

UNIT -5

ARM PROCESSOR

What's OMAP?



Processors

- Applications Processors
- Integrated Baseband and Applications Processors

*ARM core
C55 core*

Software

- OMAP™ Developer Network
- TI DSP Third Party Network
- Software Libraries
- High-Level OS Support

*DSP/BIOS
Symbian, WinCE, etc*

Support

- OMAP™ Technology Centers
- TI Support
- Development Tools

- Architecture Features
- RISC Architecture: Simplified instruction set for faster execution.
- Thumb-2 ISA: Mix of 16-bit and 32-bit instructions for better code density.
- Harvard Architecture (Cortex-M): Separate buses for instructions and data.
- Pipeline Execution: Multi-stage instruction processing for speed.
- Load-Store Design: Operations only on registers, not directly on memory.
- Register Bank:
 - 16 general-purpose registers (R0-R15)
 - Special registers: SP (R13), LR (R14), PC (R15)
- Program Status Registers:
 - CPSR (Current Program Status Register)

- Interrupt Handling:
 - NVIC (Nested Vectored Interrupt Controller)
 - Supports up to 240 interrupts with prioritization
- Memory Management:
 - MMU in Cortex-A for virtual memory
 - MPU in Cortex-M for memory protection
- Security Features:
 - TrustZone (in Cortex-A)
 - Secure boot and privilege levels
- Debugging & Development Support
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 - JTAG & Serial Wire Debug: For hardware-level debugging
 - ETM (Embedded Trace Macrocell): Instruction tracing
 - DWT (Data Watchpoint and Trace): Profiling and watchpoints
 - ITM (Instrumentation Trace Macrocell): Real-time data logging
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• **Architecture Highlights**

- **Dual-core design:** Combines an ARM processor (e.g., ARM926, Cortex-A8, Cortex-A9, Cortex-A15) with a TI DSP (Digital Signal Processor) for efficient multimedia processing.
- **Multimedia accelerators:** Includes IVA (Image, Video, Audio) engines for hardware-accelerated encoding/decoding.
- **PowerVR GPUs:** Integrated graphics processors for 2D/3D rendering and gaming.
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- OMAP processors are grouped into three categories:
- **High-performance application processors:** Found in smartphones and tablets; capable of running full OSes like Android or Linux.
- **Basic multimedia processors:** Used in consumer electronics with moderate processing needs.
- **Integrated modem + application processors:** Designed for low-cost mobile phones with built-in communication capabilities.

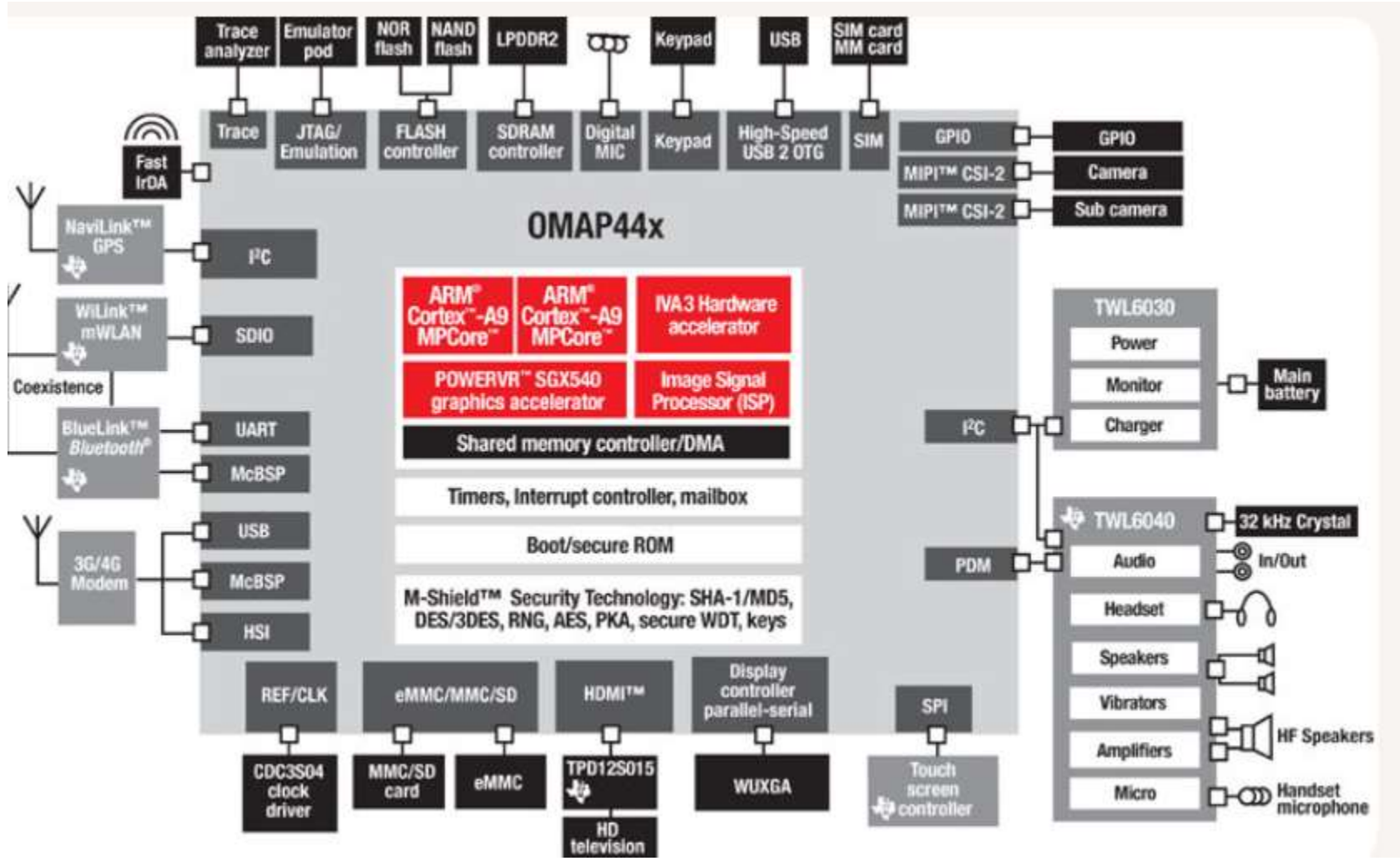
- **Technical Features**

- Advanced imaging: Support for high-megapixel cameras, JPEG compression, and image signal processing.
- Video capabilities: Up to 1080p HD video encoding/decoding, support for formats like MPEG-4, H.264.
- Audio support: MP3, AAC, MIDI, and other codecs with streaming and equalizer features.
- Connectivity: USB OTG, Bluetooth, WLAN, A-GPS, and IrDA.
- Security: Secure bootloader, hardware encryption, and unique die ID for device authentication.

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- Applications

- Smartphones and tablets
- Digital cameras and camcorders
- Automotive infotainment systems
- Industrial automation and medical devices
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THANK YOU