

MSP

Multi-Media Signal Processor

MSP Goal

Establish

MSP

as the Standard for Media Processing

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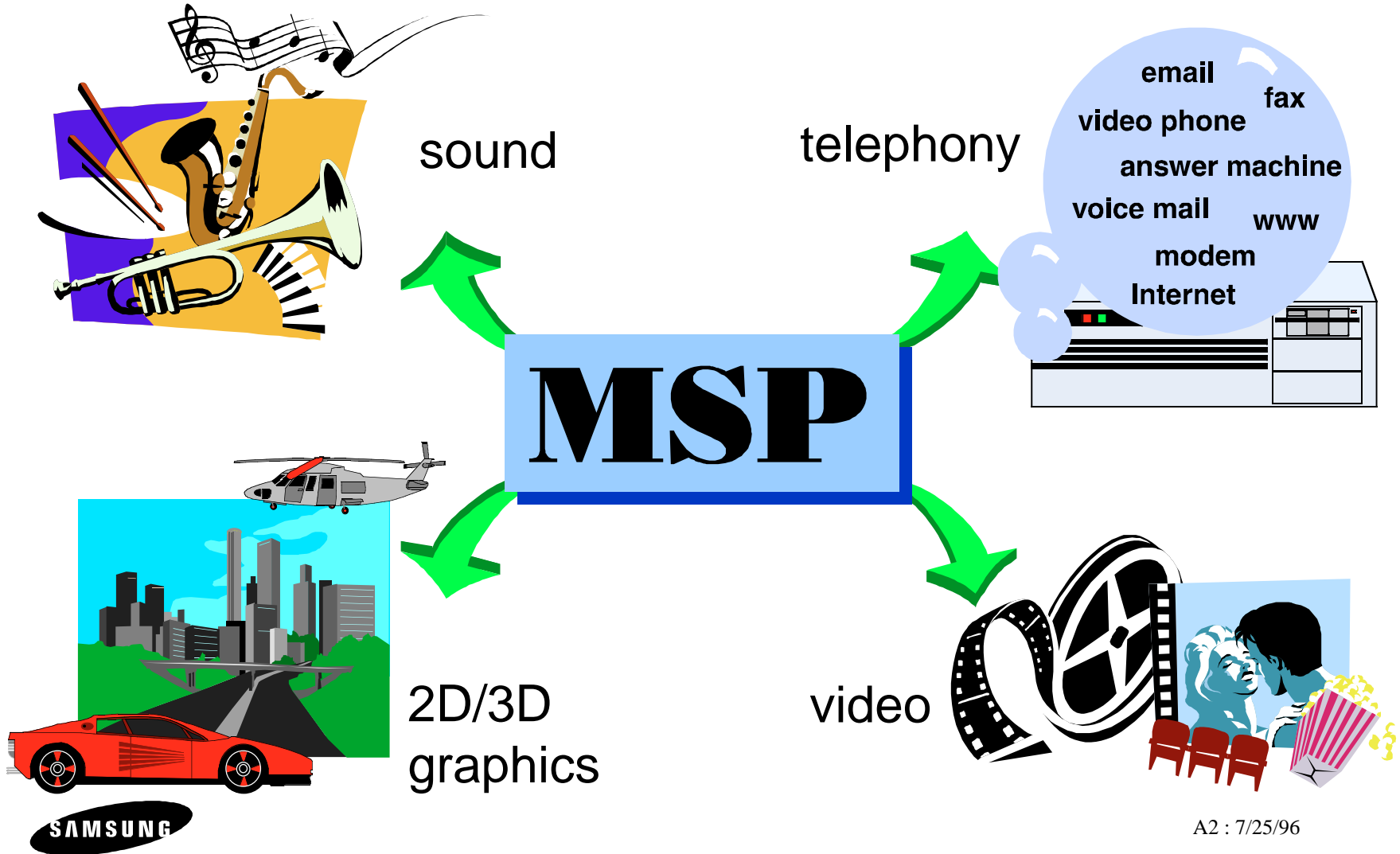
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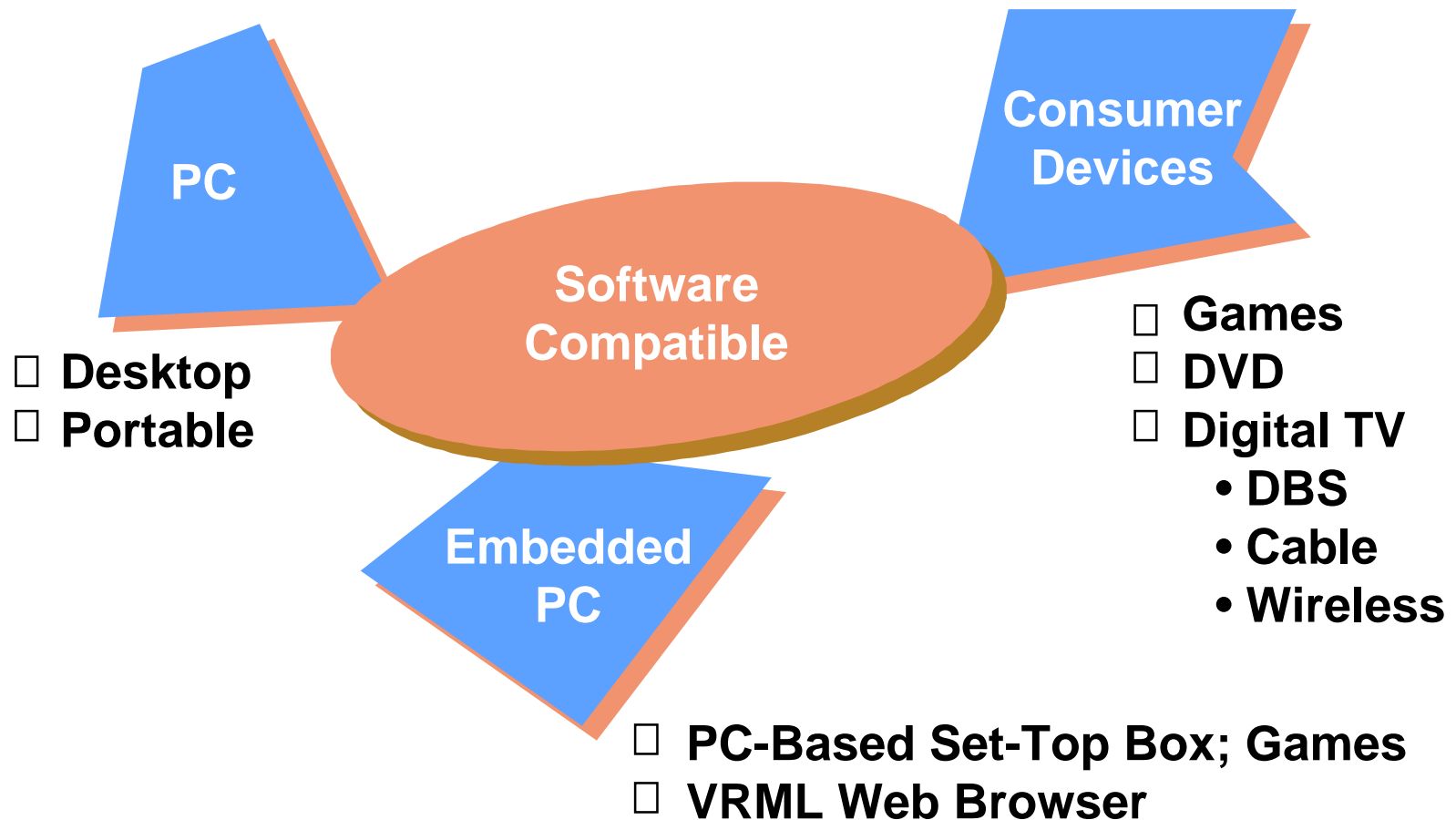


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Multi-Media Signal Processor

Media Processor for Programmable Integration





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Multi-Media Signal Processor

Product Functionality

- **Real-time MPEG1 & MPEG2 decoding**
- **Real-time AC3 decoding**
- **Real-time H.324 CODEC**
- **Wavetable, FM Synthesis, SoundBlaster**
- **V.34 Modem, V.17 Fax**
- **Video Processing & Filtering**
- **PC Telephony (DSVD, Speakerphone, TAM, Caller ID. etc.)**

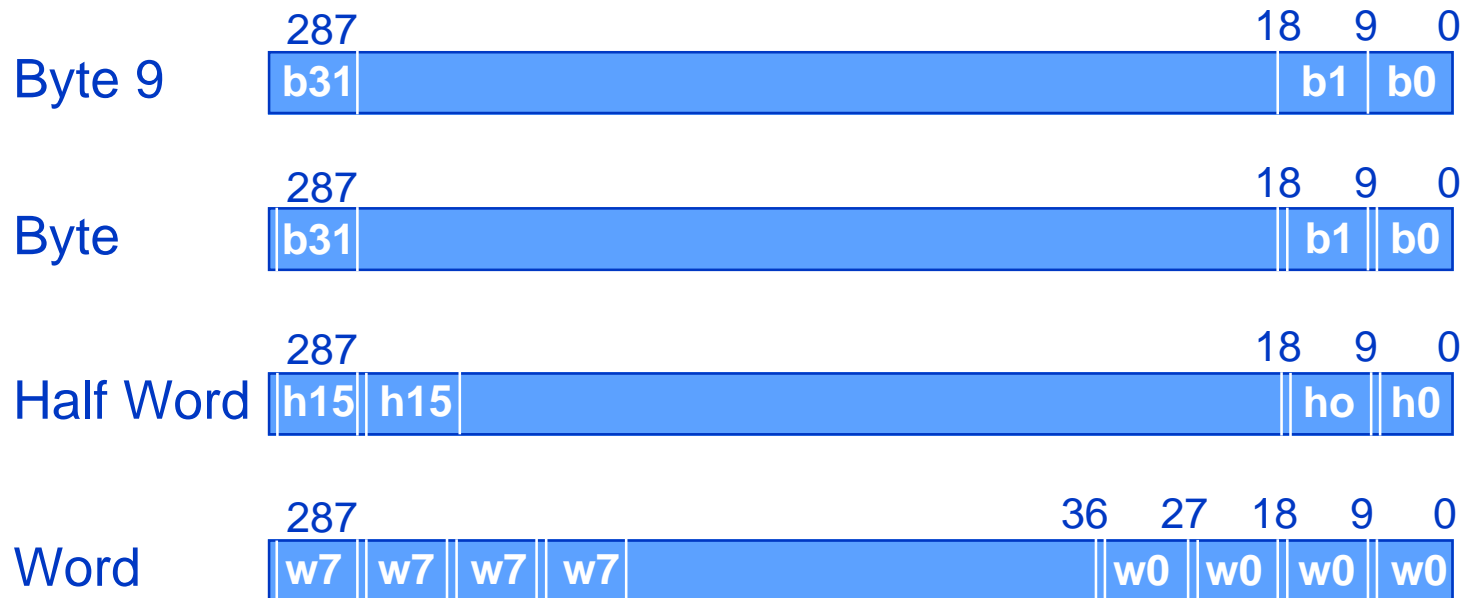


- **Fully Programmable Media Processor with conventional 32-bit instruction format**
- **Dual processor, shared memory architecture based on the ARM RISC Core & Vector Processor**
- **Dual-threaded programming model to run real-time kernel concurrently with multimedia apps**
- **Deadline driven preemptive real-time scheduling to meet hard real-time constraints**
- **Supports both scalar & vector data types**

- **High performance SIMD instructions with multiple operations per instruction**
- **Special MPEG Class instructions**
- **Special instructions for filtering applications (averaging, limit check etc.)**
- **Instructions to hide IO from programmer**
 - 1D and 2D block IO instructions
 - Special Load/Store instructions for Prefetch/Writeback & Circular Buffers
- **Macro Library instructions (DCT, CONV, MULM)**

Vector Register Data Type Formats

- **Internal Data Types**
 - Integers: 8-bit, 9-bit, 16-bit, 32-bit
 - Floating Point: 32-bit IEEE 754



VSHFL Case for shuffling 2 32-byte vectors

Conventional 32-bit Instruction

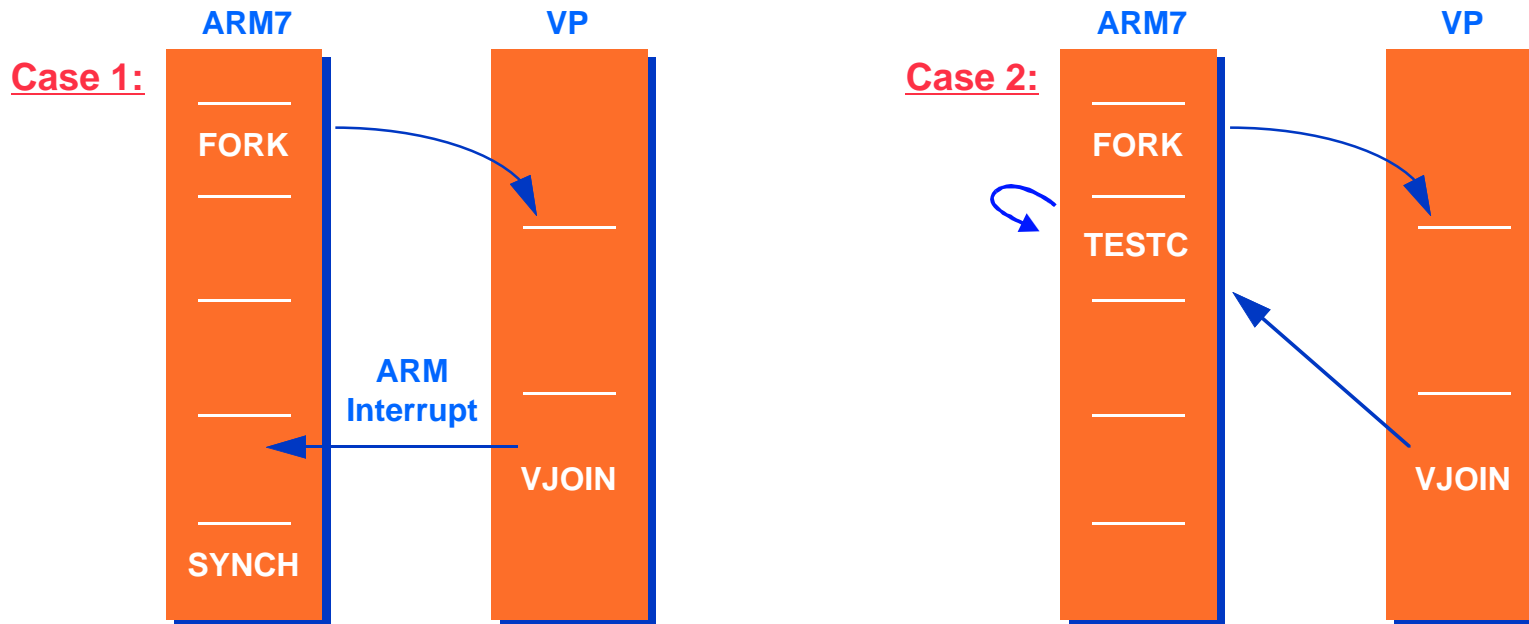


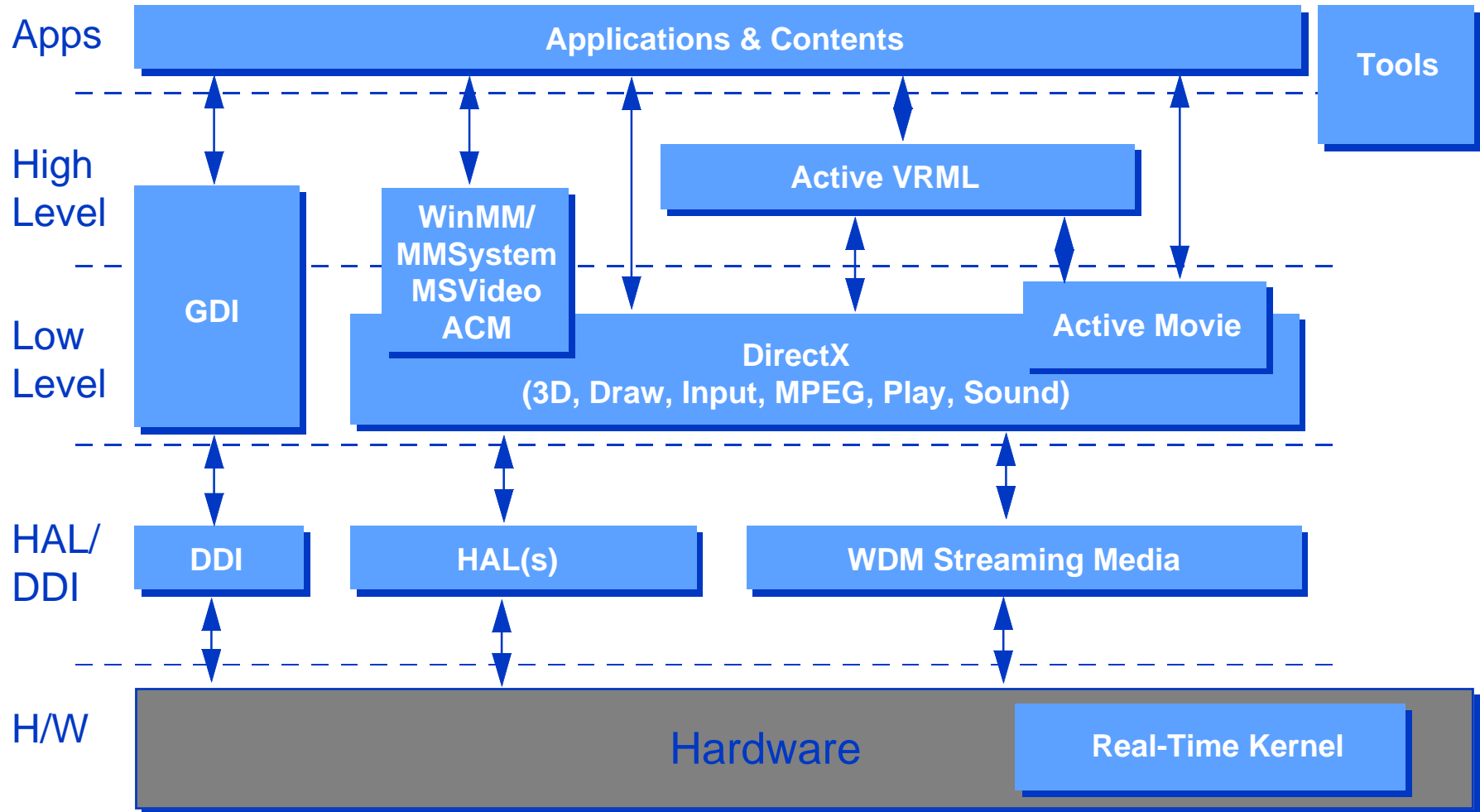
Shuffles 2 32-byte Vectors



Vector Processor (Execution Model)

- ARM7 Can Initiate the Vector Processor
- The Vector Processor Executes in Parallel with ARM7
- At Completion, the Vector Processor Returns to ARM7





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MSP/RTOS

- **Multi-tasking**
- **Multi-threading**
- **Asymmetric Multi-processing**
- **Real-time**
- **Pre-emptable**



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Software Tools

- **MSP Compiler and Debugger**
- **MSP Assembler and ELF Linker**
- **MINT Vector Simulator**
- **MSPSIM Integrated Simulator and Debug monitor**
- **STAR Cycle-accurate Simulator**

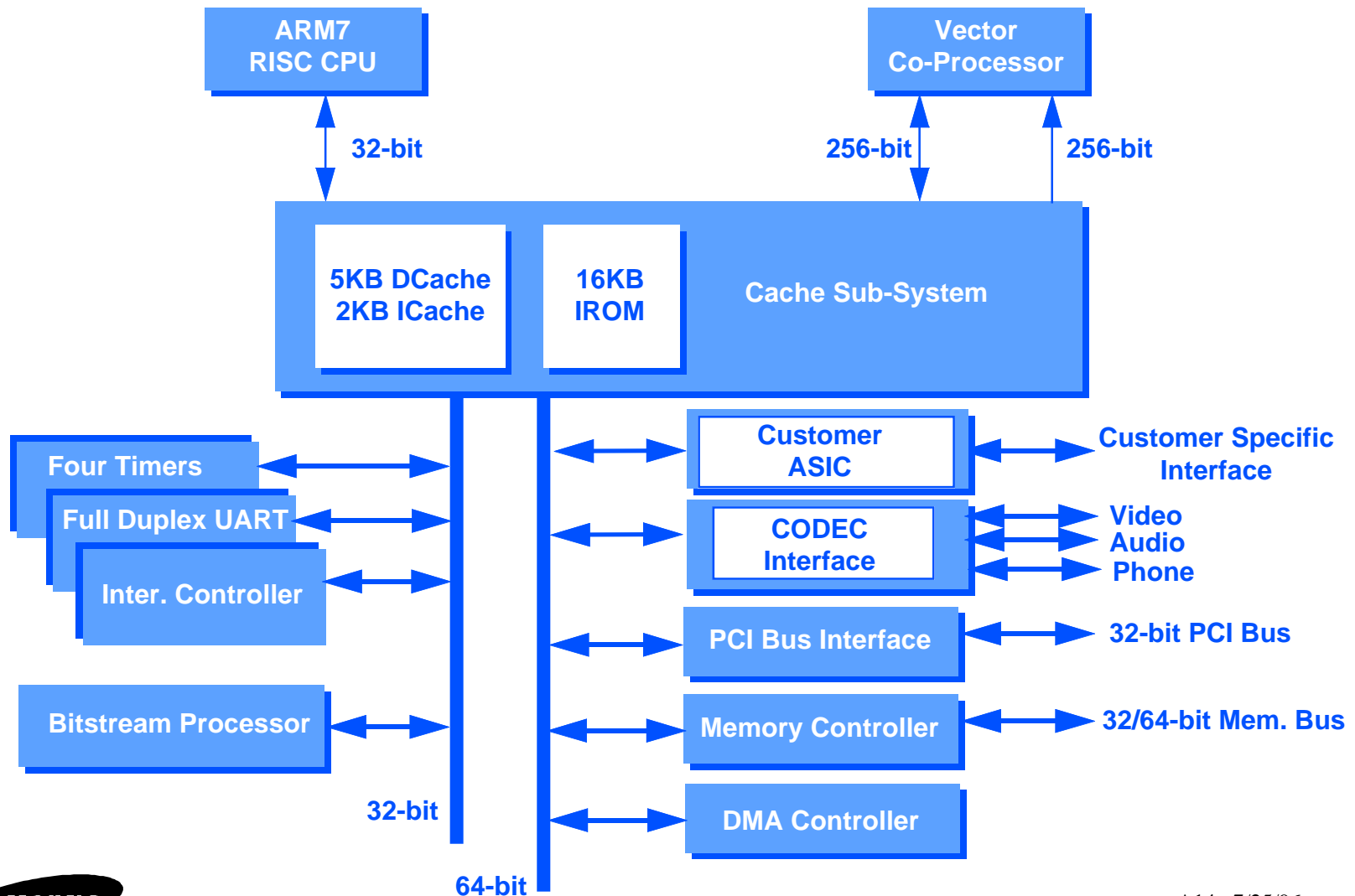


- **Vector Processor (VP) for Digital Signal Processing**
- **Powerful VP floating-point for very high quality 3D Graphics front-end processing**
- **Integrated ARM7 32-bit RISC Core for system control & management**
- **Bitstream processor for syntax & Huffman processing of video data**
- **Unused 10K gates for Optional Customization**

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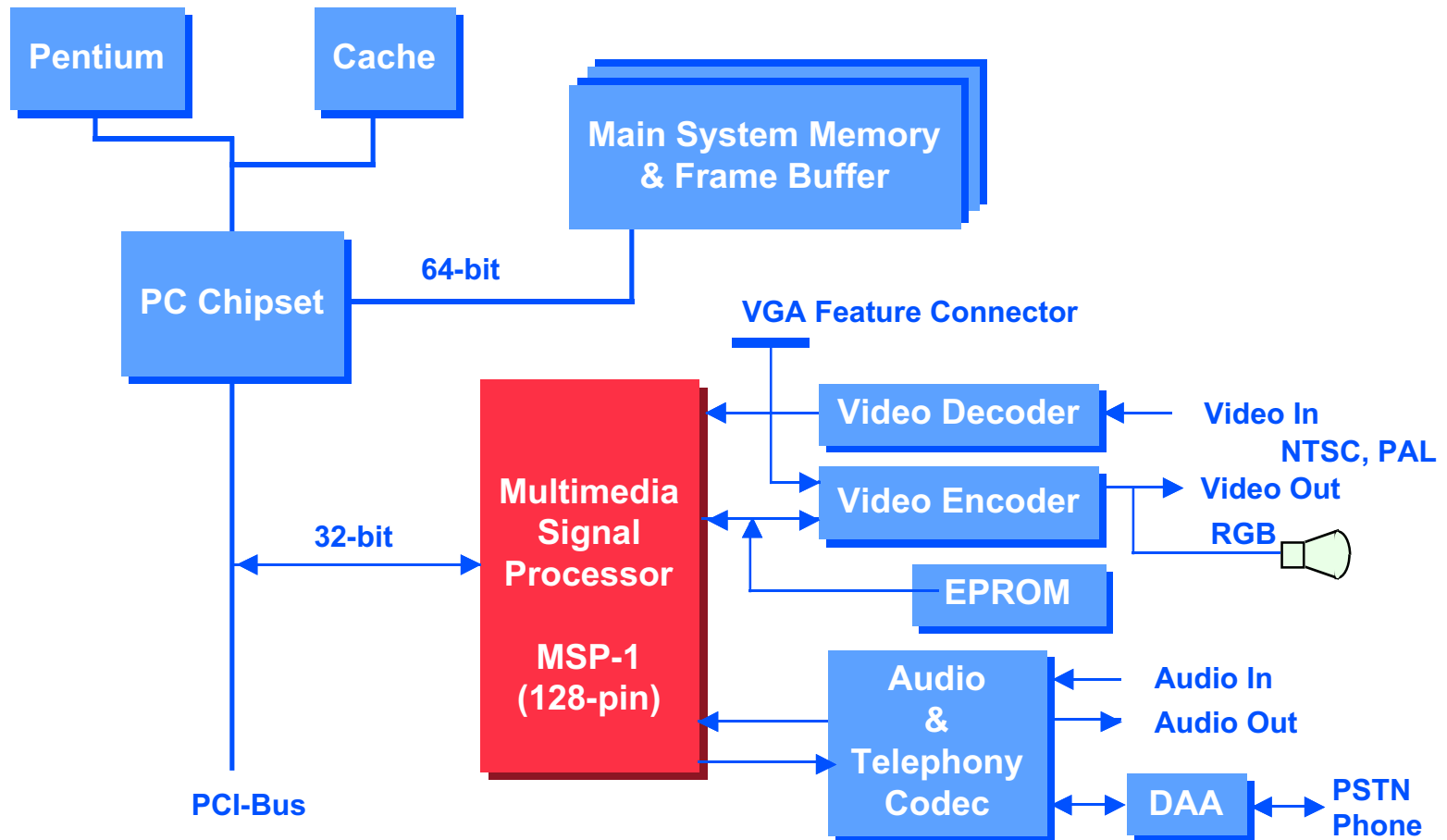
MSP-1 Micro Architecture



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MSP-1 System Architecture

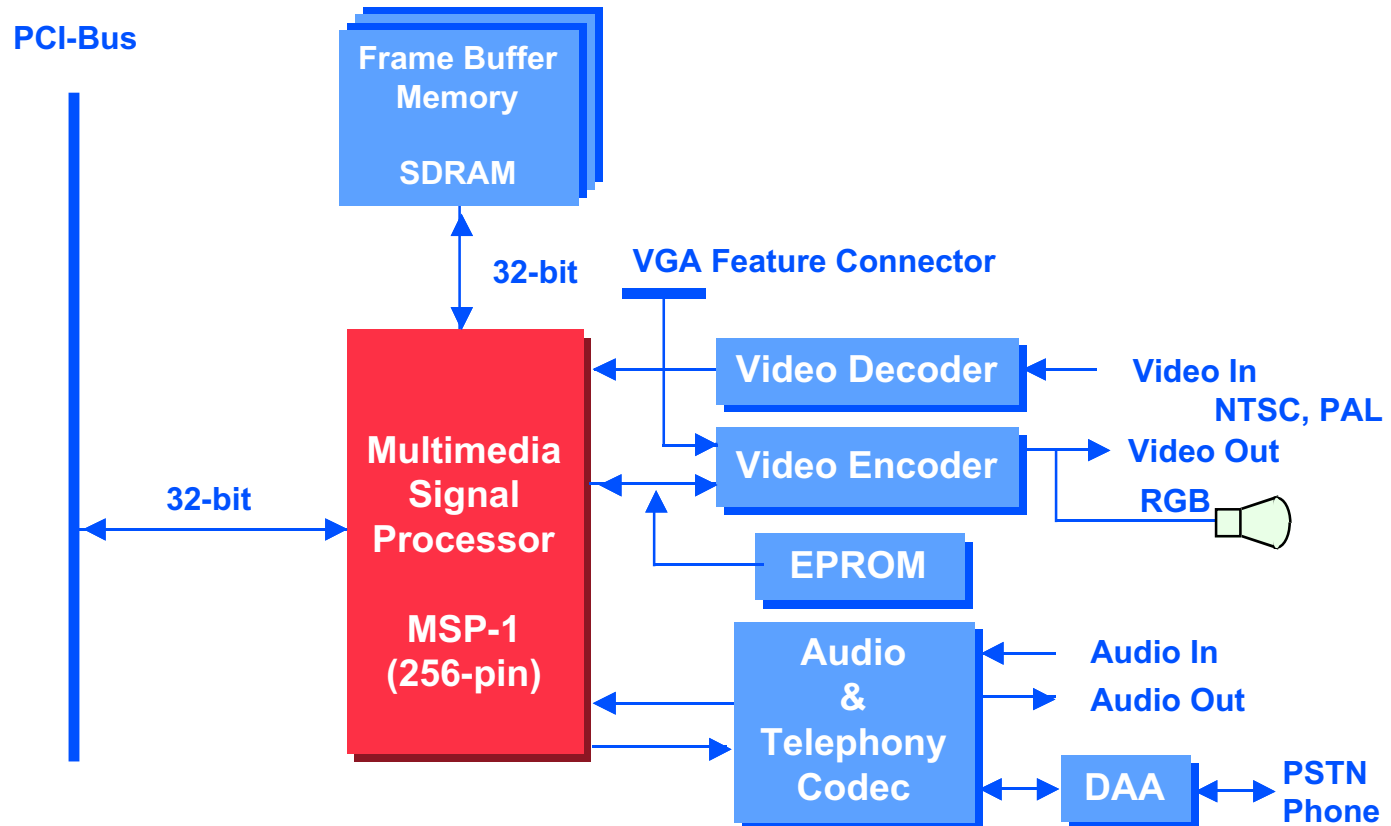
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MSP-1 with External SDRAM



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Physical Specifications

- **Based on 0.5/0.35um 3.3v CMOS Technology**
- **128-pin Package (without Frame Buffer Memory)**
- **256-pin Package (with 32-bit Frame Buffer Memory)**
- **4.0 watts Power Dissipation (worst case)**

- **Operational Speed @ 100MHz**
 - **6.4 BOPS 8-bit Integer**
 - **3.2 BOPS 16-bit Integer**
 - **1.6 BOPS 32-bit Floating-point**

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Samsung MSP Advantage

- **Media CPU for PC-based and consumer products**
- **Integrated Accelerator for DirectX APIs.**
- **Can be standalone solution, but PC content compatible**
- **Open Architecture**
 - **Comprehensive S/W development tools**
 - **Initial turnkey solution of MSP H/W and base applications firmware**
 - **Broad ISV & 3rd Party Community**
- **2nd Generation Architecture. Scaleable for cost performance.**
- **Highly effective use of silicon => Best “Cost vs. Performance” Solution.**
- **Supported by high process technologies & manufacturing.**

