

# **Intel® PXA27x Processor Family: An Applications Processor for Phone and PDA applications**

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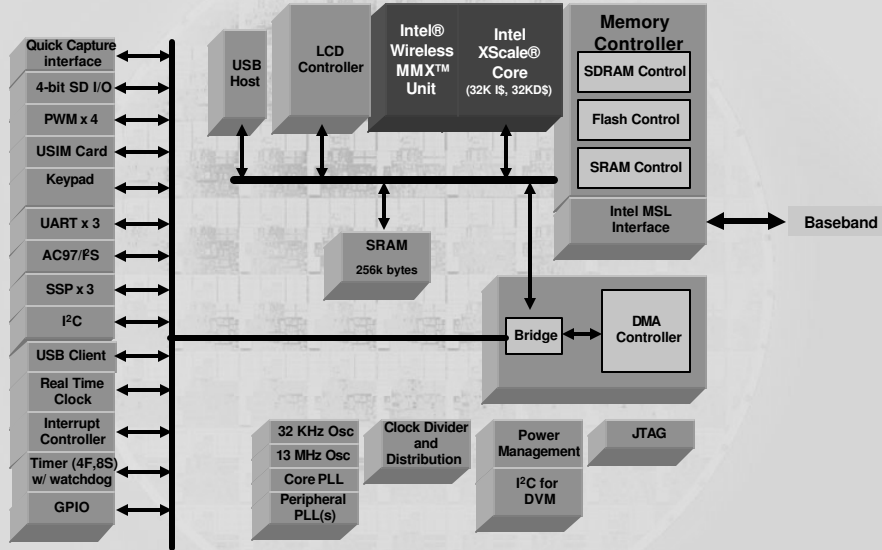


## **Agenda**

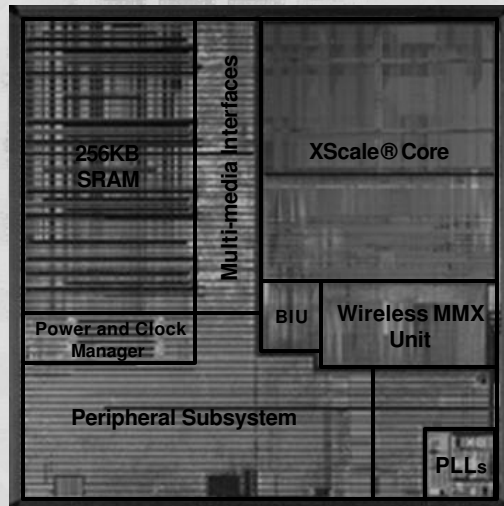
- **Overview of the Intel® PXA27X processor architecture**
- **The Intel XScale® Microarchitecture with Intel® Wireless MMX™ technology.**
- **Wireless Intel Speedstep® technology**
- **Performance/Power metrics**
- **Advanced Packaging technology**
- **Summary**



# Intel® PXA270 Processor block diagram



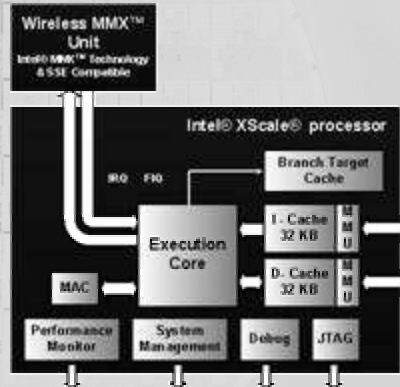
# Intel® PXA270 Processor



# Intel XScale® Microarchitecture

## Key Features:

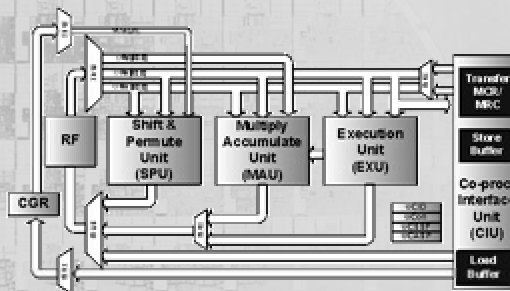
- ARM® V5TE Architecture Compliant
- Up to 624 MHz operation
- Scalar, in-order issue architecture
  - Concurrent execution in 3 pipes
  - Out-of-order return
- 7-stage integer pipeline
  - Dynamic branch prediction
- 32 KB I Cache & 32KB D Cache
  - 32 Entry I and 32 Entry D TLB
  - Eight entry write buffer
  - Four entry fill buffer
- Supports dynamic voltage and frequency management



# Intel® Wireless MMX™ Architecture

## Datapath units include:

- Register file unit,
- Execution unit,
- Multiply accumulate unit
- Shift/Permute unit.



CP1: Status & Control



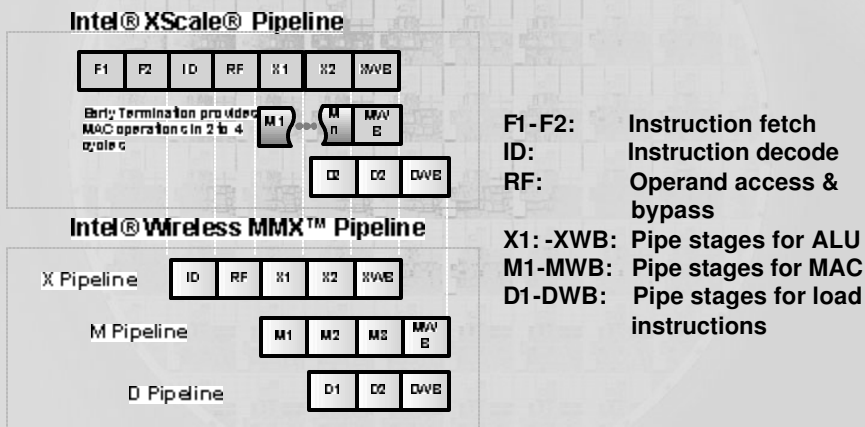
CP0: SIMD Data Registers

- Intel® Wireless MMX™ Technology offers a large register space (16x64bit registers)
- Can use register file as a Level 0 Cache.
  - Store all of the filter coefficients in the register file for repeated application
  - For motion search 8x8 reference region can be kept in only 8 registers

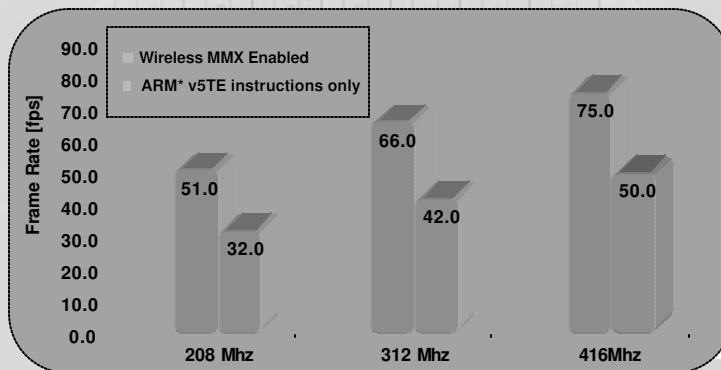


# Pipeline Organization

The Intel® Wireless MMX™ unit is tightly coupled with Intel XScale® core and also contains three pipelines.



## Intel® Wireless MMX™ Technology: Performance *Play a video while listening to an MP3*

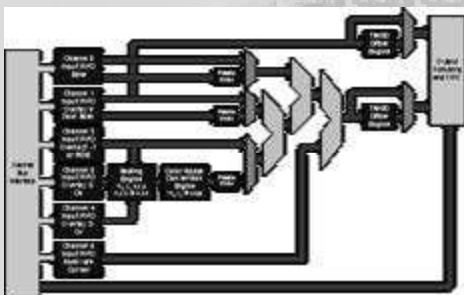


**Up to 50% more performance than Scalar code**



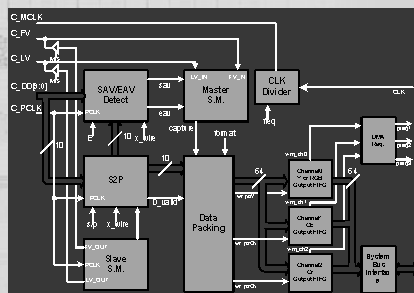
\*Intel PXA270 processor Configuration:  
 Actual benchmarks were run on a Mainstone 1 system (main board rev 1.1 ECO B, Rev 2 daughtercard, ECO D with 2.5 Volt VCC\_MEM  
 with Intel PXA270 processor. A1 stepping running at speeds indicated in graph. The 208 MHz measurements made in the processor Run mode and measurements  
 at all other frequencies were made in Turbo Mode. The system bus was 104 MHz for 208, 312, 416 and 520 MHz core frequencies  
 This platform represents a "bare metal" system with no operating applications system. MPEG-4 decoder implemented with unreleased Intel IPP library  
 optimized for Wireless MMX™ and MPEG-4 content is the CIF resolution video clip "Coastguard" in portrait mode.

# Multi-media Interfaces



- Designed to work well together
  - Capture, processing, display,
- LCD Controller provides 2 hardware overlays & 1 cursor
- Provides Hardware Color Conversion
  - $YCbCr \rightarrow RGB$

- Supports up to 4M Pixel image sensors
- Wide Range of Sensors
- Converts packed image data to planar format for SIMD processing
- Low power image preview can utilize HW color conversion

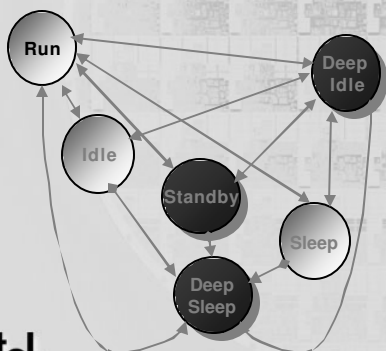


# Wireless Intel SpeedStep® Technology

Includes:

- 5 low power modes
- Ability to change Frequency and Voltage dynamically
- Power Manager software provides frame work to utilize Intel PXA27x processor low power modes

Intel® PXA27x processor Power Modes



Faster response Time\*

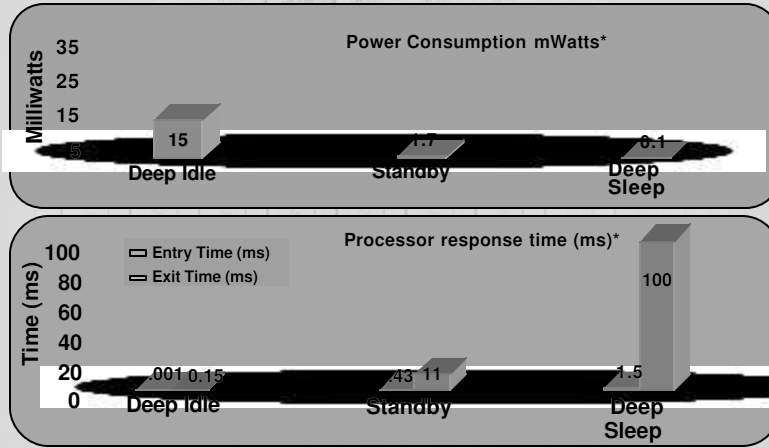
- IDLE Mode: Idle between stylus taps
- Deep IDLE Mode: Human interface devices on
- Standby Mode: CPU state retained
- Sleep Mode: GPIO state retained
- Deep Sleep Mode: Max power savings No state retained

Lower Power\*

\*Faster response time, lower power based on which power mode the processor is in



# New Low Power Modes



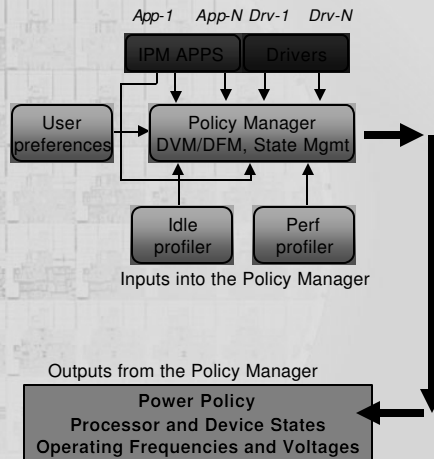
**Balance power with system response time**

Source: Intel Corporation  
 Test Configuration: AE boot code to generate specs in Intel PXA270 processor Electrical, Mechanical, and Thermal Specifications (EMTS) document from <http://developer.intel.com>. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. The Deep sleep response time is a function of external voltage ramp so is dependent on actual system. Any difference in system hardware or software design or configuration may affect actual performance.  
 \*Other names and brands may be claimed as the property of others.



# Wireless Intel SpeedStep® Power Manager

- Software which enables the use of Wireless Intel SpeedStep Technology
- Power Manager is an add-on software module that is integrated in the OS BSP's
- Supports Palm\*, Symbian\*, Linux\* and Microsoft\* OSs
- Intel provides documentation to assist driver modifications required to interface to the software



**Includes:**

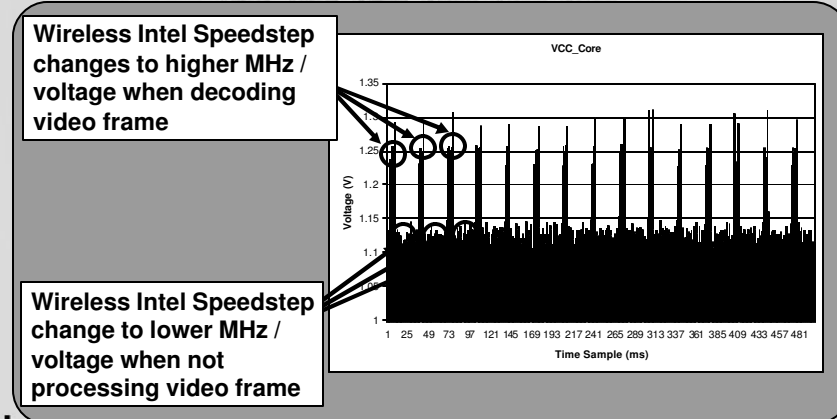
- Profiler Modules – Monitors idle activity, CPU% usage, and provide user input to the Policy Manager so the power policy can be determined
- Policy Manger – Takes input from profilers and determines the system power policy under all types of workloads



\*Other names and trademarks are property of their respective owners

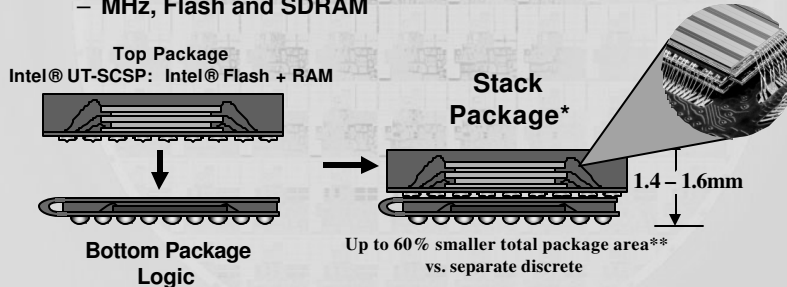
## Wireless Intel Speedstep® Technology In Action: Video Playback

- Use MHz and voltage change to achieve lower total playback power
- Enabled by Wireless Intel SpeedStep® Power Manager



## Intel® PXA27x Processor Family: SoC to SiP

- Intel® PXA27x processor family includes stacked products:
  - PXA270 discrete processor
  - PXA271, PXA272 & PXA273 stacked products
  - Processor speed and stack contents vary with product
    - MHz, Flash and SDRAM



\*The tape, die and packages shown are samples only provided solely to illustrate Steps in the folded stack packaging process and Intel makes no warranties, either Express or implied with regard to such tape, die or packages.  
\*\* when comparing 14x14x1.4mm Intel PXA271 processor and separate discretes of 17x17x1.75mm processor, 9x11x1.0mm Intel® Flash, 11x13x0.8mm SDRAM

# Summary

- **The family of Intel® PXA27x processors provide a highly integrated, low power SoC and SiP solution for wireless and handheld platforms**
- **The Intel XScale® microarchitecture with Intel® Wireless MMX™ technology provides a high performance, low power multimedia experience**
- **Wireless Intel Speedstep® technology provides advance power management for low power applications**



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