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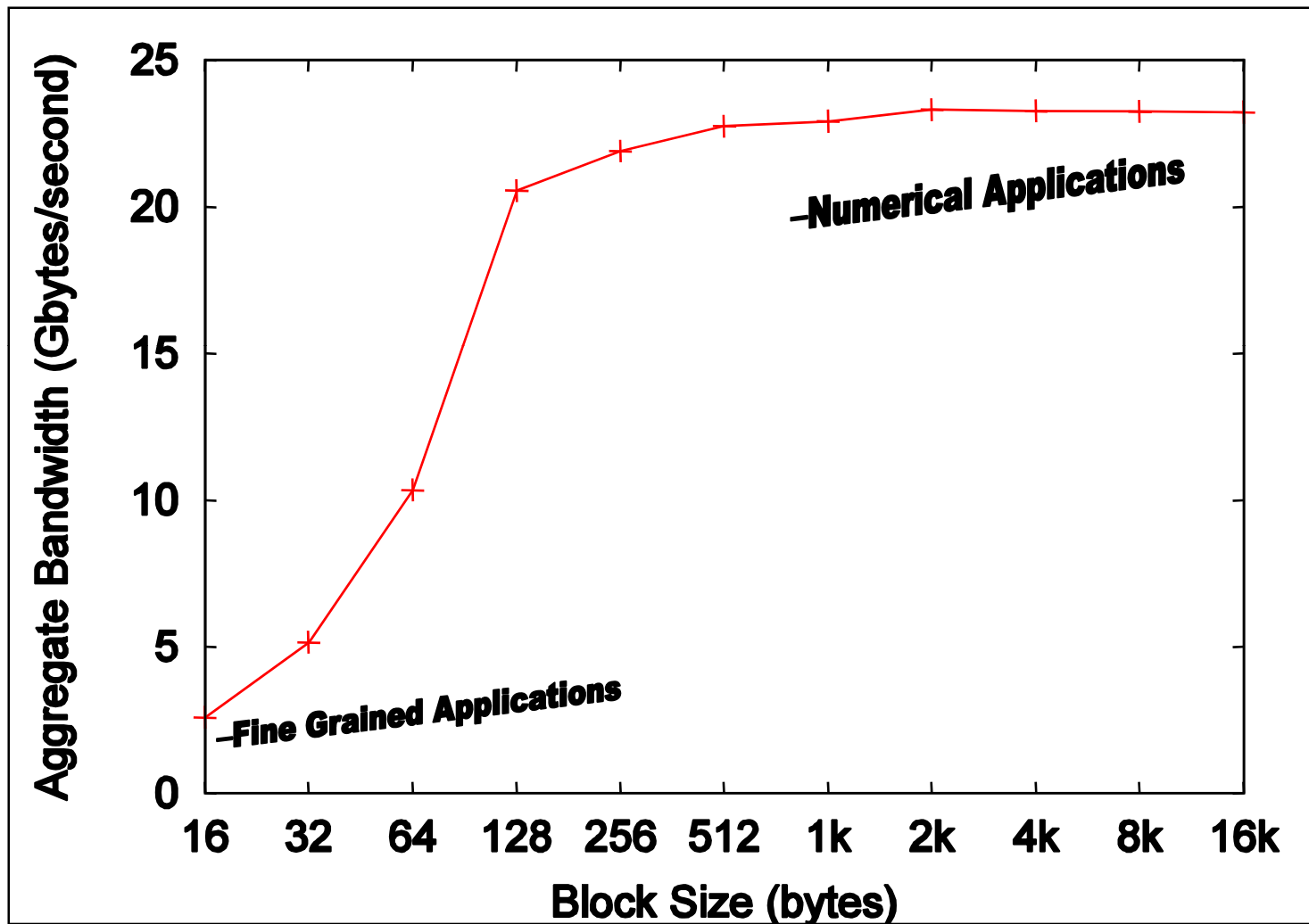
Feeding the Beast: Challenges and Opportunities for Streaming Applications on the Cell B.E Processor

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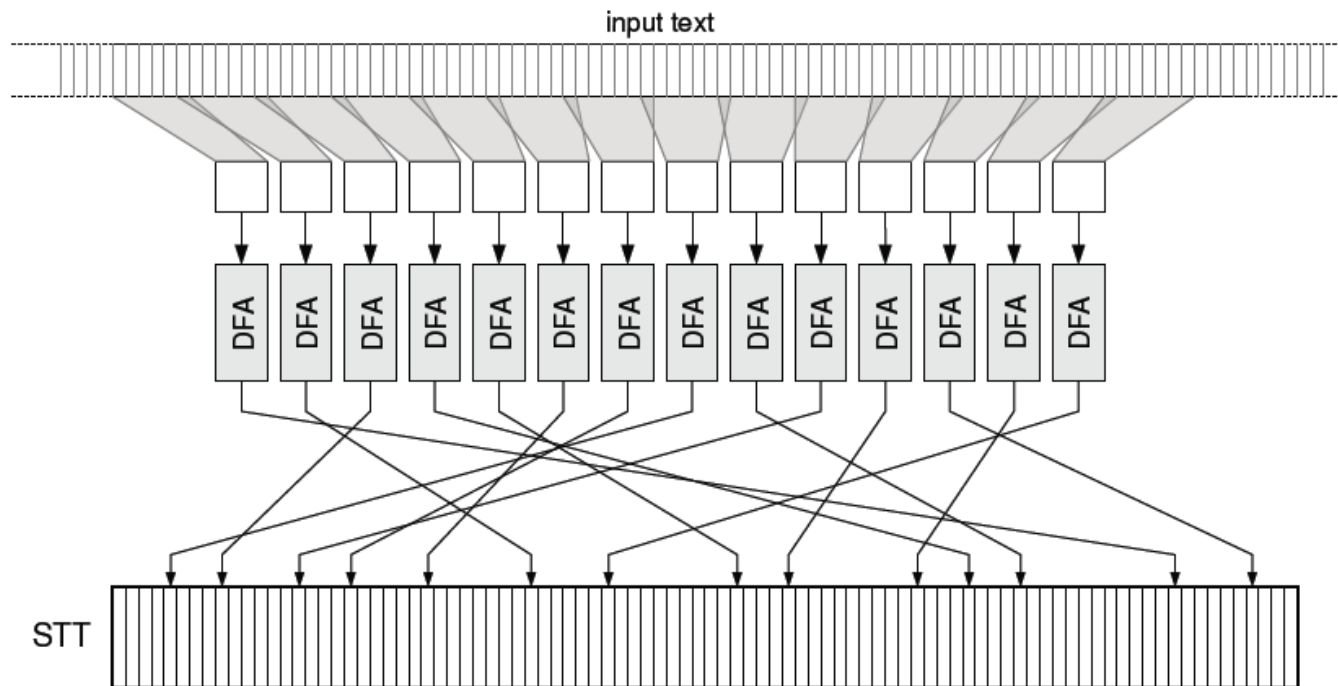
Streaming Applications on the Cell/B.E Processor

- **Traditional emphasis on computational performance**
 - ▶ **Several classes of applications are increasingly limited by the main memory latency/bandwidth**
 - **Cache size is steadily increasing, but application working sets grow faster**
 - **We need to carefully optimize the access pattern to the memory hierarchy, in many cases the primary bottleneck**
- **With the Cell/B.E. processor we can explicitly “orchestrate” the data transfers between main memory and the local store**
 - ▶ **Through the Memory Flow Controller (MFC) we can post DMA commands to gather arbitrary segments of memory in local store**
 - ▶ **Extremely powerful mechanism to efficiently support streaming applications**

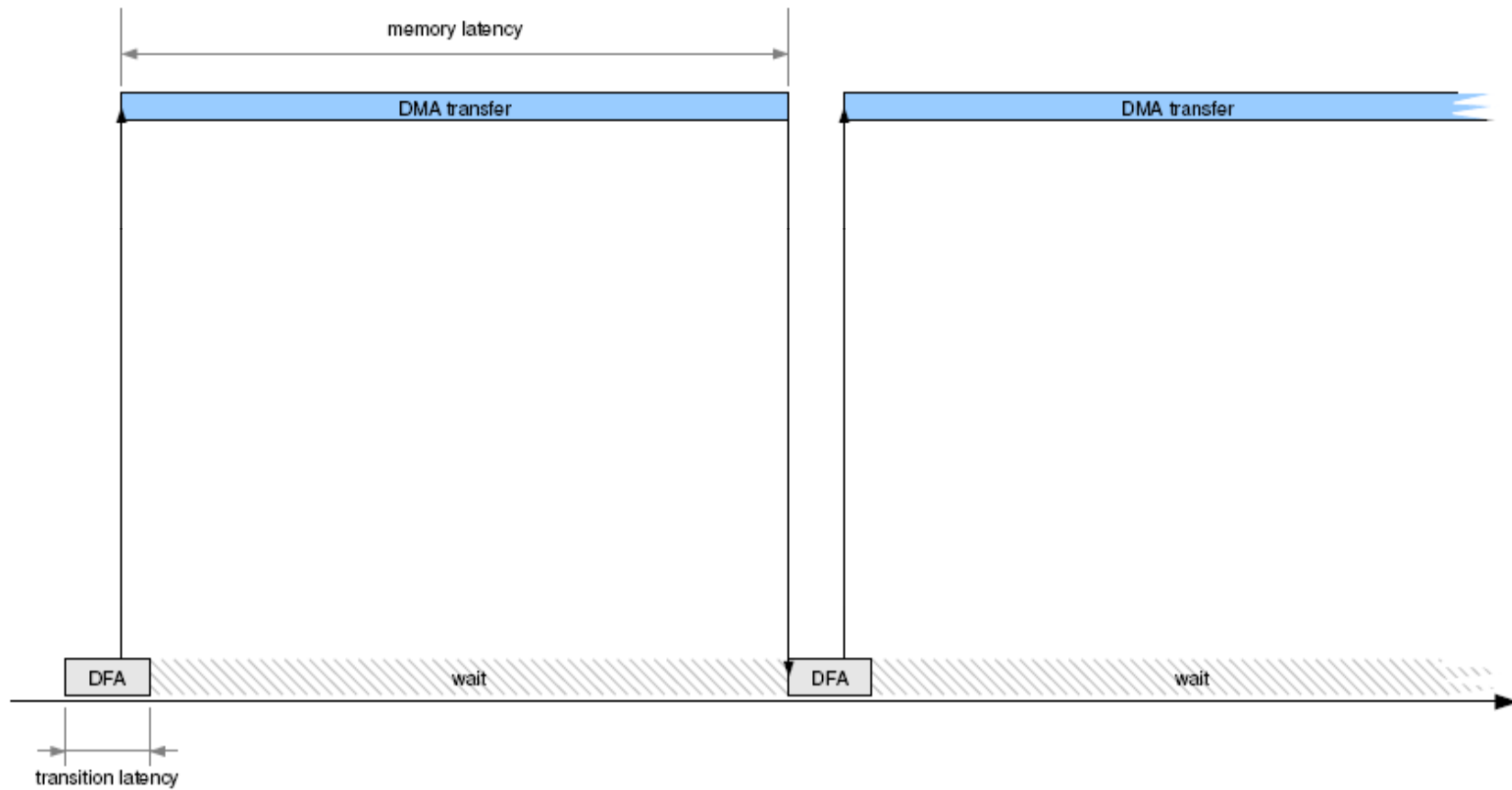
Aggregate Main Memory Bandwidth



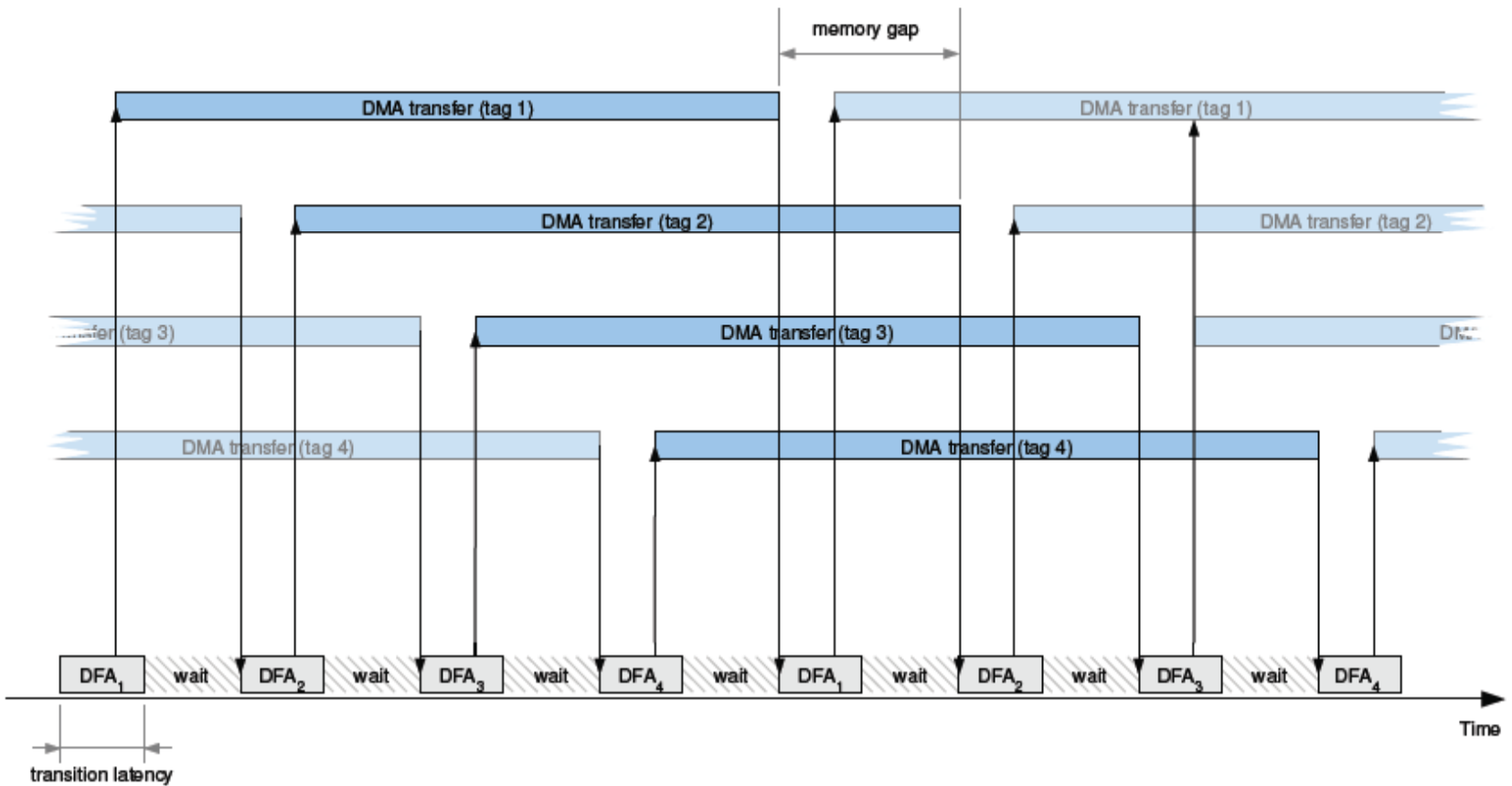
Fine Grained Streaming Applications



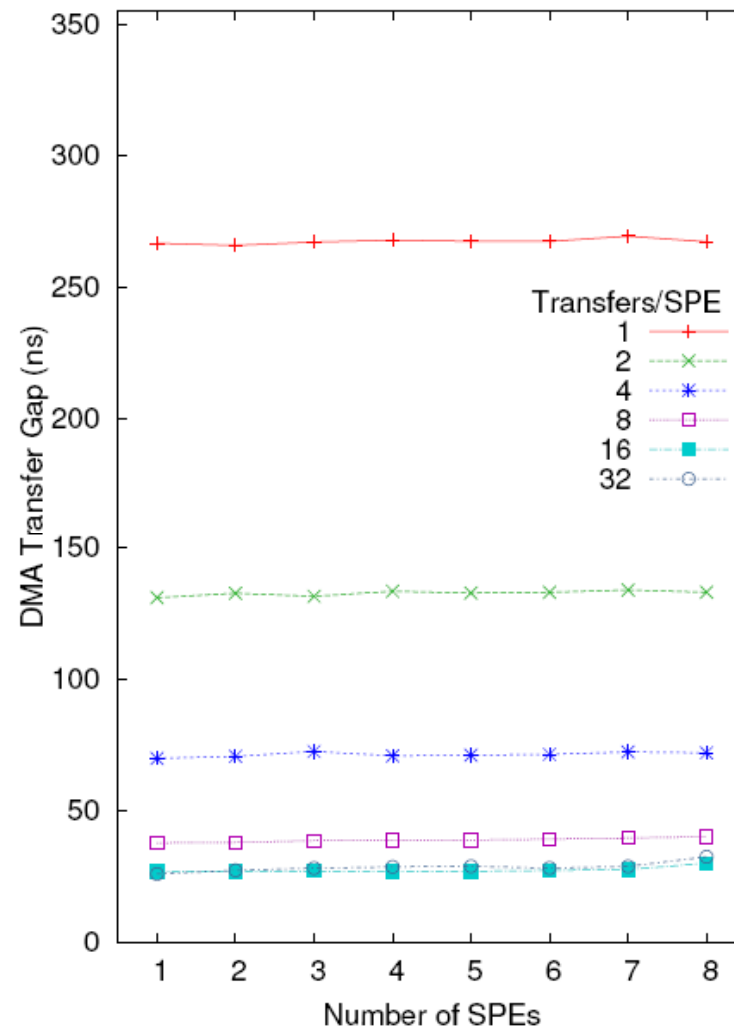
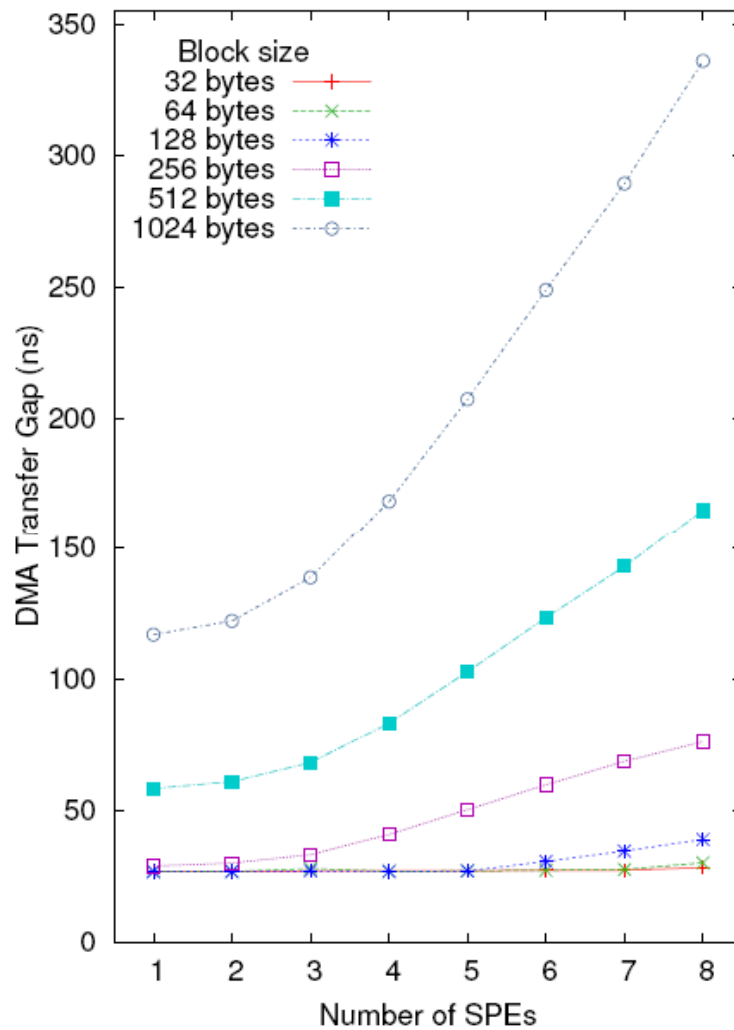
Hiding Main Memory Latency



Fighting the Memory Wall



DMA Performance: Picking the Right Parameters



A *Virtual* L3 Cache

- **By properly streaming memory requests (DMAs) we can implement a virtual L3 cache**
 - As large as the TLB coverage of each Processing Element
 - Several Gygabytes
 - With an access latency of 30 nanoseconds
 - Unique opportunity for streaming applications

DMA Transfer Gap vs. Throughput

