

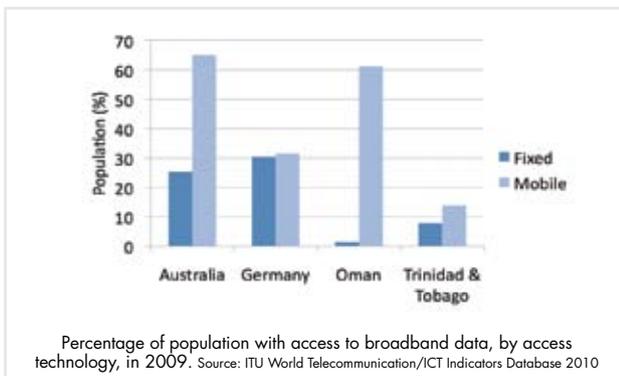
# INTERCONNECT - on your wavelength

Winter 2010

## Developing Broadband Strategy

National and regional/local governments want broadband access for businesses, households and individuals. Broadband access, and specifically the killer app internet access, facilitates effective delivery of both public services (such as e-government, education and health) and private sector services. It improves localities as places to live and work. It benefits rural, remote and urban disadvantaged areas. And it fosters social inclusion and reduces travel and CO<sub>2</sub> emissions. Hence, internet access (at a reasonable bit rate) has been identified as desirable by governments worldwide. But what should the strategy be? Should government subsidise? Or should it own and run infrastructure? Or just wait and see, letting the markets decide?

InterConnect in recent studies developed arguments for an integrative approach believing that the future of broadband access will include both fixed (wire and fibre) and radio access technologies. This is already true in developed countries such as the UK where large numbers of people already rely on 3G networks for some or all of their broadband service. In many developing countries the poor coverage and penetration of fixed networks means the great majority of broadband access will be based on radio access for the foreseeable future. ITU statistics support this.



Higher speed access is essential for businesses to remain competitive and for people to fully engage in economic and community life. As urban and suburban broadband access speeds increase and services develop to exploit these increased speeds the potential for a "digital divide" between those who have high-speed access and those who don't gets greater. Government must act to prevent that.

The key question is whether the telecoms industry will provide the necessary broadband access without intervention? If it won't, what will be the resulting access gaps? And how important will these gaps be to realising the full potential economic and social uplift?

If left to the market, deployment will focus on cities, with some customers getting 100 Mb/s through fibre to the home/business, but some continuing to get only 1 Mb/s or less. For rural areas, and for some deprived urban areas, the broad consensus is that these hard to reach, remote, low population density or low income areas will be left until last, or left out altogether. There is also a common view that deployment will take 10 – 15 years. Most governments identify that action is needed now.

Regulators are however divided on how this should happen. The areas needing highest investment to cover are also those with the lowest revenue potential. However many of the economic and social benefits of universal broadband access can't be monetised by the operators. In InterConnect's view, therefore, all sources of revenue and funding (including those from national and regional government) need to be made available to ensure provision of internet access at good speed in rural, remote or otherwise under-served areas.

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**Consulting in Communications  
Regulation and Strategy**

  
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# Technical assurance is essential

Despite the current global financial situation, InterConnect is still seeing a significant amount of financial activity in the telecoms sector. Whether it is one telecoms operator looking to acquire another, or a tower company looking to purchase the site assets of a mobile telecoms operator, strategic investment and M&A activity seem to remain strong.

A key part of this activity is valuing the business. And since the business is the network, it is essential that a proper understanding of the network is reached. Without this, many potential technical and operational risks could remain uncovered, with the associated downstream adverse impacts if and when they are realised.

However every operator's network is different. Various technologies of various ages from various vendors are employed in architectures to suit each operator's particular needs. Network deployment and management is undertaken through internal processes by differing team structures and numerous third parties.

To gain a thorough understanding of the network, to expose any risks, to establish impacts and mitigations, and to financially quantify network status requires deep technical, commercial and cost modelling expertise. InterConnect is able deliver this through its extensive experience in carrying out such exercises around the world, and the knowledge base and methodology it has built.

In approaching a technical due diligence, InterConnect makes use of all available data (data rooms; analyst reports; management interviews; physical site visits) as well as its own deep knowledge of telecoms technologies, operations and associated benchmarks and KPIs. A standard, well proven methodology is employed with this data to:

1. examine the existing network, systems and associated operational processes and organisation
2. examine planned future developments
3. prove whether the technical business plan is valid or not, particularly in financial terms.

Risks, issues, mitigations and recommendations are identified and the potential financial impact quantified.

Using its experience, knowledge base and methodology, InterConnect is able to deliver confidence to operators whether they are making an acquisition, undertaking a sale or simply conducting internal technical assurance.

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## What will LTE deliver?

Long Term Evolution (LTE) is the latest member of the GSM family, continuing the line of data standards from GPRS and EDGE through to HSPA+. The LTE radio interface aims to deliver a significant performance improvement (higher data rates, reduced latency) over these technologies at much reduced cost. Data rates of at least 100/50Mbps (peak) on the uplink/downlink respectively were the targets set for LTE at the outset.

To achieve these data rates, LTE uses various techniques including adaptive coding, modulation and MIMO. Multiple Input Multiple Output (MIMO) uses multiple transmit and multiple receive antennas to improve throughput, with 2x2 and 4x4 (transmit/ receive) configurations standardised in LTE.

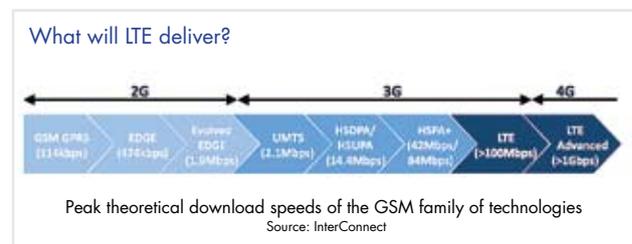
LTE standards (3GPP Release 8) were frozen in 2008. And a number of early network deployments have taken place recently – not least those in Austria, Norway, Sweden, the USA and Uzbekistan.

During and since standardisation, various operators and industry bodies have been testing LTE to assess the performance it will deliver in the real world (outside of the various simulations). These are showing that LTE may deliver (in the uplink) around 25-75Mbps with no MIMO, 100-150Mbps with 2x2 MIMO and >200Mbps with 4x4 MIMO.

Hence MIMO is central in LTE achieving its original targets. However MIMO relies on a good multipath environment. And it is also being found that such an environment is unlikely in suburban and rural areas, and does not occur very often in urban areas. MIMO's appropriately spaced receive / transmit antennas also place challenges to delivering small terminal design.

The general rule-of-thumb that real world performance of a radio interface being, at best, 1/3 of peak theoretical performance still seems to hold true. And it is these realistic data rates for LTE that must be accounted for when building the business case for LTE, and hence when assessing what LTE might deliver financially.

InterConnect has significant knowledge and experience in all major mobile communications technologies, including LTE. InterConnect can therefore assist its clients in understanding this complex new technology, in particular what LTE will deliver in terms of practical performance and financial returns.



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# The benefits of spectrum audit

There's a saying that "you can't manage what you can't measure". In spectrum management this means that if you don't have quantitative measures of spectrum use, you can't make further allocation. And from that, the risk of interference in the future is greatly increased.

There are three approaches to tackling this issue:

- We can invoke an audit. Audit makes use of records. It records use even if these are infrequent or dormant.
- We can start a continuous, statistically valid, measurement campaign. Measurement is expensive.
- Or we can do nothing. Here we only need to measure the use when there is a complaint.

This article considers audit alone.

The data captured during spectrum audit needs then to be cleansed. This process corrects the many errors that will exist and standardises station parameters. The cleansed data set needs to be improved by filling in the blanks that inevitably exist. This is done by sheer hard work, calling licensees to gain information. Finally the data needs to be delivered back to the regulator.



This is not simply a question of handing over a DVD. It means working with the regulator to determine how it will store, manage and analyse the data. And how's the data improved? Scripts run on data sets to bring all the data to the same high standard. One key principle is to default to standard values for common parameters. One also has to remember that it's not necessary to specify to the nearest 0.1 dB.

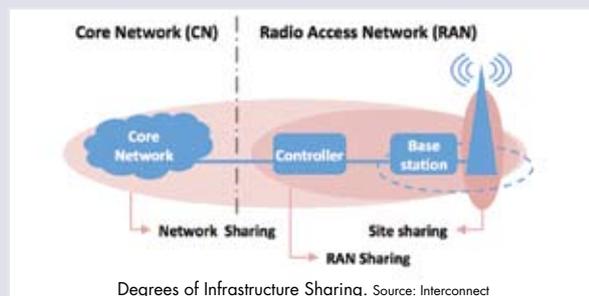
And the benefit? The regulator has a base line from which to develop further knowledge on spectrum use and perhaps can begin a subsequent campaign of measurement.

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## MOBILE INFRASTRUCTURE SHARING

Nowadays just about every mobile operator is experiencing strong pressure on revenue and margins. Declining ARPU's are pretty much a fact of life. Increasing coverage, rolling out new technologies and increasing use of data services all require further capital and operational expenditure. With network expenses typically consuming 70% of an operator's capex, and 10% of its overall opex, infrastructure sharing is now seen as a key tool in an operator's cost reduction armoury. Operators, regulators, tower companies and even vendors are all promoting the benefits.

Infrastructure sharing can take several forms, from traditional passive (site) sharing through to more complex, 'deeper' active RAN and network sharing. 'Deeper' sharing provides the potential to generate greater cost savings; from savings of a few percent for site sharing to 30% – 40% for RAN sharing. However, it also reduces the independence that an operator has in the planning and control of their network and adds complexity in the technology and processes needed to plan and manage the shared network.



As sharing options are examined, a broad spectrum of challenges need to be addressed, any of which could potentially derail the process. Challenges begin with the need for focussed strategic aims. There are also huge commercial issues in asset ownership and valuation. Engineering optimisation is essential. Operations and maintenance needs to be resolved and complex regulatory concepts, which are new to all, to be agreed. Finally the simple politics of bringing different parties together can stall outcomes and negate good work.

InterConnect consultants have a breadth of experience in these areas and can provide a full set of services from strategy development through to technical due diligence to support operators, regulators and tower companies in developing their infrastructure sharing plans.

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# Decision Making in Uncertainty

There's nothing certain about the future of communications. Vendors are influencing regulators towards their solutions. Regulators are embracing economic principles and investigating markets. Standards-making bodies are trying to please everyone by building in flexibility. But nothing's certain. Add to that the need for regulators to meet local market needs and it's not hard to see that there are many variables and many scenarios varying in fundamental characteristics and likelihood.

With this background, how does a regulator decide what spectrum mask to adopt? Or an operator what technology to use? Or a financier which business case to sponsor? The answer is to model it.

Modelling allows any system to be exercised without actually setting it up. Systems that can be modelled include business systems, investments and physical networks. The model emulates the real system with its inputs, transfer function and outputs. Every variable can be changed and effects on outputs assessed.

Right now operator licences are coming up for renewal. Regulators are faced with re-auctioning or re-awarding spectrum but at the same time taking the opportunity to

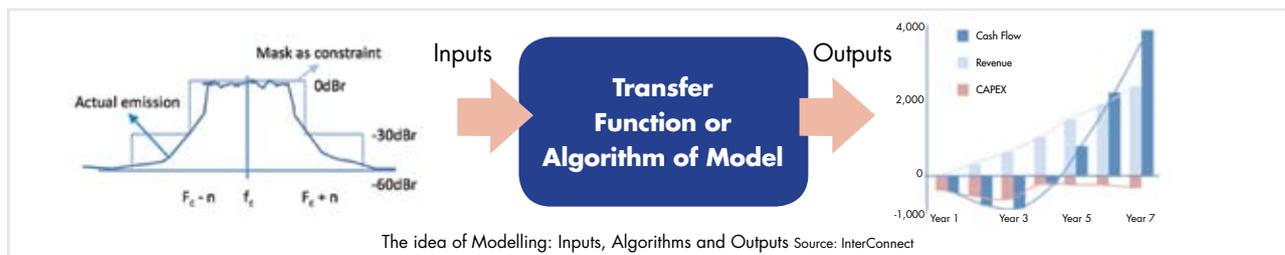
re-form. Both regulators and operators risk working blind, with only decisions made by others as a guide to possible outcomes. In such a scenario modelling is essential.

Regulators face pressure to release new spectrum blocks but have no real knowledge about the potential adjacent band interference likely. Many studies suggest specific block edge masks and regulators face making decisions in favour of this mask or that without impact analysis. Again only modelling will tell the result for that country and the networks proposed and existing.

And regulators are minded to design auctions to favour newcomers but how many operators can the market support. What services will be viable? How much spectrum should be in the spectrum lots and what rules should govern the bidding? These outcomes are impossible to predict without modelling.

Modelling is the only way to determine what might be. It is the most cost effective way to make decisions under conditions of uncertainty. Regulators, operators and financiers all need modelling. Contact InterConnect today to discuss your modelling requirements.

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## InterConnect's TRMC Master Classes

InterConnect has historically provided extensive levels of training related support to clients during the delivery of its major consulting assignments. In 2000, however, the company went one step further in creating the Regulatory Master Class, the first in what is now a series of training courses for professionals in the communications sector. The range of courses on offer now extends to Economic Regulation, Interconnection, Numbering and Addressing, and Next Generation Networks.

### **Spectrum Master Class** (16 - 20 May 2011)

This master class provides an intermediate-level view of spectrum management from policy development through spectrum engineering and modeling to assignment and coordination processes. Tutors are regulatory consultants or NRA policy-makers, with a senior figure from a regulator also giving a view on the vibrant world of spectrum.

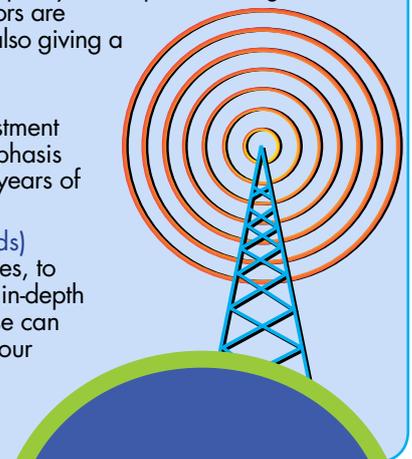
### **Modern Wireless Networks** (20 - 24 June 2011)

This course that explores modern wireless networks right from business case, investment appraisal and network dimensioning through to roll out and optimisation. The emphasis is on the viability of future investment. The course is run by consultants with many years of experience in wireless network design and deployment.

### **Customised In-House Training** (Please contact us to discuss your needs)

InterConnect has provided customised training courses, based on its Master Classes, to numerous organisations. InterConnect will fully tailor any Master Class to provide in-depth coverage of particular subject matter areas needed by an organisation. The course can then delivered either using in-house facilities or at any other location suitable for your organisation.

For more information and dates and to book your place on any course go to [www.icc-uk.com](http://www.icc-uk.com) and navigate to 'TRMC & Training'.



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