One LTE, Multiple Spectrums and Rich Services
Ultra Mobile Broadband
Content

MBB Industry Findings

One LTE Inspiring the Best Experience
Finding #1: LTE Driving Big Data Consumption

Data Consumption

- Monthly traffic per LTE user: 2.5 GB
- Traffic growth vs. 3G: 257%

Air Interface Bottleneck

- 2014 New Year’s Eve in Seoul
- Usage of air interface resources reaches the peak.
- High traffic leads to network congestion in Jonggak area in Seoul.
  - Air interface resource usage > 90%
  - 8.2 GB traffic generated in 5 minutes

CA Required to Aggregate Spectrum
Finding #2: MBB Connections Rapidly Increasing

51% MBB connection increased in 3 months

2013.10 National Day

- 423 connected users per cell
- 10 times of that when network was built

2014 New Year’s Eve

- 638 connected users per cell
- 15 times of that when network was built

2.5B 2G User will Migrate to MBB in Next 5 years

Global Subscription Forecast

Source: Informa
Finding #3: HD Voice & Video are being Main Service

HD Voice Deployment Fast Growth

- **2012**
  - Country: 45
  - Operator: 63
- **2013**
  - Country: 66
  - Operator: 93

- **250+ HD Voice Devices**
  - Huawei P6s
  - iphone 5/5s
  - Samsung S4

- **90%** surveyed users preferred HD voice instead of OTT VoIP in Spain

Video Contributed ~50% MBB Traffic

- Global Mobile Video traffic CAGR is over **75%**

Global Mobile Data Traffic Forecast

Source: Huawei mLAB, 2013
Finding #4: FDD&TDD Convergence Leads to One LTE

The Common Ground of GTI Summit: One LTE

- **GTI Target:** Develop TDD and promote TDD&FDD Convergence
- **CMCC** will expand the TDD scalability to 500,000 sites and sell 100,000,000 terminals to ensure the network faster and the price affordable
- **Vodafone** will align Huawei demonstrate FDD+TDD CA in 2014MWC and will plan to deploy LTE TDD/FDD convergence network globally
- **SoftBank** will drive TDD&FDD convergence and will deploy 3.5G TDD in future.

The Progress of Eco-System

- **2014Q3:** 3GPP freeze FDD+TDD CA standardization
- **2014Q4:** TDD+FDD CA pre-commercial test
- **2015:** TDD+FDD CA commercial

**Hope all members and partners to build a TDD&FDD convergence network**

**To accelerate the TDD&FDD convergence and global roaming progress**

**CMCC CEO, CMCC**

**Anne Bouverot, GSMA General Secretary**

**Shang Bing, Vice Director, Ministry of Industry and Information Technology**

**Steve Pusey, VDF CTO**

**Song Ben, Special Consultant of SBM CEO**

**Craig Ehrlich, GTI Chief man**
Content

MBB Industry Findings

One LTE Inspiring the Best Experience
One LTE: Inspiring the Best Experience

One LTE

Spectrum

Device

Network

Best Experience

Ultra Fast Experience
Voice Experience
Video Experience
One LTE Network for FDD&TDD Convergence

One Baseband
- GSM
- UMTS
- LTE FDD
- LTE TDD

One Radio
- 7B4M Macro
- Single Antenna
- Multi-mode LampSite

SingleEPC
- TDD LTE
- CDMA
- WiFi
- GSM
- FDD LTE
- UMTS

One BBU for 4-Mode
### One LTE, One Experience

#### Multi-Mode Chipset for One LTE

<table>
<thead>
<tr>
<th>Company</th>
<th>Baseband Chipset</th>
<th>CPU+Baseband</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUAWEI</td>
<td>Balong 710/720</td>
<td>Kirin 910/920</td>
</tr>
<tr>
<td>Qualcomm</td>
<td>MDM9X25/35</td>
<td>Snapdragon 800/808/810</td>
</tr>
</tbody>
</table>

5-Modes & 13 bands: G/U/TDS/TDD/FDD

7-Modes & 16 bands: G/U/C/EVDO/TDS/TDD/FDD

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#### One LTE, One Experience

- Ascend D2
- Ascend P6S
- Ascend Mate2
- >10 types in 2014

Ascend X1
FDD&TDD CA for Ultra Fast Experience

Multiple Component Carriers

FDD: 1st LTE 3CC CA in 2014 MWC, Up to 450Mbps

TDD: Softbank live network, 4CC CA demo 770 Mbps

FDD & TDD CA

1st FDD&TDD 4CC CA
Peak throughput: 500 Mbps

Multi Stream Aggregation

Macro 2.6GHz...
Micro/Pico 3.5GHz...
WiFi AP 5.0GHz...

World 1st Live Demo in Shanghai
LTE-U Extends LTE Benefits to Unlicensed Spectrum

Live Demo for NGMN in Hongkong, Jan, 2014

**Pico (Prototype)**

- **Licensed**
  - 20MHz@1.8G

- **Unlicensed**
  - 80MHz@5.8G

**CA**

- **740+Mbps Downlink Throughput**

**Timeline**

- Research: 2013
- Prototype: 2014
- Pre-commercial Setup: 2015
- Commercial Launch: 2016

Up to 500MHz on 5GHz
LTE-M: Bring New Opportunities to Operators
M2M technologies for smart metering applications

- LTE-M get deep coverage, 20 dB gain, 8 to 10 times coverage radius
- Massive connection: 10k to 100k connections with a single cell
- Low power consumption: battery life up to 10 years

Case: Optimized Access Technology for VDF Smart Meter

20dB
Deeper Coverage

LTE-M
EPC
LTE Macro

Fast to Deploy LTE-M Network

- LTE-M: One eNodeB, Multiple Pipes
- Unified Platform
- No Edge, Consistent Speed
- High Data Rate
- High Mobility, Low Latency
- Deep Coverage, Low Cost
- Low Latency, Low Data Rate

Unified Platform

20dB
Deeper Coverage
5G Discovery for Future Ultra Broadband Everywhere

5G Ultra-Node™

Backhaul & Access

100Gbps
Thank you

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