Hardware Requirements for Cellular Processors

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Contents

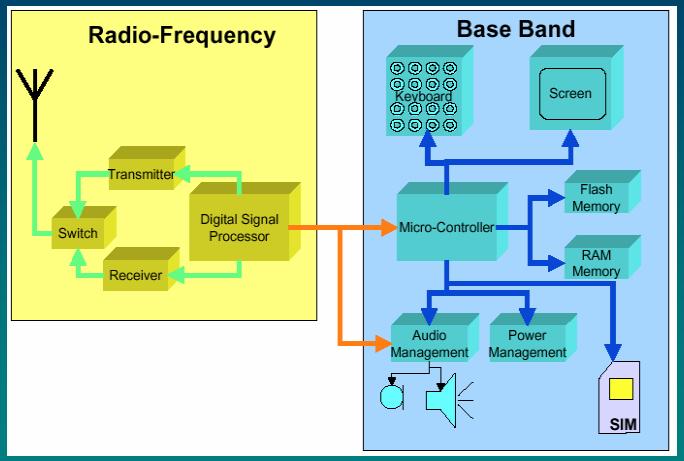
Mobile Phones Generations

- First Generation (1G)
  - Invention of Microprocessors
  - Digitization of the control link between mobile phone and cell site
  - Frequency Division Multiple Access
- Second Generation (2G)
  - Digital voice signal and Networks
  - Global System for Mobile Communications
  - Time Division Multiple Access
  - Code Division Multiple Access

Mobile Phones Generations

- Generation 2.5 (2.5G)
  - GSM based
  - GPRS
  - UMTS
- Third Generation (3G)
  - Faster communications services
  - Multimedia, Fax and Internet
  - International Mobile Telecommunications

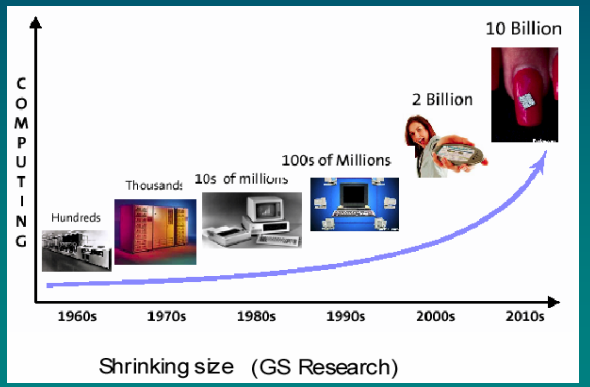
Common Hardware Backbone



Source: CEN Workshop Agreement, April 2003

Hardware Requirements for Actual Cellular Processors

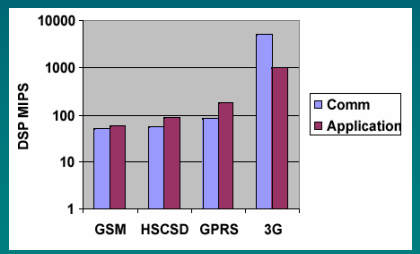
- Evolution capacity
- Small area



Shrinking size (GS Research)

Hardware Requirements for Actual Cellular Processors

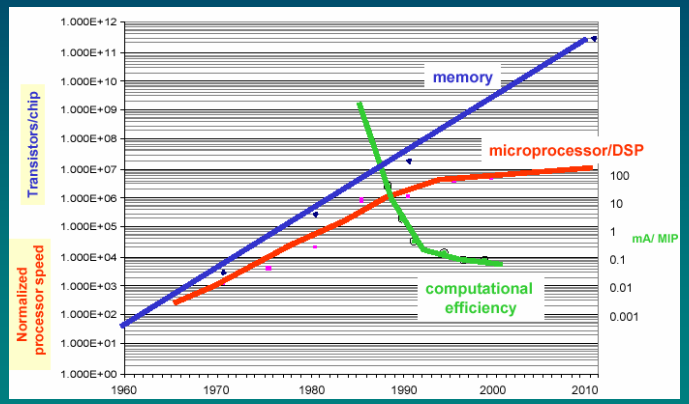
- Handle higher bit-rates
- Reduced power consumes
- Large application field



Courtesy of Jan M. Rabaey

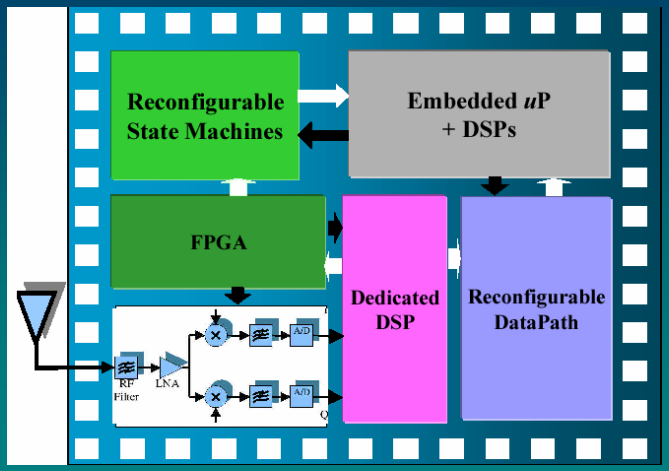
Hardware Requirements for Actual Cellular Processors

- High performance



Courtesy of Ravi Subramanian - Morphics

The Ideal Cellular Processor Model

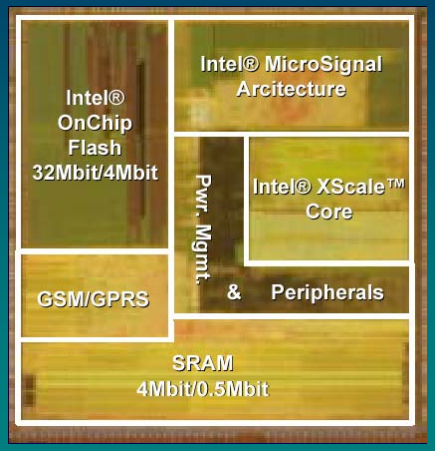


Courtesy of Jan M. Rabaey

Examples of Cellular Processors

- Philips' Nexperia
  - System on Chip design
  - Media processing and connectivity
- Motorola's i.MX
  - Applications processors
  - Advanced floating-point technology
- Texas Instruments's OMAP1710
  - Applications processor
  - DSP engine
  - supports advanced mobile operating systems such as Linux, Microsoft´s Windows Mobile, …

Intel PXA800F



Source: Intel

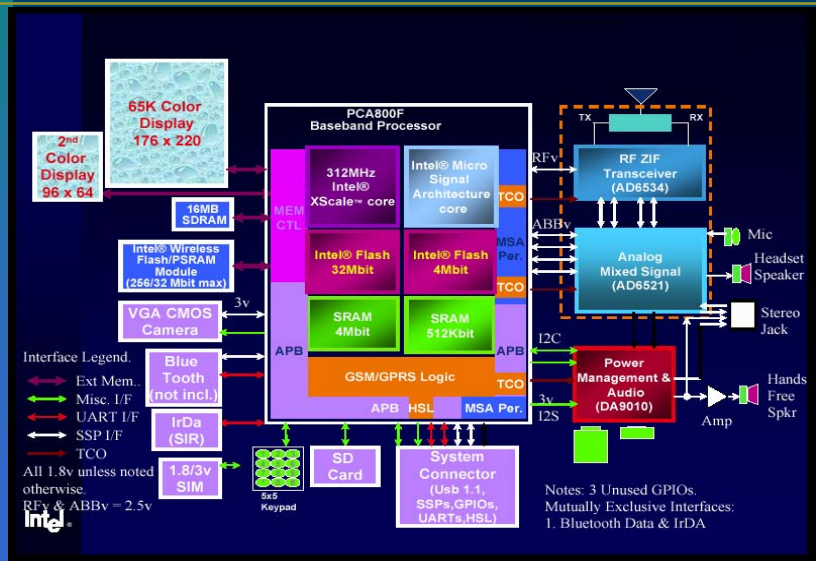
Intel PXA800F

- Intel XScale technology
  - Process applications and GSM/GPRS protocol stack
  - Controller of external memory and I/O
- Intel MSA technology
  - DSP applications for GSM/GPRS baseband
  - General control
- OnChip Flash

Intel PXA800F

- Parallelism
- Integrated Code/data (Flash/SRAM) memories
- Reduced System-level latencies
- Higher System-level Performance
- Reduced System-level power
- Lower Energy
- Lower Cost for overall platform
- Reduced Area for the platform
- Reduced RF Edge Rate Noise Effects

Intel PXA800F



Conclusions

- Achievements
  - Integration / Scalability
  - High performance in both applications and communication sub-systems
  - Low latencies
  - Low energy consumes
  - Small area
  - Low Cost
- The bounds
- Future hardware requirements