

Summary of current RA research programme

1. Introduction

The current RA research strategy (2001/02) is based on the “bottom-up” requirement approach based on a mix of research projects including propagation, EMC, sharing studies and longer-term mathematical modelling tools aimed at spectrum efficiency. The aim of this document is to highlight the current strategy and allow this information to be considered by the Radio Research Advisory Committee (RRAC) which is developing future research strategies.

2. Discussion

The current projects can be categorised into the following themes:

2.1 Propagation

Here there are projects which relate to propagation research in a range of frequency bands (HF to above 100 GHz) although the bulk of the propagation work is in the 3GHz to 100GHz range and is aimed at 2 to 5 year project cycles timescales. The bulk of the work is carried out by RAL however, future studies will be individual research contracts let by competitive tender. The three technical Task Groups (TG's) have identified particular propagation research topics that require research as well as some internal sharing research requirements (driven by CEPT, ITU-R, and WRC agenda items).

2.2 EMC

The research projects can be identified by the EMC and unwanted emission parameters and this is driven by the regulatory aspects of International technical standards and the need to determine likely future emissions and possible impact on existing and new services. Here the strategy is to benchmark the current levels of emission (often based on Standards and equipment performance) and determine technical methods and solutions that can be used to measure and reduce stray emissions. Participation in CISPR and ETSI standards bodies is significant and research information can be fed back into these organisations. The work is generally medium term (2-3 years) and is carried out at RTCG, Universities and commercial research organisations.

2.3 Sharing studies

The majority of the sharing studies are aimed at compatibility between new and existing services and are driven by CEPT and WRC requirements (typically a three year study cycle). These contracts are usually short term (typically a few months) and carried out by RTCG or contract research companies to tight timescales. The results are fed into CEPT project teams and complements ITU-R work on sharing.

2.4 Mathematical modelling

This research is targeted at the medium to long-term and examines the mathematical techniques that can be applied to spectrum assignment, cost and economic benefits and modelling aspects of spectrum efficiency. The aim is to develop mathematical modelling tools that enhance spectrum allocation and reuse. The drivers here have been spectrum efficiency, best-use and best practice and economic value of spectrum. Various Universities and academic teams carry out this research.

2.4 Other research areas including Health effects

This section includes new technology such as broadband systems and also the health effects of radiation. The aim here has been to address new systems (ADSL) and technologies where interference is important. Quantifying the system parameters and anticipating the spectrum requirements are aspects along with EMC and compatibility issues.

The driver has been new technology where high bandwidth and broadband spectral use are particularly significant.

3. Conclusion

The current RA research strategy has been based on internal and external user requirements where medium term propagation studies have underpinned a range of shorter term sharing and compatibility studies for CEPT and ITU related contributions. In addition research relating to EMC has been required for a range of international Standards and national requirements.

Some longer-term research in new radio technology has also been initiated. In recent years a greater emphasis has been placed on mathematical modelling to assist in the increasing economic value assessment of spectrum (this has been highlighted in spectrum auctioning activities).

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Attachment: Annex 1

Annex 1 (List of research projects for 2001/2002 and beyond)

Title	Timescale (end date)	Note
PROPAGATION RESEARCH		
Dissemination of information at RAL(RCRU)	2002	
Millimetric Wave Area Propagation Studies	2002	
Indoor Wideband Measurements	2003	
Bolton Overlay Project	2002	
Refractive Index in Clear Air at 38GHz	2002	
Study on Propagation through vegetation	2002	
Prop. Trans-horizon over sea path at 2 GHz	2002	
Propagation across fixed paths at 5 to 60 GHz	2002	
Sleet Monitoring Device	2002	
Impact of software radio techniques on the need for propagation	2002	
Propagation mechanisms at frequencies > 71 GHz	2001	
COST 271 support - propagation	2004	
CASE Studentship (Essex Uni.)	2003	
ITU-R rainscatter model	2001	
Propagation through vegetation	2002	
[Wideband HF measurements?]	?	
Reflection from windturbines & Fixed links	2002	
RAL CORE PROGRAMME (Research Projects)		
Propagation above 50GHz	2005	(>50GHz)
Radar studies of horizon & vertical rain structure including tropical regions	2002	(3-30GHz)
Link reliability studies	2004	(13-40GHz)
Earth space propagation – measurement and analysis of satellite beacon transmissions at freq. up to 50GHz	2005	(3-50GHz)
Lidar measurement of tropospheric radio refractivity	2002	(up to 60GHz)
EHF Propagation – Characterisation of slant path attenuation caused by cloud	2003	(50-60 GHz)
Impact of space weather on communications	2005	(10-300 MHz)

EMC RESEARCH		
Intermittent & wideband EMC disturbances ph2	2001	
Unstructured Conductive network for transmission	2001	
DSL related systems on radio services	2001	
Measure digital hardware & related circuits	2001	
EMC emissions above 1GHz, phase 2	2002	
Study on effects of deployment of ADSL	2002	
Frequency selective windows	2002	
Impact of EMC emissions from unstructured networks	2002	
Freq. Selective Windows to reduce unwanted emissions on radio	2002	
Dithered Clock Osc. On Digital radio services	2002	
Method for testing EMC emissions from fluorescent lamps	2002	
Emissions from future electric transport, ph2	2002	
Choke Tunnel design in 900MHz ISM Machines	2002	
MATHEMATICAL MODELLING – SPECTRAL OCCUPANCY		
Channel Trading	2001	
Radio Channel assignment	2003	
Higher order constraint Techniques	2002	
Cost-benefit analysis of the Maths programme & LIDAR	2002	
[Fixed link application of mathematical Radio]	2002	
Case studentship (Oxford Uni.)	2003	
Mathematical Framework Spectral Occupancy	2002	
Bounds for frequency assignment problem Case student (Cardiff Uni.)]	2004	
On the application of real options in research	2001	
Study on Particle simulation – Freq. planning of digital services	2001	
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SHARING STUDIES & BAND REALIGNMENT		
(Radar) Protection of civil aero and maritime services	2002	
Time Division Duplex (TDD) FWA Systems	2002	
Compatibility between IMT 2000 & MSS at 2.5GHz	2002	
Quasi GSO FSS Systems	2002	

OTHER RESEARCH PROJECTS		
Mobile VCE	2002	
Support for mobile phone health effects	2004	