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Phone Wars – The Hardware

September 2009

Comneon is a 100% subsidiary of Infineon Technologies dedicated to mobile software

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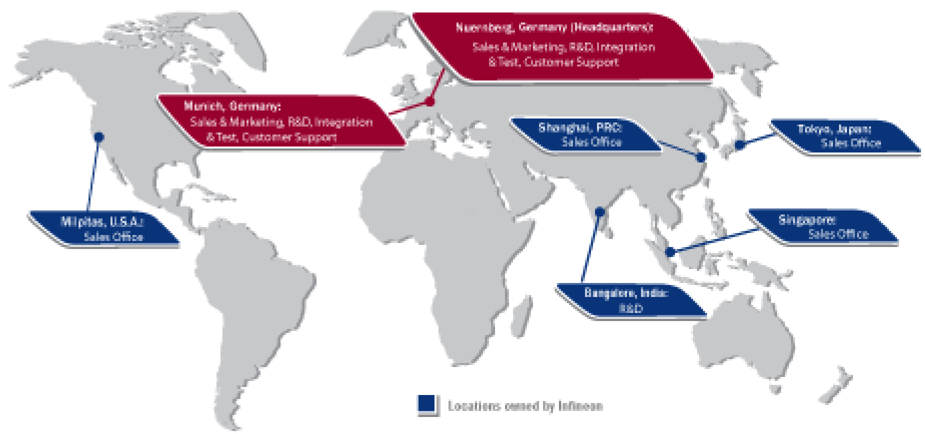
- Comneon was founded in 1991
- Acquired by Infineon in 2000
- Software for mobile phones
  - 3GPP Protocol Stacks
  - IMS Device Framework
- Comneon has been serving numerous semiconductor customers for 18 years

- Protocol Stacks ported to a variety of different chipsets and architectures
- 400 engineers for software projects
- Wide customer base
- Worldwide customer support facilities
- CMMI standard of quality assurance



The Four P's of Wireless Semiconductors

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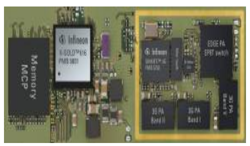
Power consumption:

Need to offer long run- and standby time without a size penalty

Price:

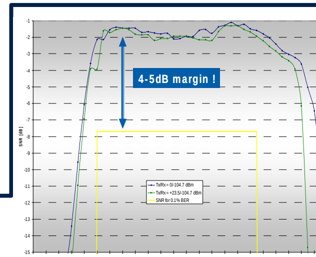
Low bill of material (eBOM) and total cost of ownership

The Four P's of Wireless Semiconductors



PCB board space:

Reduce PCB cost and offer design flexibility to OEMs



Performance:

need to fuel today's application requirements

Ongoing integration of wireless semiconductors enables more features at a lower price

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1992

- **PMB2400** GSM Receiver
- **PMB2200** GSM Transmitter
- **PMB2300** GSM PLL Synthesizer
- **PMB2900** GSM Analog Circuit
- **PMB2600** Channel Codec
- **PMB2500** GSM Equalizer
- DSP
- **PMB2700** Controller Interface
- MCU
- Discrete Power Supply

>1000 Modem Components

1995

- **SMARTi™** GSM Transceiver
- **PMB2906** GSM Analog Circuit
- **Hi-GOLD** GSM One Chip Logic Device
- Power Supply ASIC

>320 Modem components

2000

- **SMARTi ™ SD** GSM Transceiver
- **E-GOLD™+** (GSM BB+ABB)
- **E-POWER** Power Mgmt

>160 Modem components

2005

- **E-GOLD™radio** BB / ABB / RF
- **E-POWER** Power Mgmt

100 Modem components

2006

- **E-GOLD™ voice** BB / ABB / RF

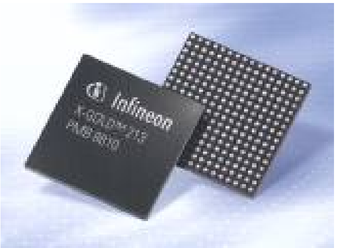
50 Modem components

2008

- **X-GOLD™ 113 / 116 / 213** 65nm BB + PMU + RF + FM Radio + mixed signal + SRAM, ARM11, USB, Memory Card IF, Video, Stereo Audio

50 Modem components

1992 | 1995 | 2000 | 2005 | 2006 | 2008



IFX GSM Chipsets | **IFX GSM Platforms P2002, ULC1, ULC2** | **A-GOLD Radio**

Source: Infineon Technologies

Technology shrinks lower the cost per transistor – at the expense of exponential growth in fab costs

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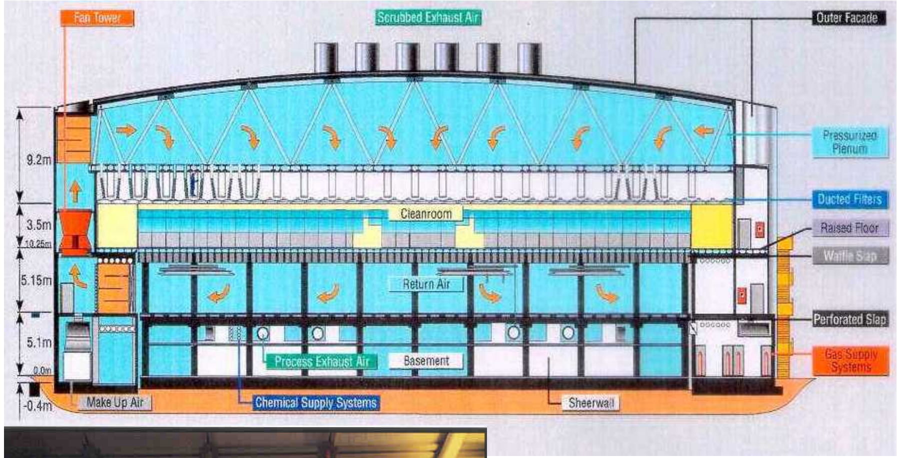
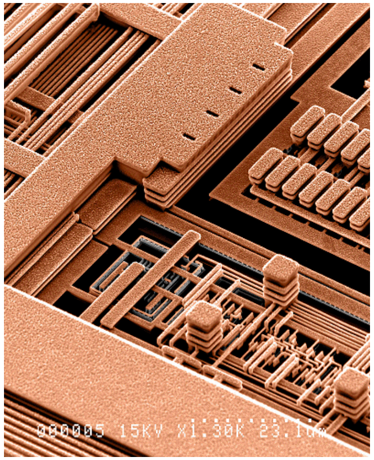
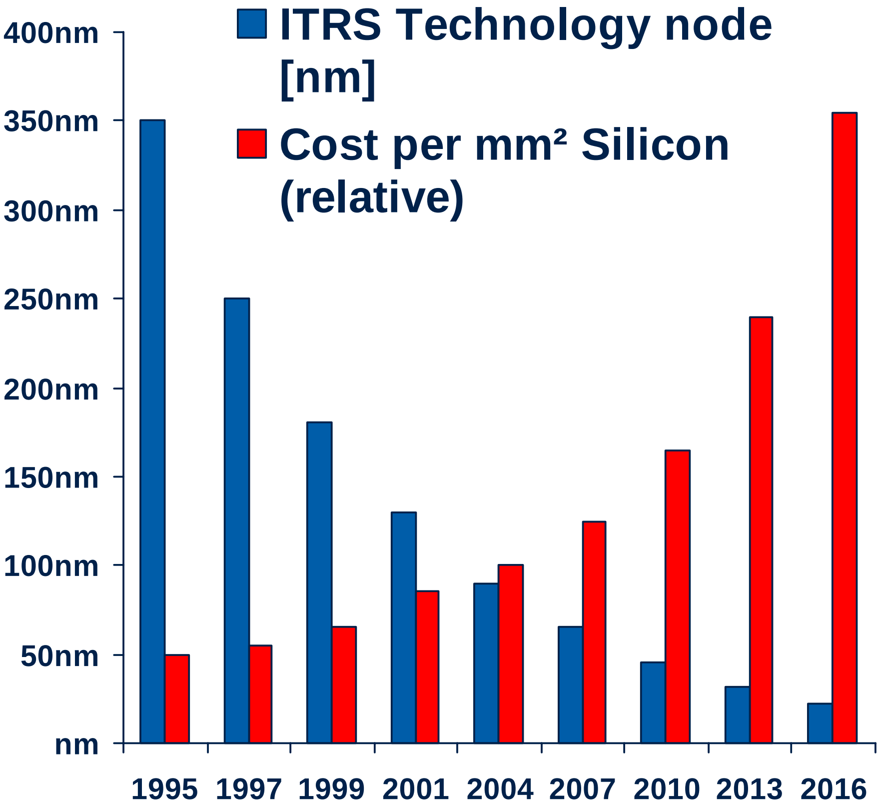


Source: Infineon Technologies



Courtesy of IBM

Cost of Technology Shrinks



Despite ultra-high integration of the chips – different phone concepts lead to different PCBs

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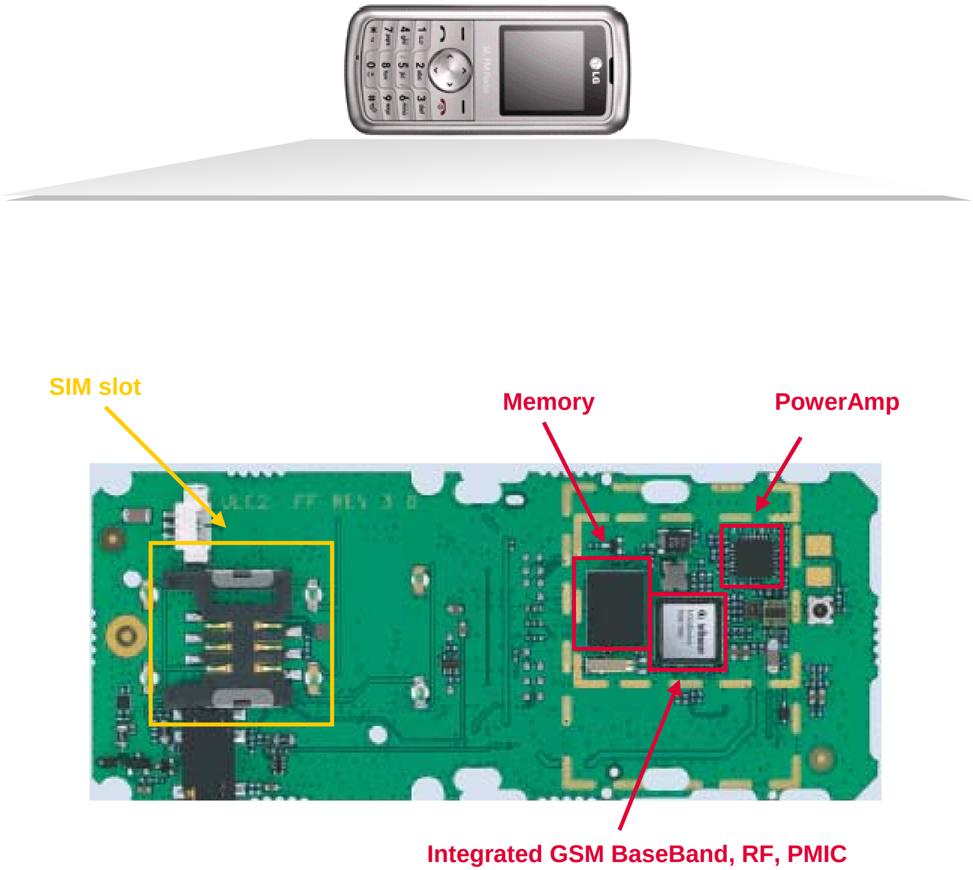
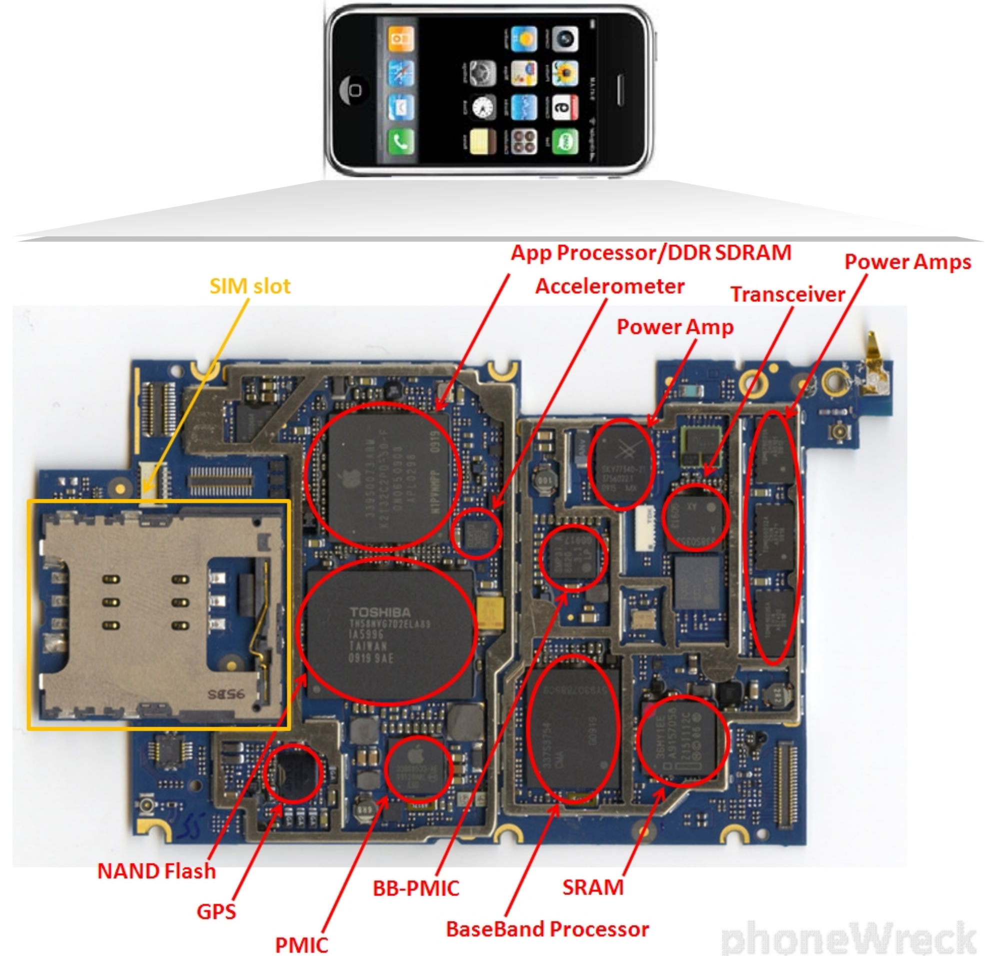
Ultra-Low Cost Phone (ULC) Example



Source: Infineon Technologies

Smart Phone Example



Source: Phonewreck.com

Mobile Market – Growth continues
Driven by ULC, Low Cost 3G, Smartphones and LTE

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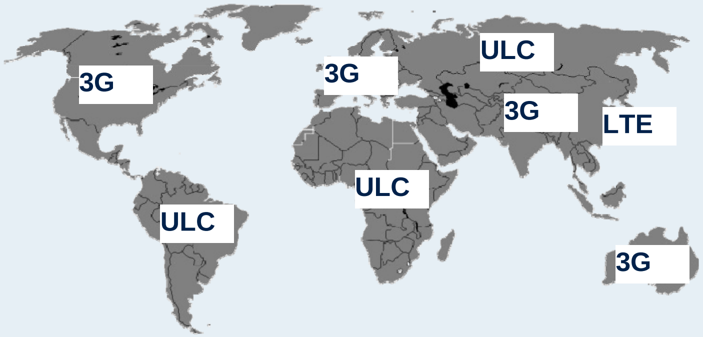
General market situation and trends

- Smartphones stimulate mobile market and provide killer application for 3G
- LTE emerges in Japan, Northern America & China from 2011
- WCDMA roll-out in China from 2H 2009
- Continuous growth of 2G Ultra-Low-Cost (ULC) segment
- Semiconductor landscape consolidation continues



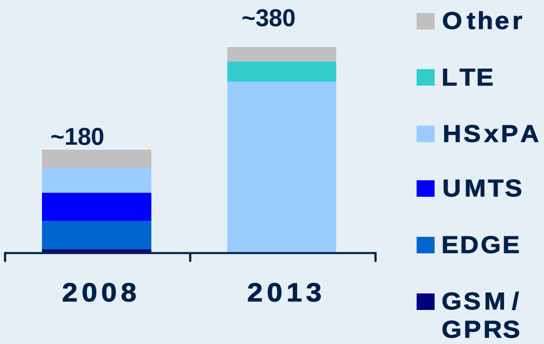
Mobile convergence and low cost 3G

- High demand for 3G in Europe and Northern America, driven by Smartphones
- Convergence of cell phone and Netbooks/ Ultra Mobile Computers fuels demand for higher data rates, Multiband, HSPA+, LTE
- Operators push for 3G low cost devices for emerging markets

Demand for ULC and Smartphones results in a "squeeze in the middle" of the mobile phone market

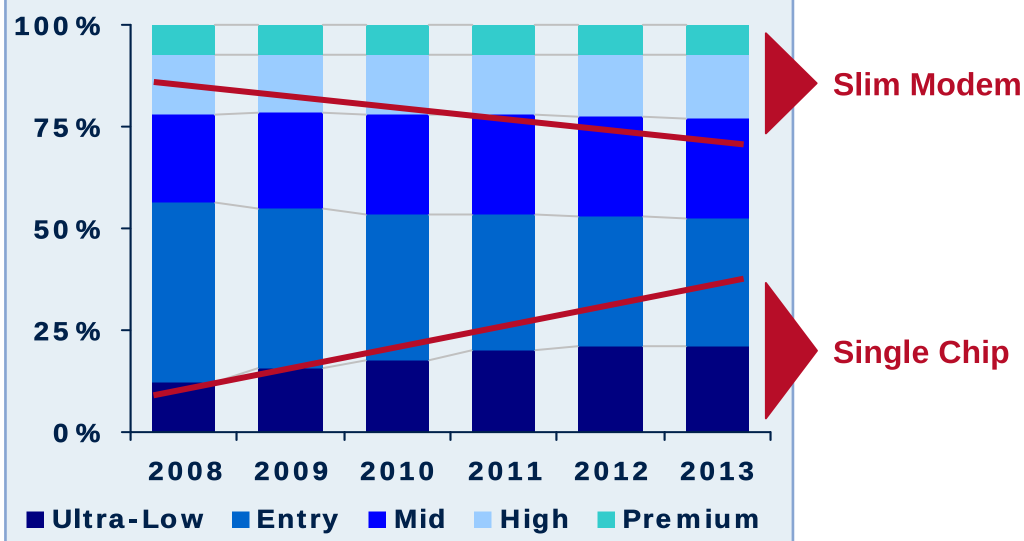
Mobile internet / Smartphones

Smart phone shipments
[units m]



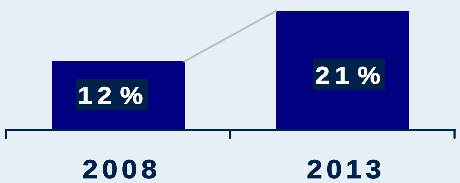
Strong growth of smartphones driven by operators subsidies due to higher ARPU, attractive user interfaces, etc.

"Squeeze in the middle"



Strong growth in low-cost phones

Share of Ultra low-cost phones



Strong growth of ULC phones driven by demand in emerging regions

Source: Strategy Analytics

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September 2009

<u>**Moderator:**</u>
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Comneon

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Tarek Fahmi, Seminconductor IP and Patent Counsel,
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Shyam Krishnamurthy, Head of Cellular Applications and Communications Processor Business,
Marvell

Clay Melugin, Director Wireless Marketing,
Infineon Technologies

Thomas Richter, Senior Director Marketing - Cellular Front End Products,
Skyworks Solutions