobile Edge Networks
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Brice Leblanc, Séchil Ercen, Université de Reims Champagne-Ardenne; Cyril de Runz, BDTLN, LIFAT, University of Tours

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4 DENM Repetitions to Enhance Reliability of the Autonomous Mode in NR V2X SideLink
Francesco Romeo, L2S, CentraleSupélec-CNRS-Université Paris-Saclay; Claudia Campolo, Università Mediterranea di Reggio Calabria; Antonella Molinaro, University ‘Mediterranea’ of Reggio Calabria; Antoine Berthet, L2S, CentraleSupélec-CNRS-Université Paris-Saclay

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Bruno Cunha Farias, Carlos Alberto Vieira Campos, Federal University of the State of Rio de Janeiro

3 Combinatorial Optimization-based Task Allocation Mechanism for Vehicular Clouds
Joahannes Costa, University of Campinas; Rodolfo I. Meneguette, University of São Paulo; Denis Rosario, Federal University of Pará (UFPA); Leandro Villas, Institute of Computing - University of Campinas

4 Leader selection in Vehicular Ad-hoc Networks: a Proactive Approach
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