

# Engineering the future of communications **2018**

Connecting people -  
Maximising **the user experience**



## The IET

- The IET is one of the world's largest engineering institutions with over 167,000 members in 150 countries. It is also the most interdisciplinary - to reflect the increasingly diverse nature of engineering in the 21<sup>st</sup> century. Energy, transport, manufacturing, information and communications, healthcare and the built environment: the IET covers them all.
- The IET is working to engineer a better world by inspiring, informing and influencing our members, engineers and technicians, and all those who are touched by, or touch, the work of engineers.
- We want to build the profile of engineering and change outdated perceptions about engineering in order to tackle the skills gap. This includes encouraging more women to become engineers and growing the number of engineering apprentices.

## The IET Communications Policy Panel

As part of the IET, the Communications Policy Panel is an independent group that undertakes to proactively identify policy issues applicable to the sector and provide guidance to IET members, Government and the public.

We are able to achieve this thanks to the expertise of our volunteer-led panels of IET Members and engineering practitioners from across industry, academia and beyond. For more information please visit <http://www.theiet.org/policy/panels/>

## Get involved

There is a whole host of areas that the IET is active in, including artificial intelligence, cyber security and applied visualisation to name a few. If you are interested in helping us gather knowledge and intelligence from across the profession to deliver thought leadership, as part of the IET's charitable remit, then get in touch.

We welcome your views and collaboration both today and beyond to help us achieve this. This ensures we can keep professionals and wider society reliably informed about the key issues of today, while horizon-scanning to understand the trends and developments that will impact the engineers of the future.

For more information, contact Ahmed Kotb, the IET's Strategic Lead for Digital, on [akotb@theiet.org](mailto:akotb@theiet.org).

# Maximising the user experience

This year we mark our tenth anniversary meeting in a series of successful annual briefings to discuss policy matters involving communications and the information economy.

The purpose of this event is to bring you up to date with the thinking of top engineers about likely future developments in communications and what they mean for us all, and to give you the opportunity to participate in a discussion about the likely consequences.

With ever more reliance on delivering a robust and secure communications network, as an enabler for the Industrial Strategy for the UK, we want to describe what will happen in the future. An important aspect of this will be the implementation of a joined-up approach to 5G roll-out - one that reaches across silos and allows for a truly connected UK.

We will also focus on how a digital UK would give all citizens, places and businesses access to the physical infrastructure they need – such as energy, transport and digital.

This event is being held by the IET Communications Policy Panel, which provides impartial advice and guidance to Policymakers and Government. The Panel draws on the experience of some of the most knowledgeable and respected engineers in the field of communications from industry, academia and the public sector.

There will then be an opportunity for wide-ranging discussions on the significance and implications of the issues and how we can collaborate to build a practical plan for the future.



**Professor Lord (Alec) Broers FEng FRS Kt DL** was Master of Churchill College from 1990-1996 and was Vice-Chancellor of the University of Cambridge from 1996-2003. He was knighted in 1998 and made a Life Peer in 2004. He was educated at Melbourne University and the University of Cambridge and worked in the Research & Development laboratories of IBM in the USA for nineteen years, becoming an IBM Fellow and ultimately holding responsibility for the development of chip technologies. His personal research concerned electron microscopes and the fabrication of nanoelectronic devices but his interests cover most aspects of the development of technology. He was Chairman of the House of Lords Science and Technology Select Committee (2004-2007), and was President of the Royal Academy of Engineering from 2001 to 2006. He has served on the boards of several high technology start-up companies and is presently on the Board of FlexEnable, a company that is pioneering the applications of flexible plastic electronics.

# Chairman's introduction

Communications is now so much a part of our lives that we increasingly regard it as a vital service, providing everyday things such as on-demand video and speech-requested functions in our home as well as occasionally-essential things like '999' calls. But these services will be less ubiquitous than we need them to be, less available to all and less reliable unless we pay some attention to the regulation of the underlying technologies. There will also be less of the vital innovation that the UK needs to stay at the forefront.

To start the discussion we have three talks on key aspects - on what 'quality' services will need to look like in the future to deliver what we need - as we have said before there is much more to this than speed. Secondly, we will look at the impacts on society and the challenges these pose, and lastly we will consider the way smart cities will evolve for us.

Although the silica fibres envisaged by the recently-late [Sir] Charlie Kao in his great paper to the IET - and of which more than 300 million km are deployed annually - carry the big communications load, delivery to us depends in large part on wireless. This will increasingly mean 5G technology, and we will describe this.

We are also mounting an initiative to DCMS and Ofcom with wide industrial support. This is aimed at ensuring that the benefits reach out to all, especially in rural areas, and encourage maximum innovation. We also have a short one-minute 'EngShorts' video being released across social media today on what this is about which we encourage you to watch!

For more details about this initiative, visit our website [www.theiet.org/5GFF](http://www.theiet.org/5GFF).



**Prof Will Stewart FREng CEng FIET FInstP** has been a member of the IET Communication Policy Panel since its creation in November 2002 and Chairman since June 2008. Previously the Chief Scientist at Marconi with wide interests in technologies from communications to bio sensing, he was educated at Imperial College (Physics). His personal interests have been in optical fibre communications and optoelectronics. Recent interests include microstructured photonic materials (photonic crystals), optical slow-wave structures, nanomechanical systems and the application of various optical, semiconductor and acoustic technologies to medicine, particle physics and industrial processes. He is a visiting Professor at UCL and at the ORC at Southampton. He is author on some 64 conference and journal papers, including many invited papers, and on 48 patents. He is a member of the editorial advisory board for the journal 'Science'.

# Quality of Experience in the Gigabit Era

*Gavin Young*

*Head of Vodafone Fixed Access Centre of Excellence*

We are now living in the era of Gigabit broadband. Gigabit speeds have become available on several fibre networks in the UK. This fixed network capability will soon be joined by much higher mobile speeds as 5G deployment gets underway.

Thus far, the single universal metric for the “goodness” of broadband has been speed. Speed has worked well for us in the past as we’ve evolved from dial-up modems through the early days of 2 Mbit/s DSL through to the tens of Megabits per second that many homes enjoy today. However, as we’ve improved broadband technology to reach Gigabit speeds we are now in the region of diminishing returns.

New, more demanding applications are now emerging for machine-to-machine communication, advanced collaboration and entertainment. For these to be successful, we need Quality Broadband. This requires us to consider attributes such as reliability, low latency (delay), and consistency (predictability).

A Quality Broadband approach can also lead to more cost-effective networks and more efficient use of capital. Fortunately, the tools and techniques already exist to take broadband to the next level. However, a major challenge is how consumers can understand the relative Quality of different broadband products and how marketeers (and regulators) can articulate this to them. As we enter the Gigabit era it is time to move the broadband debate from a focus purely on quantity (and coverage) to also include the concept of Quality.



**Gavin Young** is responsible within Vodafone Group for the fixed broadband access technology strategy, architecture, standards and deployment best practises across the 17 countries where Vodafone currently has fixed access assets. Gavin was previously Head of Strategy & Planning at Cable & Wireless Worldwide, as well as a founding member of Bulldog Communications. Prior to that, Gavin led the Access Architecture & Design team at BT. Gavin was a founding Director of the Broadband Forum where he was overall Technical Chairman for 12 years. He has been co-chair of the UK21CN consultation’s Broadband Group, chair of the UK NICC’s DSL Task Group and vice-chair of the NICC Ethernet Access Task Group. Gavin serves on the IET Communications Policy Panel, the Ofcom Spectrum Advisory Board and the Broadband Forum’s executive advisory board. He is a IEEE member, Fellow of the IET and Distinguished Fellow of the Broadband Forum.

# Future Communication - What's human about this?

*Sylvia Lu*  
*5G Tech Lead, u-blox*

Today, we are surrounded by wireless technology. We rely on it to keep us connected, no matter where we are and what we do. The new era of 5G will stretch the capabilities of the mobile infrastructure across the world well beyond the capabilities of current wireless access technologies. This will open up new applications and services for various verticals, immersive, industrial, consumers and automotive industries – but will also present significant challenges.

We are serious about building and developing a truly connected society, improving productivity and wellbeing. However, it is not enough simply to have hyper-connected infrastructure, connected cars, high speed mobile broadband or 5G. Technology must be centred on people, first and foremost.

The scale of the success of 5G will be determined by its impact on society. The key to unlock the full potential of new technology, particularly in this new era, does not lie with the technology alone. The key is for creative problem solvers to approach design challenges with people top of mind. A 'human-centric design' approach will help us deliver future communication networks that work for all citizens, and connect everyone and everything in delivering a more sustainable and prosperous future.



**Sylvia Lu** is an award-winning engineer with over 11 years' industry experience in wireless communications R&D, cellular modem developments, global standards, technology strategy and innovation. Currently employed by u-blox, a Swiss company and global leader in wireless and positioning semiconductors and modules for the industrial, automotive and consumer markets, Sylvia has been critically instrumental in the evolution of cellular connectivity standards for the Internet of Things to enable economies of scale. Sylvia was also elected to the Board of Directors of Cambridge Wireless (CW) Ltd, a leading international community known for its rich mix of companies involved in the research, development and application of fast-moving wireless and related technologies. Sylvia serves on the UK5G Innovation Network Advisory Board, which supports the UK as a global leader in the development and adoption of 5G as well as providing impartial, industry-focused, independent advice to DCMS on its future plans for 5G development. Sylvia is the DevelopHer Tech Star 2017 Winner and has been recognised for her work in promoting gender diversity in tech. Recently, she was nominated as an Asian Women of Achievement Awards 2018 Finalist in the Science and Technology Category.

# The role of 5G in AI-powered Smart Cities

*Larissa Suzuki*  
*Senior Product Manager for Automatic  
Machine Learning, ORACLE*

The infrastructure of cities has evolved through many eras of technology, often separately. This lack of connectivity can make city utilities and services operate sub-optimally, limiting the creation of new value-added services and challenging the efficiency of existing services.

We are now at the stage where Smart Cities can be built upon a complex ecosystem of technologies, data, devices and intelligent software systems. To manage this vital ecosystem of technologies alongside human insight, cities need to be able to collect, transmit and analyse enormous quantities of data from a myriad of sources and devices in real and near-real time. As such, it is imperative to maintain high-capacity, secure and reliable connectivity at all times to keep this network of connected devices on and functioning.

5G will be the key to unlocking the fast and precise interactions in smart environments, providing extreme connectivity and capacity at the edge of networks supported by a multi-gigabit-per-second speed, location accuracy and ultra-low latency.

Though we have many infrastructure issues to address, the ability to connect and process information in real time will unleash the power of AI to realise the vision of Smart Cities.



**Dr Larissa Suzuki** is an award-winning and passionate computer scientist, inventor, and engineer. She holds a PhD in Computer Science, an MPhil in Electrical Engineering and a BSc in Computer Science. She has worked in industry for more than 11 years across many organisations, including ORACLE, UCL, ARUP, IBM, UK Government and the Bank of Brazil, and has worked for Local Government leading the development of technologies to support London's growth and infrastructure delivery. She has received numerous awards, scholarships and recognitions from Intel, Google, IBM, ACM, Microsoft Research, Siemens, EPSRC, ABI, BFWG, EIT Digital, McKinsey & Company, among many others for her contributions to computer science. She is an Honorary Researcher at University College London, and she currently works as the Senior Product Owner creating the Automatic Machine Learning platform for ORACLE to serve clients in many verticals including Smart Cities. She is also the founder and chair of the Tech London Advocates group on Smart Cities.



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