InterConnect - on your wavelength

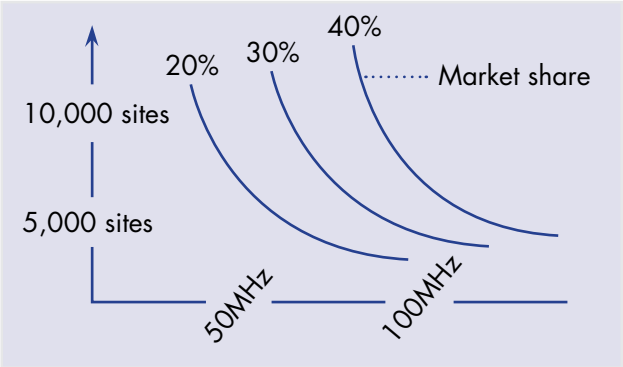
Summer 2010

Re-farming and the EC decision on Orange/T-Mobile

The European Commission recently considered the merger between mobile operators Orange and T-Mobile in the UK. It decided that the merger was acceptable from a competition viewpoint and that the new joint firm, called Everything Everywhere, was to hand back just 2x30MHz of the aggregate post-merger spectrum leaving it with 110MHz in 1800MHz and 2100MHz. The other three operators have each 34.3, 69.4 and 76MHz and an observer may be forgiven for thinking that the result of the judgement leaves Orange-T-Mobile with competitive advantage derived from its reduced costs. So does it or is there something we're missing?

There are two relationships we need to consider in answering the question. This first is that 40-50% of an operator's capital expenditure comes from its investment in radio sites on hilltops and prominent buildings. All things being equal, for the same revenue, an operator paying least for these sites makes most profit. The second is that for a fixed market share (as a proxy for the subscriber base that it serves) there is a non-linear inverse relationship between the number of sites and the spectrum available. The more spectrum, the fewer sites needed. Turning this around, the more spectrum available to an operator, the greater market share he can command for a given investment. He who has most spectrum has enhanced capacity to grow without incurring additional costs.

After merger Everything Everywhere will command about 45% market share. O2 will have 27% and Vodafone 22%. O2 has 3.4MHz per million subscribers and Vodafone 4.6 per million. So does this not level the playing field? By having 110MHz Everything Everywhere will serve its 33 million subscribers with the least spectrum per capita. For more argument one has to look to the site count.



If 110MHz allows Everything Everywhere to command 45% market share with roughly the same or less eventual site count as its competitors as the inverse relationship suggests, its costs per subscriber will be somewhat lower.
So there it is. All other things being equal, he who has the most spectrum has competitive advantage. But in the final analysis it all depends on the precise shape of the curves in turn dependent upon the traffic offered to the networks.

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About InterConnect

InterConnect Communications is a company based in the United Kingdom and trading worldwide. Our business is consulting in communications regulation and strategy. InterConnect comprises two consulting practices: Regulated Networks and Spectrum & Wireless. In Spectrum & Wireless our customer base of national regulatory authorities and wireless network operators using the radio spectrum covers the World.

Spectrum pricing and monetary value

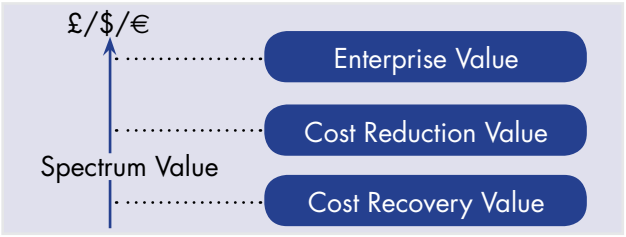
Economic teaching suggests that he who pays the most for an asset and hence values it most is likely to be the person who seeks maximum return from his investment by using the asset efficiently. We've become accustomed to spectrum auctions and have seen what we might view as fair prices paid along with some that we might say were ridiculous. But what is the value of spectrum? Auctions are not always appropriate either because there are many small lots and many bidders or simply that demand is inelastic: other factors determine who must have access. How do we set fees when we chose not to auction? How do we value spectrum?

InterConnect has just completed a spectrum pricing project during which acquisition fees and annual returns were set for a National Regulatory Authority for services across the spectrum. The following is an outline of how one might view the question.

The base level valuation is that cost to the regulator of making assignments or allotments, recovering fees and keeping the spectrum interference free. This is the cost recovery value.

Spectrum is an 'input to production' of the firm. It ranks alongside other production and operations assets. Each brings a benefit. That benefit reflects on the firm's P&L and hence can be valued. Spectrum either enables further production and realises profits or it reduces cost elsewhere in other inputs. This gives us two other possible valuations:

- Enterprise value where the spectrum value is seen in elevated profits or:
- Cost reduction value where spectrum reduces the cost of infrastructure such as base stations.



In many cases spectrum is not put to an 'enterprise' use. In the military and governmental services, there is no concept of profit. Sometimes therefore valuation must be related to opportunity cost: in economics jargon, the next most advantageous use. In the military case, this allows the value to be derived assuming an enterprise application. There is however no absolute answer. Spectrum value is modelled using techniques that simulate a competitive market. The result is a range of values from which ultimately the NRA chooses considering its approach, decrees and local policy.

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Doing NRA Strategy

InterConnect recently developed a detailed spectrum strategy plan for a National Regulatory Authority. Starting with a review of current spectrum use and the organisation and procedures for spectrum management, InterConnect went on to forecast demand and technical trends and prepared vision and mission statements as well as specific policies, strategies and plans.

Demand for radio spectrum in the country is strong. While 3G and 3G-plus licences have not yet been issued, the mobile penetration rate is around 100%. Once 3G licences have been issued the country will have some 392 MHz in use for mobile services . The strategy concluded that this will be sufficient for several years of mobile data driven growth.

The strategy proposes offering FBWA licences, with a focus on rural Internet service provision. The use of fixed radio links has been constrained in the country by the peculiarities of an historic incumbent network of operators and the strategy recommends changing this. As the mobile and FBWA operators convert from concession to a normal competitive industry structure, so demand for fixed links is expected to grow by a factor of ten.

The sound broadcasting sector is particularly vibrant (and indeed highly congested) in the country, with more than 6,000 community radio stations broadcasting. Whilst a healthy state, the strategy suggests better order in the sector.

The spectrum plan includes more than 30 specific strategies like these covering policy making, organisation, planning and operations.

Implementation of these strategies will result in:

- Alignment between spectrum management policies and those for economic and social development;
- Organisational structures which include spectrum users in policy making;
- An organisation which is "customer-focused" and not preventing spectrum use;
- A documented and auditable spectrum management system.

Strategy development requires the setting of vision and mission and the development of policy options for ways of meeting these. It is not a one-size-fits-all solution but a country-specific blue-print for ensuring that spectrum contribution is maximised.

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Conducting due diligence

When a firm seeks inward investment, the would-be investors want to ensure that the future looks promising for their newly acquired concern. InterConnect specialises in providing due diligence services to investors in wireless networks and equipment vendors and covers just this investment scenario.

In a recent project InterConnect was asked to report on three aspects of an equipment vendor's business: their R&D department, the markets and market shares they claimed they would control and their manufacturing and manufacturing capacity offshore. In assessing R&D, InterConnect used its competence in R&D management to appraise the target firm against best practice in equipment research and development. This dovetailed into manufacturing using the theorems of 'concurrent design' where R&D and manufacturing become one. This is complicated of course by an offshore manufacturing facility but with help from research firm TARCTC, InterConnect's sister company in the Far East, this proved straightforward in the project.

The front end of design is market forecasting and business planning. It is here that the margins available are exposed. InterConnect made good use of its competence in product management in the mobile sector to force serious argument over the claimed volumes - the outcome though was a market forecast that everyone was happy with.

InterConnect provided sound due diligence analysis to its client. Some four months later the investors confirmed the acquisition and the management team got on with the job of growing the firm.

All would-be investors need to control their investment risk. Risk comes from the unknown and the main aim of due diligence is discovery through inquisitorial investigation thereby reducing the unknowns to manageable levels. This project did just that.

Turning detective

Proving coverage and traffic handling capacity for a wireless network can be challenging in 2010. It's all the more so when asked to prove how a network might have performed many years ago. That was the way it was for InterConnect recently when asked to turn detective and provide a robust proof of performance for a network implemented in the 90s.

Despite often being discussed, the term 'coverage' has always been poorly defined. One possible reason is the requirement to define it considering the four probability distributions that describe the signal received as the user transits the service area - it's a technically complicated parameter. Another is the poor understanding of receiver behaviour in a digital world. Perhaps though it is the lack of linkage between the user experience and the parameter values. In its work, InterConnect had to go back to the beginnings of mobile networks and re-build the requirements considering the culture of the country and the user expectation of the day. Once done, an objective analysis of the coverage performance could begin.

Unlike coverage, quality of service, and its earlier component Grade of Service or GoS, has enjoyed a fairly clear definition since appearing in telephony specifications for many years and more recently being built in to the GSM standards. On the face of it, there's little ambiguity until one looks at the threshold limits and benchmarks these to the quality of service enjoyed by users of the fixed telephony networks of yesteryear. In determining historic network performance one has to look at the call attempts and call progress considering interconnection to non-ideal fixed line systems. One also has to consider user expectation given that this is built from experience with the fixed line networks of the day.

All in all, determining historic performance involves serious detective work. Robust proof needs evidence for every part of the modelling undertaken. And all of this considering that at the time when the network was designed, there was only an embryonic Internet limiting references available today to academic publications and books. InterConnect has developed methods for undertaking technology comparisons and other forms of network evaluation both for current and future networks. And we even cover ancient networks too.

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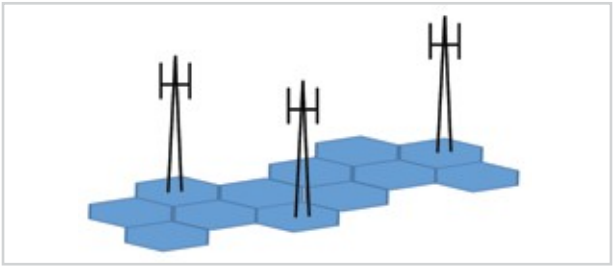

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On optimum spectrum blocks

InterConnect has recently consulted on how a regulator assures that it is designing 'optimum' spectrum blocks for direct award or for award at auction. Spectrum blocks can be any size and much depends on the services that are to be supported by them. We're used to seeing blocks of 10MHz, 20MHz and 30MHz for 3G services and sometimes as much as 50MHz for wireless broadband and will no doubt see more diverse block sizes in the future.

The block size is something a regulator constructs. The task isn't as easy as it sounds and several issues came to light during the work. The first is the definition of the word 'optimum'. When we talk of optimum, we are referring to a state viewed from someone's perspective. Is it the regulator's perspective as he strives to have maximum contribution to social and economic welfare? Or is it the would-be operator's perspective as he strives to balance the price of spectrum with the price of infrastructure?

The second is the use of one or multiple parameters when one expresses how 'optimum' is quantified and argued. Is it defined by engineering parameters only? Or do we always have to add a financial or social dimension? If it is an engineering argument, is there a necessary block size?

The final question relates to how we express things assuming we do have to have a financial dimension. Can we assess 'optimum' spectrum using a cost model alone or do we have to use an all-enterprise model where revenue and costs are balanced and where spectrum appears on both sides of the P&L?

In the end it is for the regulator to determine the meaning of 'optimum'. These issues serve to show that that there are many facets to spectrum engineering and significant discussion is needed between the disciplines before reaching conclusion.

New web site

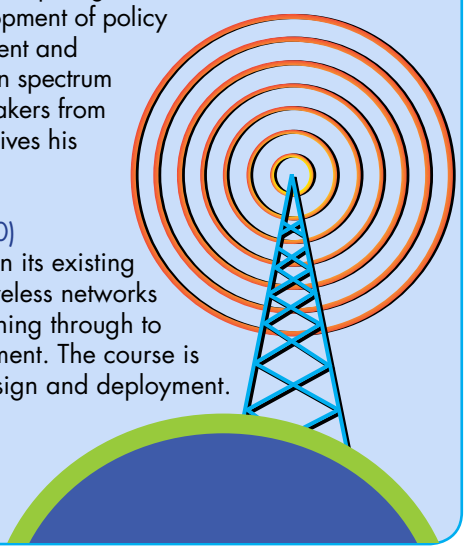
We've just launched our new and hugely improved web site. For more information on InterConnect's consulting services, go to **www.icc-uk.com**. Bookmark the site! We'll be updating it frequently to become a mine of information on spectrum management and wireless networks.

InterConnect's TRMC Master Classes

InterConnect has historically provided extensive levels of training related support to regulatory authorities and operators 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, Spectrum Management, Numbering and Addressing, and Next Generation Networks.

Spectrum Master Class (4-8 October 2010)
The Spectrum Master Class is now in its seventh year. It is ideal for anyone requiring an intermediate-level overview of the whole business of spectrum management from development of policy through spectrum engineering and modeling to processes such as assignment and coordination. New additions include spectrum economics and computers in spectrum management. Tutors are regulatory consultants or engineers and policy-makers from NRAs. And towards the end of the week a senior figure from a regulator gives his view of the traditions and transformations in the vibrant world of spectrum.

Modern Wireless Networks (29 November to 3 December 2010)
Continuing from its initial success, InterConnect Communications builds on its existing Next Generation Networks by adding a course that explores modern wireless networks right from the 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.



For more information and dates and to book your place on either course go to **www.icc-uk.com** and navigate to 'TRMC & Training'.

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