

picoChip's Rupert Baines argues why 3G home base stations shift the advantage back to mobile operators in the FMC and convergence game.

These are difficult times for mobile operators. After years of glamor and growth, stocks are being re-rated as utilities. Many markets are saturated, penetration is above 100 percent and competition is increasing.

To complicate things, there is the threat from UMA (Universal Mobile Access), FMC (Fixed Mobile Convergence) and Voice-over-WiFi (wireless VoIP). For example, BT's Fusion product uses Bluetooth and UMA, which can give new competitors cost advantages because they don't need to own a license. Indeed, it is no coincidence that BT, with strong broadband presence but no spectrum, is the first to offer such a service.

Finally, putting salt in the wound, 3G, supposedly the savior of carriers, doesn't actually work that well indoors. Or, rather, the combination of high frequencies (2.1GHz), high data rates (16QAM), long range and attenuation from walls is not a good mix. Of course, this isn't just a problem for 3G. Everyone knows WiFi has poor propagation characteristics, and it's why I cannot access my home network in my living room.

Femtocells could shift the advantage back to spectrum owners. A femtocell is a 3G home base station that is simple: a box similar to a WiFi access point connected to broadband. But instead of using Bluetooth or WiFi, the radio is using 3G signals to connect to any standard handset. To a consumer, this would be like UMA with the same advantages. At home, calls would be connected from their handset to the base station and then to the core over broadband. Those calls would be cheap or free. The advantage is that this doesn't require a dual-mode handset, which is expensive and has poor battery life, but works with any device. Customers use their standard mobile phones with all of their numbers programmed into it.

For an operator this counters a competitive threat, improves quality for subscribers and delivers some genuine differentiation in a cost-effective way. By offering attractive pricing when using the femtocell to people in the home, operators now have a powerful tool to sign up everyone in the household, reducing churn. Further, the carrier will probably want to deliver the broadband too so it can bundle services as a way to reduce churn and increase ARPU from both services.

Interestingly, it also improves service for other customers. Today, to get indoor coverage macrocells have to SHOUT REALLY LOUD to try to blast signals through walls, causing noise for other users outside. Putting the base station inside the walls improves service indoors, but also for all the other users who no longer get shouted at.

This is "Shannon meets Isenberg." Isenberg famously predicted that intelligence moves to the edge, while Shannon's law says that the key efficiency is improving signal-to-noise ratio. What better way than to have base stations where they are needed--at the edge, with short distances, less attenuation, less interference and hence higher data rates.

This is elegant ju-jitsu: taking the advantages of FMC, but using the strength back against it. Operators can use the ideas to take customers away from fixed-line competitors and reduce churn, increase ARPU and improve coverage and customer experience.

But there are three major problems. The first, not surprisingly, is cost. This whole idea only works if the femtocell is cheap enough. Recently, a 3G macro base station was \$100,000; the domestic femtocell needs a cost of below \$200. With the latest processors, this is now realistically doable.

The second challenge is working with the radio network and managing interference. This must be completely automatic and plug-and-play because there is no way that carriers' network planning could cope with hundreds of thousands of entities. The precise techniques for addressing this are sensitive but a number of different approaches have been developed.

Thirdly, is the reverse problem: Provisioning and integration with the core. This too must be plug-and-play, with no network configuration. Some carriers envisage an integrated femtocell plus broadband gateway (like Orange's Livebox), while others want an Ethernet modem using existing broadband connection. The latter is simpler, and could be deployed more quickly, while the integrated box would give better control of QoS, security and provisioning. Probably both will be deployed. In either case, it must be really straightforward for the customer to install and use.

These challenges are solvable. When wireless competition often is price-wars or who has the prettier logo, it is encouraging to see that there are carriers looking to use technology innovation to drive better services. Whichever approach wins, we can be sure that the increased differentiation and competitive pressure will drive better services for us all.

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