Wi-Fi and Femtocells

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Although it is tempting to portray technology discussions as “battles” with a winner and loser, more often they will co-exist (Bluetooth & Wi-Fi; DSL & Cable) with technologies serving different needs at different times. That said, this blog summarizes why femtocells have attractions and advantages over Wi-Fi, and for those applications it will succeed.
(A more detailed discussion is available in a Femto Forum Topic Brief: www.femtocells.org under White Papers: Femtocells - Natural Solution for Offload)

Simplicity / Usability
It is hard to overstate the importance of simplicity to consumers. Although early adopters will accept complexity, the average consumer rejects anything complicated, and the history of technology is littered with products which failed for that reason. Although Wi-Fi has improved, in general it is not simple to set-up or use on a smart-phone: few people would honestly say it passes the “Could your grandmother set it up?” test.
In contrast a femtocell is so simple as to be transparent: once you have plugged it in it is like using your cellphone anywhere else - “it just works”.

Voice Quality
Most people who have used VoIP-over-Wi-Fi will comment that the voice quality is not good. In contrast, one of the most common remarks from subscribers using a femtocell is how good the voice quality is: “I never realised cellphones could sound this good”, “Better than a landline”. Future femtocells support the AMR-WB codec that delivers wideband, CD-quality sound quality to your handset.

Battery Life
One of the most obvious advantages of a femtocell is the improvement in handset battery life, and that is especially the case when comparing to Wi-Fi. Normally, a

handset must “shout” to reach a basestation, and “SHOUT LOUDER” to blast through the walls of a building; that requires a lot of power, draining the battery, and the worse the coverage is (a remote home, a basement, thick walls) the faster the battery will drain. In contrast, a femtocell is always near the user and with no structural walls only a small amount of power is required for connections, so battery life is significantly better.

Of course, the same would be true for Wi-Fi, but there are two reasons why femto has an advantage:
First, there is only one radio. If the phone is using Wi-Fi for data, the 3G radio is still active, and still drawing power to support voice connections (e.g. in case someone calls you) – so two radios are active, both drawing power. In contrast, for a femtocell, both voice & data connections share the same single radio, so less power is required.
Secondly, there is the intended purpose: Wi-Fi was designed for powered applications, and is designed to optimize throughput, not to reduce power. In contrast, 3G was expressly intended for power-efficiency in handsets, and draws far less power. Anecdotally, web-surfing on Wi-Fi uses 3X more battery power than the same activity over a femtocell (on the same handset).

Performance
Although Wi-Fi has a far higher peak data-rate, which matters on a PC, on a handset the difference is not noticeable as actual performance is constrained by the processor and the application (e.g. the screen size).
However, a femtocell will typically have a longer reach: that is what you would expect from link budget values, and is supported by anecdotal evidence e.g. Gabriel Brown of Light Reading “My Wi-Fi covers my home, but the femto goes further and reaches the garden too”.

Precedent / Experience
A number of operators have launched Wi-Fi based services: BT Fusion, T-Mobile @HOME, France Telecom UNIK. It is notable that none of these have been successes: nearly all have been withdrawn, and a number of the operators are launching femtocell service instead.

Security & Billing
Although Wi-Fi has improved, there are still concerns (legitimate or otherwise) about security and hacking. In contrast, 3G remains extremely secure: uncompromised and well-trusted.
Indeed, in the USA, one of the femtocell trials is supported by a credit card company for just this reason. The BBC (British Broadcasting Corporation) was involved in a demonstration of streaming high-value media over 3G, which they would not do over Wi-Fi for licensing reasons.
As noted below, a number of innovative services are being developed for femtocells – many of these rely on trusted billing relationships.

Services
Although Wi-Fi and femtocells are largely equivalent for surfing, the latter supports many more services. For example, if you use voice-over-Wi-Fi to connect your

smartphone, you lose the ability to receive text messages (SMS). Carriers are launching an increasing range of functions: “service parity” ensures these all work seamlessly on femtocells.
Other innovative services are being developed: for example, “virtual home number”, home automation integration. These build on the trusted billing relationship with a handset, the location awareness or the ‘personal’ nature of a phone (a phone number is unique in a way a MAC address isn’t; a handset is personal in a way a computer isn’t).

(*A more detailed discussion is available in a Femto Forum Topic Brief:* www.femtocells.org *[1] under White Papers: Femtocells - Natural Solution for Offload*)

Links:
[1] http://www.femtocells.org/