

**Joint Short Range Wireless and Wireless Sensing SIGs**  
**“Sensing from Radio”**  
**29<sup>th</sup> September 2010**

Sponsored by:  **ROHDE & SCHWARZ**

*Championed by Tim Whittaker of Cambridge Consultants, Antony Rix of TTP and Peter George from Short Range Wireless SIG and Rob Blake of Philips Research UK, Dirk Trossen, University of Cambridge, Eiman Kanjo of Cambridge Mobile Sensing and Simon Loe of Alcatel Lucent from Wireless Sensing SIG.*

Venue: Vivien Stewart Room, Murray Edwards College, Cambridge

### AGENDA

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**12:00 Registration over Lunch**

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**13:15 Introduction to Cambridge Wireless and the Short Range Wireless and Wireless Sensing SIGs from Tim Whittaker of Cambridge Consultants**

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**Session 1: Chaired by Tim Whittaker of Cambridge Consultants**

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**13:25 “Ultrawideband (UWB) In-Building Location Systems”**  
**Dr Andy Ward, Chief Technology Officer, Ubisense Limited**

Outdoor location systems, such as GPS, have been tremendously successful in the wide-area. Recently, a range of systems have been developed to extend positioning capabilities within buildings. In this talk, I'll outline one such system, based on ultrawideband (UWB) radio, and will describe both the difficulties associated with performing accurate in-building location and case studies of industrial applications enabled by the technology.

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**13:45 Q&A**

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**13:50 “Broadband Spectrum Monitoring – Visualising Spectrum Usage and Abuse”**  
**Stirling Essex, Director of Business Development, CRFS**

This presentation will as a brief introduction to the topic, discuss spectrum needs and consumer expectations, and how spectrum availability is a driver/enabler for economic growth and security in a modern society. We will then move on to discuss the advantages of intelligent, broadband, distributed monitoring networks to build detailed pictures of spectrum usage. Data from such systems allows regulators and users of spectrum to resolve frequency allocation issues and inform spectrum policy-making, improving the efficiency of spectrum use. The presentation will conclude with a number of case studies on spectrum usage (and abuse) based on data from CRFS surveys.

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**14:10 Q&A**

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**14:15 “Towards THz Spectroscopy and Imaging in Standard CMOS”**  
**Dr. Lorenzo Tripodi, Philips Research**

THz radiation has been for long time used by scientists for fundamental research. More recently, security devices exploiting the capability of sub mm-waves to penetrate opaque objects have been introduced in the market. Also, since the invention of the terahertz time-domain spectroscopy technique, THz radiation has demonstrated its usefulness in a wide range of non-security applications connected with spectroscopy and imaging capabilities combined. Today, commercial electro-optic THz instruments are available on the market and some new technologies, based on solid state devices, are being developed around the world. Solid state devices in particular are expected to allow a larger diffusion of THz techniques for commercial use.

In this talk Dr Tripodi will discuss current research on producing and detecting THz radiation using integrated circuits, implemented with common and standard CMOS technology. The possibility of having THz devices in CMOS will allow the manufacturing of complete THz systems at a fraction of the current cost and in a much smaller size. In particular, the combination on a single chip of THz, analog and digital functions may open a completely new range of THz low cost applications.

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**14:35 Q&A**

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**14:40 5 Minute Pitch from the National Physical Laboratory**  
**Tian Loh**

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**14:45 Coffee Break**

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**Session 2: Chaired by Robert Blake of Philips Research UK**

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**15:10 Open Forum/Discussion, chaired by Dr. Dirk Trossen, University Of Cambridge**

Our interactive panel session will demonstrate the potential for sensing opportunities utilizing short-range wireless technologies. We will work with our speakers and the audience to flesh out an example opportunity, identify technical and business barriers and develop a solution draft that shows potential for an idea to move forward. Audience participation is not only welcome but will be actively solicited!

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**16:10 “Utilising Throwaway Data for Sensing Applications”**

**Led by Dr Eiman Kanjo, Cambridge Mobile Sensing & Others**

Large numbers of wireless devices around the world emit and receive signals for communication, tracking and monitoring purposes. However, not all of these signals reach their destinations, some attenuate and some others bounce off the ground around the actual antenna. In this talk, we will look at the possibility of utilising this type of wireless waste data for sensing applications. For example, using waste data from the global positioning process for snow depth measurement.

**16:30 Q&A**

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**16:35 “Locating Wireless Devices where GPS is Not Available - Final Results of Ofcom Study”**

**Dr Steve Methley, Quotient Associates Limited**

Ofcom’s key question in this study concerns whether a wireless device’s location can be found where GPS is not available, such as indoors or in urban canyons. Overall, we have shown that suitable technologies do exist and we have also shown how this capability will evolve with time. However, we have also raised a new question over the level of trustworthiness which may be placed in position reports from all consumer focussed location technologies, including GPS.

Specifically, we are concerned that more research needs to be performed in order to understand location accuracy in real-world environments at high confidence levels, such as 95%. We have noted that high confidence levels may be needed where position reports are used to ensure that transmissions by wireless devices, such as cognitive radios, do not cause unacceptable interference to others. We have also shown that a method of monitoring the integrity of the position report would add a further degree of trust to the position report. This might be best achieved by employing a combination of location technologies on the wireless device (one level of redundant data enables error detection; two levels enable error correction ). Neither high percentile accuracy, nor integrity monitoring, have yet been addressed by the industry for consumer positioning devices.

**16:55 Q&A**

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**17:00 Closing Remarks**

**Complete Evaluation Form**

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**17:10 Event Closes**

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

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## **Profile of our Sponsor**

### **Rohde and Schwarz**

Rohde & Schwarz UK Ltd has been the UK subsidiary of Rohde & Schwarz GmbH for 26 years. Based in Fleet, RSUK employs 70 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 70 years across a wide range of technologies and industries, including wireless, broadcast, aerospace, defence and security markets. For more information, visit [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## **Profiles of our SIG Champions**

### **Short Range Wireless SIG Champions**

#### **Tim Whittaker, Cambridge Consultants**

Cambridge Consultants was started in 1960 to pioneer the delivery of independent design and development services in electronic, mechanical and product engineering: we are one of the founder companies of the high-technology Cambridge phenomenon. Our history of world-class services is augmented by our development of intellectual property in telecommunications, software, silicon and medical devices, and by more than 20 successful spin-out ventures. Today Cambridge Consultants employs 350 engineers, scientists, project managers and technicians with offices in Cambridge, UK and Cambridge, MA in the USA; we provide the full range of services for excellent product design to a worldwide client base in the wireless, consumer, industrial and medical markets. Tim Whittaker is a System Architect in the Wireless business unit, where he has taken the technical lead in projects using radio standards like Bluetooth, ZigBee, DECT, and in the creation of specialist communications schemes for new applications, or to use new spectrum allocations. For more information, visit [www.cambridgeconsultants.com](http://www.cambridgeconsultants.com)

#### **Peter George**

Peter George is a Strategic Marketing Consultant providing services to the test and measurement industry. Formerly he was the General Manager of Anritsu's UK product development group based in Stevenage. They are responsible for Anritsu's short range wireless test instruments which include market leading products for Bluetooth and WLAN. Peter has worked in the test and measurement industry for over 25 years and has been involved in just about all aspects of wireless test-equipment development. During this time he also served on a number of committees, most notably for 4 years as the vice-chair of the 3G phone standards group responsible for test specifications. Most recently his work at Stevenage has been to focus his group on providing one box testers for the manufacturing markets in the Far East and the Americas, as well as addressing new short range wireless standards as they emerge.

#### **Dr. Antony Rix, TTP**

TTP is a leading technology and product development company, working closely with its clients to bring new products to market and create new business opportunities from advances in technology across a broad range of market sectors. Through ground-breaking projects and spin-offs including TTPcom and ip.access, TTP is an established pioneer in radio and communications systems and services. TTP has recently created a new Communications and Wireless group to offer specialist technology and product engineering services in these areas. Dr Antony Rix is a Senior Consultant in TTP's Communications and Wireless group. He leads development projects and consults on the cellular, wireless and mobile healthcare markets. For more information please visit [www.ttp.com](http://www.ttp.com)

### **Wireless Sensing SIG Champions**

#### **Rob Blake, Philips Research UK**

Robert Blake is a Senior Scientist at Philips Research, Cambridge. Philips has recently established their UK Research presence in the town, showing a commitment to Research, the UK and Cambridge. At Philips, Robert has worked on mobile and wireless applications, focussing on usability and acceptability issues relating to the technology. Initially he worked on location and context aware applications, using mobile phones and Bluetooth to deliver services to users. Robert was involved in the early days of Near Field Communications (NFC) where he worked on applications for this new technology and built some of the first NFC-enabled mobile phone prototypes. A major focus of the work was building and promoting novel contactless applications, including using NFC to establish a Bluetooth connection. More recently he has been investigating the application of mobile and wireless technology for home healthcare and wellbeing. One of the projects he is working on is SAPHE (Smart and Aware Pervasive Health Environment), aiming to provide a next generation telecare system for improving the quality of people's lives. Robert holds a MEng in Software Engineering from Imperial College London and is fluent in German. In his spare time he enjoys photography and is a keen cyclist. For more information please visit: [www.research.philips.com](http://www.research.philips.com)

#### **Dirk Trossen, University of Cambridge**

Dirk Trossen, has more than ten years of experience in network architectures and wireless technology with main contributions in the area of inter-domain networking, seamless handovers and physical network overlays. He designed a platform for participatory wireless sensing, available under open source license. Dirk is one of the main authors of the EIFFEL whitepaper on Future Internet efforts within Europe and one of the main caretakers in the EIFFEL FP7 support action. He is also the Technical Manager of the EU FP7 PSIRP project, an explorative Future Internet project that re-designs fundamentals of the Internet architecture. Dirk holds a Ph.D. degree in Computer Science from Technical University of Aachen, Germany. He published more than 50 peer-reviewed papers in international conferences and journals and holds currently 18 international patents. For more information please visit: [www.cam.ac.uk/](http://www.cam.ac.uk/)

### **Dr Eiman Kanjo, Cambridge Mobile Sensing**

Eiman is a Researcher at the Computer Laboratory, University of Cambridge. Her main research interest is in mobile and pervasive sensing. Prior to joining Cambridge University, Eiman worked at the MRL (Mixed Reality Laboratory), Computer Science, University of Nottingham in the area of Pervasive Computing and location based games. She has also worked as a researcher and developer at the ICCAVE (the International Centre for Computer Games and Virtual Entertainment, Dundee) carrying out research work in the area of "Interactive Toys and TableTop Interfaces". She earned her PhD from the Computer Science department, University of Abertay Dundee, Scotland, titled "Vision based Interactive toys environment". For more information please visit [www.escience.cam.ac.uk/mobilesensing](http://www.escience.cam.ac.uk/mobilesensing)

### **Simon Loe, Alcatel-Lucent**

In his current role, Simon leads marketing activities to the major telecoms service providers in Northern Europe, such as BT. He is also a member of the regional Business Strategy and Marketing team for Alcatel-Lucent's North & West Europe Region.

Prior to the formation of Alcatel-Lucent, Simon joined Lucent Technologies in 2000 and has now been with the organization for eight years. During this time, he held a number of different marketing roles. Before joining Lucent, Simon held the role of Technical PR and Marketing Manager for STMicroelectronics for five years and was based in Geneva. Simon holds an MBA from Thames Valley University and a BSc in Engineering Electronics from Warwick University. Simon is also a member of the CIM and CIPR and is fluent in French. For more information please visit: [www.alcatel-lucent.com](http://www.alcatel-lucent.com)

## **Speaker Profiles**

### **Dr Andy Ward, CTO of Ubisense Limited**

Andy Ward has designed, built and worked with in-building location systems for over fifteen years. He studied at Cambridge University, receiving a BA in Computer Science and a PhD in 'Sensor-driven Computing', and led research into location technology at AT&T Laboratories Cambridge from 1998 to 2002. In 2002, he co-founded Ubisense Limited, one of the first companies to commercialize UWB in-building tracking products, and he now leads technology planning and development for Ubisense. For more information please visit: [www.ubisense.net](http://www.ubisense.net)

### **Stirling Essex, Director of Business Development, CRFS**

CRFS develops and supplies spectral analysis tools for planning, monitoring, and licensing of wireless spectrum, based on innovative, low-cost distributed networks of broadband, real time RFeye® spectrum monitoring nodes.

Stirling has been involved in wireless systems since the early days of GSM, and was subsequently involved in the development of test systems for CDMA (IS-95), and for 3G (W-CDMA), including responsibility for the development and marketing of 3G Test Mobiles at Ubinetics. He founded Espansivo, a wireless technology consultancy in 2005, and joined CRFS in June 2008. He is a co-champion of the Cambridge Wireless Future Wide Area Wireless SIG and is a member of the Cambridge Wireless Board. For more information visit [www.crfs.com](http://www.crfs.com).

### **Dr. Lorenzo Tripodi, Philips Research**

Lorenzo Tripodi received the Laurea degree in electronics engineering from Politecnico di Torino, Turin, Italy in 1999 and the Ph.D. degree in theoretical condensed matter physics from Université J. Fourier, Grenoble, France in 2002. In 2003 he joined the Integrated Transceivers group (now ESSI group) in Philips Research Eindhoven (The Netherlands) where he is currently Senior Scientist and project leader of the THz Microsystems project. He is also coordinator of the European FP7 project ULTRA.

His research interests include nonlinear ultra-fast circuits, new devices and terahertz circuits and systems design. For more information please visit: [www.research.philips.com](http://www.research.philips.com)

### **Dr Steve Methley, Quotient Associates Limited**

Steve Methley has over 25 years' experience in telecommunications and data communications innovation, having led teams in the laboratories of British Telecom, Hewlett-Packard and Toshiba. Currently a director of communications consultancy Quotient Associates based in Cambridge, UK, his work includes technology, regulation, business strategy, socio-economic analyses and futurology for a range of clients from start-ups to large global corporations.

Steve was awarded his Ph.D. from Imperial College and his MBA from the Open University. He has a number of patents and published papers and has been a Visiting Fellow at the University of Essex. His first book, on wireless mesh networking, has recently been published. He continues to be an active IEEE Standards Association contributor and an independent expert for the European Commission's Research Framework. For more information please visit: [www.quotientassociates.com](http://www.quotientassociates.com)

**Tian Hong Loh**

Tian received, respectively, a B.Eng. degree (first class) from Nottingham Trent University, Nottingham, U.K., in 1999, and a Ph.D. degree from the University of Warwick, Coventry, U.K., in 2005, both in electrical and electronic engineering. His Ph.D. thesis involved computational electromagnetics for microwave devices incorporating periodic structures using various finite element methods. The research work was sponsored under an EPSRC/MOD grant and Warwick University. During the study, he was also involved in a research contract on wireless communication signal guidance around building, which was sponsored by Radiocommunications Agency, U.K. (now known as Ofcom, U.K.). From 1999 to 2000, he was an Electrical Engineer with SHARP-ROXY Inc., Batu Pahat, Malaysia. He joined the U.K. National Physical Laboratory in 2005 as Higher Research Scientist and since 2009 he has been a Senior Research Scientist, involved in work on fundamental research and develop measurement technologies in support of the electronics and communication industry. His current research areas involve metamaterials, small & smart antennas, computational electromagnetics, electromagnetic compatibility, photonic crystal, and signal propagation, data transfer & data clustering in wireless communications and wireless sensor networks.