Advisory Report

Femtocell Services: North America and the State of the Industry

March 25, 2011

Issue

Operators in the U.S. launched some of the market’s first mainstream, commercial, consumer femtocell services. Sprint took its initial Airave offer national in July 2008. Verizon and AT&T went on to follow suit, rolling out femtocells nationally as an option for their customers. In total per our consumer services company profiles, this operator base represents network coverage reaching 300+ POPS and a total customer base of nearly 240 million people (albeit that includes prepaid subscribers as well). With Sprint recently claiming to have 250,000 femtocells deployed, it is clear that the total number of in-home base stations outnumbers macrocell base stations by a good margin.

Over time, the consumer femtocell service offers from these operators have all evolved. While initial launches were generally local or regional, for example, national availability is now the norm. Likewise, CDMA femtocells began as 2G (voice-only) solutions, but now include EV-DO rev. A capabilities. Sprint originally built its femtocell offer with products from Samsung, though moved to Airvana-sourced kit for 3G and while a monthly premium for having a femtocell on their account was originally charged, the carrier no longer requires this.

A few years into their launches, then, it’s worth taking a look at how these services are being positioned, sold and rolled out.

The short answer is simple. Femtocells in North America are about customer care and customer satisfaction. Even where an operator proactively reaches out to its customer base, the goal is customer retention. The goal is not data offload as some femtocell vendors (visionaries) have promoted. The goal is not added revenues. Ultimately, you can credit this focus with driving femtocell vendors to look at new markets such as the enterprise or outdoor small cells. Unfortunately, it won’t help to drive femtocell sales volumes or the development of a femtocell application ecosystem, and it could well be leaving money on the table that operators could tap if femtocells were treated as strategic vs. tactical.

Current Perspective

Service pricing and terms for consumer services are an often complicated affair, just as any consumer trying to compare basic voice and data plans across service providers or the companies which offer to help them do so. Femtocell service offers have the potential for even more complexity when you consider that a new device (femtocell) must be priced and may well come with its own service options. To help wade through this, we’ve chosen to look at a few key service metrics.

- **Device Pricing:** What does a femtocell cost the customer as an upfront purchase?
- **Service Pricing:** Does the operator require an end-user to pay a monthly fee for using the femtocell?
- **Voice Offer:** Are femtocell-specific voice tariffs (e.g., unlimited calling over the femtocell) offered?
• **Data Offer**: Are femtocell specific data tariffs offered?

• **Simultaneous Users**: How many simultaneous users can the femtocell support?

• **Open Access**: Can the femtocell be deployed to indiscriminately support any of the operator’s customers (e.g., allow other subscribers to access the femtocell without first registering them)?

• **Managed Access**: Sometimes termed “white listing,” can femtocell access be restricted to a certain set of users? How? How many?

Based on these criteria, the following table represents a snapshot (circa early 2011) of North America’s femtocell service offers. For reference, Vodafone UK and SoftBank are also included in order to yield some comparison with “pioneering” or otherwise early launches from other geographies.

<table>
<thead>
<tr>
<th>Femtocell Offer</th>
<th>Verizon Wireless</th>
<th>Sprint</th>
<th>AT&amp;T</th>
<th>Vodafone UK</th>
<th>SoftBank</th>
</tr>
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<tbody>
<tr>
<td>Femtocell Vendor</td>
<td>Network Extender</td>
<td>Airave Access Point</td>
<td>3G Microcell</td>
<td>Sure Signal</td>
<td></td>
</tr>
<tr>
<td>Technologies</td>
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<td>CDMA2000 1X</td>
<td>WCDMA</td>
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<td>$200</td>
<td>~$80 (RRP ~$120)</td>
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<td>Voice Offer</td>
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<td>$19.99/month for individuals or families</td>
<td>NA</td>
<td>NA</td>
</tr>
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<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Managed Access</td>
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<td>Yes. 50 numbers (web config)</td>
<td>Yes. 10 numbers (web config)</td>
<td>Yes. 32 numbers. (web config)</td>
<td>No</td>
</tr>
</tbody>
</table>

Based on these specifics, then, what can we say about femtocell services in the U.S.? What do these services tell us about the femtocell space more broadly?

• **Care Dominates Strategy**: Femtocell vendors routinely position the in-home base stations as key to providing consistent service quality and offloading traffic from the broader radio access network along with being a potential new revenue generator. The former strategy is how operators in North America (and Europe) are leveraging them. Rather than proactively deploying femtocells (or giving them away) to lighten their RAN and backhaul network burdens, they are deployed (often given away) to customers who regularly complain of, or otherwise experience, service quality issues. Femto-specific service plans are offered in some instances; even then, however, they are limited, not required, and not a central focus of the offer. Open access, in turn, would indicate a strategy aimed at traffic offload. The most aggressive U.S. femtocell marketer – AT&T – doesn’t offer an open access option, and the managed access depth at Verizon and Sprint isn’t going to incent any users to move in that direction. To its credit, AT&T has gone on record about proactively reaching out to potentially disgruntled customers with the offer of a free femtocell, suggesting a commitment to the strategy – even if it is a narrow strategy.

• **Voice Dominates Strategy**: While we noted that service coverage and quality were the primary focus of U.S. femtocell services, it’s fair to say that it’s primarily VOICE coverage and
quality that matters. Yes, CDMA2000 operators have migrated their solutions to support 3G services, but sales and marketing tell the real story. Where femto-specific service plans are offered, they revolve around unlimited voice. Data usage on the femtocell is, generally, counted against a subscriber’s plan with AT&T suggesting that WiFi is a more appropriate in-home data technology (despite the 3G capabilities of their femtocells). Japan is a unique case (see below), but the general lack of creativity around femtocell pricing or femtocell services beyond basic voice and data (e.g., applications), signals that operators see the in-home base stations as a tool for maintaining their bread-and-butter voice revenues in the face of sometimes poor quality or coverage.

• "Official” Pricing a Fallacy. If operators see a value in femtocells as a way of keeping (potentially disgruntled) customers happy, you could ask why they are charging $200 or more for them. A look outside the U.S. indicates that this isn’t a universal phenomenon: Vodafone UK has lowered pricing to $30 – $80, with a monthly “rental” option making the Sure Signal offer even more affordable; SoftBank gives away the femtocell. Even among the three U.S. femtocell operators, however, “free” is essentially the going rate for femtocells. A customer may pay anywhere from $100 to $280 for a femtocell if they go directly to an operator to buy one. However, if they’ve complained of poor service or have moved to cancel their service due to poor coverage, a femtocell will often be offered free of charge. AT&T even targets some customers for a free femtocell offer via direct mail.

• Japan as Outlier (lesson?). At face value, the service metrics may not make SoftBank seem too different from other operators. In reality, its model is unique: a fixed and mobile operator, SoftBank offers femtocells for free and supplies them with DSL backhaul. Provisioned for open access, the customer receives improved service and SoftBank receives offload benefits. While Japan is often seen as one of the most densely covered mobile broadband markets, the extensive use of mobile broadband and SoftBank's diverse assets drive the economics of this model and make the operator a perennial case study for how converged operators could possibly exploit their properties (and ensure solid femtocell backhaul in the process).

• Uphill Battle for Applications. For the last few years, femtocell vendors and the Femto Forum have been promoting femtocell-based applications as a way to drive the femtocell value proposition. The notion is that applications which leverage the bandwidth and/or location information of the femtocell can extend their value vs. basic voice and data access. Think notifications when people arrive home, automatic content downloads when attached to the femtocell, or even user interface transformations in the home environment. From a technology perspective, application development has been delayed by a lack of consensus over where the applications should reside (device, femtocell or network) or the appropriate APIs to leverage. The bigger barrier, however, is operator strategy. If femtocells are being used as a customer retention and care tool, operator interest in broadly driving them into the market will be limited. There will be no interest, then, in applications which foster femtocell demand. At the same time, unless femtocell scale obtains a given magnitude across an operator, developers will have no interest in actually developing for them.

• Products Matter. If operators aren’t aggressively pushing femtocells into the market, it may not seem that product performance or capabilities actually matter; today’s products are supporting improved coverage in line with operator demands and consumers aren’t actually demanding femtocells, meaning operators don’t need to see improvements in order to meet market demand. At the same time, it has been argued that the scale which has developed over several years of deployment has met operator demands for cost efficiencies. Regardless, product performance cannot be ignored. If operators are giving femtocells away for free, they need vendors to deliver constantly cost-optimized solutions from the edge (access point) to the core (controllers, etc.). And, if the goal is improved performance, vendors must be certain that interference mitigation techniques are solid enough to deal with femto-to-macro and femto-to-femto “cross talk.” The latter will become particularly important as deployments scale in dense usage areas. Of course,
if operators decide to go on the offensive with femtocell deployments, new form factors and application support will be necessary to incent uptake.

- **The Focus on Outdoors and the Enterprise.** Over the past year or so, some femtocell and femtocell silicon vendors have turned their attention to outdoor and enterprise applications. The market rationale is straightforward: operators will need outdoor small cells to deal with coverage and capacity gaps, and femtocells can serve that need if built to withstand the elements and equipped with higher capacity and/or power. Enterprises will also need the coverage and capacity assistance that femtocells can deliver. The vendor rationale is equally straightforward; with operators treating femtocells as a tool to keep coverage or capacity disadvantaged customers happy, shipment volumes are never likely to be substantial. Moving into new markets, then, is critical to getting the most leverage from existing femtocell R&D and, hopefully, driving revenues until operators move more aggressively. Of course, operators looking at enterprise and outdoor small cell deployments are also trying to sort out the role for WiFi, meaning that vendors need to be ready to tell a co-existence story, or explain (in compelling terms) why WiFi isn’t the answer. With customer retention as the goal, you cannot fault U.S. operators for their femtocell strategies. A lack of service pricing and attractive (if not always free) device pricing lowers the barrier to getting femtocells into the hands and homes of customers with service quality problems. Business units and product managers charged with customer care, in turn, are not responsible for driving femtocells as a source of new revenues or even churn reduction. This does not mean, however, that the strategy isn’t shortsighted. Near-term, femtocells can be used to drive revenues or deal with data hogs that simply don’t (for whatever reason) leverage WiFi when at home. Long-term, could represent an operator’s foothold in the home, improving stickiness thanks to a premium customer experience. The applications to make this happen aren’t necessarily clear. As long as operators treat femtocells as customer care solutions, they will never actually know what those applications are, or may lose ground to competitors who move earlier.

### Recommended Actions

#### Recommended Vendor Actions

- **Vendors across the femtocell value chain need to drive sales discussions at an executive level.** Today, customer retention departments might be charged with buying femtocell solutions and deploying femtocell services. The deployment volumes implied by such a tactical view of the technology, however, are a fraction of those implied by femtocells as a strategic initiative for growing revenues and long-term customer stickiness. Strategy, in turn, is driven by executive offices, not customer care managers.

- **Outdoor small cell deployments need to be used to prove out the value of femtocells for data offload.** While operators do not seem ready to embrace femtocells as a solution for managing in-home data traffic, they are preparing to launch outdoor small cells for capacity enhancement. Once deployed, these small cells should yield data points around the economics of RAN offload that can be extrapolated to the home.

- **Building off the last point, network vendors need to position femtocells as a part of their broader offload and traffic management strategies.** From a sales perspective, this might not seem to make sense; this is not how operators are looking at femtocell deployments. From a marketing perspective, however, positioning femtocells alongside video optimization, core network offload and even WiFi solutions helps to highlight their ultimate potential as more than just in-home coverage adjuncts.

- **Device vendors need to begin investigating the role of connection managers as client-side offload tools for laptops and smartphones.** Already, connection manager software is being used
to support 3G-WiFi authentication issues with an eye towards device based policy support as well. These same functions, however, will be needed beyond the laptop. What’s more, device-side software could improve also femtocell performance by supporting improved handover (hand-out, hand-in) performance.

- Femtocell vendors need to drive examples of content caching. Content optimization is gaining interest as traffic volumes continue their climb, with caching as one focus. Some vendors are looking to put the cache at the macro-cell base station or even on the device. The former is difficult in terms of CapEx and deployment costs, along with the loose content targeting that is available when focused on a relatively large area. The latter is complicated by diverse handset models and still, potentially, requires precious RAN spectrum to be occupied. Content caching on the femto should be easier to manage and could help to make femtocells valuable beyond coverage. Again, where operators are focused on coverage, they need to see examples of new applications in order to see the possibilities.

- Application developers should ignore the femtocell space for the time being. Until operators begin proactively pushing femtocells as a solution for data offload, the market will not be big enough to warrant a focus. That said, vendors looking to promote an interest in femtocell applications could be logical partners for gaining an introduction to the space.

**Recommended Vendor Actions**

- Operators need to begin thinking about femtocells as more than just stopgap customer retention tools. Yes, they can be used in this manner. Having built an infrastructure for deploying them, however, opportunities are being lost if revenue-generating or long-term stickiness (i.e., competitive differentiation) strategies are not being pursued. For their part, vendors are ready (eager) to help execute on these strategies.

- Sprint and AT&T need to look carefully at their femto-specific tariffs for insights into revenue-generating opportunities. You might argue that maintaining these rate options runs counter to a femtocell strategy centered on customer care. Regardless, they offer an opportunity for the operators to actually see if there is room in their femtocell strategies for an added ARPU component. At the same time, Verizon should consider some femto-specific tariff trials for the same reason.

- Where near-term customer service satisfaction is the goal, AT&T’s strategy of proactive care represents a model to be mimicked; if competitors are not actively pursuing a similar strategy, they need to consider it. Already, operators have plenty of tools to identify high-value users that are likely to have service issues: number of calls to customer support, dramatic changes in usage patterns, known coverage gaps. Leveraging these tools to put femtocells into the hands of customers who spend a good amount of money should pre-empt calls to customer support lines, keep customers who might switch carriers without actively complaining and potentially even make those customers feel “special.”

- AT&T should not plan on abandoning the UMA service it inherits from T-Mobile when (if) the acquisition is complete. On one level, the two strategies seem mutually exclusive and AT&T has already abandoned a UMA strategy once before. On another level, AT&T has embraced WiFi for data offload and will gain an expended WiFi footprint from T-Mobile. Until it has a better handle on the UMA customer experience, deciding to pull the plug on the service would be a mistake.