Radio Technology SIG
'Big Radio'
13th July 2016

Hosted by **BBC** sponsored by **ROHDE&SCHWARZ**

This SIG is championed by Brian Collins of **BSC Associates**, Diego Giancola of **PA Consulting Group**, John Haine of **University of Bristol** and Gerald Miaille of **Qualcomm Technologies International Ltd**

Venue: BBC, MediaCityUK, Dock House, Salford Quays, Salford M50 2BH

AGENDA	
12:00	Registration and networking over lunch
13:00	Introduction to Radio Technology SIG from **John Haine, University of Bristol**
13:10	Welcome from **Adrian Woolard, Head of R&D North Lab, BBC**
13:20	Welcome from **Alison Barber, Account Manager**, **Rohde & Schwarz**
13:30	**Session chaired by SIG Champion, Brian Collins, BSC Associates** **Anthony Brown**, Professor of Communication Engineering, **University of Manchester** **'Multi-octave radio frequency systems: Developments in antenna technology in radio astronomy and imaging systems'** Research in radio astronomy instrumentation and related imaging systems is causing the development of extremely wide bandwidth antenna technologies suitable for large scale deployment. This talk discusses some of these solutions, including the overall system designs using digital beamforming techniques to produce multiple simultaneous high gain beams to provide a wide field of view with high sensitivity and dual polarisation capability.
13:50	Q&A
13:55	**'An Adaptive Broadcast System for the UK Digital TV Network'** **Peter Bagot,** Research Associate**, University of Bristol** Adaptive TV broadcast is a way of further improving the energy efficiency of broadcast TV by adapting the broadcast powers and beam patterns based on user feedback. Here, a distributed monitoring network consisting of user TVs and professionally run calibrated nodes would feedback Quality of Service data to the broadcaster in order to build up a more accurate view of the coverage and field strengths. Based on this information, beamforming techniques can be used to adapt the broadcast powers to provide the most energy efficient solution.
14:15	Q&A
14:20	**'Real-time Experiments using a 128-antenna Massive MIMO Testbed'** **Paul Harris**, Wireless Communications Researcher, **University of Bristol** In a recent collaborative experimental trial with Lund University using the Bristol is Open 128-antenna massive MIMO tesbed, 22 users were served on the same time-frequency resource in an indoor atrium environment. Utilising an asymmetric frame schedule, this equates to a spectral efficiency figure of 145.6 bits/s/Hz. This talk will provide an overview of the massive MIMO testbed design, recent experimental trials and some initial results
14:40	Q&A
14:45	**Refreshments and networking**
15:15	**Session chaired by SIG Champion, John Haine, University of Bristol** **A brave new world for Satcom terminals** **Paul Winter**, Programme Manager and RF engineer, **TTP** Satcom data and voice terminals are undergoing a revolution in design and integration in a bid to access new markets and onboard more subscribers. The design of a lightweight, low cost, low power terminal that can talk to a base station thousands of kilometres away, whilst meeting regulatory requirements is a tough challenge. This talk will focus on the key technical issues at system architecture and component level highlighting areas where the industry needs to respond if we are to disrupt the market and generate new products and services.
15:35	Q&A

15:40	**Scalable, Decentralised and Distributed Massive MIMO for Massive Wireless Connectivity**
	Gerard Borg, Research Scientist and Lecturer, **Australian National University**
	In cellular networks, both the mobile wireless spectrum and the connection from the base station to the backhaul are shared between hundreds of clients in a cell. This approach can never be scalable or spectrally efficient. Cellular roll-outs to remote areas will normally be uneconomical: especially in developing countries. If our aim is to bring broadband to the unconnected who are living in regional / remote areas, then a different approach is required. We propose a novel wireless access network based on a scalable, distributed and decentralised massive MIMO architecture. This network can be deployed cost-effectively by successively connecting base stations to a broadband IP point-of-interconnect as clients are added to the network. Long range links requiring sub-GHz bands can be economically deployed and can provide each client with full access to the wireless spectrum and a dedicated connection to the backhaul. Given the increasing numbers of urban and regional townships connected to fibre, such an approach could empower local communities to wirelessly extend their networks to isolated populations.
16:00	Q&A
16:05	Panel session with all speakers chaired by **SIG Champion, John Haine, University of Bristol**
16:30	Event closes

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

Profile of organisers

CW (Cambridge Wireless Ltd)

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 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 the annual Future of Wireless International Conference and Discovering Start-Ups competition 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. For more information, please visit www.**cambridgewireless**.co.uk

Profile of sponsors

Rohde & Schwarz UK

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. For more information please visit www.**rohde-schwarz**.co.uk

Profile of host

BBC Research & Development

Whether it's noise-cancelling microphones in the 1930s, the first transatlantic television transmission in the 1950s, Ceefax in the 1970s, digital radio in the 1990s and HD TV in the 2000s, or the challenge to 'broadcasting' brought about by the internet and interactive media, BBC Research & Development has led the way with innovative technology and collaborative ways of working. www.**bbc**.co.uk/rd

Profile of SIG Champions

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. For more information, please visit 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. For more information, please visit www.**paconsulting**.com

John Haine, University of Bristol

Professor John Haine is Royal Academy of Engineering Visiting Professor at Bristol University, and also the Chairman of the IoT Security Foundation, whose mission is promote best practice in appropriate security to those who specify, make and use IoT products and systems. John is a member of the IET and IEEE and serves on the CW Board. John has spent his career in the electronics and communications industry, working for BT, Marconi, PA Consulting, and with start-ups including Cognito and Ionica. In 1999 he joined TTP Communications working on research, technology strategy and M&A activities; and then became Director of Technology Strategy in Motorola Mobile Devices. He was CTO Enterprise Systems with ip.access Limited, the leading manufacturer of GSM picocells and 3G femtocells. In 2010 he joined Cognovo Ltd, which was acquired by u-blox AG, where he worked on RF platform strategy for future wireless modules. John retired from u-blox in 2015. For further information, please visit www.**bristol.**ac.uk

Gerald Miaille, Qualcomm Technologies International

Profile to follow. For further information, please visit www.**qualcomm**.com

Profile of speakers

Peter Bagot, University of Bristol

Peter Bagot studied Computer Science and Electronics at the University of Bristol, UK and graduated in 2011. He then enrolled in the University of Bristol's new Centre for Doctoral Training (CDT) in Communications for his PhD. His PhD in 'Adaptive Broadcast Techniques Based on End-User Metrics' was part sponsored by and carried out in collaboration with BBC Research and Development. Upon completing his PhD in February 2016, he has started as a Post-doctoral Research Associate at the University of Bristol. His current research topic is characterising Power Amplifiers over wide bandwidths for use at mmWave. For further information, please visit www.**bristol.**ac.uk

Anthony Brown, University of Manchester

Professor Tony Brown holds the Chair in Communication Engineering at the University of Manchester, UK and is Chief Technical Director of the Easat Radar Systems Group. Tony was Head of the School of Electrical and Electronic Engineering until last year. He has been involved in antennas and propagation for over 35 years with over 100 publications on the subject including five patents and, as co-editor, the book Ultra-Wide Band Antennas for Radar and Communications (John Wiley, 2008) He joined academia in 2003, initially to head the Microwave and Communications Group at Manchester, then as Associate Dean. Prior to academia Tony had a long industrial career with major UK companies before forming Easat in 1987. At Manchester, Tony Brown's research is in antennas and propagation as applied to radar, wireless communications and radio astronomy instrumentation. He has worked as a consultant including to a number of international Government agencies and was a member of the US government FCC Technical Advisory Commission until 2008. He was a UK representative to the COST ASSIST action, chairman of the Wireless Friendly Building Group and served on the EUROCAE WG41 standards group. He is has been a member of the Square Kilometre Array radio telescope UK research go since 2002. Tony has acted as chair or vice chair to a wide number of international conferences and seminars over his career and will co-chair the European Conference on Antennas and Propagation when it returns to the UK in 2018. He isa past Council member of the Engineering Professors Council, a Fellow of the IET and IMA and a Senior Member of IEEE. Tony was a founder member of the Engineering and Physical Sciences Research Council (UK) Communications College. For further information, please visit www.**manchester.**ac.uk

Paul Harris, University of Bristol

Paul received his BEng (Hons) in Electronic Engineering from the University of Portsmouth in 2013 and later joined the CSN group at the University of Bristol to pursue a PhD in Communications. His PhD research within the CSN group focuses pragmatically on massive MIMO and he is the lead researcher on the Bristol is Open massive MIMO testbed. Through ongoing use of the testbed, he will be investigating the real-world performance and behaviour of the technology and subsequently identifying opportunities to implement and test new algorithms. For further information, please visit www.**bristol.**ac.uk

Paul Winter, TTP

Paul Winter is a programme manager and RF engineer in the Communications and Wireless group at TTP. He has led numerous projects in commercial, industrial and healthcare sectors developing connected devices and precision instrumentation. Paul has a heritage in developing products integrating multiple wireless standards including GPS, GPRS, Wi-Fi, Bluetooth and proprietary ISM band radios, deployed within multi-sensor systems for in-home and on-body applications, often coupled to 'Cloud' based analysis and visualisation services. In healthcare Paul has applied aspects of wireless, antennas and electronics to a number of medical devices including inhalers, glucose testing and point of care diagnostic instruments. Paul has also led several incubation projects for TTP's Carbon Trust Incubator, covering a wide

range of cutting edge technologies. Paul joined TTP in 2006; prior to this he worked as a radio engineer for Global Communications developing high volume consumer in-home satellite and digital TV distribution equipment, as well as portable equipment for the 'on-location' broadcasting industry. Paul has a Masters degree in Electrical & Electronic Engineering from the University of Wales, Cardiff. He is a member of the Institute of Engineering and Technology, the Royal Academy of Engineering and is a Charted Engineer. For further information, please visit www.**ttp.**com

Gerard Borg, **Australian National University**

Gerard Borg is a research scientist and lecturer in wireless and radiofrequency engineering at the Australian National University. In a former life he was a plasma physicist working on laboratory plasmas. For his doctorate, he studied guided Alfven waves in fusion plasmas and later discovered and investigated various kinds of plasma antenna. More recently, he has championed the cause of regional broadband Internet and aims to find a better alternative to the ubiquitous cellular and satellite networks. For further information, please visit www.**anu.edu.**au/