Evolution of CDMA 2000 Devices and Multimedia Services

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LG Electronics
Ⅰ. Technology Evolution
Ⅱ. Mobile Handset Evolution
Ⅲ. Multimedia Services
IV. LGE Activities
Momentum toward Mobile Broadband Service

- 3G Evolutions on 3GPP and 3GPP2
- Broadband Wireless Evolution on IEEE 802.11, 16, and 20
- New Standard body for 4G (?)

1G
2G
3G
3G Ev.
W-CDMA
OFDM(A)
MIMO
LTE
IEEE
802.20
IEEE
802.16d
802.16e
IEEE
802.16a/d
F-WiMAX
IEEE
802.11n
IEEE
802.11a/b
WLAN
1995
2000
2005
2010

Mobility
High (250 Km/h~)
Medium (Vehicular)
Low (Nomadic)

Peak Data Rate
14.4 Kbps
144 Kbps
384 Kbps
~ 50 Mbps
~100 Mbps
~1 Gbps

Wireless Transmission
- >100 Mbps (high mobility)
- ~1GHz (Fixed, Nomadic)
- High Spectral efficiency
  (5~10 bps/Hz)

Ubiquitous networking
- Heterogeneous Network

Cost-effectiveness
- Higher capacity, coverage
IP based Core N/W has an open platform to provide seamless services for emerging wireless accesses and Multi-mode devices for multimedia services in the converged network.

- FTTx, xDSL, PSTN
- IPv6, MPLS
- OFDM, MIMO
- QoS/Security
- Server Mobility
- Short Range Connectivity
- Gateway
- Open API
- Application Servers
- CP/SP

All-IP Core N/W (IPv6, MPLS)

- Broadcast
- IPTV
- ITS
- IMT-Advanced
- New systems (OFDM, MIMO, ...)

Circuit N/W

- FTTx
- xDSL
- PSTN

WPAN

- IEEE 802.16e
- IEEE 802.20
- WiBro
- HiperAccess

Home Net/WLAN
- Bluetooth, WiFi LBS
- Sensor N/W
- Ad-hoc N/W

WMAN

IEEE 802.16–2004

IEEE 802.16e

IEEE 802.20

WiBro

HiperAccess

WLAN

WPAN

Short Range Connectivity

Multi band and Multi Mode Terminal
- (PC, Mobile Phone, Tablet PC, Smart Phone & SDR, ...)

Gateway

Softswitch

Mobility Server

Access gateway
II. Mobile Handset Evolution

- Changing the consumer’s perception of the ‘Phone’

- The phone was, ‘A tool to communicate with each other’

- The Phone becomes, ‘A gadget that symbolizes oneself’

Voice-Centric Usage
- Small Size Data Download
  - Ring Tone
  - 2D Game

Enjoy Multimedia Entertainment
- Camcorder
- Listen MP3 Music
- Broadcasting

Enter the Multimedia
- Take Picture
- Send Image
Network evolution and device convergence are creating a new era of mobile services.
Anytime, Anywhere – unlimited access to all the information and high-quality audio / video services

- Fixed Format
  - Limited Information
  - VOD
  - One-site
  - One-time

- Variable Format
  - Whatever
  - Wherever
  - Whenever

- Interactive

- MBMS*

- Technology
  - Analog TV
  - Digital TV
  - S-DMB
  - T-DMB

- Multimedia Broadcasting Multicasting Service

- Public demand for broadcasts vs. Profitability of operator
- Technical limitations for perfect convergence
  - Low power consumption circuit design / component, high capacity battery

LG E’s Initiatives

- Feb.’05
  - Terrestrial DMB
    - World 1st TDMB
    - 2.4” 320 x 320 Display
    - 1.3M Camera

- Jun.’05
  - Satellite DMB
    - 180 Degree Swivel
    - 2.2’ QVGA Display
    - 2M Camera (AF) / MP3

- May.’06
  - DVB-H / 3G
    - 2.2” QVGA Display
    - Portrait & Landscape
Unrestricted Internet access via converged networks

Cooperation or Competition between cellular and WiFi, WiMax, etc.?
Seamless communication within heterogeneous networks

LG&E’s Initiatives
- VoIP Phone (CL400)
  - GSM/GPRS + WiFi
  - 802.11 b/g
  - GSM-WLAN Handover (UMA)
Telematics

- A convenient working and comfortable living environment through the convergence of static and mobile capabilities

- Global standardization of telematics
- Development of LBS applications

LGE’s Initiatives

Navigation Phone (SV900)
- Integrated GPS
- MP3/ FM Radio
- Embedded Maps
Stimulation for all the senses in a multi-functional multimedia service environment

Opportunities for the Content business

Need for open architecture for widespread usage

LGE’s Initiatives

World 1st HW 3D Game Phone (SV360)
• Dedicated 3D HW Graphic Chip
• Game Dedicated Form Factor
Service-specific handsets are emerging to enrich consumer quality-of-life.

- Co-petition among handset manufacturers and operators will ensure better services.
- Broadband network technology will guarantee QoS.

**LG E’s Initiatives**

- Breath test Phone (SD410)
  - Prevent Drunk Driving
  - MP3
  - 1M Pixel Camera
  - Anti-Bacteria case (Silver Nano Coating)
III. Multimedia Services: Platform

Integration of Contents and Services regenerates new value added services and open platforms for a device and server are used to adopt user-friendly Application
To satisfy the Personal Trend, “I-Centric” Infrastructure network is implemented and Personal Identity Service requested and provided as well.
IV. LGE Activities – Work Scope

- First-Best Handset Provider
  - Take the global technology leadership
  - Secure commercial technology
  - Keep product leadership with competitive technical features
Technology Demonstration in ’07 3GSM

- Under specification for the prototype based on LTE
  - FDD SC-FDMA(UL) and FDD OFDMA(DL)
  - Target data rate: 20 Mbps (aggregated)@ 5MHz BW in UL and DL

- E2E Scenario
  - Streaming, Web Browsing, Conferencing

- Partnership project in LGE, Nortel, and LGE-Nortel
  - Down-link : 2x2 MIMO OFDMA by LGE
  - Up-link : 1x2 SC-FDMA by Nortel
“Slim & Luxury Design Slide Phone”

- Slim Design (15.2mm)
- Touch Pad Multi-key
- Auto Functions (Preset Equalizer & Search Functions)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>'06.07</td>
</tr>
<tr>
<td>Band</td>
<td>Tri-Band (850/900/1800/1900)</td>
</tr>
<tr>
<td>Form Factor</td>
<td>Slide</td>
</tr>
<tr>
<td>Dimension</td>
<td>95X48X15.2mm</td>
</tr>
<tr>
<td>Display</td>
<td>176x220 2.0” 262K TFT</td>
</tr>
<tr>
<td>Camera</td>
<td>1.3M /Camera Flash</td>
</tr>
<tr>
<td>Battery</td>
<td>840 mAh</td>
</tr>
<tr>
<td>Memory</td>
<td>1GB NAND for Multimedia (User Memory: 128M)</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Bluetooth, USB</td>
</tr>
<tr>
<td>Others</td>
<td>MP3/AAC+/AAC++/WAV</td>
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</tbody>
</table>
"Slim 3G Music Phone"

- Slim Design (18mm)
- Convenient MoD key
- Auto Functions (Equalizer & Search Functions)

<table>
<thead>
<tr>
<th>Availability</th>
<th>Now</th>
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<tbody>
<tr>
<td>Band</td>
<td>UMTS+GPRS Tri Band</td>
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<tr>
<td>Form Factor</td>
<td>Folder</td>
</tr>
<tr>
<td>Dimension</td>
<td>96 x 49 x 18.2mm</td>
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<tr>
<td>Display</td>
<td>176x220 2.0” 262K TFT</td>
</tr>
<tr>
<td></td>
<td>96x96 1.17” 65K TFT</td>
</tr>
<tr>
<td>Camera</td>
<td>1.3M Rotating Camera</td>
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<tr>
<td>Battery</td>
<td>840 mAh / 1100 mAh</td>
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<tr>
<td>Memory</td>
<td>70MB+ Micro SD Slot</td>
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<tr>
<td>Connectivity</td>
<td>Bluetooth, USB</td>
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<tr>
<td>Others</td>
<td>MP3/AAC/AAC+/E-AAC+/Real/WMA</td>
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</table>
### Upcoming 3G Phones

**KU730**

#### “Sleek & Luxurious Design of 3G”

- **Dynamic Music Package**
- **High Quality Streaming**

<table>
<thead>
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<th>Feature</th>
<th>Specification</th>
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<tr>
<td><strong>Availability</strong></td>
<td>May, 2006</td>
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<tr>
<td><strong>Band</strong></td>
<td>UMTS+GPRS+Tri Band+EDGE</td>
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<tr>
<td><strong>Form Factor</strong></td>
<td>Folder</td>
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<tr>
<td><strong>Dimension</strong></td>
<td>96.9x49.6x19.5mm</td>
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<tr>
<td><strong>Display</strong></td>
<td>2.0” QCIF 262k TFT</td>
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<tr>
<td></td>
<td>96x96 65K TFT</td>
</tr>
<tr>
<td><strong>Camera</strong></td>
<td>1.3M CMOS + VGA</td>
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<tr>
<td><strong>Battery</strong></td>
<td>1,100mAh</td>
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<tr>
<td><strong>Memory</strong></td>
<td>8~10MB+ Micro SD Slot</td>
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<tr>
<td><strong>Connectivity</strong></td>
<td>Bluetooth 1.1</td>
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<tr>
<td><strong>Others</strong></td>
<td>MPEG4/MP3/AAC/AAC+/</td>
</tr>
<tr>
<td></td>
<td>Multitasking</td>
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Great Company  Great People  19/21
Upcoming 3G Phones

“Faster connecting & TV Enjoyment”

Wide Landscape View for comfort

Explore interactivity Convenience (Shopping, Voting on line, etc)

Easy Electric Program Guide

<table>
<thead>
<tr>
<th>Availability</th>
<th>Nov, 2006</th>
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<td>Band</td>
<td>UMTS+ GPRS Tri Band</td>
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<tr>
<td>Form Factor</td>
<td>Eccentric</td>
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<tr>
<td>Dimension</td>
<td>102.0x52.6X19.7mm</td>
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<tr>
<td>Display</td>
<td>2.4” QVGA 260k TFT</td>
</tr>
<tr>
<td>Camera</td>
<td>1.3MP CMOS + VGA</td>
</tr>
<tr>
<td>Battery</td>
<td>950mAh</td>
</tr>
<tr>
<td>Memory</td>
<td>1Gb/512Mb + Micro SD Slot</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Bluetooth</td>
</tr>
<tr>
<td>Others</td>
<td>DVB-H, TV Capture, MP3</td>
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</table>
Summary

- 3G evolution is one of main streams to satisfy future user demands for broadband wireless

- MIMO and OFDM are one of the most promising technologies

- The Mobile handset becomes, ‘A Devices that symbolizes oneself’

- “I-Centric” Network and Personal Identity service are provided in 3G evolution.