LTE - THE ART OF THE POSSIBLE

Lars Bergendahl, LTE Program Director
156 LTE NETWORKS LAUNCHED IN 67 COUNTRIES
- ON 6 CONTINENTS

Source: GSA, Mar 19, 2013
86 MILLION
LTE SUBSCRIPTIONS END FEB 2013*
Source: WCIS

1.6 BILLION
LTE SUBSCRIPTIONS END 2018*
Source: Ericsson
**TOP 10 LTE OPERATORS IN Q1, 2013 BY SUBSCRIPTIONS**

Ericsson present in high traffic markets and powers the top 10 LTE operators’ live networks.

![Graph showing LTE traffic served by Ericsson networks](image-url)

- 50% LTE traffic served by Ericsson networks
- 2x more than #2

Subscription figures from World Cellular Information Services (April, 2013)
LGU+
A LTE SUCCESS STORY

› Subs +6.8%, coverage advantage
› 43% subs migrated to LTE
› 10% of LTE subs using VoLTE
› ARPU: +15% YoY
› Transition from Unlimited to Tiered

Service ARPU Trend [Korean Won]

+15%

2011 2012
ECO SYSTEM

› Over 20 bands supported e2e

› FDD & TDD Combined

› LTE Bands on device

- 2010: 1 band
- 2011: 3 bands
- 2012: 5 bands
- 2013: 6 and more
- 2014: 12-20 bands
**Evolution of Mobile Broadband**

<table>
<thead>
<tr>
<th>Market impact</th>
<th>2013</th>
<th>~2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak rate</td>
<td>~150 Mbps</td>
<td>~1000 Mbps</td>
</tr>
<tr>
<td>Typical user rate downlink</td>
<td>10-100 Mbps</td>
<td>Operator dependent</td>
</tr>
<tr>
<td>Typical user rate uplink</td>
<td>5-50 Mbps</td>
<td>Operator dependent</td>
</tr>
</tbody>
</table>
LTE VISION

2G/3G band X  FDD Frequency band Y  TDD Frequency band Z
CARRIER AGGREGATION
LTE ADVANCED NOW COMMERCIAL

What is it?
Exploitation of fragmented spectrum to obtain higher bandwidth i.e. higher data rates

- **Inter-band aggregation**
  - Frequency band A
  - Frequency band B

- **Intra-band aggregation, contiguous component carriers**
  - Frequency band A
  - Frequency band B

- **Intra-band aggregation, non-contiguous component carriers**
  - Frequency band A
  - Frequency band B

3GPP approved
21 combinations +13 coming
4 bands (+5 Release 12)
(4 bands in Release 12)

FDD Commercial Launch Mid-2013
Frequency combinations driven by early customers
Up to total 20MHz initially, more to follow
CA EVOLUTION EUROPE

Spectrum Evolution

- **GSM**
- **HSPA**
- **LTE**

Mixed Mode eNodeB

- **RUS 2100**
- **WCDMA**
- **RUS 900E**
- **GSM + WCDMA**
- **RUS 1800**
- **GSM + LTE**

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LTE TDD AND FDD INTERWORKING

FDD / TDD advantage
› Mix and match available TDD / FDD spectrum
› Add TDD for capacity
› Load balance traffic across TDD and FDD cells
› FDD-FDD and TDD-FDD handoff work the same

LTE TDD and FDD perform as a unified network
WORLD’S FIRST FDD/TDD NETWORK
CHINA MOBILE HK

[Image of busy street scene with phones showing FDD2600, TDD2300]

Converged & seamless TDD / FDD solution
Commercially launched

FDD2600, TDD2300
## 14 LTE TDD Deployments

<table>
<thead>
<tr>
<th>Country</th>
<th>Operator</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>NBN Co.</td>
<td>Band 40</td>
</tr>
<tr>
<td>Brazil</td>
<td>On Telecomunicacoes</td>
<td>Band 38</td>
</tr>
<tr>
<td>Brazil</td>
<td>Sky Brazil Services</td>
<td>Band 38</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>China Mobile HK</td>
<td>Band 38</td>
</tr>
<tr>
<td>India</td>
<td>Bharti Airtel</td>
<td>Band 40</td>
</tr>
<tr>
<td>Japan</td>
<td>Softbank XGP/LTE TDD</td>
<td>Band 41</td>
</tr>
<tr>
<td>Oman</td>
<td>Omantel FDD and TDD</td>
<td>Band 40</td>
</tr>
<tr>
<td>Poland</td>
<td>Aero2 FDD and TDD</td>
<td>Band 38</td>
</tr>
<tr>
<td>Russia</td>
<td>MTS Moscow</td>
<td>Band 38</td>
</tr>
<tr>
<td>S. Arabia</td>
<td>Mobily</td>
<td>Band 38</td>
</tr>
<tr>
<td>S. Arabia</td>
<td>STC</td>
<td>Band 40</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Dialog Axiata</td>
<td>Band 40</td>
</tr>
<tr>
<td>Sweden</td>
<td>3 Sweden FDD and TDD</td>
<td>Band 38</td>
</tr>
<tr>
<td>UK</td>
<td>UK Broadband</td>
<td>Band 42,43</td>
</tr>
</tbody>
</table>

Source: GSA, Mar 19, 2013
RETHINK COVERAGE

App Coverage: every app has its own coverage map
**COMBINED CELL**

- Small Cells no salvation on its own. Creates interference.
- Coverage boost
- Seamless Mobility – no handover within cell
- Efficient – small RRU transmits when needed
- Ericsson´s the world leading small cell SW provider.

Combined cell boosts system capacity and data rates with minimal interference.
VOLTE LEADERSHIP
LARGE SCALE COMMERCIAL LAUNCH

10% of LTE subs on VoLTE
99.9% service accessibility
<0.2% call drop rate
5 KEY HD VOICE NEEDS

<table>
<thead>
<tr>
<th>Sharing Feelings</th>
<th>Doing Business</th>
<th>Social Networking</th>
<th>Emergencies</th>
<th>Communicating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intimate and emotionally charged conversations with close friends and family</td>
<td>Daily professional dealings with colleagues, boss, clients, suppliers…</td>
<td>Connecting with family/social network to plan and organize encounters</td>
<td>Managing and solving the unexpected minor crisis’ in everyday life</td>
<td>Transmitting and receiving daily “data” (dates, schedules, telephone numbers…)</td>
</tr>
</tbody>
</table>

Source: Ericsson Consumer Lab
SHARED NETWORKS LTE SCENARIOS

Resource sharing
- Free: no guarantee
- Static: guaranteed but can be starved
- Dynamic: No starvation
- Free, minimum guarantee; QoS limits
OVERVIEW MULTI-OPERATOR CORE NETWORK

Operator A

EPC

OSS

eNB

Operator B

EPC

OSS

eNB

S1

Backhaul

Operator A

Operator B

Shared operation

X2
MULTI-OPERATOR SOFTWARE DEFINED NETWORK

Virtual Nodes

Operator A

EPC

OSS

eNB

Operator B

EPC

OSS

eNB

eNB

X2

Operator A

Operator B

Shared operation
SERVICE PROVIDER SOFTWARE DEFINED NETWORK

Operator A+B+n

DU ———> EPC ———> OSS

Shared operation

SDR

SDR

SDR

SDR

SDR
LTE RAN - TOTAL MARKET SHARE BY REVENUE

Source: Dell’Oro Q4, 2012 Market Share Report

Ericsson share - more than the #2 and #3 vendors combined!
LTE RBS every 4th minute

100
Commercial LTE Contracts Globally

100 000
LTE RBS in Commercial Operation Globally