Impressive broadband growth
Mobile broadband overtakes fixed

Broadband subscription forecast

Source: Ovum RHK, Strategy Analytics & Internal Ericsson

Mobile Broadband includes: CDMA2000 EV-DO, HSPA, LTE, Mobile WiMAX, Other
Fixed broadband includes: DSL, FTTx, Cable modem, Enterprise leased lines and Wireless Broadband

HSPA 70% of mobile broadband subscriptions 2012
HSPA – a global technology today

>170 commercial networks in more than 75 countries

Source: Internal Ericsson

> 400 HSPA enabled devices
From over 80 suppliers

- 203 HSPA phones, media players, camera (50%)
- 161 PC with embedded HSPA, PC cards, USB modems (40%)
- 39 wireless routers (10%)

5 times more devices and 3 times more suppliers in one year
This is Broadband everywhere

Full Mobility

High Data Speeds

Everywhere Coverage
Broadband everywhere adds value

“the ability to connect the Mobile workforce to the main office with a mobile PC is becoming a critical productivity factor for both private and public sector...”
EU Commission, June 2004

50% agrees on the statement
“Having high speed Internet everywhere is important to me”
ConsumerLab Internet Frontiers study 2007

Users quickly get used to everywhere access
HSPA enables new business

Enterprise Business
- Effective Fleet Management
- Improved customer services

Broadband on the move
- Attracts more passengers
- Preferred choice for longer rides

Healthcare to all and everywhere
- Enhanced consultation service to patients
- Increased number of patients

Mobile connectivity increases productiveness
HSPA enables cost effective broadband to all...

Case Study: Telstra provided HSPA to 98% of pop in 10 months. HSPA 14/1.4 Mbps nation wide, up to 200km cell range.
Radio evolution path

3GPP technologies

Strongest evolution path

- GSM
- GPRS
- WCDMA
- HSPA
- HSPA Evolution
- EDGE evolved
- LTE
3GPP Standards Evolution

- High Speed Downlink Packet Access in Rel 5
- Enhanced Uplink in Rel 6

"High Speed Packet Access+" in Rel 7 e.g.:
  - Multiple Input Multiple Output (MIMO)
  - Higher order modulation DL/UL

- Long Term Evolution in Rel 8
HSPA Evolution

**Downlink**
- **Rel 5**
  - 3.6 Mbps
  - 15 codes
  - 14 Mbps

- **Rel 7**
  - 64QAM
  - 2x2 MIMO
  - 21 Mbps
  - 28 Mbps

- **Rel 8**
  - Both
  - 42 Mbps

**Future candidates**
- Multi Carrier
- 4x4 MIMO
- Higher Modulation Combinations
- 80-160 Mbps

**Uplink**
- **Rel 6**
  - 61.4 Mbps
  - 2 ms TTI
  - 5.8 Mbps

- **Rel 8**
  - 12 Mbps
  - 16QAM
  - 23-40 Mbps

**Future candidates**
- Multi Carrier
- 2x2 MIMO

**Latency < 25 ms**

**Higher Speed, Lower cost per GB**
Driving forces behind LTE

- **Spectrum flexibility:**
  - Use of new, re-farmed or unused spectrum
  - FDD and TDD
  - Variable channel bandwidth

- **Performance:**
  - Higher peak rates
  - Higher bandwidth
  - Designed for "always on applications" from start

- **Cost:**
  - IP-based flat Network Architecture
    (no circuit switched domain)
  - Low OPEX
  - Simpler operation with less to configure and higher degree of self configuration
3GPP LTE performance

- **High data rates**
  - Downlink: >100 Mbps
  - Uplink: >50 Mbps

- **Low delay/latency**
  - User plane RTT: <10 ms
  - Channel set-up: <100 ms

- **High spectral efficiency**

- **High Performance Broadcast services**

- **Cost-effective migration**
Key LTE radio access features

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

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

- **Spectrum flexibility**
  - Flexible bandwidth (1.25 up to 20MHz)
  - New and existing bands
  - Duplex flexibility: FDD and TDD
Evolution of Packet Core
Evolving towards a flat architecture

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<tr>
<td>GGSN</td>
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</table>

Control plane
User plane
Full Service Broadband
Transforming the Network

- Service Flexibility
- Access independence
- Flexibility in managing changes

- Cost optimization
- IP/Ethernet over any media
- Overlay technologies

- Multiple device
- User and device mobility
- Service Flexibility

Service Layer
IMS/Service Control
Multi Access Edge
Wireline access
Wireless access

Transport
Telecom Management
<table>
<thead>
<tr>
<th>Generation</th>
<th>Description</th>
<th>Technologies</th>
</tr>
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<tbody>
<tr>
<td>1G</td>
<td>1st Generation (1970’s, national spectrum)</td>
<td>NMT, AMPS &amp; TACS</td>
</tr>
<tr>
<td>2G</td>
<td>2nd Generation (1980’s, CEPT)</td>
<td>GSM, PDC &amp; cdmaOne</td>
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<tr>
<td>4G</td>
<td>4th Generation (WRC-07, ITU, global spectrum)</td>
<td>IMT-Advanced</td>
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A Generation is defined by a technology and spectrum harmonization event.
IMT-Advanced
- more bandwidth needed

- Increased voice traffic
- Increase in information based traffic
- New capable services require high data rates

-> need for an enhanced radio technology, providing yet higher peak data rates and shorter delays

Goal:
- 50 - 100 MHz channels
- Speeds of up to 1 Gbps

IMT-Advanced cannot only be deployed within the current spectrum
Conclusions

- Demand for Mobile broadband
- HSPA, already a huge commercial success
- HSPA on par with fixed broadband and evolving (40-80Mbps)
- LTE for increased performance (>150Mb/s) and cost efficiency

HSPA, 70% of mobile broadband subscriptions 2012
From standard to mass-market

Regardless of technology, it takes ~6 years from standard to a widely adopted technology…
GSM and 3G data evolution

1000 x Higher Peak Rate in 10 years

Incremental introduction of new standardized capabilities

<table>
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<tr>
<th>Year</th>
<th>GPRS</th>
<th>WCDMA</th>
<th>HSPA</th>
<th>HSPA Evolved</th>
<th>LTE</th>
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<tbody>
<tr>
<td>1998</td>
<td>40 kbps</td>
<td>384 kbps</td>
<td>3.6 Mbps</td>
<td>28/42 Mbps</td>
<td>&gt;200 Mbps</td>
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<td>2002</td>
<td>2005</td>
<td>2008</td>
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1000 x Higher Peak Rate in 10 years