Mobile Broadband – today and tomorrow

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GSMA
The GSM Association

- 800 GSM mobile phone operators
- 200 territories & countries
- Creating Value for All
- New Business Opportunities
- Compatibility & easy access to services
- 5 Billion customers
- 200+ suppliers manufacturers

5 Billion customers
Today’s Agenda

- Mobile Broadband – Trends and Drivers
- Devices for the World
- Spectrum – The Oxygen of Mobile
The Power of Networks

6 billion connections by the end of 2011

500 million HSPA Mobile Broadband connections and adding 19 million per month

Operators investing $130B annually including $70B on Mobile Broadband
Growth rates in Mobile Broadband will average 50% per year for the next 3 years with Asia Pacific the dominant region.
The Phenomenal Pace of HSPA ....

WCDMA HSPA adoption in its first six years is ten times greater than the take up of GSM mobile phones.

The industry will reach one billion HSPA connections by the end of 2012.

*Adoption, Mobile Broadband* technologies 1–6 years after launch

Source: Wireless Intelligence

* All devices, including handsets; GSM adoption for comparison only
The Asia-Pacific region will account for 43% of all LTE connections by 2015.
21 Commercial LTE networks as of today; 206 more in the works
Data Revenues: Steady Growth

Data ARPU / % of service revenue

- Non-sms mobile data represents 8% of revenues
- Wireless data ARPU increase from $17 to $21
- Mobile data as a % of service revs increased to 17.8%
- Mobile data as a % of service revs increased by 4% to 26%
- Data ARPU surpasses Voice ARPU
- Data contributes 33% of service revenues

Total data operator revenues

- Data revenue growth of 31.1% in Q1 10
- Data revenue growth of 32.8% in 2010
- Wireless data revenue growth of 40% in Q1 10
- Mobile data as a % of service revs increased by 4% to 26%
- Data revenue growth of 43.6% in Q1 10
- Data revenue growth of 19.6% in 2009
- Wireless data revenue growth of 34% in Q1 10

Source: Operator investor sites
The Opportunity: 5 billion+ MBB users

Chart 1.1: Global ICT developments, 1998-2009

Mobile broadband will be as ubiquitous as mobile voice

Mobile voice overtakes fixed

Mobile data overtakes fixed

Note: * Estimates.
Source: ITU World Telecommunication/ICT Indicators database.

It was forecast that shipments of smartphones would surpass that of PCs in 2012. This already happened in 4Q 2010.

- 100.9 million smartphones
- 92.1 million PCs

Source: Gartner, Inc.
New Landscape: Devices

- Mobile Service Operators
- Online Service Providers
- Filmed Entertainment Service Providers

Content

Deals (Distribution, Content, Access to Network Assets)

- Mobile Service Providers
- Online Service Providers
- Filmed Entertainment Service Providers

‘Integrated’ Platform Operators

Chart
Combined revenues of Nokia (devices), Apple, Google and RIM represented 13% of India’s GDP in 2010.
Using the power of the mobile phone industry to bring economic and social change to users living on less than $2 a day.
Leading Wide-Ranging Initiatives…

- **Green Power for Mobile**
  - Delivering 180k green-powered mobile base stations and providing power to those off-grid

- **Women**
  - Aiming to give ownership of mobile phones to 150m women globally for the first time

- **Mobile Money for the Unbanked**
  - Giving 20m people access to financial services for the first time by 2012 decade

- **Mobile Agriculture**
  - Providing agricultural support services to over 5m farmers in India and Kenya

- **Mobile Education**
  - Enabling accessible lifelong learning to support economic and social development goals

- **Mobile Health**
  - Using mobile technology to reduce child mortality and helping to manage infectious diseases
The Embedded Mobile Future
Mobile data demand.....

Smartphone 50x traffic of a feature phone

iPhone = Android

Laptop user 25x traffic of a Smartphone

By 2015, networks will need to support over 700% more traffic than they do today
2008: The Credit Crunch...

... 2012: The Capacity Crunch

... Really?
Traffic Growth Forecasts

Mobile Traffic (TB per Month)

- 108% CAGR 2009-2014
- Traffic growth forecasts
- Source: Cisco VNI Global 2010

Traffic in 2014:
- Mobile Video: 66%
- Mobile P2P: 17%
- Mobile Web: 8%
- Mobile Gaming: 5%
- Mobile VoIP: 4%

Source: Cisco VNI Mobile, 2010
Spectrum: The Oxygen of Mobile

Harmonised spectrum is key

Global coverage

GSMA estimates a spectrum shortfall of 900MHz by 2025

Many thousands of devices

1,000,000,000

Subscribers by 2012
Life left in HSPA…

Similar HSPA+ and LTE Performance on top of a more developed ecosystem

### Similar Spectral Efficiency
with same number of antennas and bandwidth
(Downlink sector capacity in 10 MHz FDD)

<table>
<thead>
<tr>
<th>HSPA+</th>
<th>1x (12.5 Mbps)</th>
<th></th>
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<tbody>
<tr>
<td>R7 (EQ.+ 2x2 MIMO)</td>
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<table>
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<tr>
<th>LTE</th>
<th>1.2x (15.1 Mbps)</th>
<th></th>
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<tbody>
<tr>
<td>LTE R8 (2x2 MIMO)</td>
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Note: HSPA+ spectral efficiency would improve with multicarrier.

### Similar Peak Data Rates
with same bandwidth and number of antennas

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>HSPA+</th>
<th>LTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 MHZ</td>
<td>42 Mbps</td>
<td>37 Mbps</td>
</tr>
<tr>
<td>10 MHZ</td>
<td>84 Mbps</td>
<td>73 Mbps</td>
</tr>
<tr>
<td>20 MHZ</td>
<td>168 Mbps</td>
<td>150 Mbps</td>
</tr>
</tbody>
</table>

Note: Assuming 2x2MIMO, LTE supports 4x4MIMO but initial deployments will be 2x2 MIMO. LTE takes required overhead into account, 172 Mbps possible per standards.

### Similar RTT Latency
Transport NW key for low latency—can be same for LTE & HSPA+

<table>
<thead>
<tr>
<th>RT T3</th>
<th>HSPA+</th>
<th>LTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 ms + Transport network</td>
<td></td>
<td>22 ms + Transport network</td>
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Moving incumbents: A Significant Challenge

Percentage Spectrum Allocations: 400MHz - 5GHz

- Americas
- Europe
- ASEAN

- Mobile
- Military & govt
- Radar & aeronautical
- Satellite & fixed links
- Astronomy
- Broadcast
- Other
Meeting the capacity shortfall

Forecasted 2025 Capacity Need

- Normalised capacity
- Capacity Increase
- Shortfall 900MHz
- Efficiency Increase
- Today’s Allocation

- 350MHz spectrum today
- 16x Short Term
- 32x
- 48x

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Trends driving efficient utilisation

**Spectrum Efficiency**
LTE Advanced is significantly more efficient than GSM (18X)

**Network Offload**
Allows operators to prioritise high value traffic

**Spectrum Harmonisation**
Fragmentation impacts receiver sensitivity and battery life

**Cell Splitting**
Could result in 10-fold capacity increase if regulation allows

**Unpaired Spectrum**
Useful for asymmetric traffic management
Allocating 700 MHz band to mobile broadband in APAC

- Can increase rural Internet subscriptions by 14-23% by 2020
- Overall number of Internet subscriptions expected to increase 2-8%
- 1.1M new business activities could be created by 2020
- Could contribute additional US$ 103B to government revenues for 2014-2020
Thank you!

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www.gsma-mobilebroadband.com