U.S. Consumer Attitudes on In-Home Mobile Services and Femtocells

A Parks Associates white paper developed for the Femto Forum

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The Femto Forum is a not-for-profit membership organisation founded in 2007 to promote femtocell deployment worldwide. The Forum is chartered to encourage the growth of a partner ecosystem committed to innovation in standards-based network infrastructure and to achieve high levels of collaboration and product interoperability. The consumer research and analysis described in this white paper were commissioned by the Femto Forum on behalf of its members. Full members gain access to the full results and underlying data. See www.femtoforum.org or contact info@femtoforum.org for further details.

Executive Summary

In 2010, the Femto Forum commissioned Parks Associates to study U.S. consumer attitudes toward femtocells and femtocell benefits for users of mobile service. The U.S. consumer study revealed that more than one-half of mobile consumers (57%) find femtocells attractive and confirmed a long-held hypothesis that boosting in-home service coverage is the main driver of interest. The desire for better coverage, in fact, is twice as important as the next most important factor (enhanced online media streaming/ downloading). The survey also showed that femtocells may bring multiple benefits to mobile operators. Fifteen percent of mobile users would switch providers in order to gain femtocell services. Among those already intending to switch providers, 44% would stay with their current provider if it offered femtocell services. Moreover, one-third of households using multiple operators said they would consolidate their services with a single provider if it offered femtocell services.

Data on price expectations indicated that there are multiple means to market and generate revenue from femtocells; direct sale, subscription services, value-added features, etc. Consumers said they would prefer to purchase a femtocell outright and they also appeared to have definitive price thresholds in mind—demand dropped considerably if equipment costs exceed $50 and even further once prices exceeded $100. Services hold additional revenue potential. Eight hypothetical features were tested and each was appealing to 20-30% of all respondents—an even larger portion were interested in at least one of the services. Finally the survey found that Wi-Fi use is not a barrier to consumers' femtocell interest but rather mobile Wi-Fi users are ideal candidates for femtocell use. Those using mobile Wi-Fi are willing to pay more for femtocells than those who do not use Wi-Fi.

Research Background

Femtocells are small cellular base stations that improve in-building signal coverage by integrating existing core mobile networks with broadband infrastructure. For billions of mobile phone users worldwide, cellular indoor signal strength is generally much poorer than outdoor signal strength. Poor reception indoors becomes an even greater issue with 3G technologies that operate at a higher frequency relative to 2G and 2.5G technologies. As the operational frequency increases, the signal penetration through walls and buildings decreases. Femtocells were designed to solve this problem and help mobile operators answer users' demand for consistent coverage.

Femtocells have been commercially available in the U.S. since late 2007, however to date there has been little in the way of widely-published systematic research on consumers' attitudes toward them. To better understand consumer perceptions and interest in in-home mobile services and femtocell solutions, the Femto Forum commissioned Parks Associates to conduct a consumer survey on the topic.

Parks Associates surveyed 1,100 broadband Internet heads-of-household with mobile phone services in the U.S. All respondents were 18 or over and had an equal or greater share in household decisions on telecommunication services and consumer electronics. The sample matches broadband household characteristics in terms of age, gender, income, and education. The results of the survey have a margin of error of +/- 2.95% at a 95% confidence level. A profile of the respondents is contained in the Appendix.

Satisfaction with In-Home Mobile Service and Drivers of Femtocell Interest

In general, U.S. mobile consumers give a thumbs-up to the mobile services they use. Seventy-three percent are very satisfied with their outdoor mobile service coverage, but only 59% are happy with indoor coverage. Nine percent are dissatisfied with indoor coverage, rating it a 1, 2 or 3 on the seven-point scale. Twelve percent experience dropped calls three times a week or more often while at home. Femtocell awareness is very low among U.S. consumers even though femtocells are commercially available from all three U.S. top mobile operators. Overall, only 6% of respondents say they are very familiar with femtocells. However, the benefits of femtocells resonate with consumers. After the femtocell concept and benefits are fully explained to consumers, more than one-half (57%) find femtocells appealing. Interest levels vary among consumer segments. In general, high ARPU households are more likely to find femtocells appealing than low ARPU households. Consumers with mobile data plans or 3G smartphones are also disproportionately drawn to the benefits of femtocell.

Improving in-home mobile services is the main value proposition for consumers. In-home service quality is a multi-faceted issue. Besides dropped calls and poor voice quality that are traditionally voice-related, mobile data services have exposed consumers to a new set of service quality issues, namely slow and disrupted data access. In addition, mobile data use also quickly drains the phone's battery. A femtocell can mitigate all of these problems.

Parks Associates employed regression analysis to identify the leading factors driving consumer interest in femtocells. Better in-home voice coverage is by far the most significant driver, even across the multiple consumer sub-segments Parks Associates examined. It is notable that the overall level of interest level at 57%—with coverage as the dominant driver—far exceeds the 9% who say they are dissatisfied with their indoor coverage. This suggests that even consumers who are not expressly dissatisfied with their coverage will still welcome better coverage. The second and third key drivers are enhanced video and audio downloading/streaming speed and cheaper in-home call/data rates. Figure 1 illustrates the relative importance of the five factors and normalized rankings of each factor's importance. Better in-home coverage/signal strength is three times as important as cheaper voice/data rates in driving end user interest in femtocells, for example.

Relative Importance of Femtocell Benefits in Consumer Appeal (Q2/10)

(Among all respondents, n=1,100; ±3%)

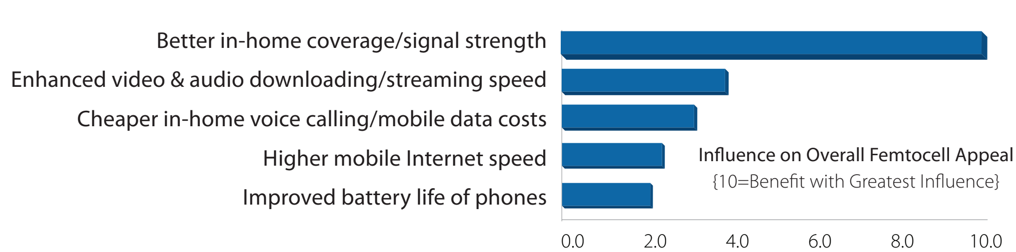

Figure 1: Relative Importance of Femtocell Benefits in Driving Consumer Appeal

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Although better in-home coverage has broad appeal, the second and third most important drivers vary considerably by consumer segments (Figure 2). Parks Associates profiled four major consumer segments (not mutually exclusive) as follows:

- **Femtocell Fans**: Those who find the femtocell appealing.
- **Heavy Mobile Wi-Fi Users**: Those who use Wi-Fi on their phone more than three times a week.
- **High Service ARPU Households**: Those in the top 30 percentile of the mobile households in terms of monthly spending on mobile services—roughly those spending $120 or more per month.
- **Heavy Mobile Data Users**: Those with unlimited mobile data plans or daily users of mobile Internet and email services.

Among Femtocell Fans and High Service ARPU Households, higher mobile Internet speed is the second most important driver. For Heavy Mobile Data Users, cheaper call/data rates are the second most significant driver. Among Heavy Mobile Wi-Fi Users, improved phone battery life is the second most significant factor driving femtocell interest.

	Femtocell Fans	Heavy Mobile Wi-Fi Users	High Service ARPU Households	Heavy Mobile Data Users
Top Driver	Better in-home coverage/signal strength	Better in-home coverage/signal strength	Better in-home coverage/signal strength	Better in-home coverage/ signal strength
Second Driver	High mobile Internet speed	Improved phone battery life	Higher mobile Internet Speed	Cheaper in-home calling/ data rate
Third Driver	Cheaper in-home calling/data rate	Enhanced video/ audio download/ streaming	Improved phone battery life	Higher mobile Internet speed

Figure 2: Major Drivers of Interest from Multiple Consumer Segments

Consumer's Price Expectation for Femtocell Products and Services

Mobile operators and equipment vendors are using different pricing and bundling formulas to market femtocell products and services. Pricing is perhaps the most challenging question. The consumer survey devoted considerable effort to understanding consumer price expectations on femtocell products and services. One question asked consumers to state the price they deem femtocells to be "a good value". For femtocell fans, the average price was $44. Another question probed consumers' willingness to pay a monthly recurring fee for a femtocell instead of making a one-time purchase. The average "fair" monthly price for rentals among femtocell fans was $15.

Parks Associates' analysts calculated a hypothetic revenue curve based on the demand at different price points. The revenue curve notably has several peaks and troughs as prices move upwards. Beyond $50, there is a significant drop in femtocell revenue that declines further once prices exceed the $100 mark. These price points are clear indicators that consumers form psychological price thresholds based on their perception of femtocell's benefits.

Further analysis shows that the willingness to pay is higher among those that desire better in-home service coverage and highest among those with prior familiarity with femtocells. Figure 3 illustrates these differing expectations.

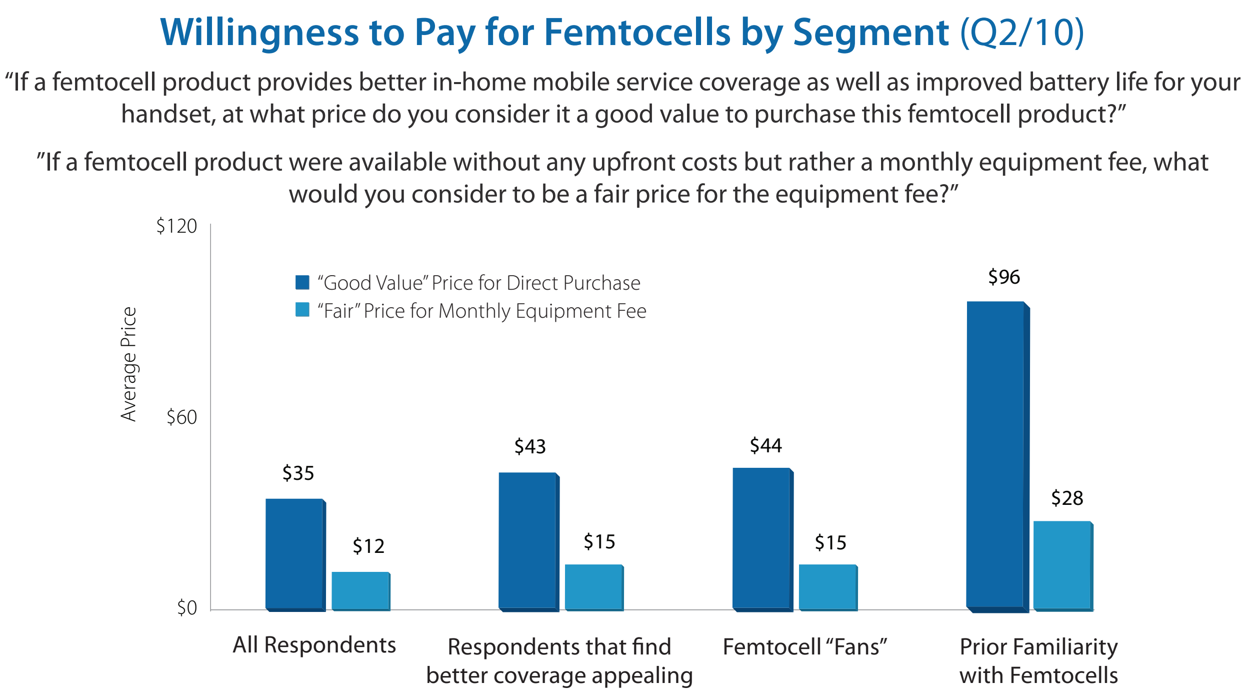

Figure 3: Consumers' Price Expectation for Femtocell Products: Purchase vs. Rent

Femtocell's Effect on Churn and Customer Retention

The survey also reveals that in a competitive mobile market like the U.S., femtocells would help mobile operators retain valuable customers, attract new ones, or potentially persuade families with multiple operator accounts to consolidate service plans. For instance, among those who indicated a strong likelihood of changing operators within the next 12 months, 44% expressed strong willingness to stay with their current provider if it offers a femtocell. Fifteen percent of all respondents indicated they would be likely to switch away from their current provider if a competing provider offered them a femtocell. Among those households using multiple operators, 35% are likely to consolidate service plans with the provider that offers femtocells. These are concrete benefits to mobile operators if they offer femtocells directly to targeted consumers (Figure 4).

Femtocell benefits for mobile operators are more prominent among several key consumer segments profiled in Section 2.0. For instance, if femtocells are offered to Femtocell Fans, 24% of them would switch services compared with 15% among all mobile families.

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Effect of Femtocells on Mobile Plans (Q2/10)

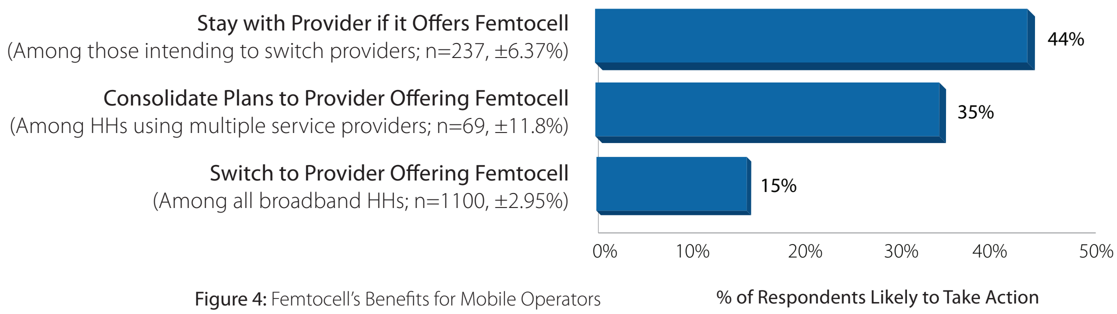

Figure 4: Femtocell's Benefits for Mobile Operators

Among Heavy Mobile Wi-Fi Users, up to 36% could be lured away (Figure 5). On the flip side, if femtocells are offered to current mobile customers, among Femtocell Fans who intend to churn, 54% would choose to stay compared with 44% among all mobile families planning to switch service providers. The effect is more significant on Heavy Mobile Wi-Fi Users as almost 70% of would-be switchers in this segment will stay (Figure 6).

Femtocell's Impact on Customer Acquisition (Q2/10)

"If your current mobile service provider does not offer a femtocell product, how likely are you to switch to a provider that offers a femtocell solution?" (Percentage who rated likely, ratings 6-7)

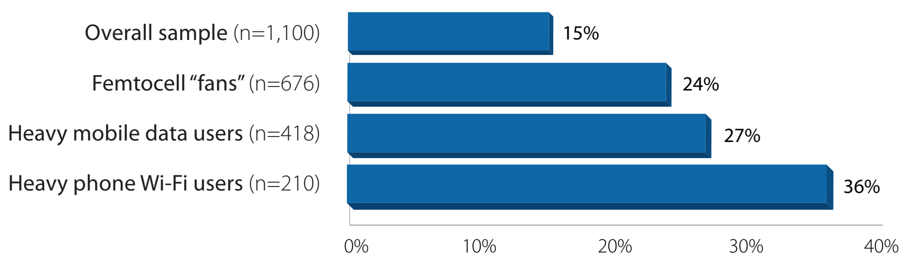

Figure 5: Femtocell's Impact on Customer Acquisition by Consumer Segments

Femtocell's Impact on Customer Retention (Q2/10)

"If your current mobile service provider began offering a femtocell product with those benefits at a price that you like, how likely would you be to stay with it?"

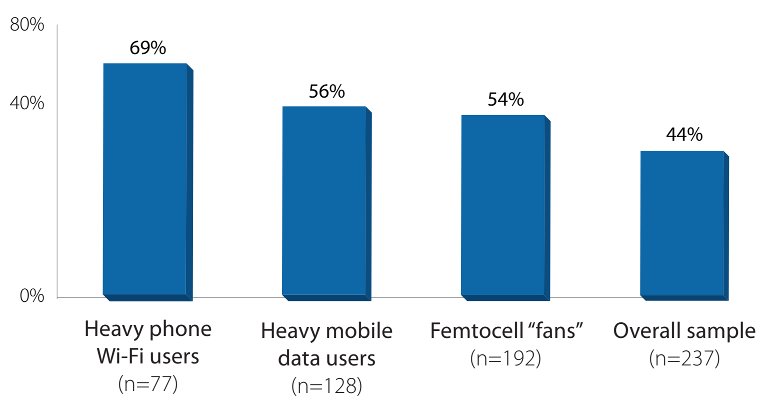

Figure 6: Femtocell's Impact on Customer Retention, by Segment

Heavy Mobile Wi-Fi Users and Femtocell

The consumer femtocell market is still in its early stage but already has a potential rival. Wi-Fi has found its way into a growing number of mobile phone models and mobile operators are encouraging Wi-Fi use to improve data service and to offload mobile data traffic from their core networks. Consumers, on the other hand, do not have to pay for Wi-Fi access if they already have a wireless network at home. Some in the industry believe that Wi-Fi use may hold back consumer interest in femtocells.

To the contrary, the survey found that heavy mobile Wi-Fi use correlates positively with femtocell appeal. Among those who use Wi-Fi on their phone more than three times a week, 84% found femtocell appealing, compared to 57% of all respondents (Figure 7). The data show that among these heavy mobile Wi-Fi users, Wi-Fi usage does not undermine their interest in femtocell, implying that they are open to using both in their home.

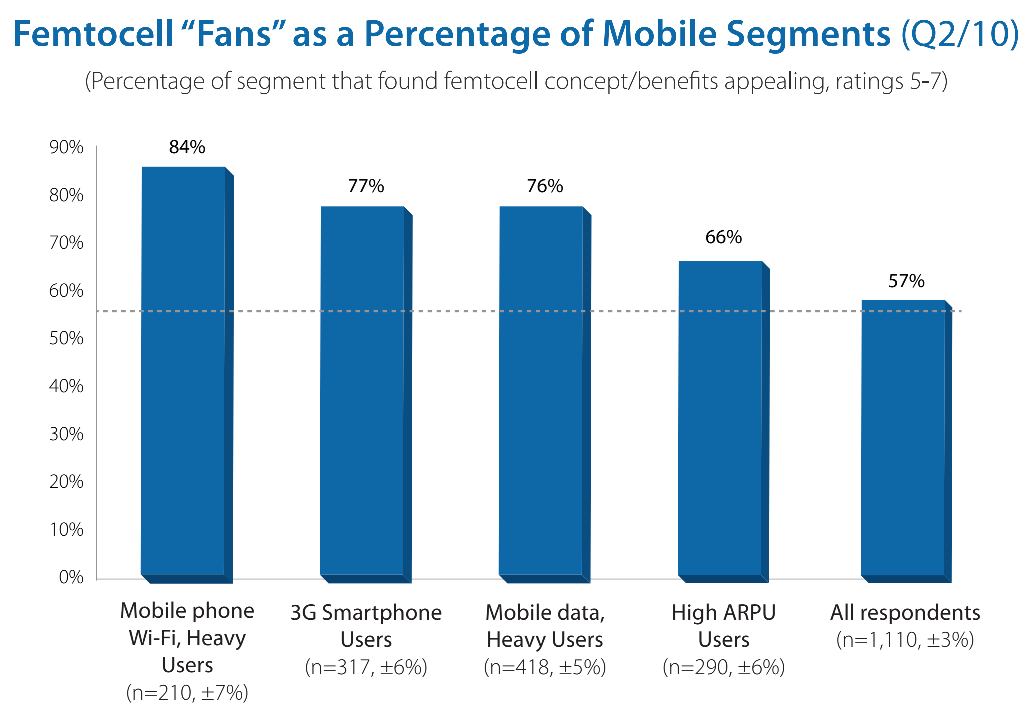

Figure 7: Heavy Mobile Wi-Fi Users Have the Highest Proportion Finding Femtocells Appealing

There are several possible explanations for this finding. First, survey data suggest those using mobile Wi-Fi heavily are the same early adopters that would welcome a technology solution to their coverage problems. As Figure 2 shows, they are attracted by femtocells' coverage benefits first and battery life extension second—current Wi-Fi capabilities are not sufficiently addressing these problems.

Secondly, heavy mobile Wi-Fi users tend to experience in-home service problems more frequently than the average user due to their elevated voice and data use. As a result, they are more actively seeking in-home service improvement solutions (Figure 8).

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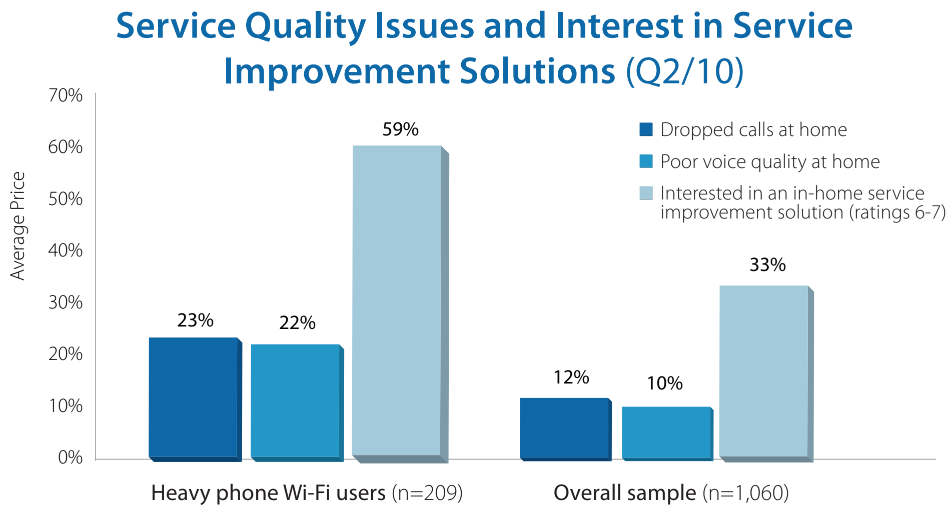

Figure 8: Service Quality Issues and Interest in Service Improvement Solutions

Finally, these consumers are willing to pay more for femtocell products and services. Figure 9 illustrates that heavy mobile Wi-Fi users are willing to pay almost twice as much as non Wi-Fi users for femtocell products both under the one-time purchase model and the monthly rental model scenarios.

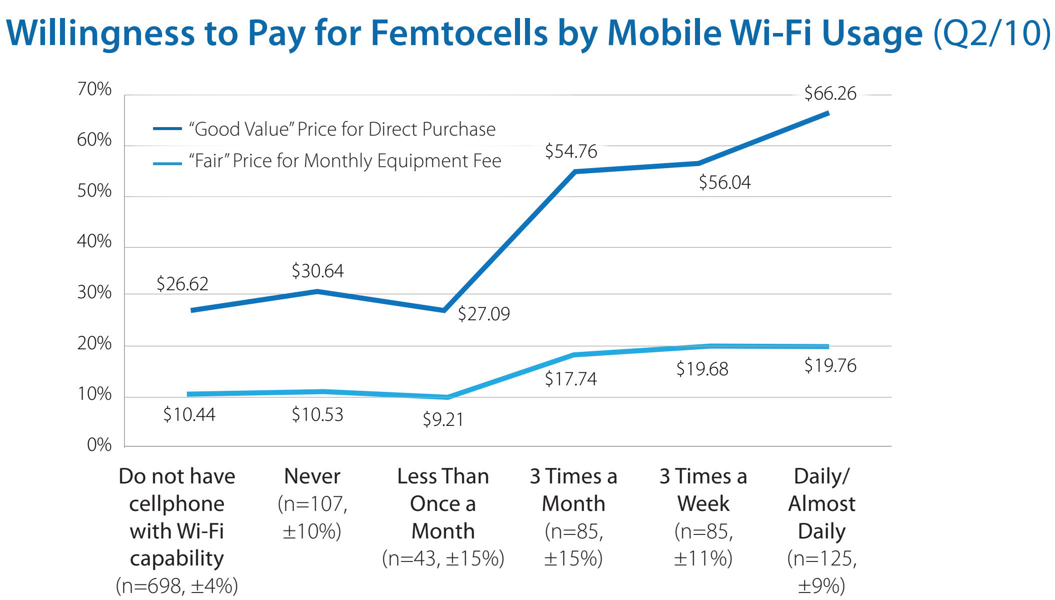

Figure 9: Heavy Mobile Wi-Fi Users Are Willing to Pay More for Femtocells

Targeting Heavy Mobile Wi-Fi Users with a femtocell also benefits mobile operators as these consumers are twice as likely as other subscribers to switch service providers in the next 12 months (26% vs. 13%). When they switch, they are more than twice as likely to switch to a mobile operator that offers a femtocell solution (36% vs. 15%) and almost 70% would consider staying with their current operator if a femtocell is offered.

Appeal of New Femtocell-Enabled Services

Besides the core offerings of a femtocell, the survey also examined consumer interest in a number of new services that can be deployed through femtocells. Specifically, eight services were tested with attributes of each described below:

1. **Family Alerts**: The ability to receive automated notifications (by text message, email, etc.) whenever a family member enters/leaves your home. For example, a parent at work could automatically receive a text message when their child arrives or leaves home.
2. **Virtual Home Number**: A phone number that, when dialed, rings all the cell phones that are currently within your home. This allows you to have a "home number" that you can provide people, even if you choose to discontinue your landline phone service.
3. **Music Sync**: A feature that automatically (and wirelessly) transfers all of the music files stored on your home computer to your cell phone.
4. **Photo Sync**: A feature that automatically (and wirelessly) transfers all the photo and video files on your cell phone to your home computer.
5. **Contact/Calendar Sync**: A feature that automatically (and wirelessly) synchronizes the calendars and contacts you use on your computer with those on your cell phone.
6. **Cell Phone Remote Control**: The ability to control home electronics (DVRs, DVD players, TVs, etc.) with your cell phone.
7. **Family Locator**: A screen or password-protected web page that shows current locations of family members, using a combination of GPS and femtocell presence capabilities. For example it could show that one child is at home, another at a friend's house, and the parent is at work.
8. **Home Reminders**: The ability to leave electronic reminder messages for family members via a website, that are delivered as text messages on their phone when they arrive home (just like finding a note on the refrigerator).

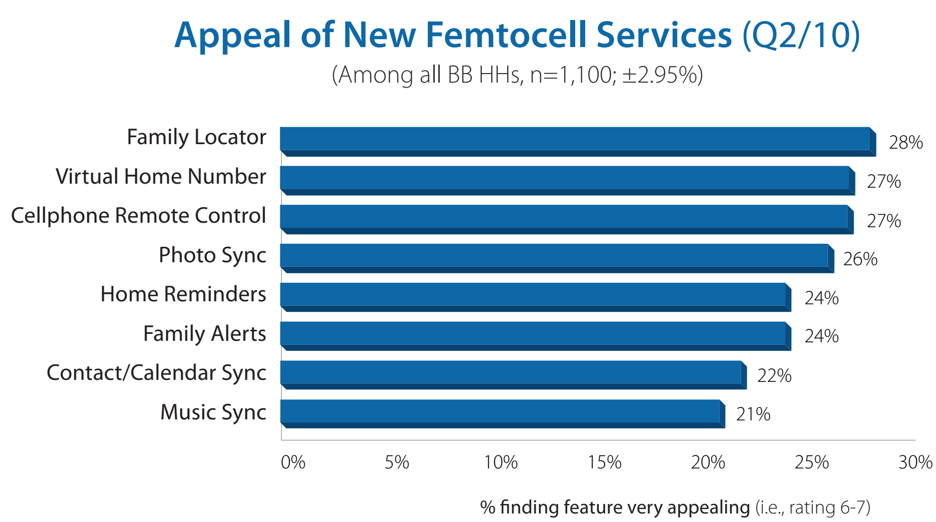

Figure 10: New Femtocell Services' Appeal

Survey data indicate that each of these new femtocell services appeal to 20-30% of broadband mobile households (Figure 10). Among Femtocell Fans, 72% express high interest in at least one service. Among the eight services, "family locator," "virtual home number," and "cell phone remote control" garner relatively higher interest.

Willingness to Buy Top Feature (Q2/10)

"If the [feature] cost [price] per month, how likely would you be to subscribe to it?"
(Among Those Finding Some Features Appealing, n=911, ±3.25%)

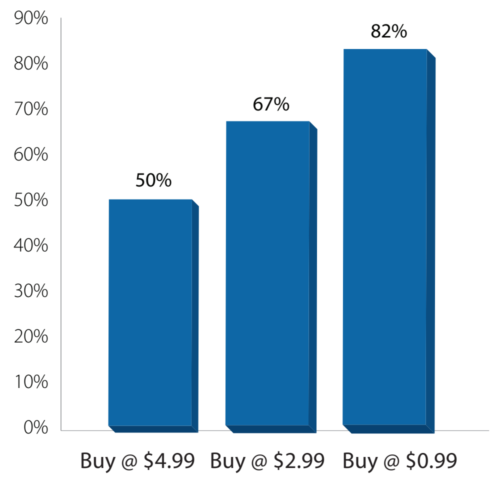

Figure 11: Consumer Willingness to Pay Femtocell Service Features: Single Subscription

Likelihood of Subscribing to Feature Bundles (Q2/10)

"If the following features are offered as a bundle for [price] per month, how likely would you be to subscribe to it?"
(Among Those Finding Some Features Appealing, n=856, ±3.35%)

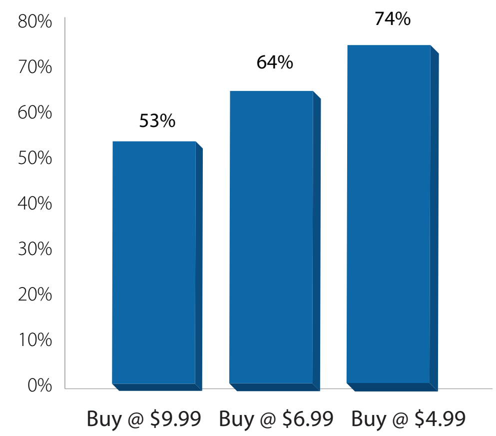

Figure 12: Consumer Willingness to Pay Femtocell Service Features: Bundles

There is also substantial willingness to pay for femtocell-enabled services. The survey gauged respondents' willingness to pay for services at price points of $4.99, $2.99, and $0.99 per month and the results were encouraging. First, 50% of those interested in at least one service are willing to pay $4.99 per month. This figure rises to 67% when the price is lowered to $2.99 per month and 82% at $0.99 per month (Figure 11). When the respondent's top three services are offered as a bundle, more than 50% are willing to pay $9.99 per month and 64% are willing to pay $6.99 per month; 74% at $4.99 per month (Figure 12).

Conclusions

A large proportion of mobile consumers in the U.S. find femtocells attractive and survey data confirms a long-held hypothesis that boosting in-home service coverage is the main driver of interest. The survey also shows that femtocells may bring multiple benefits to mobile operators in the forms of reduced customer churn, improved customer loyalty, or service plan consolidation among families with multiple provider accounts. Data on price expectations indicate that there are multiple means to market femtocells to consumers and consumers appear to have psychological price thresholds in mind. Furthermore, a healthy portion of consumers express interest in subscribing to additional femtocell-enabled services. More surprising (in a positive sense) is that Wi-Fi use is not a barrier to consumers' femtocell interest.

The femtocell industry would benefit from consumer education efforts that explain what a femtocell is and what benefits it can bring to mobile users. Broad interest in advanced femtocell services can then evolve femtocells from being a service enhancement to a service platform in their own right.

Appendix A: About the Survey

The U.S. online survey was conducted between 04/30/10 and 05/12/10. It surveyed 1,100 broadband Internet heads-of-household with mobile phone services in the U.S. All respondents were 18 or over and had an equal or greater share in household decisions on telecommunication services and consumer electronics. The sample matches broadband household characteristics on age, gender, income, and education. The results of the survey have a margin of error of +/- 2.95% at a 95% confidence level. Below is the profile of the respondents in the survey.

Demographics

- 19% of all broadband HHs with a mobile phone
- 49% female, 51% male
- Avg. age 37; 42% under 35; 4% over 55
- 55% hold 4 year college degree including 20% with a graduate degree

Mobile Phone Profile

- 15% pre-paid mobile phone plan; 85% post-paid plan
- Avg. mobile phone bill $92 (individual plan)/ $141 (family plan)
- 12% pay $50 or less (in total); 45% pay $100 or more
- 40% (of post-paid subs.) have unlimited voice minutes with their plan
- Avg. number of anytime minutes is ~950
- 75% have unlimited data use with their plan
- 80% own a 3G phone
- 46% make VoIP calls using their mobile phone on a monthly basis
- 18% tried switching to Wi-Fi after experiencing problems with the cellular network

In the survey, the concept of femtocell and its benefits are described as below:

A femtocell is a small device that works through your DSL/cable/fiber broadband connection to provide your existing cell phone(s) with the following benefits while you and your family are within your home:

- Improved indoor coverage, consistently 4-5 "bars" throughout your home
- Improved battery life of your cell phones
- Improved speed of Internet access and audio/video streaming/downloading speed on your cell phones throughout your home
- Potentially lower calling costs/mobile data costs

Topics examined in the survey include the following:

- Current mobile service subscription and mobile device ownership
- Mobile service usage, phone features and usage
- Mobile Internet usage and phone Wi-Fi features and use frequency
- Mobile service satisfaction, service issues, and churn factors
- Femtocell familiarity and interest
- Femtocell pricing expectations
- New femtocell service features and consumer interests
- Effects of femtocell on churn, provider switching and consolidation
- Preferred methods to acquire femtocell products

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Harry Wang studies the consumer electronics and entertainment service industries with a focus on portable and mobile CE hardware, software, and associated applications and services. He is also the lead analyst for Parks Associates' digital health research program. Harry has presented his research in numerous industry events including CES, Digital Hollywood, Photo Marketing Association Annual Show, American Telemedicine Association Annual Show, World Health Congress, and Parks Associates' CONNECTIONS™ conferences.

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Parks Associates is an internationally recognized market research and consulting company specializing in emerging consumer technology products and services. Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, primary studies, consumer research, custom research, workshops, executive conferences, and annual service subscriptions.

The company's expertise includes new media, digital entertainment and gaming, home networks, Internet and television services, digital health, mobile applications and services, consumer electronics, energy management, and home control systems and security.

Each year, Parks Associates hosts executive thought leadership conferences CONNECTIONS™, with support from the Consumer Electronics Association (CEA) ®, and CONNECTIONS™ Europe.

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