

[招待講演]携帯機器向けアプリケーションプロセッサOMAPの変遷

宮崎 昌浩

日本テキサス・インスツルメンツ株式会社 営業・技術本部 〒160-8366 新宿区西新宿 6-24-1

E-mail: miya@ti.com

あらまし 近年小型化・省電力化とともに高性能化の要求が高まる携帯機器向けのアプリケーション・プロセッサの一つである OMAP の世代ごとの進化を紹介する。アプリケーション・プロセッサは昨今の携帯電話に見られるようにマルチメディアの性能要求の高まりと、低消費電力の要求を同時に実現することが課題となる。これら市場要求を取り込み問題解決するための幾つかの工夫を重ね変遷したアプリケーション・プロセッサ OMAP の世代の移り変わり为代表的な技術を紹介する。

キーワード 携帯機器、アプリケーション・プロセッサ、マルチメディア、低消費電力

Evolution of application processor OMAP for mobile products

Masahiro Miyazaki

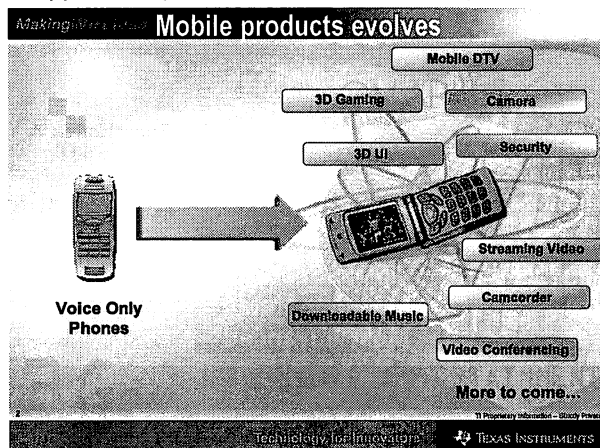
Texas Instruments Japan Limited Sales & Applications

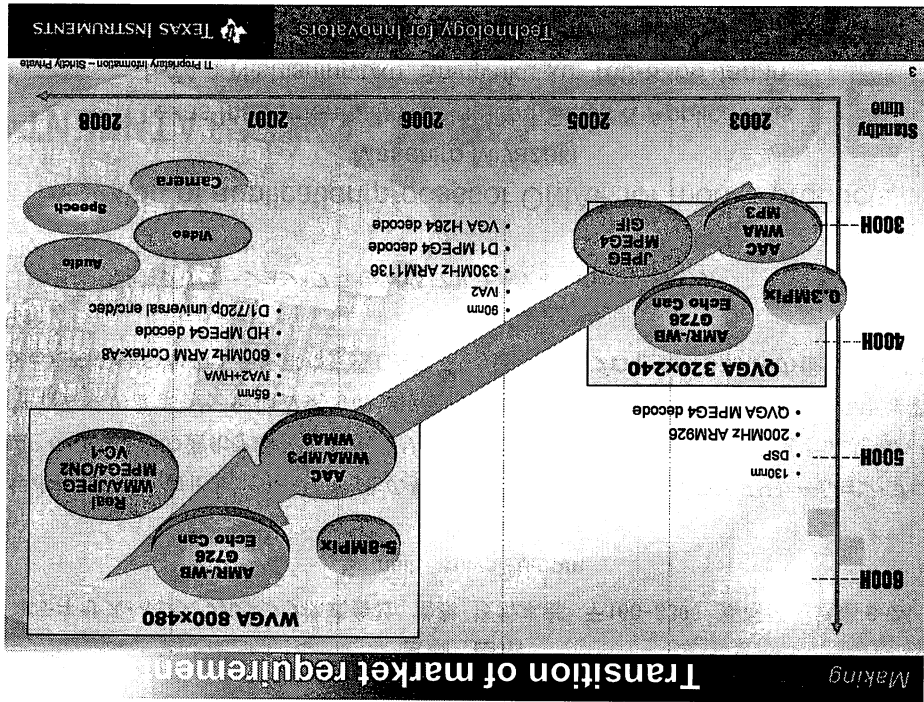
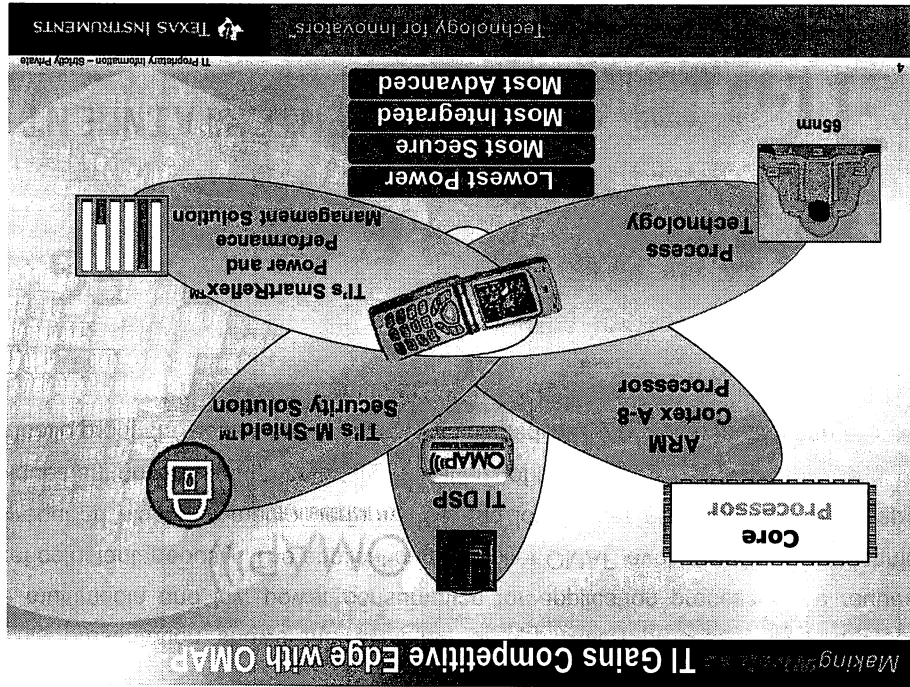
6-24-1 Nishishinjyuku, Shinjyuku-ku, 160-8366 Japan

E-mail: miya@ti.com

Abstract This presentation shows the evolution of application processor OMAP. Recently, high performance multimedia and low power consumption for application processor are requested in the mobile market coinstantaneously. The application processor OMAP evolves with some techniques which support the required high multimedia performance and low power consumption. This paper explains above techniques enhanced through several generations of OMAP.

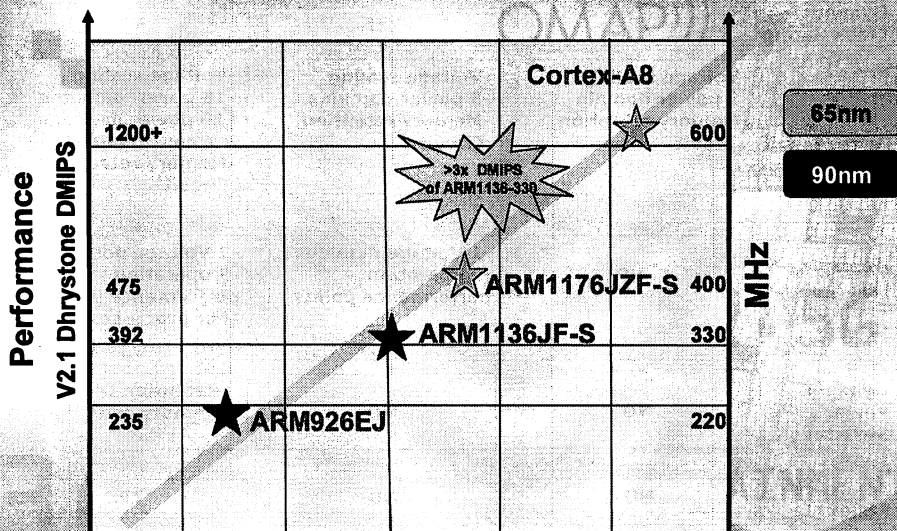
Keywords mobile products, application processor, multimedia, low power consumption





Processor Core Performance

Cortex-A8 provides 5x performance over ARM9 based solutions

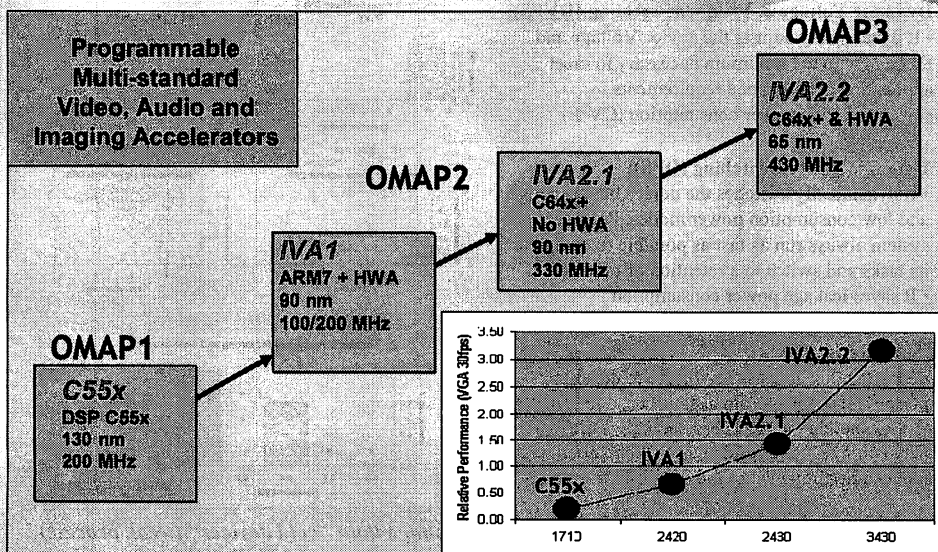


TI Proprietary Information - Strictly Private

Technology for Innovators™

TEXAS INSTRUMENTS

Image & Video Accelerator



Based on Combined MPEG-4 SP and H.264/AVC Codec Performance at VGA 30.

TI Proprietary Information - Strictly Private

Technology for Innovators™

TEXAS INSTRUMENTS

	OMAP1	OMAP2	OMAP3
Dynamic Clock Gating	YES	YES	YES
Standby Leakage Management	-Voltage scaling -1 power domain -Memory retention Circuit	-Voltage scaling -5 power domains -Memory retention Circuit	-Voltage scaling -18 power domains (10 power domains are controllable) -Memory retention Circuit
Dynamic Voltage Frequency Scaling	NO	-1 Voltage domains -2 operation performance points	-2 Voltage domains -5 operation performance points (For processors)
Dynamic Power Switching	NO	NO	- Retention DFF - Memory retention
Smart Reflex	NO	NO	YES

15

TI Proprietary Information – Strictly Private

Technology for Innovators™

TEXAS INSTRUMENTS

Dynamic Voltage & Frequency scaling (DVFS):

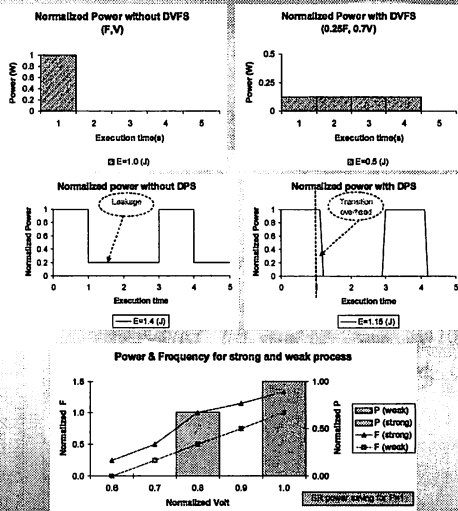
- It dynamically adjusts the device Voltage and Frequency to the minimum necessary to meet application performance requirements.
- It saves active power consumption (CV^2F)

Dynamic Power Switching (DPS):

- It dynamically switches the device between high and low consumption power modes. Processor or system always run as fast as possible to complete its tasks and switch to a retention or off states
- It saves leakage power consumption

SmartReflex (SR):

- SmartReflex adjusts the voltage to the silicon performance either from a static sense (e.g. adapted to the manufacturing process of a given device), or a dynamic sense (e.g. adapted to the temperature induced performance of the device).



"hot devices" (strong process) runs at a lower voltage than "cold devices" (weak process) for the same frequency of operation. This results in both active and leakage power saving

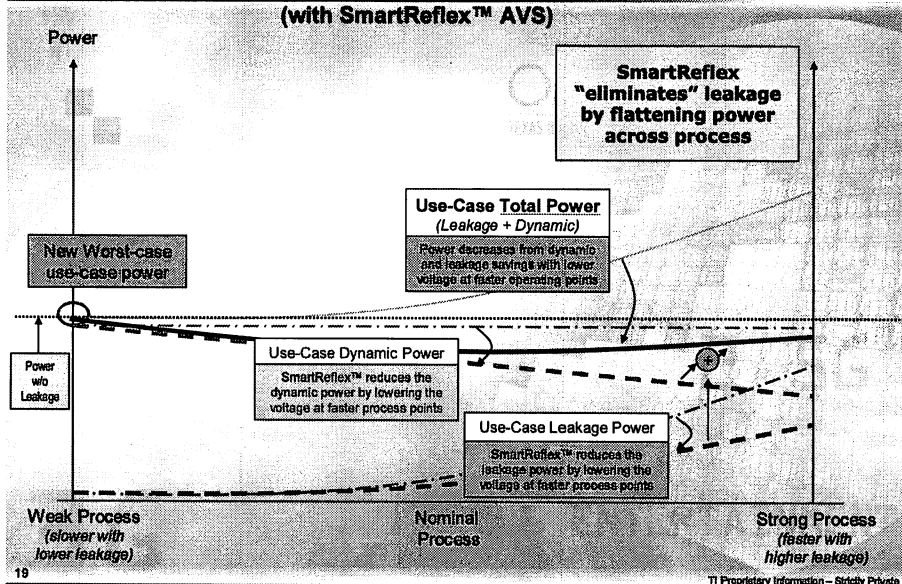
16

TI Proprietary Information – Strictly Private

Technology for Innovators™

TEXAS INSTRUMENTS

Power vs. Process (with SmartReflex™ AVS)



Technology for Innovators™

TEXAS INSTRUMENTS

Summary & Next Step

Summary

-Application processor OMAP evolves with market trend that are high performance multimedia and low power techniques

- Multimedia engines

DSP + Hardware accelerators, iME, iLF, iVLC

- Power management techniques

Dynamic Clock Gating, SLM, DVFS, DPS, SmartReflex

-Other intelligent sub systems

Display, Camera ISP, Memory controller

Next step

- Process technology evolving to next step

- Symmetrical Multi-Processing Dual Core

- Multi-standard HD-1080p playback and record

- Low power audio playback via virtual audio chip

- TI DSC quality imaging improving

- High Bandwidth Memory Interfacing

- Industry Standard Peripherals and Interfaces

- Larger, color rich display support

- SmartReflex™2 for advance power management

Technology for Innovators™

TEXAS INSTRUMENTS