Headline Information sheet - A perspective on Technical research needs of the Radiocommunications Agency.

1. Aim and purpose

The aim of this information sheet is to give a perspective on the technical research activities of the Radiocommunications Agency (RA) that manages the Civil spectrum for the UK Government. The Agency promotes a programme of contracted research to underpin developments in the utilisation of the radio spectrum. Each year it spends a little under £4M on radio-related research activities in support of its spectrum management activities. The purpose is to look ahead on the technology horizon and conduct studies and research that are not near market but support the implementation of existing and new services, by contracts to Universities, Laboratories (e.g. RAL) and research organisations. The spectrum is a scarce resource and "keeping the radio spectrum clean" by minimising unwanted emissions is vital and understanding the interdependency of frequency use in different service bands is particularly important.

2. Introduction.

The overall Agency objective is to be the best spectrum manager in the world, promoting opportunities to access radio spectrum to build a successful competitive economy and enhance quality of life. The Agency has published in 2002 its "UK Spectrum Strategy" document that is a form of road-map seeking to set out a flexible and forward-looking view of how we see spectrum management over the next few years and the major changes facing us.

In March 2002, The Office of Communications Act 2002 established the new office of Communications or OFCOM and a draft bill setting out its responsibilities has been published.
The Government has announced that, once the necessary legislation is in place the Agency's responsibilities for spectrum management will be carried out by this new body. Prior to this the Government's White Paper: A New Future for Communications, gave important assurances that OFCOM will be required to exercise its spectrum management functions in interests of all, both inside and outside the communications sector.

In addition, the recently published report of the Independent Review of Radio Spectrum Management by Professor Martin Cave has recommended a challenging agenda for the future of spectrum management in terms of market mechanisms. In the introduction it notes "that major technological changes are giving the spectrum much greater importance in the prosperity of the British economy..". If in addition we consider the global changes to markets and a requirement to meet government social objectives as well then the importance of managing the scarce resource of radio spectrum is significant and technology research can play a key part in delivering this.

The creation of OFCOM reflects the recognition that, in an increasingly converged communications environment, traditional service demarcations can be a hindrance rather than a help to effective regulation. This is true of spectrum management, as technologies converge and in consequence, service definitions become blurred and increasingly strained. The challenge is to establish a forward-looking research programme to recognise and support this in a range of communication technology areas. Looking ahead with a view to supporting all the research activities relevant to the other partner regulators in OFCOM, the ITC has its "broadcast technology" and Oftel its "telecommunications systems" aspects. [This links the "Broadband Britain", Internet, Mobility, and portability technologies.]

The Agency has traditionally carried out a number of engineering functions and technology research work to underpin and help promote the introduction of new services and the ability for co-existence of a range of radio-related systems. These types of activities (Propagation, EMC, sharing studies, and new radio-related technologies) are managed within its Engineering and Research Unit (ERU) and it has a Radio Technology Compatibility Group (RTCG) providing measurement, technical support and development activities for a range of compatibility and interference issues.
The UK spectrum strategy mentioned above, forms the Agency's top-level strategic vision and other policy strategies aim to support this. A more detailed example would be the Agency's technology orientated "Research Strategy" on radio-related topics developed with advice from the Radio Research Advisory Committee (RRAC). The RRAC has an independent chairman and provides a national forum to assist the RA in formulating its radio research strategy and obtaining advice on research related issues. The research strategy sets out four themes into which radio-related research activities can be categorised in support of our

regulatory function and aims to align them into short, medium and long-term project timescales. Within the Agency, a Technical Forum (TF) approves research projects, which form its overall "research programme" which is managed by ERU staff.

3. Technical Research requirements

Setting aside the spectrum management objectives relating to economic efficiency and public policy, there are technical research requirements, some of which are indicated, below:-

Radio research in support of regulatory function

- Support the UK Government for its International regulatory commitment through treaties, bilateral meetings, and World Radio Conference (WRC) activities. (This may require technical sharing studies, harmonisation, coexistance or research into interference and radio spectrum matters. Also there are links with research councils e.g. EPSRC.)
- Research to help understand the allocation and interdependence of different frequency bands throughout the radio spectrum. (harmonics, out-of-band emissions, characteristics of co-existence, and interference within bands.)
- Some standardisation work relating to radio and communications equipment, Electro Magnetic Compatibility (EMC) work (National and International), European Commission Directives, ETSI, pan-European initiatives and radio aspects of site clearance. (IEE professional network).
- EMC activities reflect the following objectives
  - International standards to protect the use of spectrum above 1GHz & for digital technology
  - Promote new radio services taking account of current EMC standards
  - Examine interference threats from broadband, Digital, and ISM services
  - Promote EMC awareness within Government departments
- Radio propagation research and studies of radiocommunications technology, radio interference, mitigation and evaluation of radio device or system characteristics. (Research includes studies on the effects of precipitation and climate in changing refractive index, and looking at area coverage at higher frequencies, with a view to broadband and multi-point services. Ionospheric studies for radio paths, including satellite and navigation services.)
- Studies in support of 3G rollout and BFWA.

Technical efficiency

- Intensive use of scarce spectrum consistent with adherence to technical interference limits.
- Promote development and introduction of new spectrum-saving technologies where the cost of such technologies is justified by the value of the spectrum saved.

[Spectrum Efficiency Scheme (SES)

- Within the Agency's Spectrum Efficiency Scheme (training, refarming, research) there is a research element aimed at promoting collaborative, pre-competitive technology related research to support and promote radio spectrum use in an efficient manner.]

[OFCOM may perhaps promote the following:-??

- The informed regulator (need an understanding of technology developments)
- "Technology neutral"
- Understand markets and drivers
- Research to help prevent anti-competitive behaviour
- Light-touch regulation]

[**Others**: There may be other radio research issues relating to general policy of Convergence of technology, Delivery of service, Quality of service, and provision of information such as for "Public Service", Health effects, National coverage issues or security etc.]