

Cambridge Wireless Radio Technology SIG
'Delights and Disasters of RF measurements'
Sponsored by Qualcomm Technologies International
20th March 2024

The Radio Technology SIG is championed by Mark Beach, **University of Bristol**, Brian Collins, **BSC Associates**, Paul Harris, **VIAVI Solutions**, Peter Kibutu, **TTP Group** and Peter Topham, **Qualcomm Technologies International**

Venue: Qualcomm Technologies International, Churchill House, Cambridge Business Park, Cowley Road, Cambridge, CB4 0WZ

AGENDA

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| 10:30 | Registration over refreshments |
| 11:00 | Welcome from Paul Crane, CEO, Cambridge Wireless |
| 11:05 | Welcome from our sponsor and host, Dave Yates, Qualcomm Technologies International |
| 11:15 | Session 1: Chaired by Professor Mark Beach, University of Bristol & Radio Technology SIG Champion |
| 11:20 | 'Why I have trouble with spectrum analysers!'
Tim Newton, CTO, RFcreations
A potted history of spectrum analysers from CRTs to modern digital analysers, explaining the evolution of terminology and the perplexing controls which confront us today. The talk will be illustrated by references to the use of spectrum analysers in the Bluetooth test specification. |
| 11:40 | Q&A |
| 11:45 | 'DIY Load-Pull using an Oscilloscope and Vector Signal Generator'
Jamie Lunn, Vector Network Analyser Product Manager, Rohde & Schwarz
We set out to build a Load Pull test bench using off-the-shelf Test & Measurement instruments. Specifically, an RF Oscilloscope and a Vector Signal Generator. This is what we learned. |
| 12:05 | Q&A |
| 12:10 | 'Exploring the outer limits of Spectrum Analysis'
Jonathan Borrill, CTO, Anritsu
In this discussion we will look at the fundamental architecture of a Spectrum Analyser, stopping briefly for some mathematical brain teasers, before then exploring how we can take this technology to the outer limits of RF measurement that sits in the sub-THz bands. The design, implementation, and measured results from a Proof-of-Concept demonstrator will be presented and discussed. |
| 12:30 | Q&A |
| 12:35 | Networking lunch over displays |
| 13:40 | Session 2: Chaired by Peter Topham, Principal Engineer, Qualcomm Technologies International & Radio Technology SIG Champion |
| 13:45 | 'Power Amplifier Linearity Measurement for 5G and Satcom Applications'
Kausar Chaudhry, Compound Semiconductor Applications Catapult
Power Amplifiers (PAs) are critical components for communication systems, the PAs amplify the transmitted signal to adequate levels, ensuring the signal is detected by the receiving device, regardless of distance or obstacles. With the growing demand for data, modern communication signals like 5G and broadband satellite communication (Satcom) have complex modulation schemes and wider bandwidth. This complexity makes it more challenging to design power amplifiers that meet performance standards, including efficiency, output power, gain, and linearity. |
| 14:05 | Q&A |

14:10 'In assessing the antenna performance, are far-field azimuth and elevation radiation patterns sufficient?'

Dr Geoff Hilton, Senior Lecturer, University of Bristol

Commercial antenna manufacturers' data sheets supply you with a plethora of useful information including bandwidth of operation, antenna gain, and generally the azimuth and elevation radiation patterns (or sometimes even three orthogonal planes). While this is maybe sufficient for some applications, what useful information that could significantly affect the communications link performance could be missing from this? In this talk a number of examples of antennas for operation both indoor and outdoor operation are presented and identifies situations where the antenna environment (the unit in which the antenna is housed or the location of the unit as a whole) becomes the dominant mechanism for shaping the radiation pattern. The need for full polarimetric radiation pattern measurements and the range of error that could occur with a limited measurement dataset is discussed.

14:30 Q&A

14:35 Refreshment break

15:00 'Smarter Installation and Troubleshooting'

Sam Darwish, VIAVI Solutions

Sam will share how VIAVI Solutions have been supporting their customers to speed up deployments and also how they have helped troubleshoot using a tried and tested method. The work VIAVI have done has reduced the time to optimise sites and also reduced the amount of revisits and components swaps to get sites performing.

15:20 Q&A

15:25 'Gaining Efficiency in the Calibration and Verification of Phased Array Antennas (for Satellite Communication)'

Clive Barnett, Solution Engineer, Keysight

Modern satellite networks operate at higher frequencies and use active phased array antenna systems which are driving ubiquitous connectivity and sensing requirements of next-generation satellite communication. Phased array antennas use electronic means to steer beams to precise locations to improve overall reliability. Testing these highly integrated systems is a complex and time-consuming task. Designers and manufacturers need fast OTA testing to efficiently calibrate and verify the performance of phased arrays.

15:55 Q&A

16:00 Closing remarks from **Peter Topham, Principal Engineer, Qualcomm Technologies International & Radio Technology SIG Champion & Event ends**

With the permission of the speakers, presentations will be available upon request after the event.

Profile of organiser

Cambridge Wireless - www.cambridgewireless.co.uk

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 an active community of over 1000 technology companies ranging 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 Special Interest Groups 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 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.

Profile of sponsor & host

Qualcomm Technologies International - www.qualcomm.com

For more than 30 years, Qualcomm's ideas and inventions have driven the evolution of wireless communications, connecting people more closely to information, entertainment and each other. These technologies now power the

convergence of mobile communications and consumer electronics, making wireless devices and services more personal, affordable and accessible to all.

Radio Technology SIG & SIG Champions

This event has been organised and delivered by the Radio Technology SIG and we are very grateful to our Industry Champions who are;

- **Professor Mark Beach, Professor of Radio Systems Engineering, University of Bristol** - www.bristol.ac.uk/engineering/research/csn/
- **Brian Collins, Managing Consultant, BSC Associates** - www.bscassociates.co.uk
- **Paul Harris, Principal Wireless Architect, VIAVI Solutions** - <https://www.viavisolutions.com>
- **Peter Kibutu, 5G NTN Market lead, TTP plc** - www.ttp.com
- **Peter Topham, Principal Engineer, Qualcomm Technologies International** - www.qualcomm.com

Further information about our Champions and the activities of this SIG Group can be found at the CW website www.cambridgewireless.co.uk/groups/radio-technology

Profile of speakers

Tim Newton, CTO, RFcreations - www.rfcreations.com

Tim has spent his life taking apart radars, sonars, optical systems, and a substantial number of radios in a desperate attempt to understand how they work. During his spare time, he relaxes by trying to put them back together!

Jamie Lunn, Vector Network Analyser Product Manager, Rohde & Schwarz - www.rohde-schwarz.com

Bio to follow shortly.

Jonathan Borrill, CTO, Anritsu - www.anritsu.com

Jonathan has over 30 years' experience in the area of advanced RF and wireless signalling systems. After graduating from Southampton University (UK) in electronic engineering, Jonathan worked for the UK Ministry of Defence (now QinetiQ) developing advanced millimetre wave communications systems. After a stint at Motorola as application engineering manager, in 2001 he moved to Anritsu. There, after performing business development and management roles for the EMEA region, he was appointed as Head of Global Market Technology for the corporate T&M business. Jonathan is a full member of the Institute of Engineering and Technology and a Chartered Engineer.

Kausar Chaudhry, Compound Semiconductor Applications Catapult - <https://csa.catapult.org.uk>

Bio to follow shortly

Dr Geoff Hilton, Senior Lecturer, University of Bristol - www.bristol.ac.uk

Geoff's research interests include antenna element, array and system design for a variety of communications and radar applications, and he is a reviewer for IET publications and EPSRC grant proposals in these areas. He has been the principal investigator or supervised projects involving Ground Penetrating Radar (QinetiQ); performance evaluation of antennas used in mobile radio (Ofcom and Mobile VCE); antenna array design/analysis (Airspar, Kyocera, ProVision, QinetiQ and Toshiba); tuneable elements (Hewlett Packard, QinetiQ and Samsung), and vehicle-mounted antennas (BAR/Honda). The latter involved the design of a low-profile antenna, which was employed on their F1 racing cars from 2004 until they withdrew from F1 racing.

Sam Darwish, VIAVI Solutions - www.viavisolutions.com

Sam has 20 + years of experience working in the test and measurement industry, in a combination of OEMs and channels supporting customers working in research and development to field test. For the last 10 years he has been focussing on the telecommunications eco-system working with service providers, network equipment manufacturers and contractors supporting both wireless and wireline. Within Viavi Sam is responsible for the 5G business across the region with a focus on driving test efficiencies within the telecommunications eco-system.

Clive Barnett, Solution Engineer, Keysight - www.keysight.com

Clive is currently working as a Solution Engineer with Keysight Technologies and he has been with HP, Agilent and now Keysight for 25 years, before that for Com Dev Europe for 4 years. In that time he's worked as an R&D Engineer designing components for Satellite payloads, as an Application Engineer specialising in VNA measurements in the UK for HP, before becoming a Custom Systems Engineer working in the 8510 group for HP in California. He then

spent 2 years for HP in Queensferry, in Marketing before HP split into Agilent. Since 2007 Clive has been working supporting Component Test solutions for Agilent/Keysight which includes VNA solutions, Phase Noise, Antennas and Lightwave Component Analysers.