



Advisory Report

Femto Fray: The What and Why of Femtocells

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■ Summary

Issue

While operators and vendors alike have been talking about residential base stations (2G or 3G) for years, the femtocell concept has picked up strong momentum this year. Start-ups are touting their solutions. Incumbent vendors are exploring the space. Operators are reportedly beginning trials. Yet, like many “hot” new technologies, it makes sense to take a step back from the initial hype to answer a few critical questions. What, exactly, is a femtocell and why would an operator be interested in them?

■ Current Analysis Perspective

At a very basic level, femtocells are an easy idea to grasp: residential base stations designed to deliver fixed mobile convergence (FMC) services based on standard 2G/3G or even WiMAX technologies. Beneath the surface, however, additional details help to explain why any operator would deploy a femtocell solution, and specifically what they would be deploying.

Again, “residential base station,” provides a concise femtocell snapshot, but what would a residential base station look like and how would it perform?

- **Technology / Spectrum:** Unlike a WiFi access point, femtocells operate over licensed spectrum using standard mobile wireless air interface and protocol technologies – GSM, UMTS, EV-DO, WiMAX etc.
- **Form Factor:** Like a WiFi access point, femtocells are designed to be unobtrusive – perhaps even attractive. Standalone forms (on par with WiFi APs) and integrated options (built into cable or DSL modems) will be available.
- **Transport:** Deployed in the home, a femtocell user will provide their own transport in the



Current Analysis

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form of DSL, FTTH or cable-based broadband.

- **User Capacity:** Deployed in the home, femtocells need not support more subscribers than an average family – around five users.
- **Carrier Capacity:** To support five users, no more than one carrier or TRX would be necessary.
- **Power Output:** With a range of roughly 500 feet (a good-sized home or estate), power output can be kept very low, no more than necessary with a 2.4 GHz WiFi product.
- **Deployment Support:** Operating in licensed spectrum (on a specific channel defined by the operator) and likely to face interference from neighboring base stations (femtocells or macro network), femtocells will need to come with deployment “wizards” and specific set-up tools – or otherwise dynamically and transparently adjust to the environment it “hears” with no input from the user.
- **Functional Components:** In order to manage handoff with the macro network and keep track of local users, the femtocell will need to be more than a base station. It will need to integrate limited HLR as well as RNC/BSC functionality.

Building on the buzz surrounding WiFi-based FMC services, the basic value proposition behind femtocells should be easily digestible, with one major difference: no need for dual-mode (i.e., 3G / WiFi).

- **Improved Coverage:** People make a lot of wireless calls from home. Operators have an interest in driving this usage up. Yet, if the wide area network cannot support good in-home coverage (good call quality), this just won't happen.
- **Spectrum Offload:** Even if the wide area network can support strong in-home call quality, robust residential usage will sap network capacity. Pushing residential users onto their own base stations should free up capacity for everyone else (improving service quality and obviating the need for some network upgrades.)
- **Transport Offload:** As operators look to roll out new 3G services, the cost of supporting high-capacity backhaul from every base station is a major concern – and potential drain on profits. Backed by a “bring your own backhaul” model, femtocells should deliver on improved profitability.
- **New Tariff Introductions:** With calls running over an ISP's broadband infrastructure – leveraging core infrastructure and spectrum that have already been paid for – the mobile operator can leverage a femtocell to execute new pricing plans: cheaper calls in the home, free calls to other users, unlimited data usage in the home etc.
- **New Service Introductions:** Lured by potentially attractive tariffs and strong in-home coverage, femtocells could drive users into the arms of a new technology. An operator with 2G and 3G networks, for example, might only offer 3G femtos. Equipped with 3G devices, users can then be sold on new services: mobile data, mobile video, IMS and blended applications etc.
- **Service Stickiness:** A customer that purchases a femtocell will think twice about abandoning the operator's service. More than creating a psychological barrier, other tangible benefits accrue to the customer, such as improved in-home coverage, improved in-home data rates and cheap or potentially even free calls. If a femtocell can deliver on these benefits, femtocell users will be that much less likely to sign up with another service provider. Churn is still a major drain on operator profits. Anything that can be done to

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reduce it will be welcome.

- Device Diversity: The issue of devices needs to be revisited. Where WiFi-based FMC will require users to acquire 2G/3G devices with 802.11 built in, femtocells will not: they will leverage standard, off-the-shelf handsets, smartphones etc. Mass-market devices will clearly enjoy cost benefits. Perhaps more importantly, there will be many more varieties of them – delivering a more broadly attractive service proposition.

Recommended Actions**Vendor Actions**

- All femtocell vendors need to begin an aggressive marketing campaign on the femtocell opportunity as well as their own products. Operators have a real reason to look at femtocells as an FMC technology. Yet, WiFi-based FMC solutions have a major head start in terms of marketing, trials etc. Femtocell vendors will need to work hard to overcome this lead and position their products as credible, near-term FMC offers.
- Femtocell vendors need to focus their early marketing on the limitation of WiFi-enabled handsets. From an FMC perspective, femtocell and WiFi-based offers deliver most of same benefits – with femtocells actually suffering from a number of technical issues associated with licensed spectrum, 2G/3G network standards and business issues regarding customer support. Femtocells, however, allow an operator to roll out FMC services with a wide array of off-the-shelf devices (voice-only, data-oriented, cheap, expensive etc.) – something WiFi-based FMC may never be able to claim.
- Ideally, vendors would peg their femtocell marketing to trials or initial deployments. Again, WiFi-based FMC has a lead in the market. Whether it's UMA or VCC, operators know that these solutions work and they have concrete examples of how to roll out services based on them. Whitepapers and Powerpoint presentations may argue that femtocells are real, but only deployments will definitively make the point.
- Femtocell vendors should refrain from conflating the residential and enterprise markets. To be sure, both residential and enterprise users could benefit from their own, dedicated 2G or 3G base station. Likewise, the products needed for both markets may seem similar – low capacity, low-power, handoff capabilities to the wide area network etc. Yet enterprises will have different transport, coverage and reliability expectations. Trying to fit a residential product into an enterprise market (or vice versa) won't work. Likewise, splitting R&D and marketing resources between these two markets may stretch a smaller vendor too thin.
- Femtocell vendors need to outline a roadmap for bringing the cost of their products down to \$200 or less (preferably \$150 or less). The femtocell concept is not a new one. Pricing, however, has been one of the key obstacles to making it viable. Driving the cost of a 3G base station to \$200 or less is no small feat. Operators need to know that this is really possible before they'll take the femtocell market seriously.

User Actions

- Would-be FMC operators need to take femtocells seriously. While the promise of a mass-market priced 3G base station may seem farfetched, there's no shortage of vendors ready to

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deliver. Clearly, WiFi-based solutions have a time to market advantage and many operators have already decided to go down this path. Those still considering their FMC options need to look at femtocells as a viable alternative.

- Would-be femtocell operators need to consider their plans for 2G vs. 3G services carefully. 2G femtocells would support a broader set of devices along with broader wide area coverage. 3G femtocells, on the other hand, could encourage users to upgrade to 3G devices and services – opening up new revenue opportunities. Ideally, an operator would manage to include both in their femtocell portfolio.
- FMC-focused operators should use ongoing femtocell trials and momentum to drive improved terms and even custom R&D from UMA and VCC vendors. It is clear that femtocells represent a very real competitive threat to UMA and VCC vendors – particularly given the limited availability of dual-mode devices. To stave off the threat and build potentially insurmountable momentum, vendors should be willing to “go the extra mile” to win a deal.
- FMC-focused operators should use ongoing femtocell trials and momentum to drive dual-mode device development. Again, femtocells are a real threat to WiFi-based FMC given their use of off-the-shelf devices. For UMA or VCC (and IMS-based) solutions to be successful, they too will need a deep stable of devices. Operators need to remind vendors of this fact, using femtocells as a “stalking horse.”