

Joint ICT KTN and Radio Technology SIG Event

“Millimeter-Wave Radios: Challenges and Opportunities”

30th January 2014

Kindly hosted by: 

Joint lunch sponsor: 

This SIG is championed by Gerald Mialle of CSR, Brian Collins of BSC Associates, Diego Giancola of PA Consulting and John Haine of u-blox AG

Venue - PA Consulting Group, Cambridge Technology Centre, Melbourn, Herts, SG8 6DP

AGENDA

12:00 Registration & Networking over Lunch

13:00 Introduction to the Cambridge Wireless Radio Technology SIG by Gerald Mialle of CSR

13:10 Welcome from our partner, Stuart Revell of ICT KTN

13:15 Welcome from our host, Steve Crammond of PA Consulting

13:20 Welcome from our joint lunch sponsor, Jamie Lunn of Rohde & Schwarz UK

Speaker Session chaired by Brian Collins of BSC Associates

13:25 William Carson, Consultant Analyst, PA Consulting

“Quantifying the benefits of MIMO and millimetre waves: less is more”

The spectrum crunch has reignited interest in millimetre wave communications. Huge bandwidths are available at these wavelengths but at what cost? Academia and industry have been addressing potential stumbling blocks that degrade performance, for example, mobility, shadowing and range. This talk illustrates how multiple-input multiple-output (MIMO) technologies addresses these issues and could deliver the promised increased capacity benefits. Using information-theoretic models and metrics, we discuss how modern communications devices (smartphones, tablets, laptops) should exploit spatial diversity for millimetre wave communications.

13:45 Q&A

13:50 Professor Yang Hao FIEEE, FIET, Queen Mary University of London

“Towards Body-Centric Wireless Communications at Millimeter Wave Frequencies”

Body-Centric Wireless Communications is referred as to a new means of communications with the use of wearable and implantable wireless sensors connected through body-area networks. Potential applications include healthcare, defence, security, smart home and personal entertainment, just to name a few. This talk gives an overview of recent development of this research, in particular, the feature of radio propagation of millimeter waves on the body, antenna and system design requirements and future applications at 60 and 94GHz frequencies.

14:10 Q&A

14:15 Dr Tim Brown, Lecturer, 5G Research Centre, University of Surrey and Andy Sutton, Principal Network Architect, EE

“V-Band Radio Systems - Practical Deployment Considerations”

EE has delivered Europe’s fastest LTE rollout and acquired over 2 million 4G customers in record time. This investment in network capability along with fast adoption from consumers and businesses alike highlight the importance of advanced digital mobile communications infrastructure to the UK economy. To ensure 4G maintains the wow factor it’s essential that the network can scale in terms of capacity density within high traffic areas. The adoption of small cells and integration with the macro network to form HetNets, will ensure this objective can be realised. The use of point to point links at V-band is one of the solutions available to provide cost-optimised backhaul from the small cell layer. This presentation will detail the challenges from an operator perspective as well as the academic perspective in terms of implementation at this band, which will include device size constraints, path loss issues and will discuss some possible means of overcoming the difficulties.

14:50 Q&A

14:55 Refreshment Break and Networking

Speaker Session chaired by Diego Giancola of PA Consulting

15:25 Djamel Berraki, PhD Student, University of Bristol**“Exploiting the Spatial Sparsity of mmWave Outdoor Channels for Beamforming”**

The ever increasing demand for data access has pushed the carriers to deploy small cells. As providers attempt to offer higher capacity, they are faced by the shortage in the bandwidth used by the current systems. One prominent solution could be to migrate the carriers to higher, non-licensed or lightly licensed, frequency bands such as mmWave where bandwidths of the order of 100 times larger than those used by existing wireless access technologies are available.

This talk will present a study of the application of the Compressive Sensing (CS) theory to accurately estimate the sparse spatial mmWave propagation channel. This scheme is especially attractive for outdoor mmWave systems where large antenna arrays are more likely to implement beamforming to compensate for pathloss. Current analogue beamforming techniques such as the codebook based 802.11ad beamforming manifest large beamforming overhead for large antenna arrays of typically 16x16 elements. Measurements in an anechoic chamber are carried out to demonstrate the applicability of the CS concept. The impact of noise on the estimation of Directions-of-Departure using CS theory is analysed. Finally the benefit of exploiting the reconstructed Power Angle Profile in beamforming is assessed and compared to the beam searching algorithm adopted in the IEEE 802.11ad standard.

15:45 Q&A

15:50 Mark Barrett, CMO, Blu Wireless Technology**“Low Cost 60 GHz Backhaul: Opportunities and Challenges”**

Worldwide License free operation in the 57 – 64 GHz band has spurred the development of a number of wireless systems targeted at consumer applications – most notably the 802.11ad extension of the WiFi standard marketed as WiGig™. This is forecast to develop into a mass market measured in billions of devices per annum over the next 5 years. Meanwhile, MSOs are being driven to rollout dense LTE mobile networks to meet the exponentially increasing data demands of their smartphone customers – but without increasing their monthly bills. This has created the acute need for low cost and flexible wireless backhaul in densely populated urban areas. The question asked is to what extent wireless backhaul can re-use technology developed for the WiGig mass market. This paper explores some of the fundamental radio and baseband technology challenges behind adapting 60 GHz WiGig technology for wireless back haul applications.

We also highlight the need for changes in the European and Asian radio regulatory frameworks to encourage the deployment of low cost 60 GHz mesh networks. Finally, we comment on how this technology base can be extended for future mobile 5G communications.

16:10 Q&A

16:15 Howard Benn, Head of Standards & Industrial Affairs, Samsung Electronics Research Institute, UK**“Realising 5G Cellular in the mmWave Band”**

From GSM (2G) delivering data at 9.6 kbps, to LTE (4G) providing 10's of megabits per second our expectations grow every year. What will 5G be, is it just higher data rates, and if so how can we deliver this in the sea of tiny spectrum allocations scattered from 700 MHz up to 3.6 GHz? Samsung have been thinking about this. We will show how cellular can deliver 1Gbps in the mmWave (20 – 40GHz) band, starting with the theory then moving to our demonstrator system working at 29 GHz.

16:35 Q&A

16:40 Open Forum, chaired by Stuart Revell of ICT KTN

17:15 Closing remarks from John Haine of u-blox AG and fill in evaluation forms

17:20 Event Closes

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

Profiles of Organisers

Cambridge Wireless (CW)

CW is the leading international community for companies involved in the research, development and application of wireless & 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 18 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

ICT KTN

Creating a competitive advantage for the UK by facilitating knowledge exchange on Information and Communications Technologies and accelerating innovation. This new KTN has been formed from a merger by the Digital Communications and Digital Systems KTNs with the objective of bringing competitive advantage to the UK by facilitating the exchange of knowledge on ICT technologies and capabilities. We plan to do this by acting as a 'Network of Networks', organising a range of events and providing support throughout the UK in association with other communities of interest and centres of excellence. For further information please visit www.ictktn.org.uk

Profile of Host

PA Consulting

An employee-owned firm of over 2,500 people, PA Consulting work with business and governments worldwide through their offices in North America, Europe, the Nordics, the Gulf and Asia Pacific.

PA's mobile wireless capabilities include leading-edge technology consultancy in all wireless technology issues such as LTE and the emerging 5G, through to product development in areas such as chipset, software, core technology and femtocells. They have a full design, development and prototyping capability at the component, board and software level, and support a wide range of studies, investigations and analysis in the use and deployment of new wireless and communications technologies.

Clients include vendors, carriers, users and regulators and we help them to maximise the effective use of new technologies, to reach the market quickly, and to optimise the deployment of scarce resources such as spectrum and Intellectual Property. For further information please visit: www.paconsulting.com

Profile of Joint Lunch Sponsor

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 further information please visit: www.rohde-schwarz.co.uk

Profiles of SIG Champions

Brian Collins, BSC Associates

Brian Collins has designed antennas for applications from radio and TV broadcasting to base station and handset antennas. He has published more than 60 papers on antenna topics and contributed chapters to several recent textbooks. As well as his work with Antenova, Brian operates a small consultancy company, chairs the Antenna Interface Standards Group and is a Visiting Professor in the School of Electronic Engineering and Computer Science at Queen Mary, University of London. www.bscassociates.co.uk

Diego Giancola, PA Consulting

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, u-blox AG

John Haine has spent his career in the electronics and communications industry working for British Telecom, Marconi, PA Consulting, and with start-ups including Cognito and Ionica. His technical background includes R&D in radio circuitry and microwave circuit theory; and the design of novel radio systems for cordless telephony, mobile data, and fixed wireless access. He has led standardisation activities in both the latter areas in ETSI, and contributed to WiMax. In 1999 he joined TTP Communications working on research, technology strategy and M&A activities; and after the company's acquisition by Motorola became a Director of Technology Strategy in Motorola Mobile Devices. After leaving Motorola he was CTO Enterprise Systems with ip.access Limited, the leading manufacturer of GSM picocells and 3G femtocells. In early 2010 he joined Cognovo Limited, which was acquired by u-blox AG in 2012. In u-blox John is defining RF platform strategy for future wireless modules and looking at emerging standards for M2M. John has a first degree from Birmingham and a doctorate from Leeds universities. For further information please visit: www.u-blox.com

Gerald Miaille, CSR

Gerald Miaille has spent his entire career in the semiconductor industry, designing RF and mixed signal ICs for various wireless technologies including WLAN, BlueTooth, NFC, FM, SoftGPS as well as Cellular radios. He has developed novel ideas, which have seen patents as well as an engineering award appended to his name. Gerald currently works for Cambridge Silicon Radio (CSR plc) as a director of RF/Analog IC design. He leads two design centers which are developing state of the art wireless connectivity IC solutions for stand alone as well as Combo chips. For further information please visit: www.csr.com

Profiles of Speakers

William Carson, PA Consulting

Dr Carson is a technology consultant at PA Consulting. He specialises in the analysis and design of wireless communications systems, his research interests focuses particularly on MIMO precoding and receiver designs for the latest mobile and wireless standards (LTE/LTE-A and 802.11). William is currently actively engaged in a research project investigating the practical limits of 60 GHz communications. He received his M. Eng (with honours) and Ph.D from the University of Cambridge in 2005 and 2009, respectively. From 2009 to 2011 he was a post-doctoral researcher at the University of Porto, and a visiting researcher at the Program in Applied and Computational Mathematics at Princeton University and Department of Computer Science at Duke University.

For further information please visit: www.paconsulting.com

Prof. Yang Hao FIEEE, FIET, Queen Mary University of London

Yang Hao is a Professor of Antennas and Electromagnetics at Queen Mary University of London. He also serves in the management team of Cambridge Graphene Centre from 2013. He is active in a number of areas, including computational electromagnetics, microwave, metamaterials and transformation optics, antennas and radio propagation for body centric wireless networks, active antennas for millimeter/sub-millimeter applications and photonic integrated antennas. He is a co-editor and co-author of the books Antennas and Radio Propagation for Body-Centric Wireless Communications (Artech House, 2006, 2012), and FDTD modelling of Metamaterials: Theory and Applications (Artech House, 2008), respectively. Prof. Hao is an Associate Editor for the IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION etc. He has published more than 200 journal papers and is a frequent keynote speaker for many international conferences. He is a holder of the Royal Society Wolfson Research Merit Award between 2013 and 2018. Prof. Hao was elected as a Fellow of the ERA Foundation in 2007, a Fellow of the IET in 2010 and a Fellow of the IEEE in 2013.

For further information please visit: www.qmul.ac.uk

Dr Tim Brown, 5G Research Centre, University of Surrey

Dr Brown is a lecturer in RF, antennas and propagation at the University of Surrey who has had several years of experience at the University both as an undergraduate student and postgraduate researcher. During this time as a student, Tim specialised in antennas and propagation through his tuition and industrial experience with Nortel Networks and Nokia Mobile Phones, where his PhD title focused on diversity antennas at the mobile. After spending over two years of postdoctoral research at Aalborg University, Denmark, he has developed long term experience in antennas and propagation for mobile and wireless applications and at present is actively researching in several applications of RF and microwave including RFID, NFC, wireless devices, UWB radar. More recently Tim has been taking up further research interests in point to point as well as other device applications likely to be used in 5G technologies. In 2011, Tim qualified as a chartered engineer.

For further information please visit: www.surrey.ac.uk

Andy Sutton, EE

Andy Sutton is Principal Network Architect with responsibilities for RAN architecture evolution and mobile backhaul strategy and architecture. He has almost 30 years of experience within the telecommunications industry, mainly in radio access, transmission and transport network strategy, architecture and design. During his career Andy has worked for Mercury Communications Ltd, Orange, France Telecom Group, H3G and EE. Andy is a Visiting Professor with the department of Computing, Science and Engineering at the University of Salford, he's a Chartered Engineer, Fellow of the Institution of Engineering and Technology, Member of the Institute of Telecommunications Professionals and Fellow of the British Computer Society.

For further information, please visit www.everythingeverywhere.com

Djamal Berraki, University of Bristol

Djamal Berraki received an Electrical and Wireless Communication Engineering Diploma from the Polytechnic School of Algiers in 2008 and an MSc degree in Wireless Communication and Signal Processing from the University of Bristol in 2010. He is currently a PhD student at the University of Bristol. His work focuses on 60 GHz band for wireless communication systems, physical and mac layer solutions for gigabit per second communications and systems performance analysis. His research interests also include propagation and radio channel modelling, antenna models, MIMO systems and beamforming. For further information, please visit www.bristol.ac.uk

Mark Barrett, Blu Wireless Technology

Mark has over 30 years' experience in wireless technology and product development in technical, operational, business and market development roles. He has also either founded or taken key leadership roles in several start-ups. During the 1980's he worked at Philips Research where he successfully developed several FMCW radars operating at X band and millimetre wave frequencies.

During the 1990's Mark led the team at ERA Technology which pioneered the applications of array antennas and digital beamforming to satellite, radar and mobile communications (Smart Antennas) applications. He instigated and led the TSUNAMI series of multi company European projects which demonstrated the use of Smart Antennas for 2G and 3G mobile systems. He has also either led or been involved in the design of over a dozen mixed signal SoCs. In 2001 he founded Mansella Ltd who developed the world's first Bluetooth cordless telephone, including the development of three complex SoCs.

In 2009 he was one of the founding team at Blu Wireless Technology where he is currently their Chief Marketing Officer. He holds degree in Electronics from Nottingham University and is a Chartered Engineer.

Blu Wireless Technology is a Silicon IP company developing low cost 60GHz WiFi technology for consumer and telecom backhaul applications. For further information, please visit: www.bluwirelesstechnology.com

Howard Benn, Samsung

Howard leads the standards team at Samsung Electronics in the UK, he started his career writing the radio specifications for GSM, and 21 years later is still very active in world of standards and technology development. For further information, please visit www.samsung.com

Delegate List		
Name	Organisation	Company Profile
Viraj Abhayawardhana	BT Plc	major telco
Lawrence Archard	uPBeat Product Development	Electronic product development for fees or equity
Tim Bancroft	Microlease	
Mark Barrett	Blu Wireless Technology	
Neil Bartlett	Trackwise	Trackwise is a specialist manufacturer of high frequency PCBs serving markets and applicatio
Mark Beach	University of Bristol	University research group addressing advanced wireless connectivity (5G and beyond).
Howard Benn	Samsung Electronics research Institute UK	
Djamal Berraki	University of Bristol	
Damian Bevan	DBAF Consulting Limited	Freelance consulting in wireless technology
Francesc Boixadera	MStar Semiconductor UK	
Steve Braithwaite	ASH Wireless Electronics Ltd	ASH is a creative electronics design consultancy who are experts in wireless technologies

Tim Brown	University of Surrey	
Colin Campbell	Cambridge Consultants	
Chris Carr	Microwave Marketing	Supply of mmwave components, antennas and Diplexers
William Carson	PA Consulting	
Gilles Charbit	Mediatek	Chipset manufacturer
Brian Collins	BSC Associates	SIG Champion
Steve Crammond	PA Consulting	
Liam Devlin	Plextek RFI	Plextek RFI specialises in the design of MMICs and microwave/mm-wave modules to 100GHz
Oberdan Donadio	ANSYS	
Hazel Doughty	Castle Microwave Ltd	
Andrew Dumbreck	Andrew Dumbreck Media Limited	communications technology and regulatory consultancy
Richard Edgar	Imagination Technologies Limited	
David Edwards	Underwriters Laboratories (UL)	Providing certification and Global Market Access for Wireless and Automotive products) globally
Andrew Entwistle	New Street Research	
Stirling Essex	Espansivo	Board Member. Helping organisations make better strategic decisions in technology, marketing and business devt.
Darren Fawcett	Pace plc	
Simon Fletcher	NEC Telecom MODUS Ltd	SIG Champion
Frank Gao	Queen Mary University of London	Research and Education
Raj Gawera	Samsung	Board member
Mike Geen	Filtronic Broadband	
Zahid Ghadialy	eXplanoTech	SIG Champion Technical consultancy, Technical trainings and Managed services in wireless telecoms
Diego Giancola	PA Consulting Group	SIG Champion
James Goodwin	Anite	SIG Champion
Remi Griffaton	Alpental Technologies	New venture developing software-defined wireless networking / fiber extension solution.
John Haine	u-blox UK	SIG Champion
Morgan Hanson	Agilent Technologies	SIG Champion The world's premier measurement company and a technology leader in communications and electronics
Prof Yang Hao	Queen Mary University of London	
David Hayes	Plasma Antennas	Plasma Antennas has developed a range of next-generation smart selectable multi-beam antennas
Ibrahim Hemadeh	University of Southampton	Academic Organization
Chris Hole	TTP	
Zhirun Hu	University of Manchester	
Malkit Jhitta	RoodMicrotec	Design, Test, Qualification and Suply Chain Management Services
Adrian Jones	Aeroflex	
Soraya Jones	Cambridge Wireless	
Peter Jupp	Peak RF Ltd	RF design and development consultancy
Jussi Kahtava	Sony Europe	

Dr Triantafyllos Kanakis	eXplanoTech	Technical Consulting, Technical Training, Managed Service, Resourcing and Recruitment
Santosh Kawade	BT	Telecom Service Provider
Paul Kenworthy	Ranplan	SIG Champion
Mohammad Khatib	NetInteg Solutions	
Kit Kilgour	ip.access Ltd	ip.access is the leading provider of 2G, 3G and LTE small cell systems, with over 1M cells deployed
Michael Kowalczuk	Wavemaker Technology Ltd	Hardware design.
Richard Langley	University of Sheffield	University
Barry Lewis	Samsung Electronics	Multinational mass market CE manufacturer.
Paul Lowbridge	Microwave Marketing	Technology lead technical representative organisation
Jamie Lunn	Rohde & Schwarz UK	
Claire Mackay	eXception EMS Ltd	UK based CEM, SME, High Tech, High Reliability Fast Turn Prototype and Production capabilities
Paulo Marques	IT-Instituto de Telecomunicacoes	Research center on wireless communications
George Matich	Selex Es Ltd	Selex is defence systems solution provider in the global defence market space
John McNicol	Nova Modus	Commercialising research and developing business for innovative wireless technologies
Gerald Miaille	CSR	SIG Champion
Kevin Morris	University of Bristol	UK university carrying out research into next generation RF technologies
Maziar Nekovee	Samsung	
Graham Norgett	Cellmetric	
Mark Norris	Cambridge Consultants Ltd	Wireless engineering consultancy
Henry Nurser	Blu Wireless Technology	
Tim Phipps	Cambridge Consultants	SIG Champion Product Development Consultancy
Mark Posen	RPC Telecommunications Limited	Consulting, software and training in satellite and radio communications
Vasily Pribylov	Etherstack	PMR/LMR Protocol Stacks
Stuart Revell	ICT KTN	
Michael Reynolds	Invisibly Connected	Wireless technology consultancy specialising in low power license exempt and mesh technologies.
Onur Sahin	InterDigital	Research and Development
Malcolm Sellars	Sub10 Systems	Develop and supply mmwave radio links in V-band and E-band
Ruben Selva	ip.access	Leaders in 2G, 3G & 4G end-to-end Small Cell solutions
David Sharp	Ocado	Ocado is the world's largest online only grocery retailer. It ships over 1 million items per day.
Jon Strange	MediaTek	cellular chipset, wireless, RF
Andy Sutton	EE	SIG Champion
Diana Teixeira	Sub10 Systems	Development and Manufacture of mmW Wireless Ethernet Bridges
Bernard Tenbroek	Mediatek	fabless semiconductor company, wireless system provider
Martin Thorp	BBC	British Broadcasting Corporation - research and development department
Simon Tonks	PA Consulting Group	
Catherine Viola	Quindi Research	
Marcus Walden	Plextek Ltd	Electronics design consultancy

Andrew Wallace	Applied Wave Research Ltd	
Kin Wan	EE	Mobile Network Operator
Zhongxiang Wei	University of Liverpool	The University of Liverpool is one of the great centres of research, knowledge and innovation.
Saul Wiggin	Queen Mary University of London	
Adrian Wolmarans	British Broadcasting Corporation	BBC R&D develops and licences innovative technologies for the broadcasting industries
Steven Wright	Covnetics	Expert telecoms & networking consultancy with FPGA design services
Jie Zhang	University of Sheffield	www.sheffield.ac.uk