

call to action...

Mobile VCE operates at a pre-competitive stage of the industry, creating value for all. By joining with us your company can share this value. Your company can help shape our visions, leverage its own research budget and access a unique not-for-profit resource.

Mobile VCE exists to serve its members and help grow the industry. In the words of its chairman, Dr Keith Baughan: *"The concept seemed to catch the enthusiasm of key company individuals. The uptake was remarkably quick and effective. The more companies you bring into this, the more firepower you inject into the research activities"*

By joining Mobile VCE as an industrial member your company will secure the substantial benefits enjoyed by our existing membership, and will add new value by 'increasing the firepower'.

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Mobile VCE is a not-for-profit company which undertakes world class long term research for the global communications industry utilising the UK's leading academic research teams. It is supported in this by the UK government acting through the Engineering and Physical Sciences Research Council (EPSRC) and the Technology Strategy Board (TSB).

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Mobile VCE

Virtual Centre of Excellence
in Mobile and Personal
Communications

a unique company for a unique industry

- strategic value for the future of the industry
- industry-led, industry-defined, industry-steered
- long term, world-class, research
- proven track record over the past decade
- ahead of industry trends

Mobile VCE is a not-for-profit company, serving a global industry membership comprising leading fixed and mobile operators and manufacturers, from Europe, America and Asia, in a unique industry-led, long-term, collaboration, harnessing the UK's top University research teams.



www.mobilevce.com

a unique company for a unique industry

Wireless personal communications and the Internet are **revolutionising telecommunications**. Costs are falling, integration increasing, with 'everything' becoming 'always on'. Increasingly machine-to-machine will complement and eventually exceed person-to-person communications. We are still only at the threshold of the wireless networked world.

New opportunities and threats are emerging...

- **New service concepts and revenue streams**
- **Interworking of industries, with 'new telecom' a key enabler of the digital economy**
- **New products and even new industries**
- **Inevitable societal change**

Mobile VCE - the Virtual Centre of Excellence in Mobile and Personal Communications - was established in 1996 by the industry and universities, encouraged by the UK Government to undertake strategic technology research to underpin and enable this vision.

Mobile VCE's contribution has come to be internationally recognised, with a global industry membership and with strategic links with leading research centres around the world.

delivering value

A consensus vision process, involving all our member companies, has successfully enabled Mobile VCE to consistently pioneer ahead of the industry trendline, in areas such as, *inter alia*, IP-based architectures, mobile-broadcast interworking, personal networking, 4G wireless, personal contextualised services.

Our industrial members make effective use of this leadership position to deliver benefits to their companies in many different ways...

- Industrially Relevant, Long Term, World Class research
- R&D Acceleration
- Threats & Opportunities - strategic early warning
- High Financial Gearing - typically 40x
- Intellectual Property - a significant portfolio
- Elective Research - shared-cost, shared-benefit, research typically x4 to x6 financial gearing
- Training & Recruitment - access to leading research talent
- Networking - identify and shape new trends
- ...and more



"Vodafone is delighted with the work of Mobile VCE. The importance of its results continue to be internationally recognised, and provide valuable input to the company's own globally based research"

Prof Michael Walker, Group R&D Director, Vodafone



outcomes

Technology Watch

Many emerging technologies promise high impact, but no company can track them all. Participation in Mobile VCE's Industry Steering Groups enables member companies to monitor the leading edge of a broad research agenda at low cost.

'Seed & Feed': In-house Research Acceleration

At the right time member companies start up new in-house projects, building upon Mobile VCE research deliverables, rather than from scratch, interacting with our researchers, to bring staff rapidly up to speed. By designing complementary programmes, in-house research can become more cost efficient.

Technical Report Library

Research deliverables are all electronically-searchable, delivered on CD-ROM, via company Intranet and via the Web, providing for easy access by industrial staff worldwide.

Software Tools

Where appropriate, tools developed by our researchers are made available to industrial members for internal R&D. Such tools have included a realtime video traffic generator, network traffic analyzer, GPRS network simulator, radio channel models.

Propagation Measurement Campaigns

Propagation measurements can be expensive, but necessary. Our campaigns are always specified closely with our industrial members. Raw data is delivered, as well as processed results and software channel models, allowing companies to undertake additional analysis for custom applications.

Patent Portfolio

Patent filing decisions are made by our Industry Steering Groups. Industrial members have full royalty free access and exploitation rights to all IPR they have jointly funded through their membership or through participation in elective programmes.

Publications

Research overviews are published in international fora, after prior review and approval by our Industrial members. Such refereed publications provide valuable external calibration of research quality.

Industry & Government Dialogue

Through our industry and government relationships, and global research links, Mobile VCE facilitates industry missions and international symposia, focusing upon important industry trends and opportunities.

High Quality, Industry Literate, Researchers

Many of our researchers are subsequently recruited by industry members, who find them immediately able to contribute at a high level, due to their in-depth experience of working with industry within the Mobile VCE framework.



"We gain great value through our membership, in terms of ideas, research results, the industrial and academic interactions, the IPR and the links that Mobile VCE can provide into Government"

Louis G Samuel, Executive Director, Bells Labs Ireland & UK, Alcatel-Lucent



research activities and scope

Research programmes are

- defined jointly by industrial members and key academics
- monitored and steered by industrial members supported by academic co-ordinators
- undertaken at member university premises, usually by combined teams from more than one university
- integrated core research, major programmes accessible to all industrial members, or...
- elective research, ie a customised activity funded by a subset of the member companies
- based on formal contracts placed by Mobile VCE with its academic members
- overseen by the Mobile VCE office, which provides a central hub for management, communication and information dissemination
- endorsed and supported by Government

Elective Research

An elective programme is 'customised' research, initiated by a single member company, but open to participation from others. Electives provide a mechanism for cost sharing for smaller, perhaps shorter term, but pre-competitive, research.

Example elective programme topics have included:

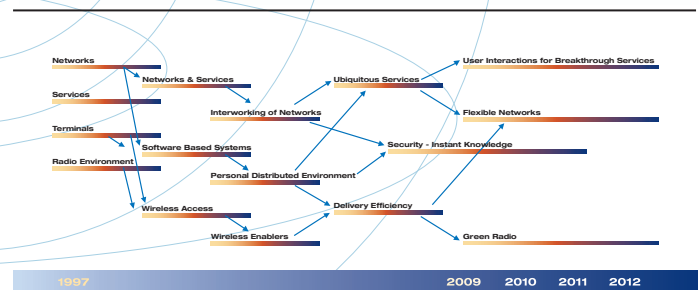
- coverage prediction for wireless local loop
- implementation of beamsteering on a handheld terminal
- ad hoc wireless networking
- the 2GHz/3.5GHz MIMO channel
- fundamental capacity limits of wireless networks

Core Research

Mobile VCE's core research programme is defined by our industry members through consensus, focusing on jointly agreed priority areas where Mobile VCE's capabilities allow it add early and unique value. Programme priorities have evolved with our members to reflect the changing opportunities and challenges facing the industry. Recent and current research streams have included:

- ubiquitous services - removing barriers to commercialisation
- wireless efficiency - reducing the cost-per-bit
- instant knowledge - high value, secure, enterprise services
- green radio - reducing energy consumption and OPEX
- enabling flexible networks - in a future of unpredictable demands
- user interactions - to enable breakthrough services

Core Research Evolution



the future - vision, challenge, excellence

If just three words characterise the Virtual Centre of Excellence it would be these.

Vision

By sharing and jointly exploring future visions our industrial members from Europe, Asia and America bring to Mobile VCE multiple perspectives on industry evolution, catalysing new concepts and applications, to the benefit of all. This process facilitates a programme of research that supports these differing emphases and adds value, identifying synergies and omissions.

Our Visions Group - comprising individuals who participate in international standards fora - reviews and renews such visions, calibrating and revising outputs through 'Industry Future Vision' events, part of the research programme definition process.

Challenge

Profound challenge lies at the heart of the technical, industrial and societal revolution that wireless will enable over the next decade. We do not seek simply to extend the present - we actively seek fresh challenges to create a new future, challenges that will stretch our researchers and that will facilitate fresh industry growth. This requires questioning accepted assumptions. Such is the calibre of researcher we employ and the nature of the targets we seek from our industrial members. In return, we challenge our industrial members to fully exploit the fruit of our research, through effective pull-through via internal company R&D programmes.

Excellence

Research excellence is the watchword of Mobile VCE - without this we would not exist. Quarterly review of specific research activities by Industrial Steering Groups is complemented by periodic industrial review of our research teams against a broad set of criteria, encompassing staff quality, supervision quality, effectiveness of collaboration, communications, etc, as well as basic technical contribution. The effectiveness of these quality control mechanisms is attested by our publication and patent record and by the wide international acclaim that Mobile VCE enjoys.

relationships

The Value of a Long Term Relationship

Relationships developed over several years have created levels of trust that cannot be easily replicated in a consortium created for a single short-term project. This benefits all our members, avoiding inefficiencies, creating shared values and ease of communication.



"Mobile VCE is a leader in terms of the perspectives provided, a direct result of the participants. It focuses on the appropriate 'big issues' that face the industry evolution."

**Bob Schukai, VP Wireless/Broadband Technologies,
Turner Broadcasting**



membership...

Industrial Members include fixed and mobile telcos, handset and infrastructure manufacturers, component, software and content suppliers, as well as players from adjacent industries.

| | | |
|----------------|-------------------------|----------|
| Alcatel-Lucent | Hutchinson '3' | Samsung |
| BBC | NEC | Thales |
| BT | Nokia Siemens Networks | Toshiba |
| Fujitsu | Nortel | Turner |
| Huawei | Orange (France Telecom) | Vodafone |

Academic Members are selected by the industrial membership and join by invitation; their ongoing performance is assessed by industry steering groups.

| | | |
|-------------------------|---------------------------|---------------------------|
| University of Bristol | King's College, London | University of Strathclyde |
| University of Edinburgh | University of Southampton | University of Surrey |

Academic Associate Members

| | | |
|-----------------------|------------------------|----------------------------|
| University of Bath | Royal Holloway College | London School of Economics |
| University of Glasgow | Imperial College | University of Swansea |



"As well as international quality research, Mobile VCE provides excellent networking mechanisms between industry, university and Government - one of the real successes of Foresight. These capabilities position us well as we move forward to implement Digital Britain"

Lord Stephen Carter, Minister for Communications, Technology & Broadcasting

