BurstLink

Techniques for Energy-Efficient Video Display for Conventional and Virtual Reality Systems

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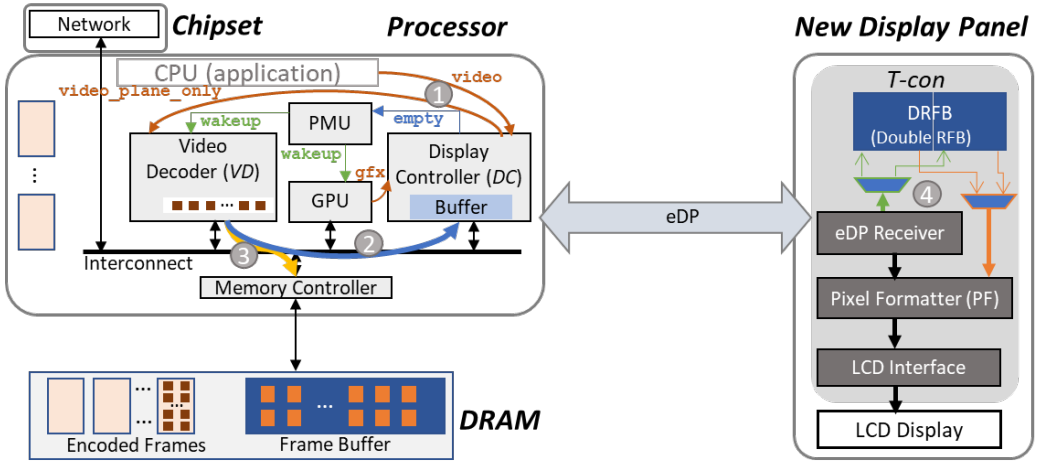
Our Goal: an Energy Efficient Video Streaming Scheme

- Planar and virtual reality (VR) video streaming consumes significant system energy due to high power consumption of major system components (DRAM, display interfaces, and display panel)
- We find two major inefficiencies in state-of-the-art video streaming schemes: 1) unnecessary data movement to/from DRAM, 2) underutilization of eDP interface bandwidth
- **Our Goal** is to improve energy efficiency of planar and VR video streaming by leveraging display panel local memory to eliminate buffering frames in main memory
- **BurstLink Key idea:** directly transfer a full decoded frame from the video-decoder (or GPU) to the display panel in a burst, exploiting the display interface's maximum bandwidth



BurstLink: Key Results

- BurstLink reduces the energy consumption of the host DRAM by eliminating data movement to/from the DRAM frame buffer

- BurstLink increases the system's idle-power state residency by reducing the usage of the processor and the display subsystem since they are active only during the burst period

- We evaluate BurstLink using an analytical power model that we rigorously validate on an Intel Skylake mobile system. BurstLink:
  - Reduces system energy consumption for 4K planar/VR video streaming by 41%/33%
  - Provides an even higher energy reduction in future video streaming systems with higher display resolutions and/or display refresh rates

- We **show** that using main memory (DRAM) as a communication hub between system components is energy-inefficient
  - BurstLink uses small remote memory near the data consumer to significantly reduce the number of costly main memory accesses in frame-based applications

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