Network tweaking = more profit

Pressure mounts to optimize 3G, HSDPA services

by Stephen McClelland (Special to *Telecommunications*®)

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There was a time when we all breathed a sigh of relief that radio communications worked at all on a national scale. And when it did, most people in the telecom industry probably thought that the job of deployment was essentially finished until the next mobile technology generation. These days, relentless pressure for solid performance has put emphasis on what happens after vendors have sold their networks, and operators – presumably – have planned them.

Radio planning and post-installation optimization are
arcane jargon-filled subjects. Engineers pore over complex
network planning aids but the field still carries a feeling that it is almost certainly more black art than science and engineering. But in at least one leading meeting place, the Radio Planning Forum 2007, held this year in Monaco, there were plenty of opportunities to see that detailed, hard-won experience from practitioners in the field could, in principle, make a big difference to newcomers by avoiding expensive mistakes affecting entire national networks. Such a knowledge-intensive approach may well be the way of the future as operators seek to squeeze more and more from their networks. Certainly, present day managers seem convinced that quality- based networks are pulling away from the competition; one network engineer noted that his competition had begged him "to stop optimizing the network" and consequently winning customers away. The manager in question was able to demonstrate an impressive bottom line performance for the operator. But in engineering terms as always, planners have always to make acceptable compromise between expenditure and revenue and in technical terms between power, coverage, capacity, interference and a host of other parameters.

Incremental Improvements

It's an intellectual exercise. Small improvements–generally done by engineers carefully mulling over the network on their desktop computers rather than massive and individual modifications out in the field to thousands of base stations, can lead to significant revenue gains, says Simo Patari of Omnitele, the consultancy division of Finland's Finnet operator group. Patari points to the example of a (unnamed) service provider of modest size with 200,000 subscribers. The operator in question had a relatively high call success rate at 93 percent of calls but this still meant a loss of over 5 million minutes in a year.

When the network was optimized to improve success rate from 4 percent to 97 percent, there was a revenue gain of over US$640,000, most of which dropped to the bottom line. If anything, Patari argues, there is a greater sensitivity in the HSDPA era and in the offering of advanced and premium services to users. Network quality issues translate into competitive advantage between operators and in turn to significant ARPU improvements.

Moreover, demands are constantly growing. Amongst the many questions on the table for radio planners are: how to efficiently mix GSM and WCDMA, how to optimize HSDPA and emerging HSUPA requirements and a whole host of future services that could include mobile TV and WiMAX competition, how to cheaply infill underserved gaps, how to handle rural areas with a 3G service, and – a perennial demand – how to provide in- building coverage.

In-Building Challenges

The in-building environment is probably the greatest challenge for radio experts because of propagation problems; differences in construction materials and practices usually conspire to make every deployment a unique one. But it is a persistent requirement. "In-building [deployment] is becoming ever more important in creating revenue," says Pompeu Costa, of Portuguese mobile operator Optimus, which has created a special projects team that is charged with this list and not only giving a guaranteed indoor service in public and corporate buildings but also providing coverage for special events.

Optimus' Costa says the group continues to handle many projects, which offer unique challenges. Recent ones have included improving coverage in a large industrial building through the addition of two pico repeaters as well as outdoor optimization of the cell itself. Another project involved one of Portugal's most prestigious legal practices which had complained of poor network availability. But the cause in this case was not lack of coverage, says Costa, but rather in the high-rise building, many outside cells were competing with each other in the office. Again, various solutions were on offer including a complete dedicated indoor site, as well as a macro-repeater solution. In this case, says Costa, the problem was most cost-effectively solved with the repeater.

User demands will grow and radio planners quietly agree that users will also be making unforeseen, unofficial, unlicensed, and arguably uncontrolled extensions to the public network in the form of home repeaters, and probably more sophisticated devices such as femtocells. Indeed the residential environment may prove to be a thorny subject for service providers as inexperienced users will probably expect a plug and play 3G solution with laptop HSDPA cards back in their homes, and will be disappointed when it is not forthcoming. Vendors which neglect to provide antenna options for such people "should have the death penalty imposed on them" says one network manager darkly.

Emerging Options

But the technology options on the table are also growing. Time of day alteration of cells through variation in mechanical and electrical antenna characteristics – called 'tilting' in the industry – is already in use to accommodate fluctuating subscriber demand and suggests that networks themselves will have to grow more flexible. Byron Bakaimis of Vodafone Greece ticks off a list of potential technology variants that might be called into play in the foreseeable future: home nodes, micro Node-Bs, repeaters, non-hierarchical network and ad hoc architectures, beamforming techniques, HSDPA, HSUPA, as well as new relaying concepts and the like. Bakaimis says, "for existing and future networks, new coverage related issues must be addressed." He adds: "relaying concepts like multihop technologies can address these issues, [but the] technology needs to be proven."

Ultimately, what we regard as conventional 3G networks may be in the process of changing anyway. Emerging technologies such as UMTS900-- unlike the 2.1 GHz W-CDMA technology already established--may provide an effective way to extend 3G coverage to rural areas even in developed countries. Putting all this together with existing radio technologies probably means that radio planners – wherever they may be – won't be looking for new jobs for a while yet.

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