The Why? And How? of Femto

Femto is More Than Shrinking The Form Factor

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Agenda

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5. Femto Activities in Alcatel-Lucent Turkey
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1 Introduction
Cellular Concept: A Logical Evolution to Femtocells

**Megacells** are cell sites that have very large coverage areas (often used in rural areas and highways)
Coverage area 10s KM

**Macrocells** are sites used for coverage in urban and suburban areas with tower heights of 20 to 30 meters
Coverage area 1 to 3 km

**Microcells/Picocells** are sites used to address capacity hot spots with tower heights of 2 to 3 meters.
Coverage area 100s meters

**Femtocells** are sites used to address capacity hot spots with tower heights of 2 to 3 meters.
Coverage area 10s meters
**Femtocells** - 2013 ~ 106 Million Subscribers on 36 million Femtocells.

**Broadband** - 2011: Total ~ 585M subs, WiMAX~60M subs, IPTV: 60M subscribers

**Mobile** ~ 100+% penetration in developed markets 2011 ~ 4B subscribers

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*ABI Research 2006*

*Infonetics Research 2007 & Parks Associates Q2’07*

*Mobile Industry Outlook*
2 Why Femto?

Value Proposition
BSR Femto - Fundamentals

Small UMTS Access Point that supports any 3GPP UMTS terminal
DSL backhaul connectivity
Flexible box design for service branding

Offloads traffic from macro layer
Improves coverage and quality of service
Increases data usage

A Home multimedia access point offering one bill, converged service bundle and Home networking

WCDMA Femto Forecasts

Source: Dell’Oro July ‘08

A communication device at the centre of the home
Predicted steep adoption for Innovative services
The Compelling Event?

3G speeds and coverage is disappointing

*Figure 1: Myth vs. reality – The true 3G capacity*

1. Maximum theoretical capacity next to the antenna: 14.4 Mbps
2. Average sector capacity before voice traffic: 2.4 Mbps
3. Average sector capacity after voice traffic: 2.2 Mbps
4. Average sector capacity with 75% indoor share: 776 Kbps
5. Average user bit rate depending on sector load: 259 Kbps

*Note: e.g. assumption that available capacity is shared among three data users*

Arthur D Little
Small Cell Market Drivers

Data Coverage

Problem
- Poor high data rate coverage
- Good voice coverage

Basic Coverage

Problem
- Basic RF Coverage holes
- Requires improved voice coverage
- Requires improved data service

Capacity Expansion

Problem
- Data loads exceeding capacity
- Limited macro expansion ability
- Increase capacity economically

Improving the end user experience
Is Indoor Coverage Important?

- 42% of US mobile data is consumed at home\(^1\)
- 44% of data usage on smartphones occurs at home\(^2\)
- 46% of UK 18-34 year olds watch mobile video & TV at home\(^3\)
- 50% of US 18-24 year olds want to watch mobile TV at home\(^1\)
- 60% of mobile data traffic will be generated in the home by 2013\(^4\)
- 75% of UK mobile broadband users access the internet via their dongle while at home

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1. Gordon Mansfield, Director of RAN planning at AT&T, Jun 08 while at home
2. Nokia smartphone survey, Dec 07
3. Market Tools survey of over 650 mobile phone users, May 08
4. Informa Telecoms & Media, Mobile Broadband Access at Home, Aug 08
5. Ofcom report, Aug 08

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Value Prop Positioning

Solution value

Simple Secure Setup → 5 bars at home + cheaper calls → Great mobile data experience at home → Femto Sphere Services → The Connected Home

Today's Value Prop

- Network Quality Can Be a Differentiator

Arthur D. Little study finds strong correlation between consumer price sensitivity and network quality i.e. people will pay more if service quality is good

“The paradigm of offering best effort access to every customer has passed its sell-by date and needs to be refined”

“Tariffs that incorporate a ‘quality of service’ element could increase usage and deliver new revenues streams for operators”
Basic voice coverage has driven the femto market to date

Factors in establishing the business case for femtocell deployment...

- Improved Coverage: 72%
- New In-Home Services: 59%
- Improved Capacity: 58%
- Macro Network Off-Load: 55%
- Ability to Offer FMC Services: 54%
- Ability to Win Fixed-Line Traffic: 36%

Chart shows factors ranked as critically important

Heavy Reading Femtocell Deployment & Market Perception Survey of 111 professionals from 79 operators, published August 2008
No one will deploy unless all the requirements are ticked! -Faster, Simpler, More efficient and Cheaper
Value Proposition for Operators
Femto is an innovation engine

Reduce User Churn
- By improving indoor coverage
- By improving performance (QoS, throughput)
- By proposing new applications
- With new bundles / family pack -> Increased user fidelity

Reduce Network CAPEX/OPEX
- Low TCO solution for Indoor
  - Flat IP architecture: 15% less network CAPEX
  - Plug and Play: 9%- 15% less network OPEX
  - Reduction of Macro Backhaul Cost (Iub bottleneck)
- Reduce customer acquisition costs
- Macro Offload: up to 50% gain on macro layer
- Speed of Rollout: gain 3 to 6 months (corresponding to site ac) for capacity increase

Generate New Revenue with New Services
- Educate mobile end-users to use high throughput applications at home
- Increased Market share
- Increase Data ARPU: up to 5% more outdoor data calls due to behavior changes
- Increase voice ARPU: 7-10% more MT calls
- Femto Rental (3-6€ / month)
- Better load management (push to use voice and data)
- Targeted advertising

>50% users would switch towards the Operator providing Femto & xDSL offer
Alcatel-Lucent Primary Research Survey of 1K 2G&3G subs

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Femto Value Proposition for Home End-Users

**Simplicity**
- **FMC:** One handset, One number, One bill, One voice mail, One phone book
- Handset Diversification: Game pad, Remote control

**Improved QoS**
- Better Indoor coverage
- Higher data rates for HSPA

**Enabler for enhanced Multimedia & Applications Experience**
- Apps based on Profiling & location => Interactive TV/ Targeted advertising
- Apps based on Presence information: Warning message when family arrive
- Content sharing apps: Extract mp3 / pictures from your PC
- Social Networking: Automatic update of Instant Messaging (Facebook, Myspace)
- Poll (e.g. on brand/TV audience)
- Video calls on TV, IPTV, video broadcast
  - => Family pack

**Money Savings**
- Home Tariff
- Incentive off-peak data use:
  - Provide cheap deals when capacity is unused
- Learn to use new & high data rate applications at no cost

Applications are a major part of the Femto value proposition to the end-user, and a key Value Add for the Operator (opportunity for more revenue)
Value Proposition for Enterprise End-Users

**Simplification**
- FMC: One handset, One number, One bill, One voice mail, One phone book

**Improved Quality of Service**
- Better Indoor coverage
- Higher data rates for HSPA

**Office Applications**
- Possibility of free intra-company calls
- Incentive off-peak data use: Provide cheap deals when capacity is not used
- Expansion to multi-site
- Voice & Videoconferencing via TV flat screen
- Auto update of “in the office” information
- Local Routing
- Blending local voice (Mobile and SIP-Phones)
- VPN: Avoid need for secure Token, thanks to Femto and mobile core secure setup

**Local Services Applications**
- Localized indoor advertisement (special bargain/coupons in shopping mall, pubs, restaurants...)
- Content Push to visitors
- Audio / Video guides in Museums via handset; Tourism & Hotel guides
- Gaming and Gambling in VIP boxes of stadiums / Pubs, ...
- Local information (transportation, traffic, ...)

Specific Applications and Services for Enterprise End-Users
3 Femto BSR Technical Overview
What is Femto Technology?

“Femto-cell”

A femto cell is a cell that covers a very small radius from the base station, typically in the region of 20 to 50 metres.

It is ideally suited to address the domestic market for high-speed data and voice via localized in-building wireless service provision.

Support 3GPP standard handset.

ALU BSR-femto

Flat IP, Architecture reduces CAPEX and OPEX (no new RNC).

2 Femto versions: Standalone or Integrated with DSL, Wifi, IP-TV, VoIP.

True Plug & Play: Delivery process and Auto-configuration.

Architecture (Iu-PS / Iu-CS) with smooth evolution to Gn/Gi for internet traffic off-load then LTE/SAE and IMS.
High Level Architecture View

- Femto Cell
- Secure Tunnel
- Voice Service
- Public Network
- Femto Network Gateway
- Operators Core Network
- Legacy Circuit Network
- Packet Data Services
- Data Services

Operators
Femto Fundamentals

- Flat IP Architecture
- Simple addition into the network
- Scalability not a problem
- Minimal network reconfiguration
- Low backhaul and OPEX costs
- Auto-configuration and self-optimization
- Simpler evolution to LTE
- Simplify the installation of mobile networks
- Make the access comparable to a WLAN Access Point: it just routes IP packets between a wireless and wireline networks
- Ensure the simpler network architecture provides improved performance when compared to a traditional wireless network
- Use any kind of backhaul available
Flat Ip Explained

Future-proof technology innovation
Simplifies evolution to IMS and LTE

Capex, Opex optimization: No RNC
Centralized aspects confined at IP layer for lower scaling cost

Flat IP architecture
Lower Latency
Simple to Operate
Full Plug & Play

Step0 : Factory
Product identifications are programmed and labeled (bar code and identification).

Step1 : User’s Subscription
The user subscribes to the service (in a shop or on the web).
He selects the type of Femto and service set.
He fill-in his personal details.

Step2 : Subscription Confirmed
End user receives confirmation of the subscription and login information.
Includes the Femto if he had subscribed by web.

Step3 : Plug the Femto
Power-on the Femto.
Auto-Configuration procedures starts:
A. Initialization to connect to BSR Gateways
B. Authentication
C. Auto-configuration of initial parameters
D. Check Femto location
E. Registration of authorized UE

Step4 : Femto is working!
Users received a confirmation call or SMS on his mobile.
Register up to 16 UE.

BSR Femto System fully integrated in Customer’s IT to enable Plug & Play.

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Our Femto solution is composed of the following elements:

- **BSR Femto - 9365**
- **Loop Management – 5530 NA**
- **BSR Gateway & OAM - 9365**
- **Customer Service Management**

- **Assess line quality**
- **Diagnose**
- **Troubleshoot**

- **Facilitate and automate installation**
- **Customer support (Self-care, assisted care...)**
- **Accelerate repair and troubleshooting**
- **Add-on services (home network mgt, security...)**
9365 UMTS BSR Femto

**In a nutshell**
- ALU developed system architecture, & software.
- Sagem box design, manufacture and logistics
- Sagem manufacture the complete residential unit

**Technical Summary**
- 3GPP interfaces (Air Interface/ core network)
- Works with any 3GPP terminal
- Flat IP reduces CAPEX and OPEX (no new RNC)
- True Plug & Play Auto-configuration and self-optimization
- Supports Iu-PS/Iu-CS interfaces with smooth evolution to Gn/Gi, then to IMS and LTE/SAE

**Offer**
- 2 versions: Standalone UMTS, or Integrated with Residential Gateway (DSL & Wi-Fi in the box)
- Commercial launch in Q3 2008
- Available to take orders NOW
ALU’s Services for BSR Femto Networks

Consult and Design
- Business model & service evolution roadmaps,
- System & Security design

Solution Validate
- Validation of the complete Femto solution through lab testing
- Build, Provision and integrate Femto network elements in support of the solution
- Perform security, feature and system wide testing of a Femto solution

Implementation

Maintain and Operate
- Multi-technology, multi-vendor services to respond, resolve, and prevent network problems

A leader in fixed, mobile and converged broadband networking, IP technologies, applications and services

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Address new market segments with Femto
Alcatel-Lucent is the right partner

The Right Partner to Boost your Revenues

- 1st among 25 Femto Vendors by Heavy Reading (Aug ’08)
- Commercials contracts in Places
- Mastering the Femto Business Case to allow operators to prepare service launch
- >16 trials on-going with major Operators Worldwide, Femto Solution connected to 4 major 3G Core Network vendors, to +20 ADSL providers. +15 terminals types used; ALU Internal Friendly User Network in Europe
- Several operators asking us to trial after technological failure of competitors

Technical Excellence

- Alcatel-Lucent is committed with its partner Sagem to deliver the best in class solution
- Strong Technical solution (patent portfolio): Security, Plug & Play, Self Optim, Mobility ...
- Pushing the Femto Forum standardization: Alcatel-Lucent supported solution (Iuh) selected

Full End to End FMC Solution

- Alcatel-Lucent has the full range of services & products for fixed mobile convergence:
- #1 in DSL: 41% market share Worldwide
- W-CDMA expertise
- Applications, IMS and #2 position in Services worldwide
- Thanks to this we have Best in Class OAM
Why a standard?

- Consumer CPE needs standards to drive volume to drive costs
- Will stimulate an overall larger addressable market
- Avoid emergence of ‘de-facto’ proprietary interfaces
- Fulfill lead operators request for standard specs before proliferation of deployment

What ALU has achieved via the strategy

- Leader at 3GPP and Femto Forum. Admiration of operators and vendors.
- Protecting our current architecture, while introducing most needed enhancements
5 Femto Activities in Alcatel-Lucent Turkey
Femto Management Solution R&D activities in Turkey

Leverage Alcatel-Lucent Motive HDM Leadership and W-CDMA Wireless Management System Experience

- Femto CPE located @home/office
- Number of Femto CPE
- W-CDMA network requires constant tuning
- Efficient customer care, i.e. DSL model
- Asynchronous group operation handling (TR.69)
- Femto as autonomous as possible
  - Network listening and self Optimization

Motive (HDM): more than 10M CPE managed in the world
Wireless Management Solution (WMS): Recognized UTRAN OAM
Full Plug & Play

@ Network preparation
- Ready for Femtocell:
- Femto Range declared as Neighbour in Macro

@ Factory
- @Gateway
- Femto ID

@ Subscription
- Link User / Femto
- Femto profile & Access Control List

@ Femto Reception
- Plug & Play

PLUG: Authenticate, Download standard parameter, Environment scanning, Adjust parameters (negotiate, power, ...)
PLAY: Continuous optimisation
Technology Introduction & Support activities in Turkey

Multiple trials > 20 E2E Trials, including hundreds of Friendly Users

Femto Solution connected to 6 major 3G Core Network vendors

Networks, 2 commercial rollouts 1 customer Pilot

Femto connected to +40 ADSL providers

ALU Internal Friendly User Network in Europe > 140 Femto’s connected

ALU powers the 1st Commercial Femto Network in Europe

Alcatel-Lucent Femto - Today

1 E2E Trial in NA

>10 E2E Trials in Europe

>5 E2E Trials in APAC
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