



FEMTOCELL ECONOMICS

Michael W. Thelander
CEO and Founder
Signals Research Group, LLC

Femtocells Asia
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Background Information

- Femtocells have the ability to benefit consumers and operators in a number of different ways. An increasingly important challenge for the industry has been articulating a simple quantitative value-creation story:
 - How can the operator make money?
 - What is in it for the consumer?
- The Femto Forum commissioned Signals Research Group, LLC (SRG) in 2008 to develop a business case modeling tool that would allow its full members to evaluate their own business case for deploying femtocells.
 - A history of modeling complex operator/network economics
 - An understanding of the femtocell industry
- SRG has developed a sophisticated femtocell business planning tool, complete with documentation and training, along with a whitepaper which describes the economics of femtocells in a number of representative scenarios
- Training on how to use the model will occur at the Femto Forum Plenary Session which takes place later this week.



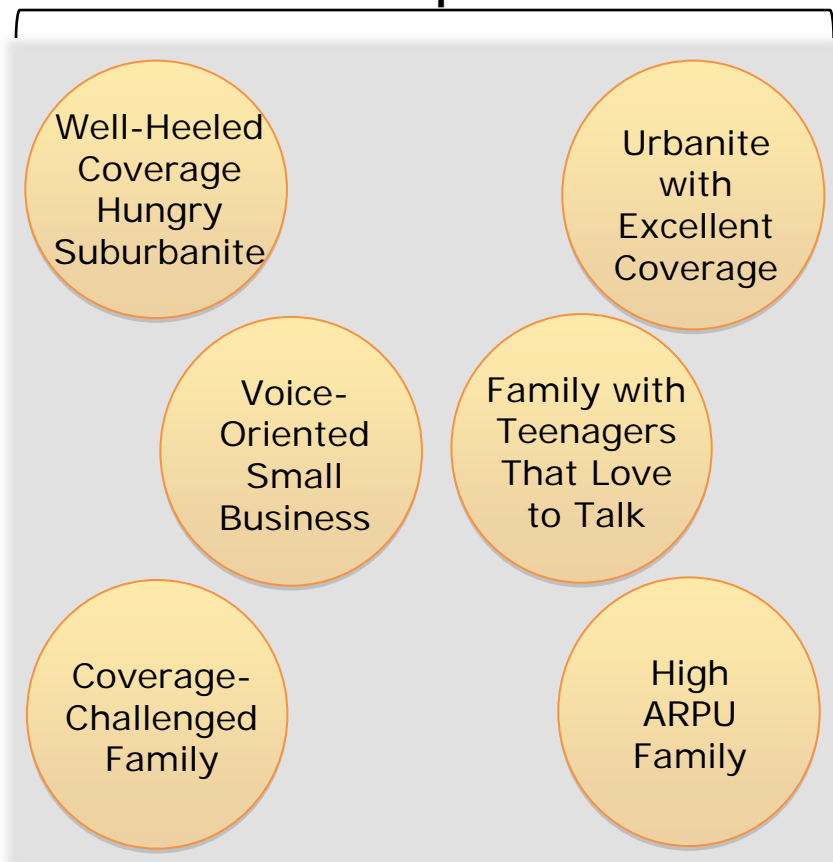
A brief introduction to Signals Research Group LLC

- Signals Research Group, LLC offers thought-leading field research and proprietary consulting services on the wireless telecommunications industry.
- Our flagship research product, a research newsletter entitled *Signals Ahead*, includes more than 70 corporate subscribers on five continents across the entire wireless ecosystem, as well as trade organizations, government regulatory bodies, and organizations within the financial community.
- Publisher of *The Dollars and Sense of Broadband Wireless*, www.signalsresearch.com.

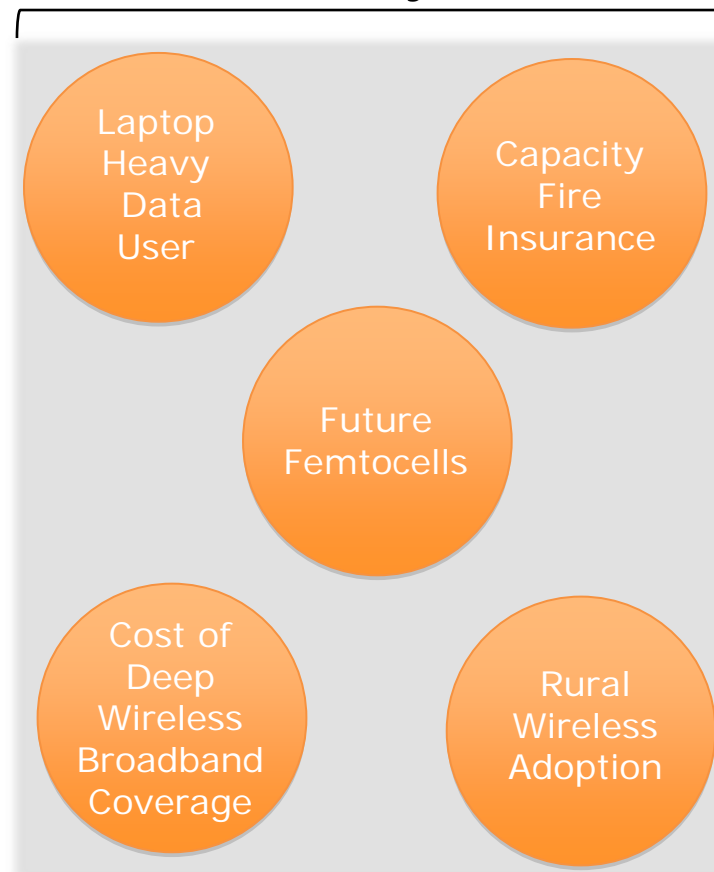


Femtocell Economics: Mainstream Service Concepts and Sidebar Analyses

Key Service Concepts



Sidebar Analyses

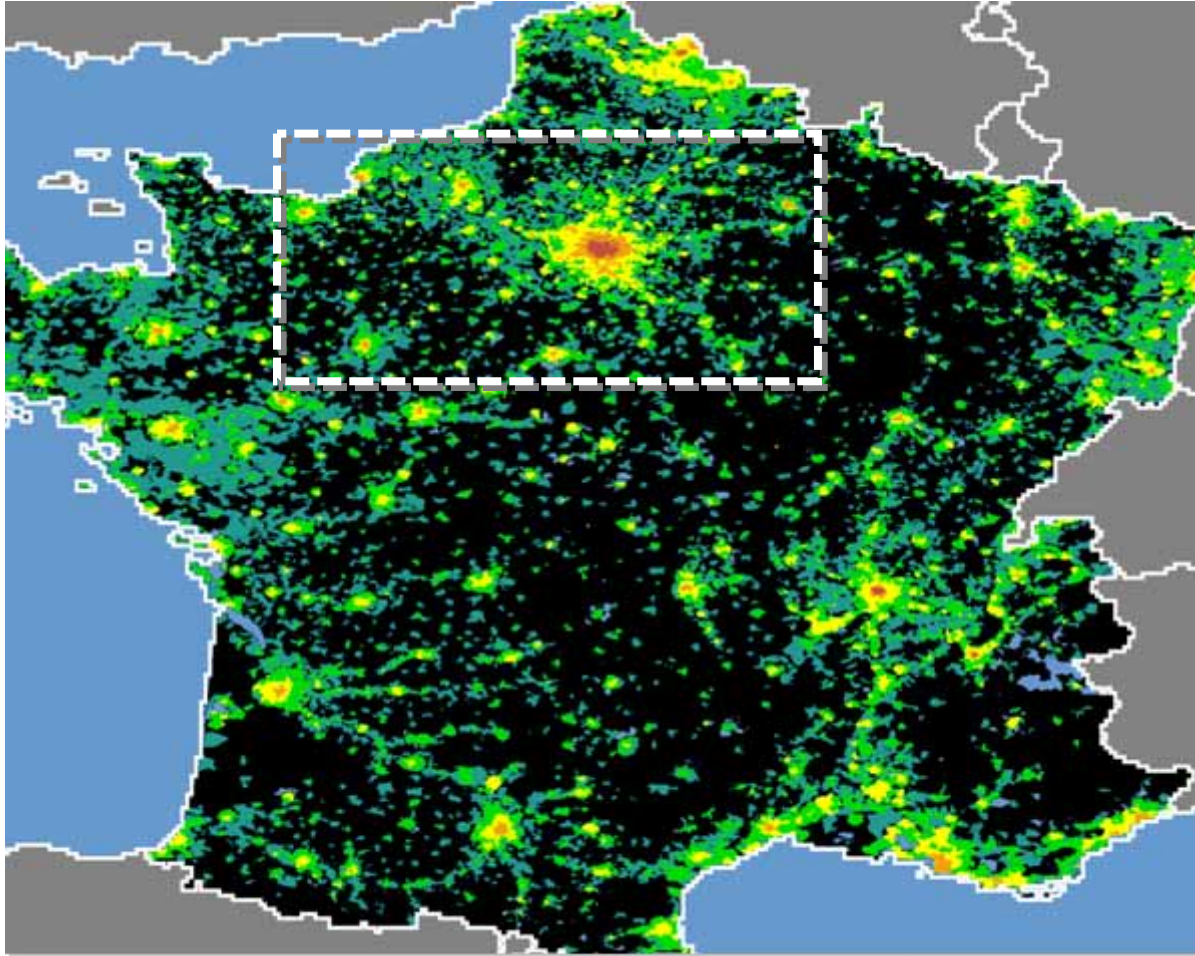


Femtocells can fill a surprising number of end-user and operator needs. After building the business case for a family with voice coverage needs, we will explore a number of other important femtocell applications

Customer Lifetime Value (CLV) Methodology

- A Customer Lifetime Value (CLV) methodology offers a powerful tool for modeling complex service concepts:
 - *how* value is created
 - segment-specific propositions, not on blended results
 - allows an operator to choose where to participate
- Here's How it Works:
 - It includes all sources of revenue and expense
 - It calculates the present value of the cash flows associated with a customer
 - the results are independent (with certain caveats) of the size of the market
 - It is widely used in many service-oriented industries and in businesses with recurring revenue
- It leaves some responsibilities to the operator:
 - Carefully choosing then refining segments and propositions
 - Segmenting the market, sizing the appropriate segments, then data mining to find potential customers

Modeling Operator Economics



- How is value created?
- A single “go/no” decision vs. a segment-based approach
- Operator decision-making process (segments, propositions, data mining)
- How large is the addressable market?
- Effect of existing technologies (1X/EV-DO/EGPRS/HSPA)

Modeling Methodology –Inputs and Outputs

Customer Proposition/Behavioral Assumptions

Proposition: key benefits (coverage? capacity offload? home-based discount bundle?), household demographic / ARPU / Usage?

Behavioral Impact: increased usage due to coverage? Increased usage due to venue-based pricing? Reduced churn due to increased loyalty and/or stickiness of propositions?

Femtocell Costs

Box Cost: wholesale cost (likely to vary by radio technology and to decline with volume and over time)

Significant Allocated Costs: provisioning / billing system integration, femtocell-specific platforms, marketing, selling, support, future subsidies & support

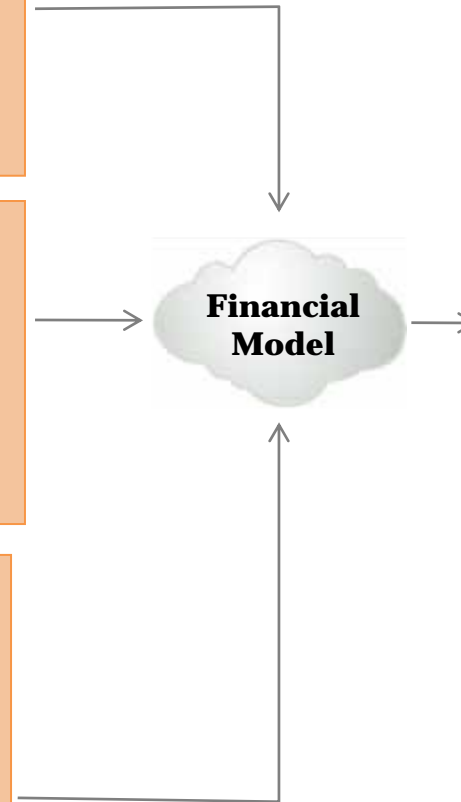
Macro Network Economics

Network Technology: Radio Access (EGPRS, 1X, 1X/EV-DO, WCDMA/HSPA)

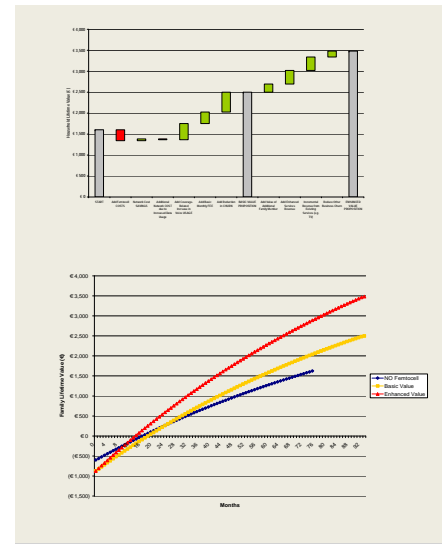
Spectrum: Amount of Spectrum (2x10MHz? 2x15MHz?), Frequency Band (900 MHz? 2100 MHz?)

Site Costs: FNE, Ancillary Radio Equipment, Battery Backup, Civil Costs (shelters, site upgrades, structures), Site Lease, Transmission Capital, Transmission Expense, Other Operating Expenses

Core Network: Traditional vs. Flat IP? Local Bypass?



Family Lifetime Value (by feature and by month)



Consumer and Operator Benefits (1/2)

Benefit	Description	Consumer	Operator
Improved Coverage	<ul style="list-style-type: none"> Femtocells provide high quality coverage in homes or offices that might have poor macro network coverage. 	●	
Improved Wireless Data Rates	<ul style="list-style-type: none"> Femtocells provide exceptionally high data rates (limited largely by the speed of the existing fixed broadband infrastructure). 	●	
Reduced Network Transport Costs	<ul style="list-style-type: none"> The cost per minute or the cost per MB of sending traffic over a femtocell is less – often much less – than sending it over a normal macro network. 		●
Reduced Congestion in Locations with Exceptionally High Network Capacity Requirements	<ul style="list-style-type: none"> In some instances an operator is more concerned about providing service than reducing cost. This is often the case in areas with a large number of users where traditional options for locating cell sites might be limited. Examples include the top of skyscrapers, convention centers, and airports. In these locations “super femtocells” might make service possible or might improve the quality of service from “unacceptable” or “marginal” to “acceptable” or “excellent” levels. 		●

Consumer and Operator Benefits (2/2)

Benefit	Description	Consumer	Operator
Ability to Isolate Usage in Specific Geographic Locations	<ul style="list-style-type: none"> If an operator can identify with confidence which traffic is originating or terminating in the home he can offer a wide variety of “converged” offerings, with different bundles for home and wide area usage. 	<p>•</p>	<p>•</p>
Ability to Deliver Advanced Services	<ul style="list-style-type: none"> If the operator can place a “box” within the home and if that box can identify traffic within the home a wide range of new service offerings become possible. 	<p>•</p>	

Where do people use phones and data connections?

Application	Venue / Physical Location *		
	Home	Office	Elsewhere
Voice	36%	24%	40%
Data	45%	25%	30%

The femtocell business planning model calibrates “effects” to impact usage in the venue (home or office) of the femtocell.

* Sources: Analysys Research, 2006 and Informa Telecoms & Media, Mobile Broadband Access at Home, Aug 08



A family with teenagers



Service concept: a family with teenagers that love to talk (Asia)

Description: Families with teenagers that love to talk

ARPU Criteria	2 people x \$40 ARPU	
Family Usage	Voice	Two people, each with 700 MOU voice usage
	Data	Average data usage for two phones (2 x 50 MBs)
Family Economics	Up-Front Cost	\$60.36
	Monthly Cost	\$21.56
	List of Features	Coverage + Free Data at Home + Unlimited Home Calling*

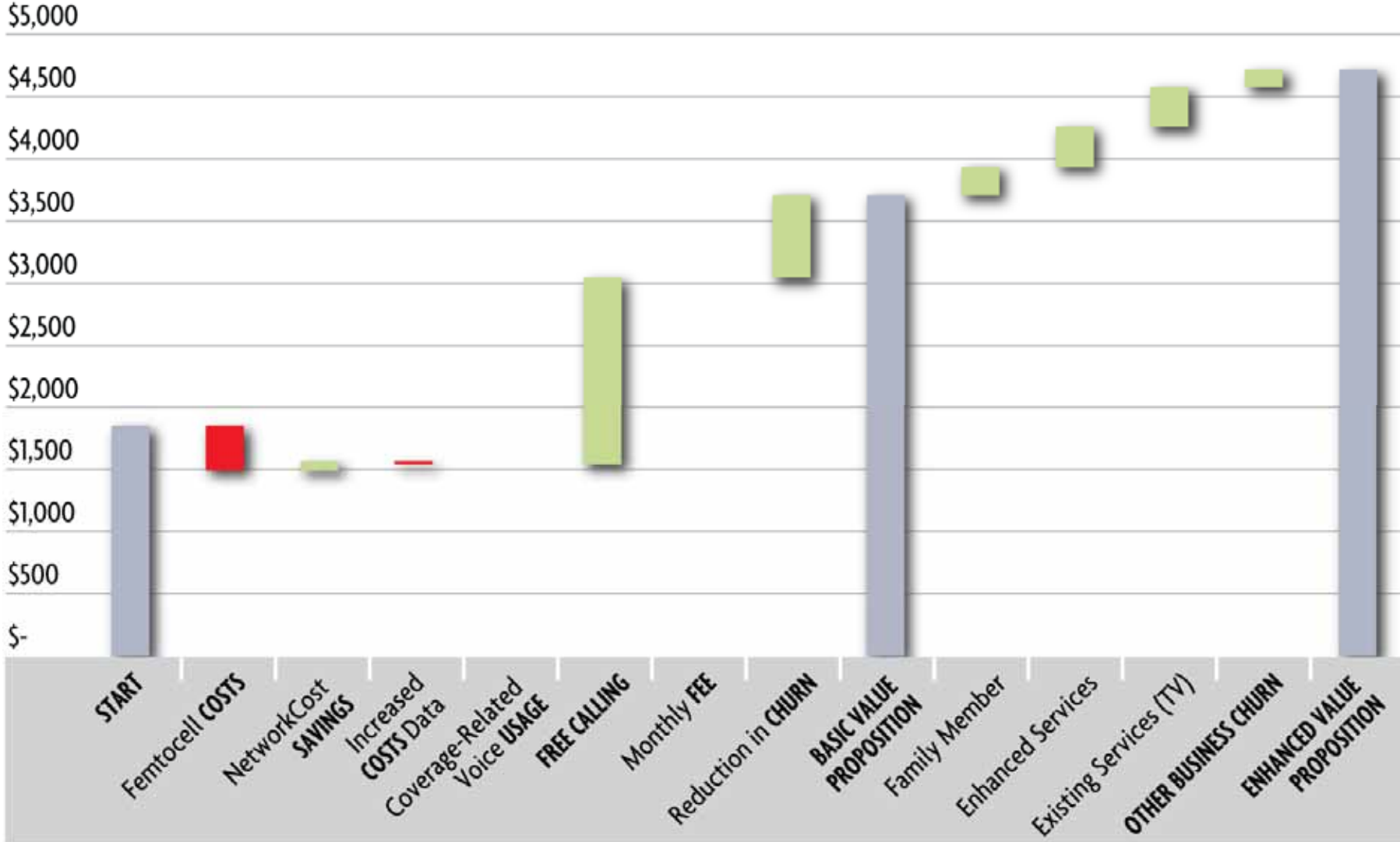
* Note: the “unlimited calling plan” is carefully designed to prevent cannibalization of the revenues associated with home-based minutes in the original bundle. In other words, only usage above and beyond that which is included in the starting bundle is free.

Source: Signals Research Group, LLC

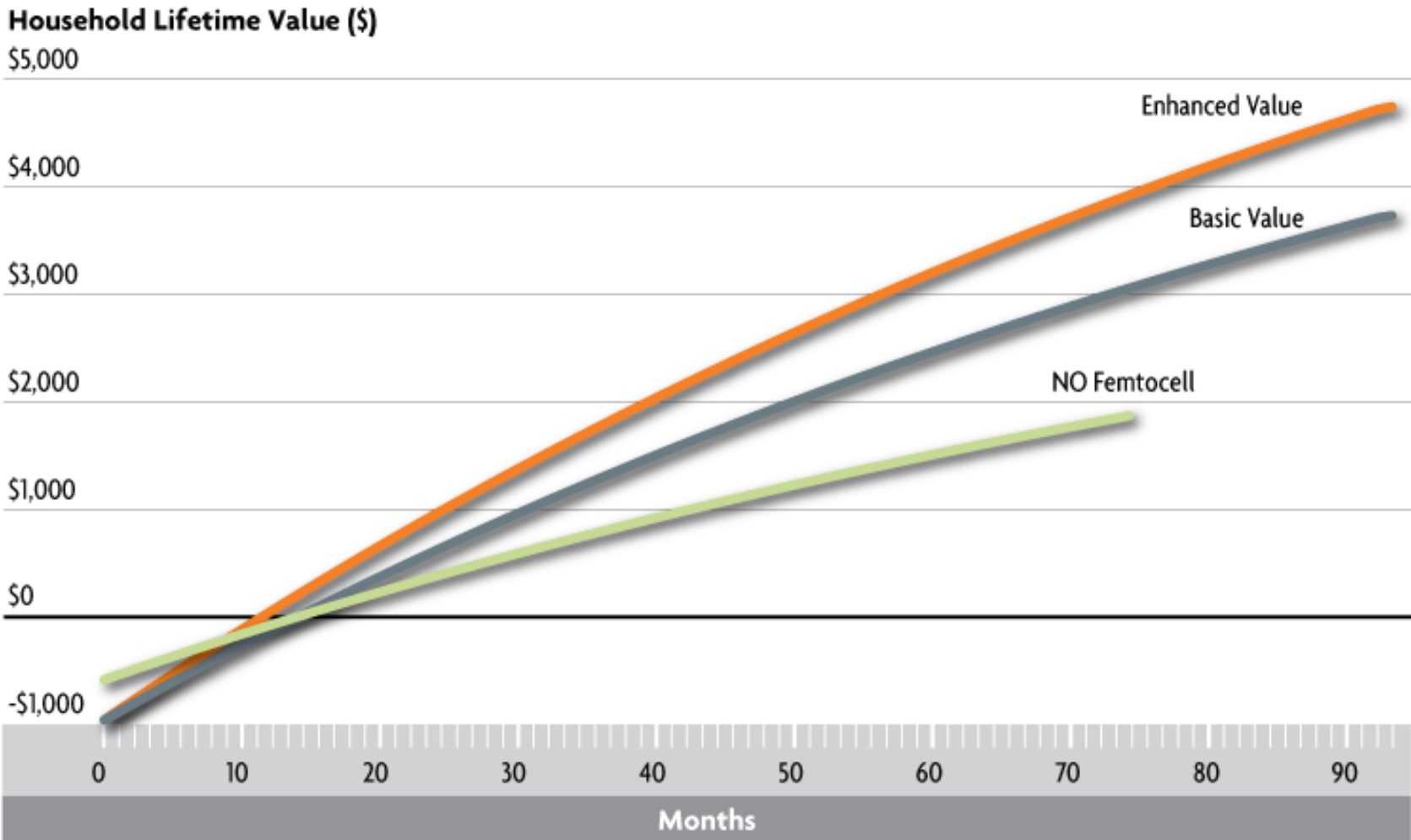


Service concept: a family with teenagers that love to talk (Asia)

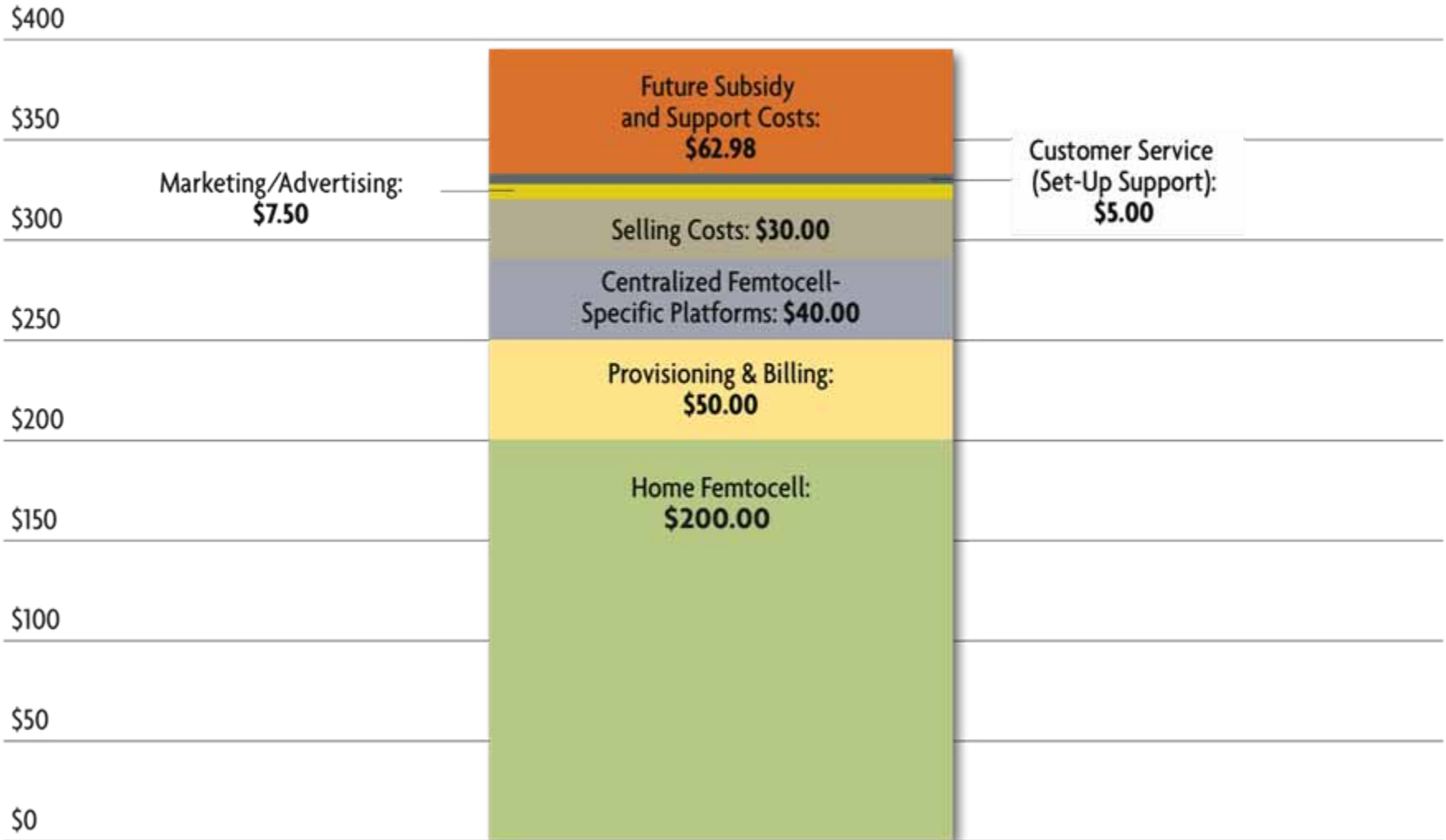
Household Lifetime Value (\$)



Service concept: a family with teenagers that love to talk (Asia)



Femtocell COST of Deployment



Financial effects portrayed in model (1/2)

Effect	Description
START	The customer lifetime value (CLV) of the family <i>before</i> receiving a femtocell.
Femtocell Cost	The cost of the femtocell (\$200), plus a number of allocated costs, including: provisioning and billing integration (\$50.00), centralized femtocell-specific platforms (\$40.00), Marketing (\$7.50), Selling Cost (\$30), future retention expense (\$50.00 replacement subsidy every 36 months). Total: \$420.
Network Cost Savings	This is the difference in cost of carrying traffic on the macro versus the femtocell network. The cost varies based on voice and data usage and the technology in use in the macro network (e.g. HSPA, 2x15 MHz, 2100 MHz).
Network Cost due to Increased Data Usage	We assume every handset increases usage by 100MBs per month and every data card increases usage by 1000 MBs per month. This is the cost of carrying that traffic through a traditional core network.
Coverage-Related Increase in Usage	Propositions for coverage-challenged households assume that when high quality coverage is delivered by the femtocell there is an increase in voice traffic, recapturing some of the minutes that would have been consumed in the home had it been well covered. We assume a 13.6% (36%/3) increase in overall monthly minutes, with a corresponding increase in Europe in voice ARPU.
Free Calling Plan	Cash flows include the monthly fee of \$21.56, the network cost of the increased call volume, cannibalization of the revenue from existing home minutes and cannibalization of the revenue associated with the increase in usage due to improved coverage.
Basic Monthly Fee	Many propositions include a basic monthly fee (e.g. \$5). In this scenario there is no fee.
Reduction in Churn	We assume that churn is reduced 20% from its "pre-femtocell" figure (e.g. from 16% to 12.8%)

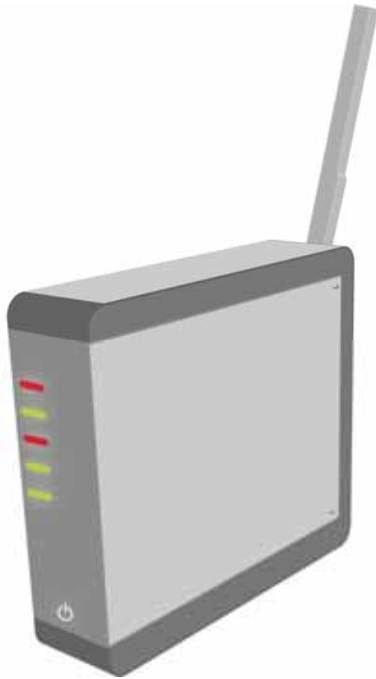


Financial effects portrayed in model (2/2)

Effect	Description
BASIC VALUE PROPOSITION	The “basic” impact of femtocells captures each of the items listed on the earlier slide, if it is part of the proposition.
Value of Additional Family Member	This is the value of adding an additional family member to the operator’s subscriber base. We attribute 20% (adjusting for the probability this will happen) of the customer lifetime value of a typical subscriber, based on the profile.
Enhanced Services Revenue	Households are likely to consume femtocell-specific service offerings, such as virtual home number, SMS alerts, music / video synchronization, etc. We assume \$5 per household in additional monthly profit contribution. These services are likely to become increasingly available over time.
Incremental Revenue from Existing Services (e.g. TV)	High quality data access within the home is likely to encourage experimentation and adoption of existing wireless data applications, such as streaming TV. We assume \$5 per household in additional monthly profit contribution.
Reduced “Other Business” Churn	In some cases femtocells are deployed by converged operators, offering some form of fixed (DSL, cable) and mobile services. Femtocells are likely to make a fixed broadband operator’s service more sticky. We therefore include an “other business” churn reduction, which is the increase in present value of the profit contributions of the existing business, due to a reduction in its churn. This effect applies only if the operator has another fixed business with recurring revenue.
ENHANCED VALUE PROPOSITION	This is the potential impact of femtocells, including the “basic value proposition” plus a number of more speculative or future effects.



Heavy Wireless Data User



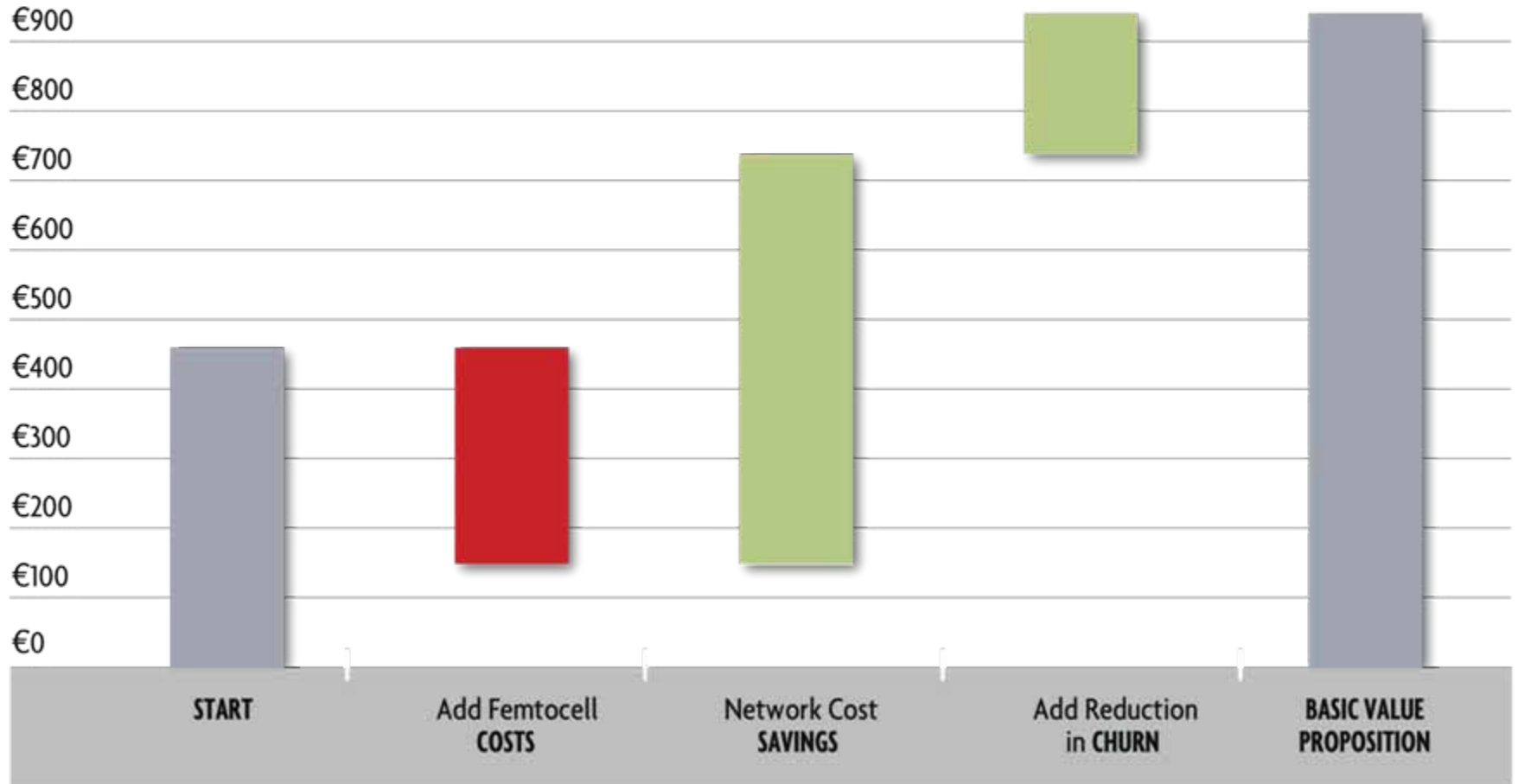
Service Concept: Heavy Data User (5 GB)

Description		Heavy Data User
ARPU Criteria		1 person x €60 ARPU
Family Usage	Voice	No Voice Usage
	Data	1 person using 5 GBs per month
Family Economics	Up-Front Cost	Free
	Monthly Cost	Free
	List of Features	Consistent high quality data at home

Service Concept: 5 GB Data Card User, Free Femtocell

Household Lifetime Value (€)

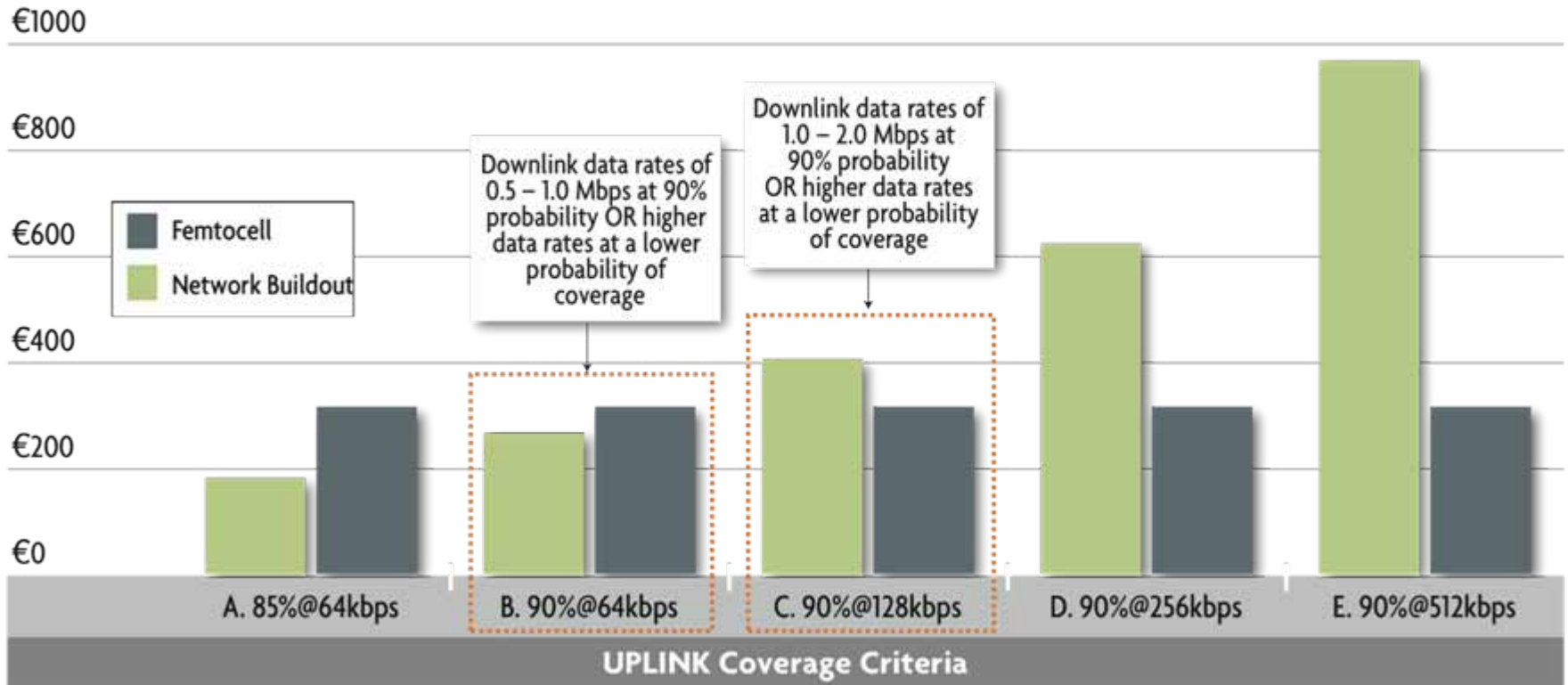
€1,000



Hypothetical Incremental HSPA Network Investment Across Western Europe

One operator with a 20% market share, 2100 MHz 3G spectrum, 70% population coverage within each country, investment per coverage-challenged household

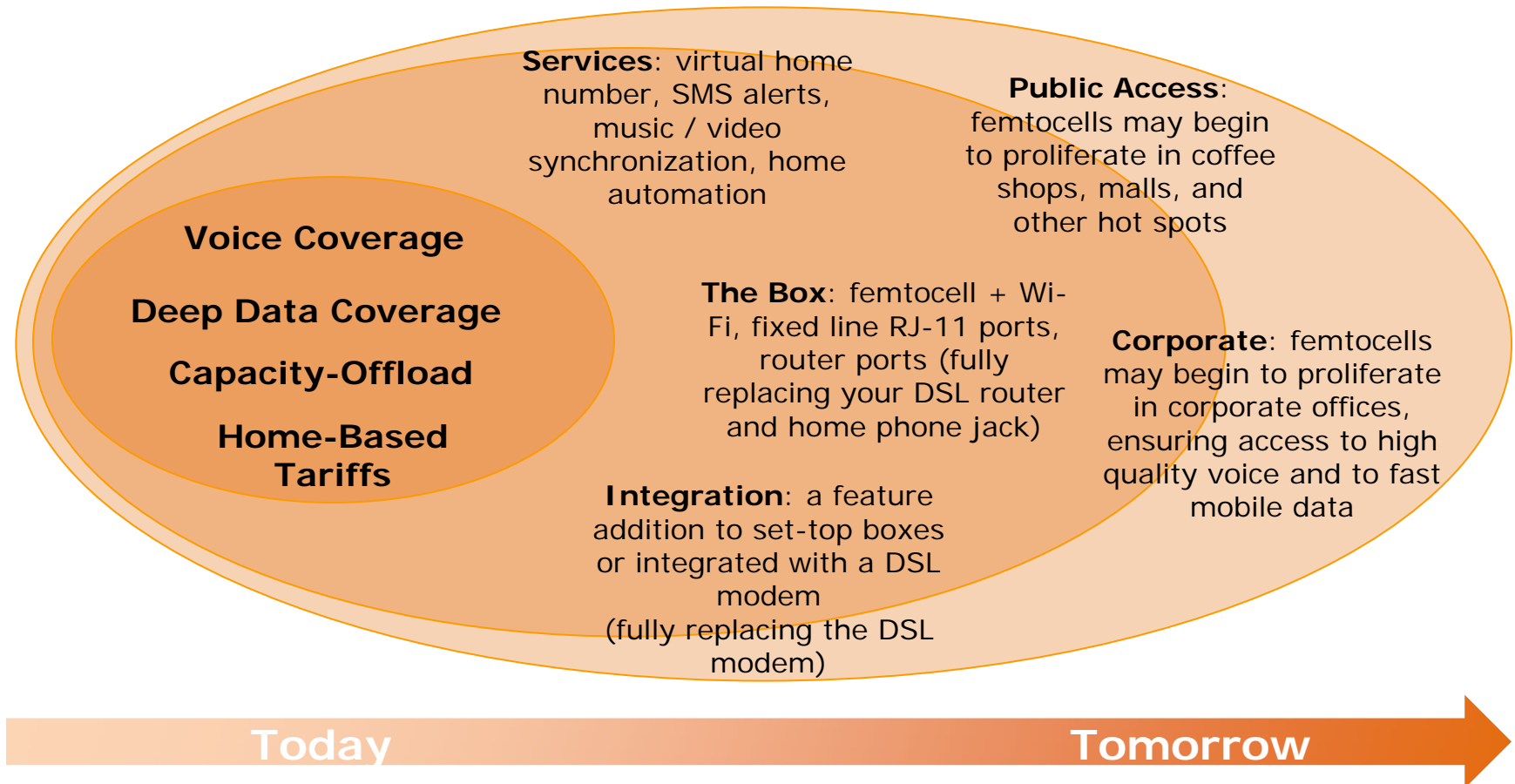
Network Capital Investment per HH (€)



Network investment purely for coverage is difficult to justify in the 2100 MHz band for a depth of coverage greater than that of scenarios “B” or “C.” The graph compares the incremental industry investment to the cost of placing a femtocell in each coverage-challenged household.

Femtocells today and tomorrow

Femtocells will become increasingly capable over time ...



As femtocells become more capable the “enhanced value scenarios” which may seem abstract today will begin to feel much more tangible

Conclusions

- A detailed background paper is available on the Femto Forum web site, <http://femtoforum.org>
- A femtocell business planning model will be available for Femto Forum members. SRG will provide user training in Tokyo on March 25th and March 26th.
- SRG (<http://signalsresearch.com>) is available to advise operators on femtocell business planning issues and on other questions of operator economics.



The logo for Signals Research Group features a stylized orange signal icon above the word "SiGNALS" in a bold, black, sans-serif font. Below "SiGNALS" is the text "Research Group" in a smaller, orange, sans-serif font.

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