

**Radio Technology SIG****'New developments in multiple access schemes'**

14 December 2017

**Sponsored by Rohde & Schwarz**

This SIG is championed by Mark Beach, **University of Bristol**, Brian Collins, **BSC Associates**, Diego Giancola, **PA Consulting Group** and Peter Topham, **Qualcomm Technologies International**

**Venue: Old Hall, Girton College, Huntingdon Road, Cambridge, CB3 0JG****AGENDA****13:30** Registration and networking with refreshments**14:00** Introduction to Radio Technology SIG from Mark Beach, **University of Bristol****14:10** Welcome from sponsor, **Rohde & Schwarz****Session chaired by SIG Champion, Mark Beach, University of Bristol****14:20 Paul Crane, Head of Practice. Mobile, Network Services and Sustainability, BT**  
Narrative to follow.**14:40** Q&A**14:45 'Multi-RAT convergence - A new spin through the Edge!'****Alain Mourad, Senior Manager, Interdigital**

The talk will discuss a new spin to Multi-RAT convergence brought by the recent paradigm of Edge (including Fog) networking and computing. This new spin is being addressed in the European-Taiwan 5G-CORAL project launched in September 2017. The concept and architecture of 5G-CORAL will be presented.

**15:05** Q&A**15:10 'Massive MIMO a key enabler for sub-6GHz wireless connectivity'****Mark Beach, University of Bristol**

This talk will describe the operation of sub-6GHz massive MIMO and how the 'Marzetta' based architecture differs to SDMA baseband beamforming. A brief description of the NI based Bristol Massive MIMO system will be given alongside an overview of field trials and results obtained to date. The talk will conclude by proposing a list of open research questions in the field.

**15:30** Q&A**15:35 Refreshments and networking****Session chaired by SIG Champion, Brian Collins, BSC Associates****16:10 'Low Power Wide Area Networks: Simple Access Technologies to Create the Big Data'****Juan Nogueira, Director of the Center of Excellence for Wireless and Connectivity, Flex**

Big Data is not only becoming important because of the large amount of collected data, but also because of the large amount of data sources that contribute to it and that enables to run data analytics on them to extract the valuable information hidden behind them. Many of these sources are low cost and remote Things, providing unfrequently small amounts of data. However, research and development in wireless technologies in the last decades have been focused in improving spectral efficiency by increasing modulation complexity, spatial diversity, etc., to come as close as possible to the Shannon limit. These technologies are oversized for the connectivity needs of these Things and too expensive for a positive return of the required investment. To fill this gap, new wireless access solutions based in old RF technologies, commonly known as Low Power Wide Area Networks (LPWAN), were developed in the last 4 years to provide the four "L" these Things were demanding: Low data rate, Long range, Low power consumption and Low cost. This talk will review the most adopted LPWAN technologies, namely LoRa, SigFox Ingenu and NB\_IoT, both from RF and market perspectives.

16:30 Q&A

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16:35 **Dr Konstantino Nikitopoulos, Lecturer (Assistant Prof), Signal Processing for Wireless Communications & Dr Yi Ma, Senior Research Fellow, 5GIC, The University of Surrey**

Narratives to follow.

16:55 Q&A

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17:00 Panel session with all speakers chaired by **SIG Champion, Mark Beach, University of Bristol**

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17:40 **Complete evaluation forms**

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17:45 **Event closes**

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With the permission of the speakers, presentations will be loaded to the CW website on the day following the event

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## Profile of organisers

### Cambridge Wireless (CW)

CW is the leading international community for companies involved in the research, development and application of wireless and mobile, internet, semiconductor and software technologies. With over 400 members from major network operators and device manufacturers to innovative start-ups and universities, CW stimulates debate and collaboration, harnesses and shares knowledge, and helps to build connections between academia and industry. CW's 19 Special Interest Groups (SIGs) provide its members with a dynamic forum where they can network with their peers, track the latest technology trends and business developments and position their organisations in key market sectors. CW also organises major conferences and start-up competitions along with other high-quality industry networking events and dinners. With headquarters at the heart of Cambridge, UK, CW partners with other international industry clusters and organisations to extend its reach and remain at the forefront of global developments and business opportunities. [www.cambridgewireless.co.uk](http://www.cambridgewireless.co.uk)

## Profile of sponsor

### Rohde & Schwarz

Rohde & Schwarz UK Ltd has been the UK subsidiary of Rohde & Schwarz GmbH for 40 years. Based in Fleet, RSUK employs 105 people to provide dedicated sales, services and support to customers across the UK and Ireland. Rohde & Schwarz has designed and manufactured the highest-quality specialist products in Germany for 77 years across a wide range of technologies and industries, including wireless, broadcast, aerospace, defence and security markets. [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Profile of SIG Champions

### Mark Beach, University of Bristol

Mark Beach received his PhD for research addressing the application of Smart Antenna techniques to GPS from the University of Bristol in 1989, where he subsequently joined as a member of academic staff. He was promoted to Senior Lecturer in 1996, Reader in 1998 and Professor in 2003. He was Head of the Department of Electrical & Electronic Engineering from 2006 to 2010, and then spearheaded Bristol's hosting of the EPSRC Centre for Doctoral Training (CDT) in Communications. He currently manages the delivery of the CDT in Communications, leads research in the field of enabling technologies for the delivery of 5G and beyond wireless connectivity, as well as his role as the School Research Impact Director. Mark's current research activities are delivered through the Communication Systems and Networks Group, forming a key component within Bristol's Smart Internet Lab. He has over 25 years of physical layer wireless research embracing the application of Spread Spectrum technology for cellular systems, adaptive or smart antenna for capacity and range extension in wireless networks, MIMO aided connectivity for through-put enhancement, Millimetre Wave technologies as well as flexible RF technologies for SDR modems underpins his current research portfolio. [www.bristol.ac.uk](http://www.bristol.ac.uk)

### **Brian Collins, BSC Associates**

Brian has designed antennas for applications including radio and TV broadcasting, base stations, handsets and consumer products, and has operated his own consultancy firm for the last 12 years. He has published more than 70 papers on antenna topics and contributed chapters to several recent textbooks. He operates a small consultancy company, chairs the Antenna Interface Standards Group and is an Honorary Visiting Professor in the School of Electronic Engineering and Computer Science at Queen Mary, University of London. [www.bscassociates.co.uk](http://www.bscassociates.co.uk)

### **Diego Giancola, PA Consulting Group**

Diego has spent his career in radio systems R&D and modem design in the wireless communication sector, from 2G to the latest 4G evolutions. His research interests lie in multi-antenna systems and novel signal processing and architectures for radio signals. He currently co-runs PA's signal processing team and leads the research activities in LTE evolution and 5G landscaping. Diego has a first degree in telecommunication engineering and a doctorate in electronics and communication engineering from Politecnico di Milano. [www.paconsulting.com](http://www.paconsulting.com)

### **Peter Topham, Qualcomm Technologies Inc.**

Peter has more than 30 years' experience of RF and high-speed circuit design, taking chips into production ranging from FM Band II through cellular, Bluetooth and on to UWB at 10GHz. He has been with Qualcomm for 7 years, specialising in low-power RF design for portable and wearable products. [www.qualcomm.com](http://www.qualcomm.com)

## Profile of speakers

### **Dr Yi Ma, Senior Research Fellow, 5GIC, The University of Surrey**

Profile to follow. [www.surrey.ac.uk/5gic](http://www.surrey.ac.uk/5gic)

### **Dr Konstantino Nikitopoulos, Lecturer (Assistant Prof.), Signal Processing for Wireless Communications, 5GIC, The University of Surrey**

Profile to follow. [www.surrey.ac.uk/5gic](http://www.surrey.ac.uk/5gic)

### **Alain Mourad, Senior Manager, Interdigital**

Dr Alain A.M. Mourad holds a PhD degree in Telecommunications from ENST Bretagne in France. He has over 15 years' experience in the wireless systems industry. He is currently leading the research and development of Next Generation Radio Access Networks at InterDigital International Labs (London, Berlin, Seoul). Prior to joining InterDigital, Dr. Mourad was a Principal Engineer at Samsung Electronics R&D (UK) and previously a Senior Engineer at Mitsubishi Electric R&D Centre Europe (France). Throughout his career, Dr. Mourad has been active in the research and standardization of recent communication networks (5G/4G/3G) and broadcasting systems (DVB/ATSC). He has held various leadership roles in the industry, invented over 40 granted patents and several other patent applications, and authored over 50 peer-reviewed publications. He received the Inventor of the Year Award from Samsung Electronics R&D (UK) twice in 2012 and 2013, and in 2016 InterDigital Innovation Award for the "idea, creation, and execution of InterDigital Europe". [www.interdigital.com/](http://www.interdigital.com/)

### **Paul Crane, Head of Practice. Mobile, Network Services and Sustainability, BT**

Profile to follow. [home.bt.com/](http://home.bt.com/)

### **Juan Nogueira, Director of the Center of Excellence for Wireless and Connectivity, Flex**

Dr. Nogueira is director of the Center of Excellence for Wireless and Connectivity at Flex. In this role he is defining technology roadmaps, evaluating new innovative solutions, establishing strategic collaborations with partner companies and leading internal research programs in the field of wireless communication in general and Internet of Things in particular. Prior to working at Flex, he was Lead System Architect of advance development and system architecture first at Robert Bosch GmbH and then at Bosch Connected Devices and Solutions GmbH (BCDS) in Reutlingen (Germany). In this position he defined the connectivity technology roadmap that later concluded with the foundation of BCDS as the Bosch subsidiary focused in connectivity and IoT. Before that, he worked in corporate R&D for wireless communication and sensing systems at Sony Corporation in Stuttgart (Germany) where he held the positions of Senior System Engineer and Principal Engineer. Dr. Juan Nogueira holds a PhD in Telecommunications Engineering from the University of Vigo (Spain). He subsequently became an associated professor at the University of Vigo in the Electronic Technology Department, collaborating with industry on

projects in the area of industrial field buses. He has written numerous articles and holds 20+ patents in the area of communication protocols and wireless sensor networks. [flex.com/](http://flex.com/)

**Mark Beach, University of Bristol**

Profile as above. [www.bristol.ac.uk](http://www.bristol.ac.uk)