

SONICS



System-Level Design Panel

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Application Examples: Consumer SoCs

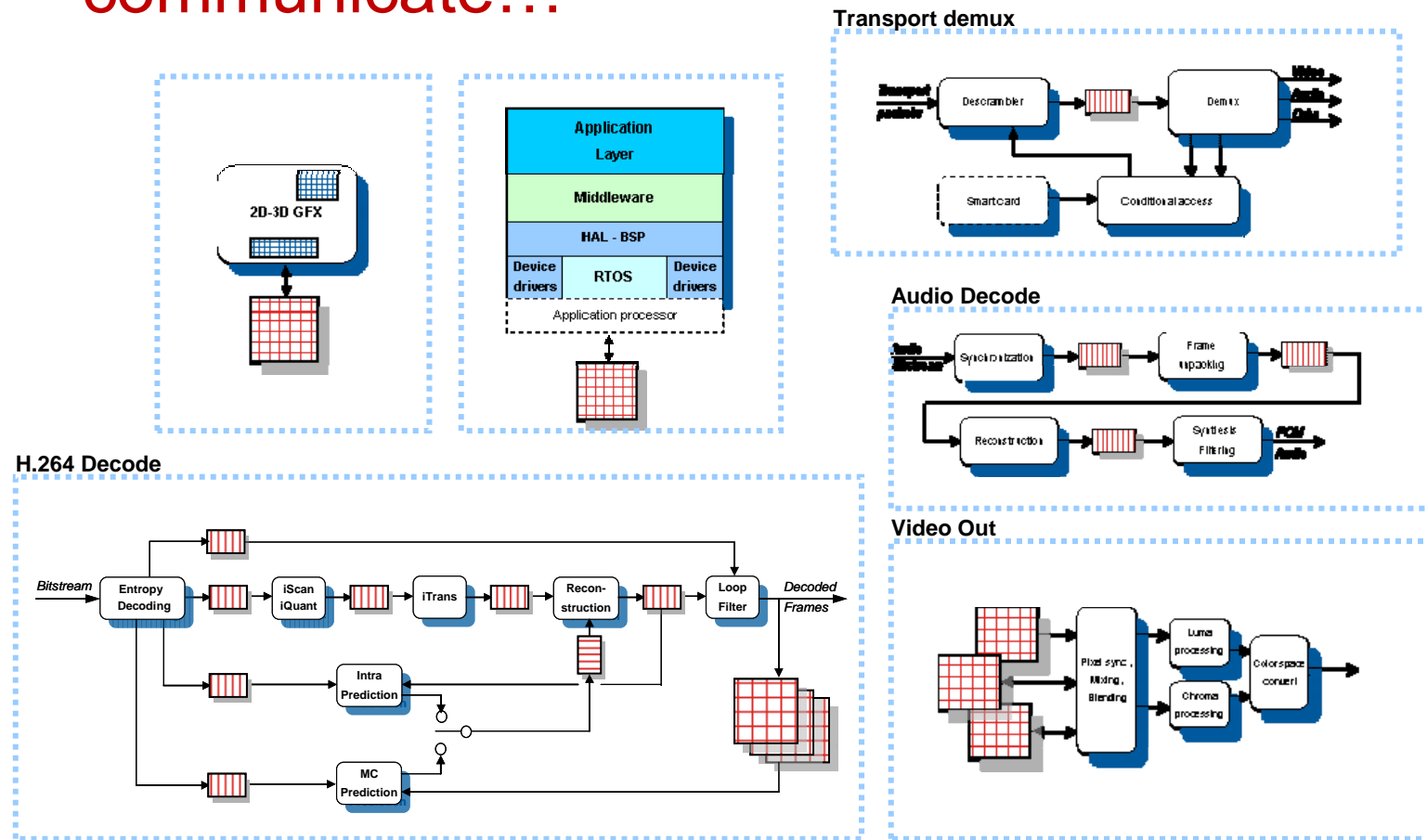
- What are some key applications for consumer SoCs?
- Key characteristic: relentless push for higher quality user experiences – at minimum system cost!



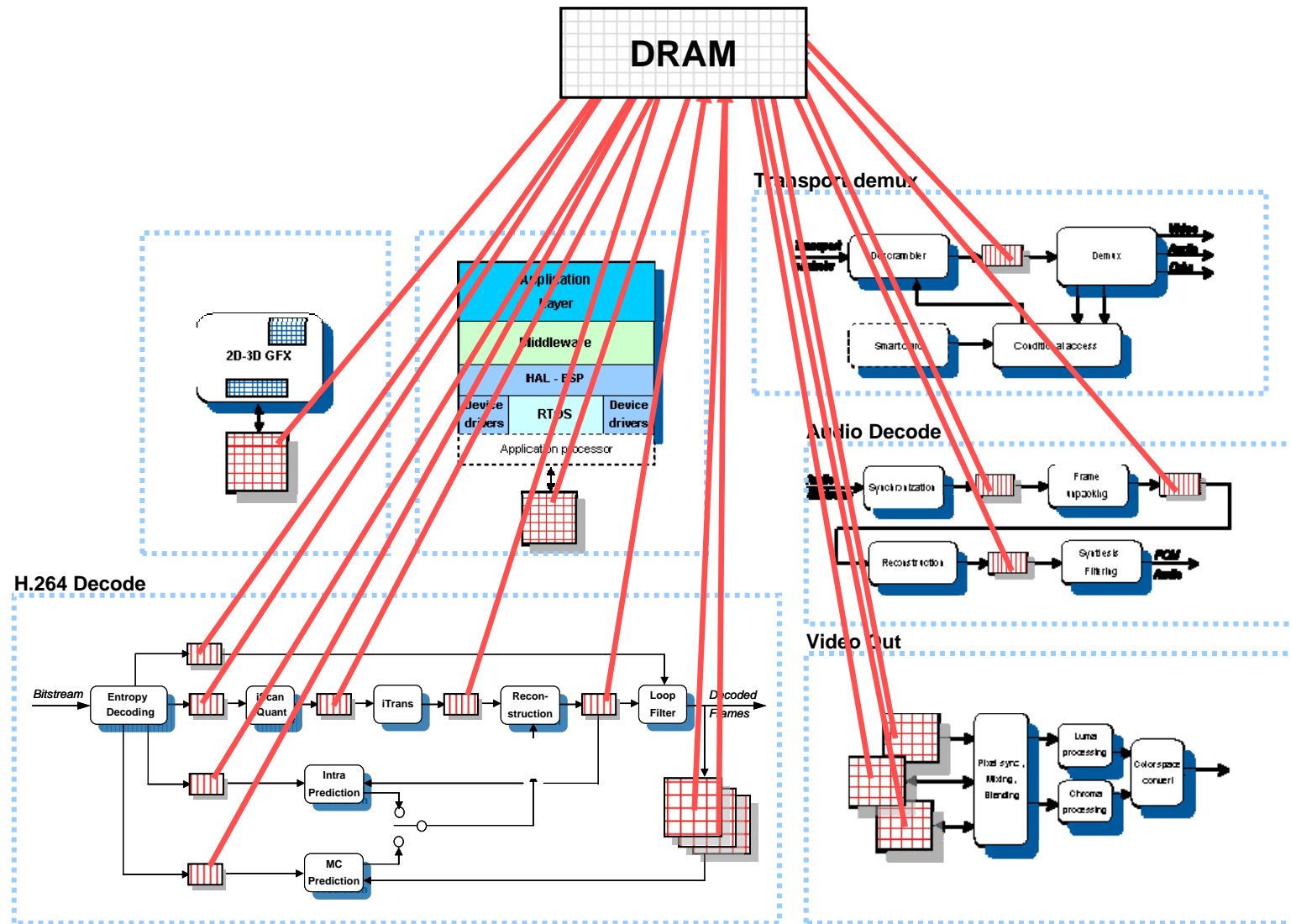
Concurrency in Consumer SoCs



Consumer SoCs process data in parallel, but communicate...



Concurrency in Consumer SoCs



- **Assertion: video SoC applications have >> 50% of system traffic to/from external DRAM**
 - And have (soft) real time performance requirements
- **System cost is driven by memory system cost**
 - Consumer volumes and price points demand cheapest DRAM configurations that support required throughput
 - Throughput needs often dictate multiple DRAMs in parallel, resulting in excess bit capacity – and cost
- **Implications:**
 - SoC architecture is *mostly a fan-in tree* to external DRAM
 - Maximizing *delivered DRAM throughput and efficiency* are key
 - Architectural exploration needs *accurate performance models*

■ Performance analysis platform

- Cycle accurate interconnect and memory system models
 - Accurately model contention and DRAM access patterns
 - Configurable to match application requirements
- Representative traffic models for initiators
 - Address patterns, burst lengths, read/write mix, timing
 - Performance *not* sensitive to data itself
- Collection of application *performance scenarios*
 - Cover required use cases for SoC
 - Consider performance and power constraints
- Rich instrumentation to analyze results
 - Interactive & visual for exploration
 - Batch-mode for validation

- **Modeling language: SystemC**
- **OSCI TLM 2.0**
 - High level (PV) for initiators
 - Detailed (CA) for interconnect/memory system
 - Adapters between these abstractions
 - Example: OCP-IP TLM Kit (www.ocpip.org/systemc_ocp_models.php)
- **Configurable interconnect/memory system models**
 - Cover interface protocols (AXI, OCP, AHB, ...)
 - Support relevant DRAMs (DDR2/3, LPDDR1/2, ...)
 - Enable rapid exploration (topology, DRAM config., arbitration)
 - Example: Sonics interconnects and MemMax scheduler
- **SCV Transaction Recording API**
 - Standard interface between performance models and analysis
 - Example: Sonics SPA
- **New TSV-enabled DRAMs**
 - Proposed JEDEC WideIO standard