



An Efficient Scheduling Approach for Concurrent Packet Processing Applications on Heterogeneous Systems

Eva Papadogiannaki and Sotiris Ioannidis
 FORTH
 {epapado, sotiris}@ics.forth.gr

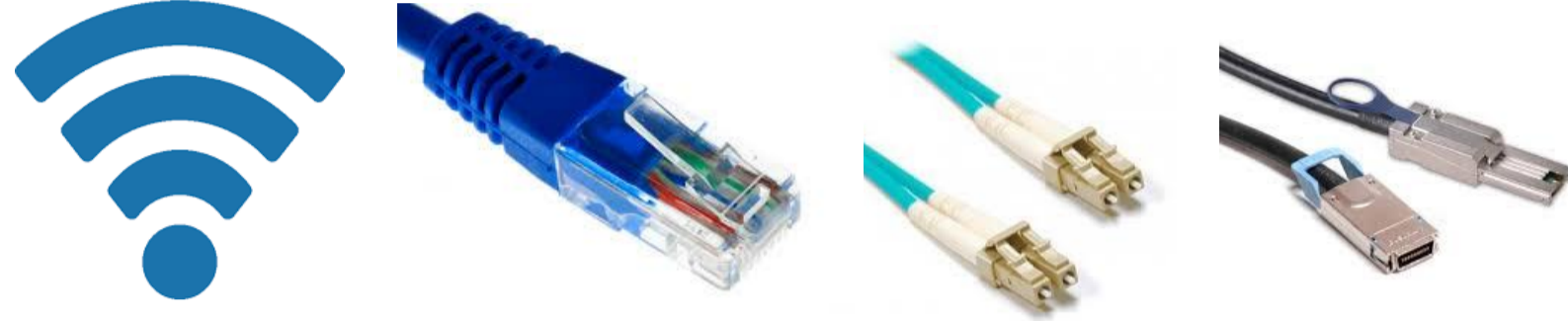
Programming heterogeneous processing units on modern commodity systems




OpenCL



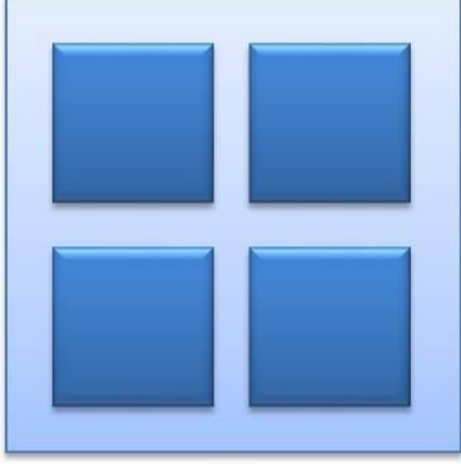
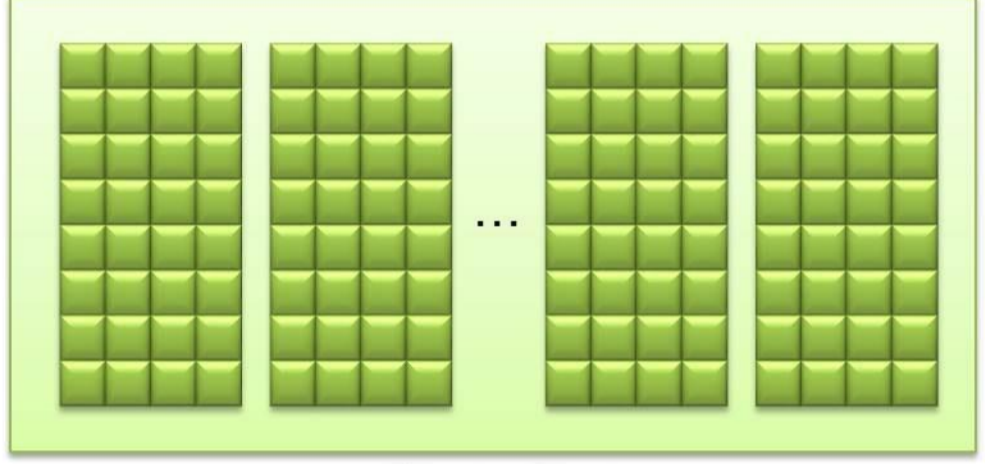
Heterogeneous traffic characteristics



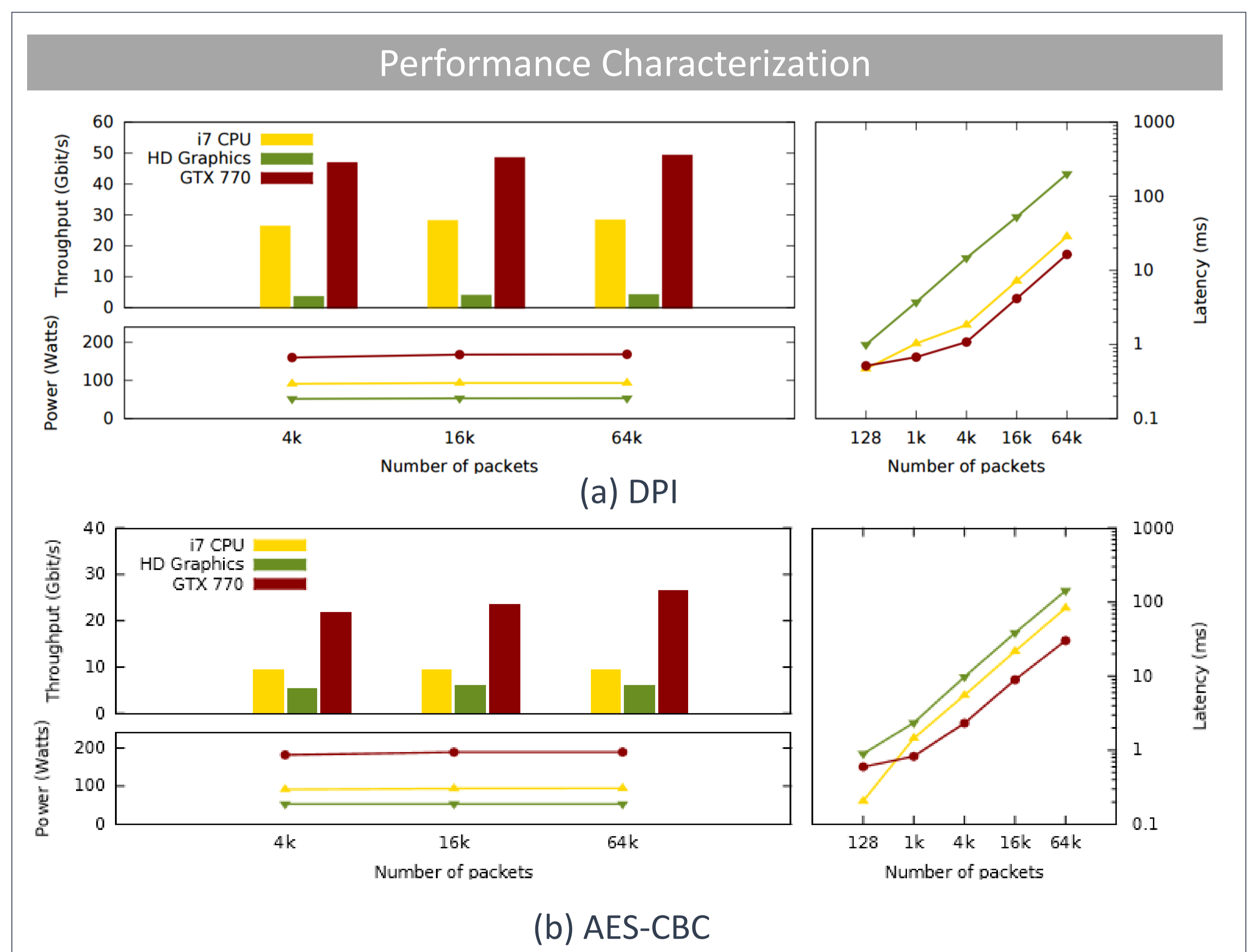
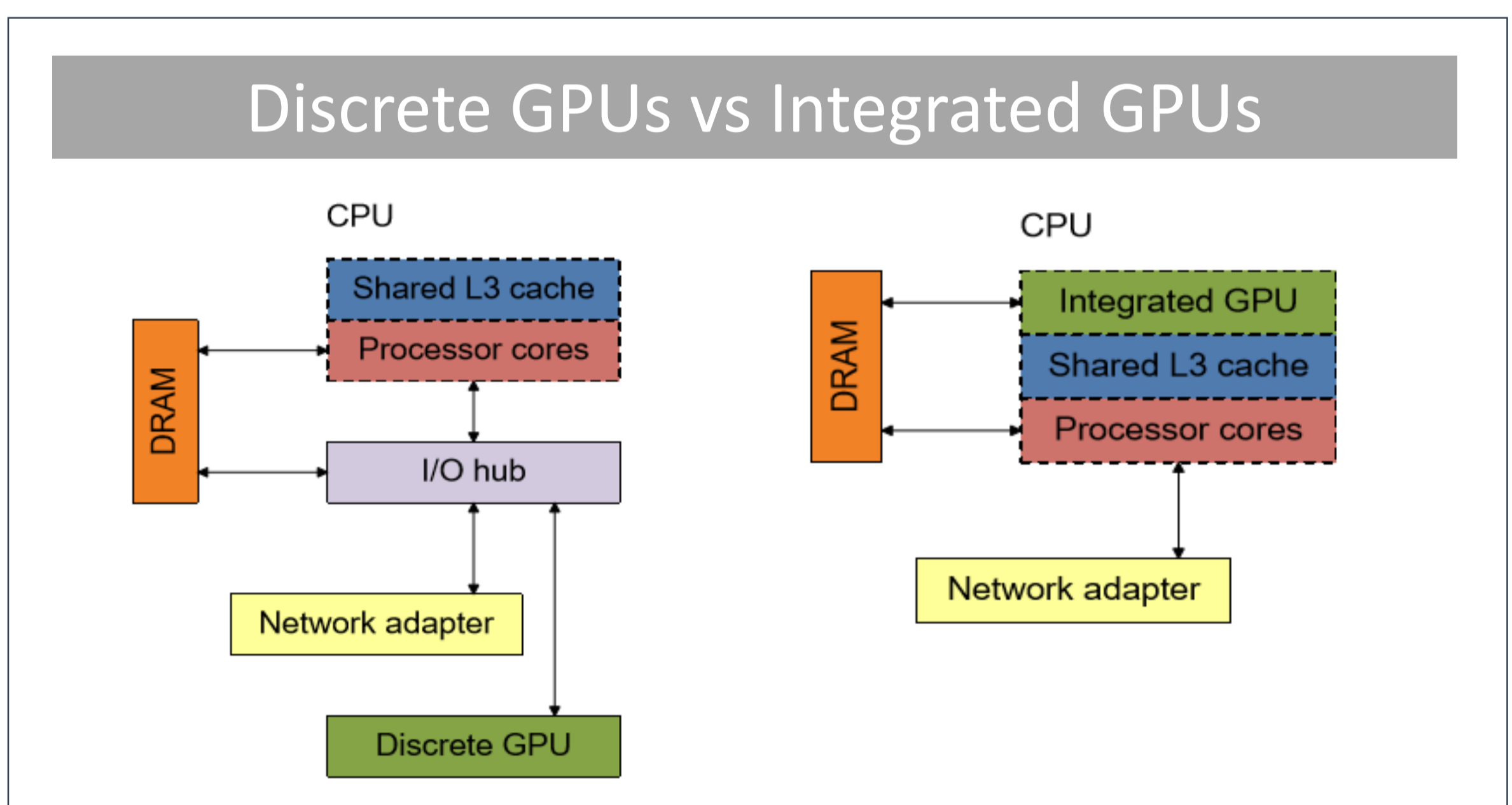
Heterogeneous network packet processing applications



CPU vs GPU

- CPUs handle branch-intensive and latency-critical workloads.
- GPUs are designed for data-parallel workloads, leveraging the thousands of cores.



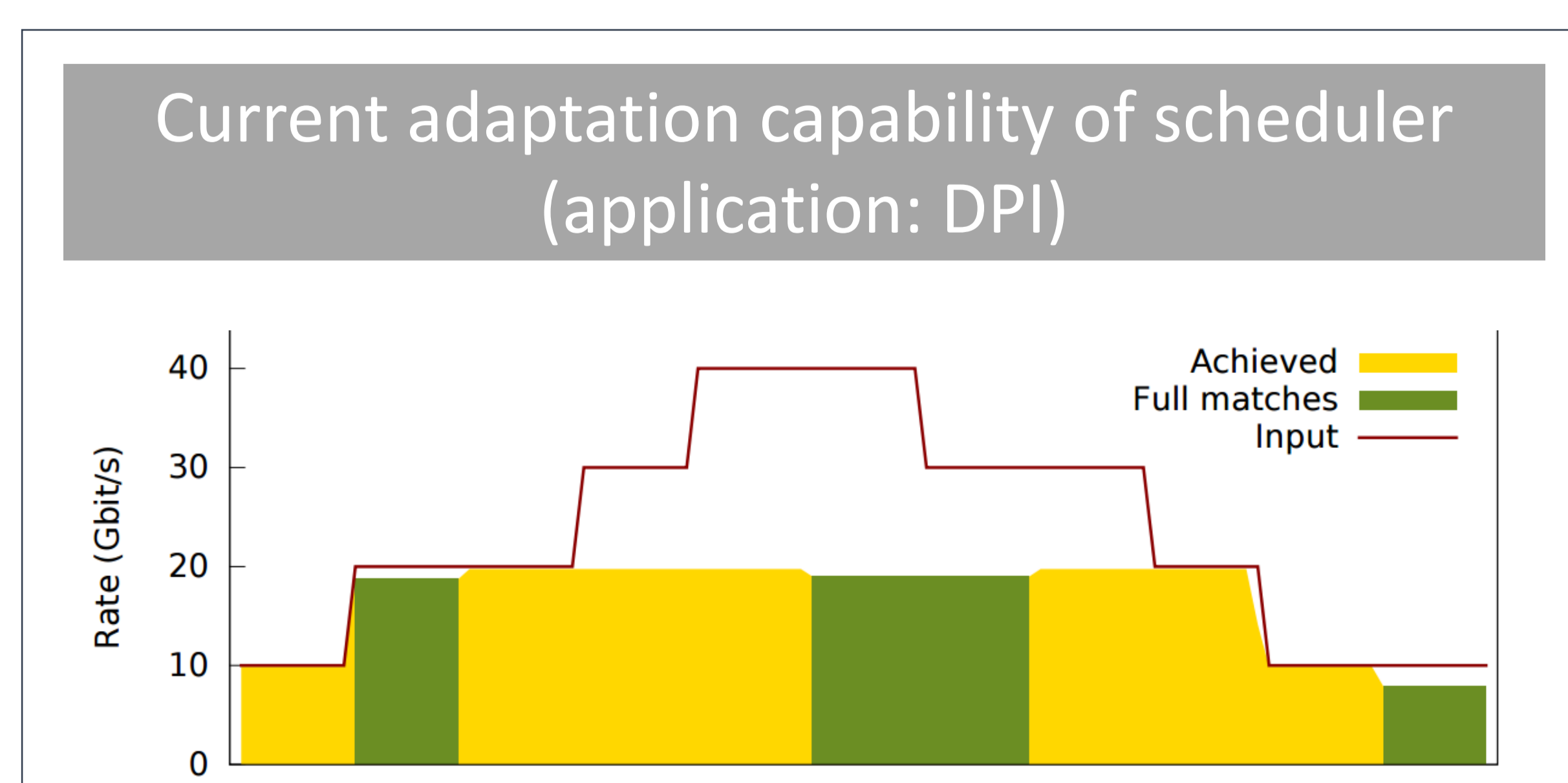
Challenges

- TDP limit and thermal constraints.
- Contention for hardware resources.
- Contention for software resources.
- Not a single configuration is the best fit for all the applications.

	CPU	iGPU	dGPU	CPU iGPU	CPU dGPU	iGPU dGPU	CPU iGPU dGPU
IPv4 forwarding	✓						
MD5		✓			✓		
DPI			✓	✓			✓
AES				✓		✓	

The goals of our scheduler

- Efficient scheduling of concurrently running network packet processing applications on heterogeneous processors.
- Adaptive and effective network traffic management and distribution.
- Energy efficiency.



Scheduling policies for each application

- High throughput.
- Low energy consumption.
- Low latency.