Addressing Femtocell Integration Challenges

Manish Singh  
VP, Product Line Management

Continuous Computing
Key Business Drivers

Key Challenges
3C Stifling 3G Adoption

- **Coverage, Churn, Capacity**

- **Coverage**
  - 3G suffers from inadequate indoor signal penetration
  - Consumer spends ~ 60% - 70% time in indoor environments
  - *Poor Coverage = Poor Voice + Poor Video + Lower Data Rates*

- **Churn**
  - Consumer paying higher price for 3G / HSPA expects high quality of service
  - Poor coverage increases churn
  - *Churn = ~ $100/month ARPU Loss + ~ $400 New customer acquisition cost*

- **Capacity**
  - Indoor users transmitting at high power
  - High Power = Low Battery Life
  - *More Cell Sites = Higher OpEx + CapEx*

**Tough to be a 3G carrier**
Key Business Drivers

- Mobile Broadband Driving Growth
  
  “Wireless data services are now a $115bn global market, growing at 28% annually, contributing ~2 pts to aggregate telecom services revenue growth – outstripping fixed broadband revenues and growth”

  Source: Merrill Lynch 2007

- TeliaSonera Mobile Broadband
  
  Traffic Grew ~ 400% in 1yr

- 2 billion mobile broadband users by 2015

Femtocells Accelerate Mobile Broadband Demand
What Is Driving this Growth?

**Demographics**

- Internet Generation: 15 – 25 Years Old

**Devices**

- Internet-Ready Devices

**Demand**

- Internet Applications & Content

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Ideal Conditions for the Perfect Data Storm
**BUT, Consumers Want MORE for LESS...**

AT&T and T-Mobile on Tuesday moved quickly to match Verizon’s $99.99 all-you-can-eat wireless plan, leaving just one big carrier — Sprint Nextel — on the sidelines.

Source: USA Today, 02/18/2008

The new plans will give Vodafone customers reliable and fast unlimited access to their favorite social network sites, email and the whole of the internet ...

Source: Vodafone, 05/1/2008

The Era of Flat Rate

Following the lead of its competitors, Sprint Nextel Corp on Thursday unveiled a $99.99 pricing plan that gives customers unlimited minutes, text messages, e-mail, Internet access and other wireless service applications.

Source: Kansas City Business Journal, 02/28/2008

Price / Bit MUST Go Down!!
FemtoZone Services
Beyond Voice and Data...

- Monetize Dead Minutes
- Service Integration

- Real-Time Notification
- Real-Time Monitoring

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Femtocell Network Rollouts

Capacity

Nation-wide Network

Demand based Capacity / Coverage

Coverage

Broadband Proliferation

Low

High

Femto in 2.1GHz

3G / HSPA Networks in 2.1GHz

GSM / GPRS / EDGE Networks in 900MHz / 1800MHz

Rural

Sub-urban

Urban

Dense Urban
Key Business Drivers

Key Challenges
Network Integration Challenges: IP RAN vs SIP / IMS Architectures

**IP-RAN**
- **Tunneled Lu**
  - Security Gateway
  - Lu Concentrator
  - MSC
  - Iu-CS
  - Iu-PS

**SIP / IMS**
- **SIP in FAP**
  - AAA System (e.g. HSS)
  - IWF AS
  - CSCF
  - MGC MGW
  - Iu-CS
  - IuPS
  - SIP RTP

- **New Lu-h**
  - Security Gateway
  - Femto Gateway
  - MSC
  - Iu-CS
  - Iu-PS

- **3G RAN**
  - IMS Call Control
  - Packet Data Gateway
  - AAA System (e.g. HSS)
  - MGC MGW
  - GGSN
  - SGSN
  - Gn
  - Gi
  - Wi
  - Wm
  - Cx
Trillium Repertoire Loaded

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FAP: Under the Hood
Good News: 3GPP Standardizing Iu-h

- Iu-h interface between FAP and FGW
- Architectures remove SS7 bottlenecks
- Scalable to add ~100Ms FAP
- Support Iu-Flex with NNSF in FGW
- Two Finalists
  - RANAP / RUA / SCTP + HNBAP
  - RANAP / SCTP

New Iu-h

Control Application
- Stack Manager
- RRC
- RLC
- MAC-b, MAC-d, MAC-sh
- MAC-HS, MAC-ES, MAC-E*

Forwarding Application
- PDCP
- RANAP
- HNBAP
- Iu-UP
- RUA
- SCTP
- GTP
- IP (IP Sec)
- PHY
Femtocells’ Cost Challenge – The 4th C

- Femtocell is the compelling solution to the 3C Challenge …
- If it can meet the 4th C = Cost
- Low per-unit cost for Femtocells is a MUST
- 4th C Solutions
  - Software and Silicon Integration
    - Custom silicon addressing femtocell requirements
    - Software integrated with silicon to meet the performance needs
  - CPE Device Convergence
    - STB+Femtocell, Residential Gateway+Femtocell
    - Drives BOM cost down through higher level of integration & component re-use
    - Delivers True Quad-Play: Voice + Video + Data + Mobility
CPE Convergence: Fixed / Mobile Operator Example

Customer Premises

Wireline
- Secure aDSL / FTTx Network (20 – 100 Mbps)
  - Fixed Voice
  - Internet Access
  - IPTV
  - Set Top Box
  - Mobile Voice
  - Femtocell

Wireless
- Untrusted Access Network (Security? QoS?)
  - Compelling IPTV story
  - True “Quad-Play”
  - Reduced Churn
  - Increased ARPU
  - 100% Secure = more content
  - Managed QoS reused for voice
  - 4 medium blended applications
  - Drives ROI for FTTx build out
  - Huge CapEx / OpEx savings

“The New Paradigm”

Secure aDSL / FTTx Network (20 – 100 Mbps)

Mobile Voice
- Fixed Voice
- Internet Access
- IPTV

Femto-enabled STB
“All-IP” Network Challenges

- Service Delivery over “All-IP” networks
  - Traffic Shaping – will P2P traffic clog Mobile Broadband Networks?
  - QoS – delivery of real-time voice, video, data over IP network?

- Securing “All-IP” networks
  - Security – DDoS
  - Ever-emerging New Threats – IDS, IPS

Unlike wireline, wireless networks are limited by access capacity
Will Wireline DPI Solutions Fit NGMN?

Today’s Wireline

DSLAM → DPI Box

CMTS → DPI Box

“Bump in the Wire”

Tomorrow’s NGMN

“Bump in the Wire” is NOT right for NGMN

• Another box – additional CapEx, increased OpEx
• Increases round-trip latency – another network hop

DPI function MUST be embedded in Femto Gateways

Access Networks → DPI Enabled Femto Gateways

Same problem, but need a different solution
Conclusions

• Key Business Drivers for Femtocells
  – Coverage
  – Capacity
  – Growing Demand for Mobile Broadband

• Key Challenges for Femtocells
  – Cost – CPE Device Convergence
  – Traffic Management – DPI! DPI!! DPI!!!
  – Network Architecture Harmonization – New Iu-h

• State of the Femto Nation
  – Multiple trials in North America, Europe and Japan
  – Major commercial rollouts in 2009
Thank You

manish@ccpu.com