

## **AEGIS NEWSLETTER July 2004**

In our last newsletter in 2003 we mentioned a number of projects that were ongoing but would not be published until this year. Well that has now changed and most are now available in the public domain and in fact you should have already received the information that the results of the “Economic Study to Review Spectrum Pricing in the UK” have been published on the Ofcom web-site and that they can also be found on our web-site at <http://www.aegis-systems.co.uk/online/library.html>.

In the attached document is a brief summary of our completed and ongoing Projects. We have used an attachment this time because of the inclusion of some graphics. If you need any further information please contact us – our main number is +44 (0)1932 860070.

Best regards

Val Jervis

Aegis Systems Ltd

## **SPECTRUM REGULATION**

### **Analysis of Costs and Benefits of International Harmonisation of Radio Standards and Frequency Allocations**

The Indepen / Aegis Study has been completed and has been published on the Ofcom web-site as well as our own at <http://www.aegis-systems.co.uk/online/library.html> . The study considered a number of purely hypothetical case studies and the costs and benefits of the outcomes were compared under a known situation and a hypothetical alternative. The conclusions indicated there is scope to relax some of the constraints arising from European harmonisation and standardisation measures but when this is feasible very much depends on a number of issues including:

- Service demand
- Value of the service
- Timeliness and appropriateness of the standard
- Mobility of equipment
- Economies of scale in production
- Maturity of the market
- Flexibility of technology, and whether
- The European measure is more/less restrictive than national requirements?
- There were a number of proposals resulting from the work such as building milestones into harmonisation measures, or if this is not feasible to have time-limited support for the measures, so that services that do not reach fruition do not “tie up” spectrum and stop other harmonised technologies and services developing in the band.

### **Efficient use of the radio spectrum by cellular operators**

We have recently provided assistance to the Telecommunications Regulatory Authority in India (TRAI), with LCC, on issues associated with the efficient use of the radio spectrum by the cellular operators. Our report proposed a methodology to quantify spectrum utilisation and compared the spectrum utilisation achieved by the different GSM and CDMA 2000 1x networks based on their network deployment. Also based on estimates of potential market demand and network deployment options estimates of radio spectrum requirements were calculated using ITU-R Rec. M.1390. The report also addressed issues such as procedures for award of spectrum, refarming and approaches to charging for the radio spectrum and for each topic a comparison of the different approaches was provided. Proposals were provided on how to adopt administrative pricing of radio spectrum, including how fees might be derived taking account of the opportunity cost of spectrum and the specific objectives of TRAI, such as promoting rural coverage. The issue of how to migrate from the current revenue / spectrum awarded

based approach was also considered. The final consultation document, part of which is based on our work, is available on the TRAI web site at [www.trai.gov.in/consultation%20paper%20on%20spectrum%20released.htm](http://www.trai.gov.in/consultation%20paper%20on%20spectrum%20released.htm).

### **Digital Broadcasting and Convergence**

Aegis has just concluded a study for the European Commission on Spectrum Management in the Field of Broadcasting, with the support of economics consultants Indepen and the French research organisation IDATE. The study focused on the implications of digital switchover and the growing convergence between broadcast and telecommunications for radio spectrum management. A number of key issues were addressed, including the potential role for new market-based approaches to spectrum management, constraints arising from technical co-existence and the potential use of broadcast spectrum and technology to support convergent applications such as the delivery of multimedia content to mobile devices. The final report can be found at [http://europa.eu.int/information\\_society/topics/ecom/useful\\_information/library/studies\\_ext\\_consult/index\\_en.htm](http://europa.eu.int/information_society/topics/ecom/useful_information/library/studies_ext_consult/index_en.htm)

### **Spectrum Strategy**

We have continued providing support to the EETT in Greece on fixed links, SAP/SAB and PMR. This work has involved considering the available frequencies and appropriate channel plans, taking into account current usage, as well as developing assignment policies for fixed links and SAP/SAB. We would very much like to thank those administrations that have provided information on their best practice, which we have used to inform our proposals to the EETT.

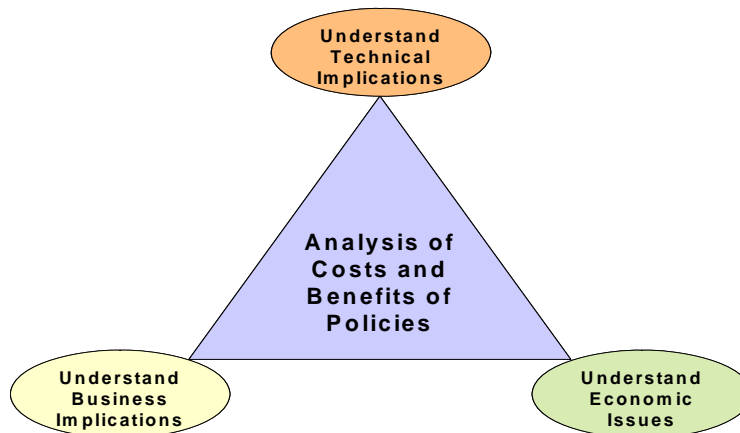
### **European Union Study on Availability of Information on Radio Spectrum**

Some of you might already be aware that we are involved in a study for the European Commission to investigate the availability of information relating to the management and use of radio spectrum in European Union Member States. IDATE, Bird and Bird and ourselves have sent out questionnaires to spectrum management organisations and industry to gather information. The purpose of the study is to contribute to ensuring the co-ordinated and timely provision of radio spectrum information and provide input for possible Commission policy action in the future.

The industry questionnaire and European Commission letter of introduction are available through a link on the main page of the IDATE ([www.idate.fr/](http://www.idate.fr/)) and Aegis ([www.aegis-systems.co.uk/](http://www.aegis-systems.co.uk/)) web-sites.

## Some Thoughts ...

Regulatory reform has the potential to deliver significant increases in economic growth in Europe. The Irish, Dutch, Luxembourg and British presidencies of the EU have agreed a joint initiative to prioritise regulatory reform over the course of 2004 and 2005. One element of this initiative is improvement in the quality of analysis in economic impact assessments to ensure that there are identifiable and supportable net benefits to industry resulting from proposed reforms. Our experience of undertaking studies with Indepen such as costs and benefits of decisions concerning digital switchover, radio spectrum harmonisation and standardisation and sector liberalisation, have shown the importance of having a mix of the knowledge and skills shown below:



Without inputs from these three elements the final analysis could be flawed. For example, without robust economic analysis there is a risk that impacts that are simply transfers from one group to another rather than net economic effects will be counted. Without robust business analysis that takes account of the impact of competing services that could become available in the same timescales the results could be over optimistic. Without robust technical analysis the assumed costs, timing and customer benefits from new services may be inappropriate.

If you require further information on the activities of Indepen their web-site can be found at [www.Indepen.co.uk/](http://www.Indepen.co.uk/).

## **RESEARCH STUDIES**

### **Licence Exempt Occupancy Model**

This study, just completed by Aegis Systems Ltd and Transfinite Systems Ltd for the Office of Communications (Ofcom), outlined a general method for quantifying spectrum occupancy in licence-exempt frequency bands. The method introduces systems to an area until an unacceptable level of interference occurs. The point just before this occurs then constitutes full occupancy based on interference between systems of the same type. The same process can be used with the area pre-populated with other types of system acting as the interferers. The method has been applied to the 2.4 GHz band where it was assumed that the wanted service was a WLAN. In addition a limited number of measurements have been made in order to make a connection between real systems and the modelled results. It was found from the measurements that were carried out on a smaller scale than the model, that the effect of protocols dominates physical layer effects in these circumstances. Care therefore needs to be taken when setting and using the criterion that determines the point at which full occupancy is reached.

### **Location variability of radio signals**

As noted in the previous Newsletter, we are undertaking an experimental campaign on behalf of Ofcom, to investigate aspects of radio signal variability.

Radio signals at frequencies above 30 MHz generally suffer rapid changes in amplitude with position, due to a combination of shadowing and multipath effects. For the design of systems, and the avoidance of interference, it is necessary to understand the statistics of such fading. While a large number of relevant measurement campaigns have been conducted over the years, the methods used have been varied, and the results are therefore not directly comparable. In particular, there has often been confusion as whether multipath fading effects are included in reported statistics, or not.

The Aegis campaign is seeking to clarify these issues, and to produce a new set of fully documented statistical data for submission to the ITU-R. Measurements are being made using both narrowband methods, and a wideband channel sounding system (developed in-house) with a 20 MHz bandwidth. The frequencies in use are 237 MHz, 1477 MHz and 3430 MHz.

Initial measurements in suburban areas on the South coast of England have now been completed, and measurements in London will commence soon. It is expected that the results of this study will be submitted to the ITU-R Study Group 3 meetings in October this year.



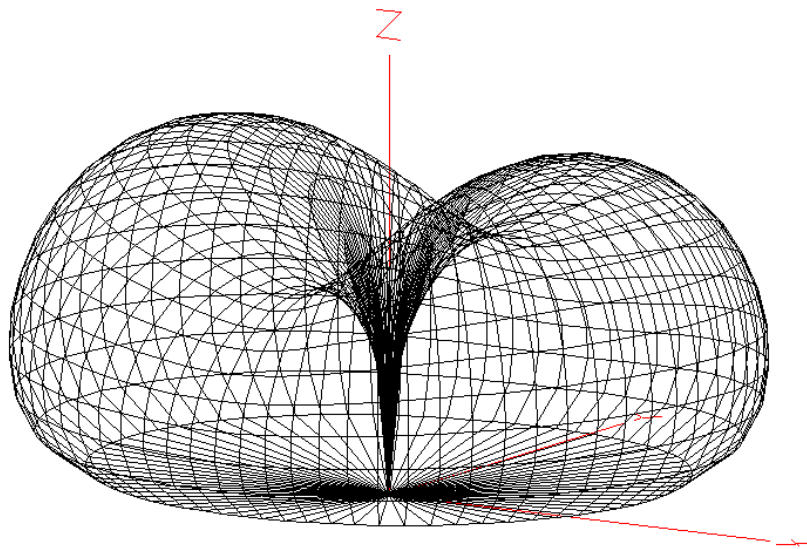
**Transmitting antennas for location variability measurements**

## **OPERATIONAL STUDIES**

### **MF Broadcast planning**

For a UK client, we have recently undertaken a study examining the options for the provision of Medium Wave broadcast services from readily transportable equipment. The study has focussed, in particular, on the dependence of achieved coverage on ground conductivity, the potential use of skywave transmissions, and the importance of appropriate antenna system selection.

This work has used the in-house Aegis MF/LF coverage planning tool to generate detailed maps of interference-limited coverage areas. Modelling has also been undertaken of candidate antenna systems, using the commercial EZNEC software package, as illustrated below.



**MF antenna radiation pattern modelled with 'NEC' software**

### **Impact of new buildings on broadcast coverage**

For a European client, we have recently made predictions of the impact of a proposed new city building development on local broadcast reception (FM, DAB and DVB-T). The study involved the development of software to import architectural CAD data into the Aegis VHF/UHF propagation model. This work, in conjunction with that carried out independently by the client, highlighted the sensitivity of such predictions to small changes in both input data and in the propagation models used.