Mobile Technologies & Services

Stanford Computer Forum
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Dr. Jan Uddenfeldt
Senior Vice President and Senior Technology Advisor to the CEO, Ericsson
Agenda

- Ericsson in Silicon Valley
- Mobile Broadband - a runaway success in the world
- Open applications – Vertical or Horizontal?
- Ericsson Research & Stanford
Our Strategy - Internet and Mobile

Internet Leaders are in Silicon Valley, USA

Mobile Leaders are in Europe

Ericsson Silicon Valley – Focus on Mobile Broadband
Ericsson Silicon Valley Technology

Position

- **Ericsson is**
  - Infrastructure Provider
  - Chipset provider for Devices

- **Ecosystem needs**
  - Applications, Devices, Developers …

Ericsson Complements Silicon Valley Companies in Ecosystem
Global Scale

- Present in more than 175 countries
- Global leader in Telecommunications
  - 76,000 employees
- 19,000 in Research and Development
  - 30,000 in Global Services
- Sales 30 billion USD
Top Telecom Vendor to Operators
Market Position in Full Service Broadband Architecture

- 225 IPTV/Video HD Deployments
- 170 IMS & Softswitch Networks
- 350 operators & 1.2 m radios
- 500+ Packet Core & IP Edge Customers
- Top 3 in Europe & Top 5 WW
- 40% market share 2G & 3G, >1 m base stations shipped
- 500 operators & 1.2 m radios
- Top 3 in Europe & Top 5 WW
- 40% market share 2G & 3G, >1 m base stations shipped

And… #1 in Professional Services, Top 10 Green companies
Ericsson Silicon Valley
Campus for Next Generation Ecosystem

- IP Networks & Broadband Products (P&L)
- Mobile Broadband Apps
- Ericsson Research
- Technology & Business Leadership for the new era

Ericsson Complements the Companies in the Valley
Decade of Technology Disruptions

Mobile Broadband – from niche to mass market
Mobility Driven by 3GPP

Reported subscription forecast by standard

GSM Worldwide Penetration

2008 Facts
GSM Subs 3.7b
3G/HSPA Subs 230m
3G/HSPA Growth 9M/month

3G/HSPA Dominates Mobile Broadband

Source: Internal Ericsson
Strong Mobile Broadband Growth

~80% will be of Mobile Broadband enabled by HSPA/LTE

80% of Broadband subscribers are mobile in 2014

Source: Ericsson Q4 2008
ST- Ericsson Joint Venture
The New Leading Chipset provider
Consumer electronics is going mobile

Three waves of embedding mobile broadband

1. The notebook
   - Already here
   - Bundled offerings with notebook and mobile broadband

2. The consumer PC
   - Netbooks
   - Starts to happen now
   - Will be sold like a mobile phone

3. Consumer devices
   - MIDs, navigation, gaming, cameras, car entertainment
   - Early stages yet
   - Start to see volumes 2009

2008 the tipping point – going from niche to mass market
Mobile broadband evolution

- **3G**
  - Peak rate: 384 kbps (2002)
  - Peak rate: 3.6 Mbps (2005)
  - Peak rate: 7/14 Mbps (2007)
  - Peak rate: 28/42 Mbps (2009)

- **HSPA**
  - Peak rate: ~150 Mbps (2010)

- **LTE**
  - Peak rate: 1 Gbps (2014)

- **LTE Evolution**
Mobile System Evolution into LTE

GSM Track (3GPP)

- GSM
- WCDMA
- HSPA
- LTE FDD and TDD

CDMA Track (3GPP2)

- CDMA One
- EVDO Rev A

WiMax Track (IEEE)

- Fixed WiMAX
- Mobile WiMAX

- 2001
- 2005
- 2008
- 2010

LTE is the Global standard for next generation

Companies: AT&T, T-Mobile, DoCoMo, Vodafone, Telstra, TeliaSonera, China Mobile, Others...

Verizon, China Telecom /”Unicom”
Bitrates and technologies

OFDMA does not mean 4G

- Bitrate (Mbps)
  - >100
  - "4G"
  - <100

- Technology
  - 3G
  - FDD
  - HSPA
  - EVDO
  - TDD
  - WiMAX 16e
  - LTE

Here now!

2010

4G is defined as data rates over 100Mbps
Key LTE radio access features

- LTE radio access
  - Downlink: OFDM
  - Uplink: SC-FDMA

- Advanced antenna solutions
  - Diversity
  - Beam-forming
  - Multi-layer transmission (MIMO)

- Spectrum flexibility
  - Flexible bandwidth
  - New and existing bands
  - Duplex flexibility: FDD and TDD
LTE Data speeds [Mbps] in Urban Network

95 Mbps average rate

9% penetration

Note Peak rate of 140 is with max overhead (control blocks)
LTE Standardization timeline

- January 2008, Rel-8 specifications approved
- December 2008, Rel-8 specification frozen
- March 2009, ASN.1 code ready and backwards compatibility secured
LTE Device Introduction

- Interoperability Testing Started Dec 2008 At Ericsson
- First Voice Terminal
- Prototype Feb 2008
- First Chipset Samples
- Pre Commercial Trial Devices
- First Data Only Device
LTE is Packet Only

- **Legacy**: Traffic Differentiation split into packet and circuit

- **LTE**: Packet only
Openness in devices

open handset alliance

symbian foundation
Device Oriented “Open” Vertical

Verticals will drive the market through advanced applications
Device Oriented “Open” Vertical

<10 Apps interoperable (voice, sms, mms, email)

Verticals kick starts the market through advanced applications
Device Oriented “Open” Vertical
From 10s of apps to thousands

Operator Network
Open API: Presence, Messaging
  e.g. Interoperability, Hosting,
  Internet Service Brokering

Horizontal API (Vendors+Operators+Ecosystem) needed for mass market
Service architecture

"Services"

Interoperable Communication services

Interoperable Communication services

Standard services
Telephony, SMS, e-mail, MMS, (IM, Presence, Sharing)

On portal services

Access Enablers
such as QoS, device identity position, etc.

Internet services

Internet enablers

"Accesses"

IP / Broadband

All access going packet
Ericsson opens up the telecom world for software development!

Welcome to Ericsson Labs

Here you can find our latest applications and explore our latest API's.
Next Generation Internet

Trends & Issues

Security

- Daily Spam Billions
- Botnets and Spoofing - Now an industry

Mobility

- Billion subscribers
- Mobile vs. Fixed

Lagging Deployment

- Protocol X
- Fully deployed
- Ex. IPv6, RSVP, HIP...

B-width & cost

- Traffic vs. Revenues
- Relative Price Bandwidth vs. Storage

New Technologies

Cloud computing

- Google Apps (Gmail, MobileMe, Windows Live, Salesforce Gliffy)
- Google AppEngine
- Microsoft Azure
- Sun Project Caroline
- Force.com
- Rollbase
- Amazon EC2
- GoGrid
- Joyent
- Mosso
- FlexiScale

NW Virtualization

- Substrate link
- Virtual router
- Virtual end-system

Mobile Broadband

- LTE EV
- LTE
- HSPA Ev.
- 3G
- HSPA

How to use the new technologies for a new network paradigm - without a clean slate deployment
Ericsson Research – a look at future IP Convergence and Mobile Apps

- 100G Transport
- Open Mobile Broadband Applications 2015
- Self Optimized Networks
- Future Internet Caching
- Evolved Packet Core
- 10GigB GPON Control and Signalling - IP
- Next Generation LTE evolved for 1GB mobile broadband (IMT)

The launch of labs.ericsson.com
Research Areas

- Multimedia Technologies
- Service Layer Technologies
- Wireless Access Technologies
- Access Technologies & Signal Processing
- Service Layer
- Packet Technologies
- Broadband Technologies
- Security
- EMF Safety and Sustainability
- Standard Services and IMS
- Wireline Access
- Transport
Ericsson Research Silicon Valley
The new star in our global research organization

- ~600 people
- GSM, 3G and LTE technologies were invented here
- Leading IP competence in IETF
- Delivers concepts and pre-commercial prototypes
- Files over 50% of all Ericsson patents

- Packet Networking
- Open Application environment
- Led by Jan Söderström, V.P. Research USA
Ericsson Research and Stanford

- **Our No1 choice for access to US academic community**
  - New members of Computer Forum and long collaborations with EE
  - Seminars, meetings, what’s hot in the Valley info
  - Access to graduate students and Interns
  - Visiting Ericsson scientists at Stanford

- **Next Generation Internet projects**
  - Engage in FIND/GENI and other NSF activities
  - Members of Cleanslate&POMI - our first such project in US
  - Plan to take active part involving prototyping and interop
  - Vision: Connect European Framework and NSF program activities with industrial research with partners in the Valley

- **Technologies**
  - Openflow - and how/if that can fit into public networks
  - NetFPGA – we are already active. e.g. the PSIRP forwarding code
  - POMI fine grain data rights in connection to mobile applications
  - Etc.