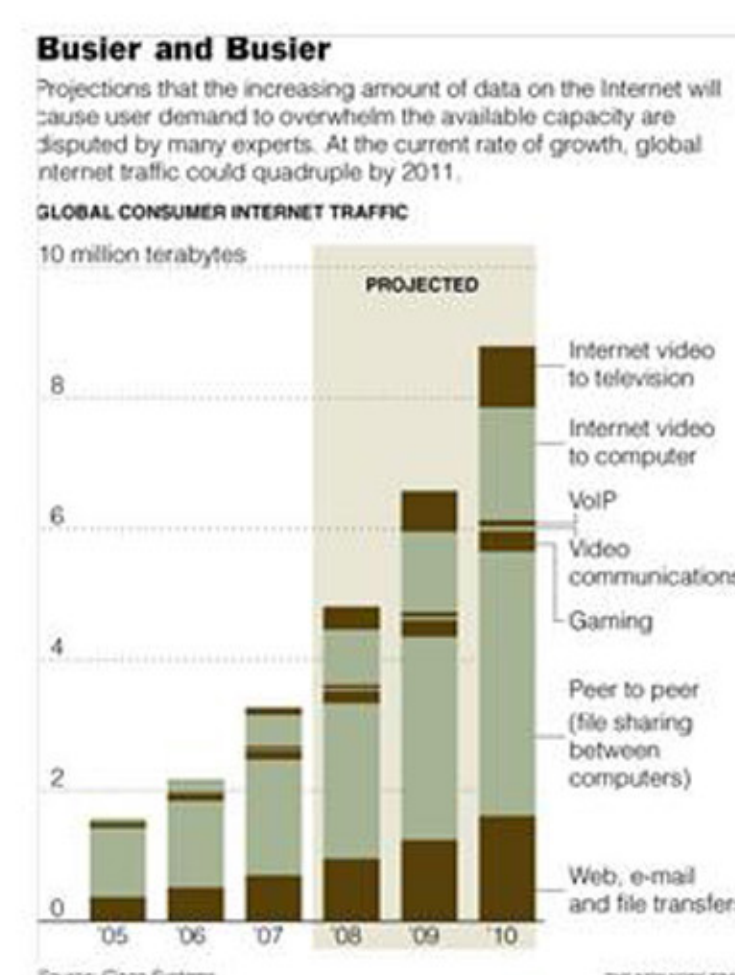


# Using GPUs for Internet Routing Processing

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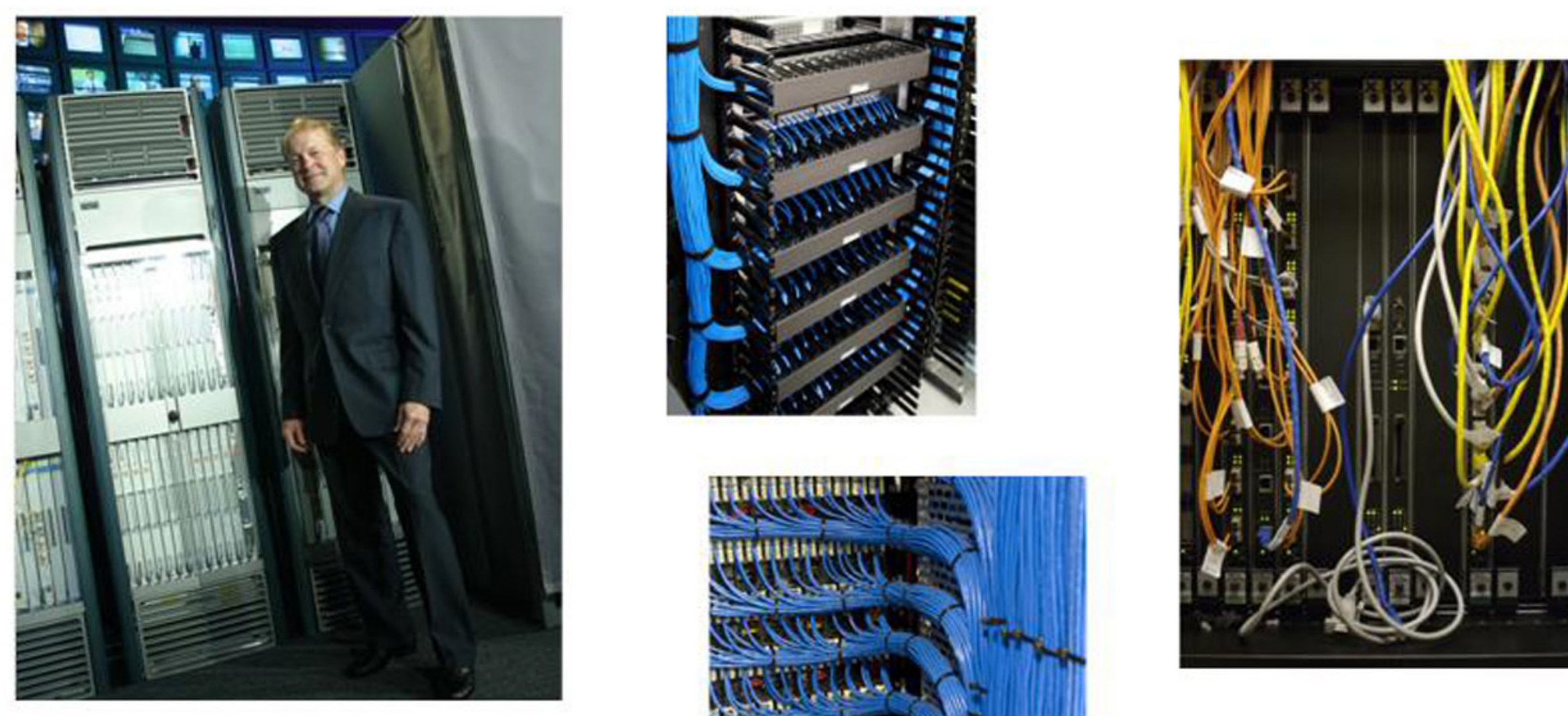
## Motivation for Packet Processing on GPUs

Internet traffic is still fast increasing



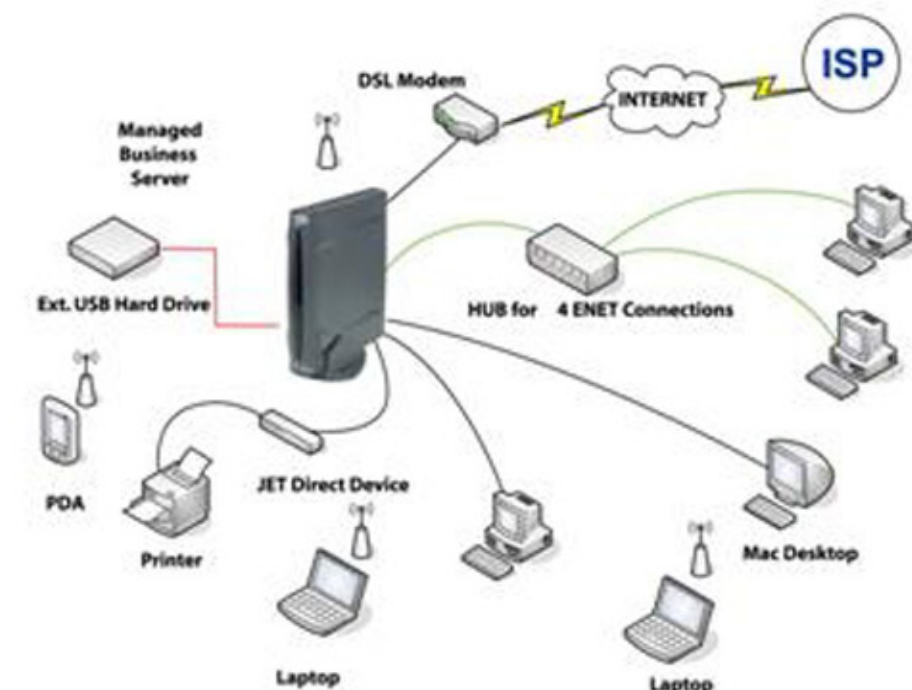
Proprietary routers offer amazing packet throughput

But they are expensive, incompatible, hard to upgrade and manage

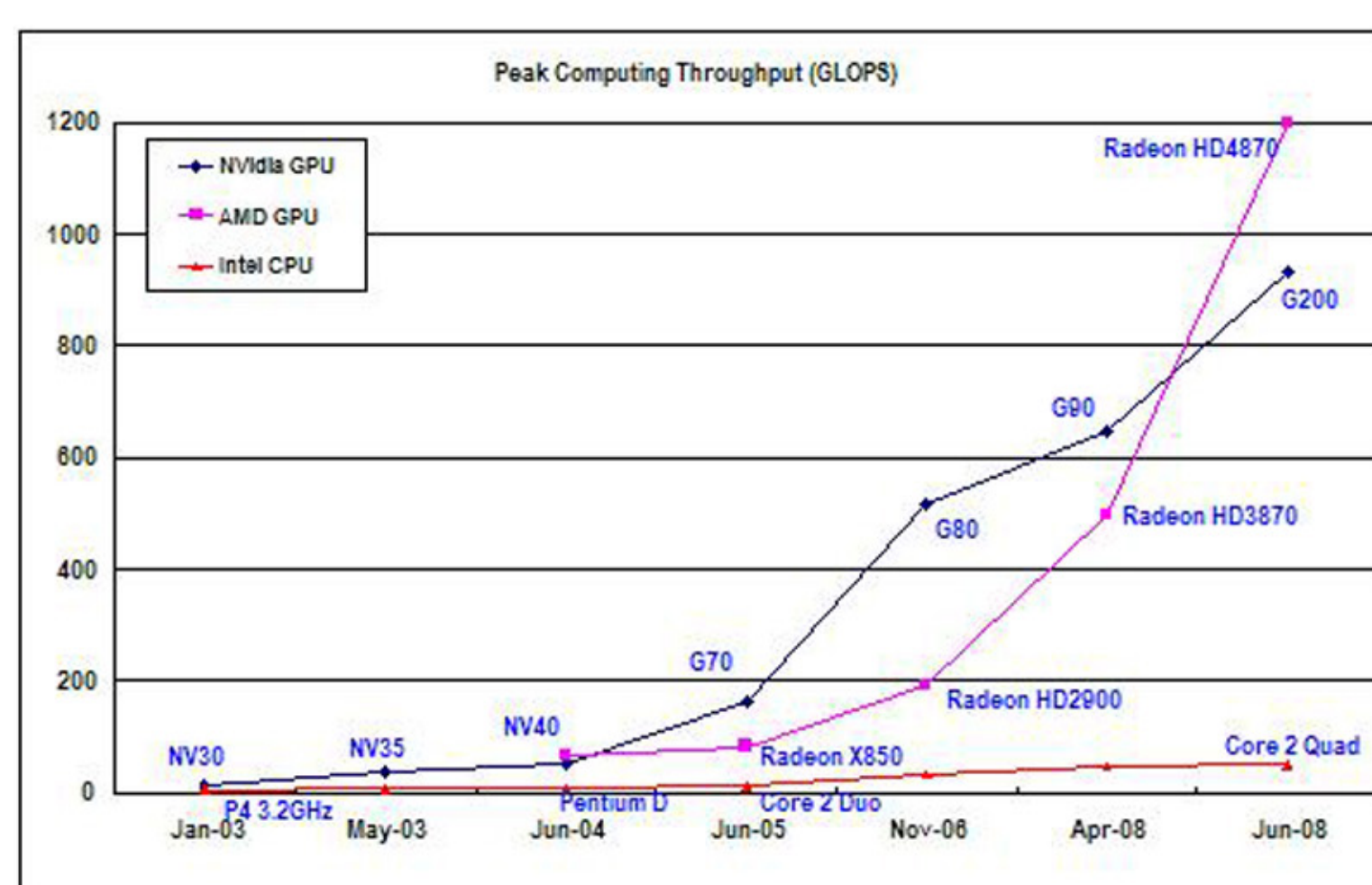


Software routers are flexible and

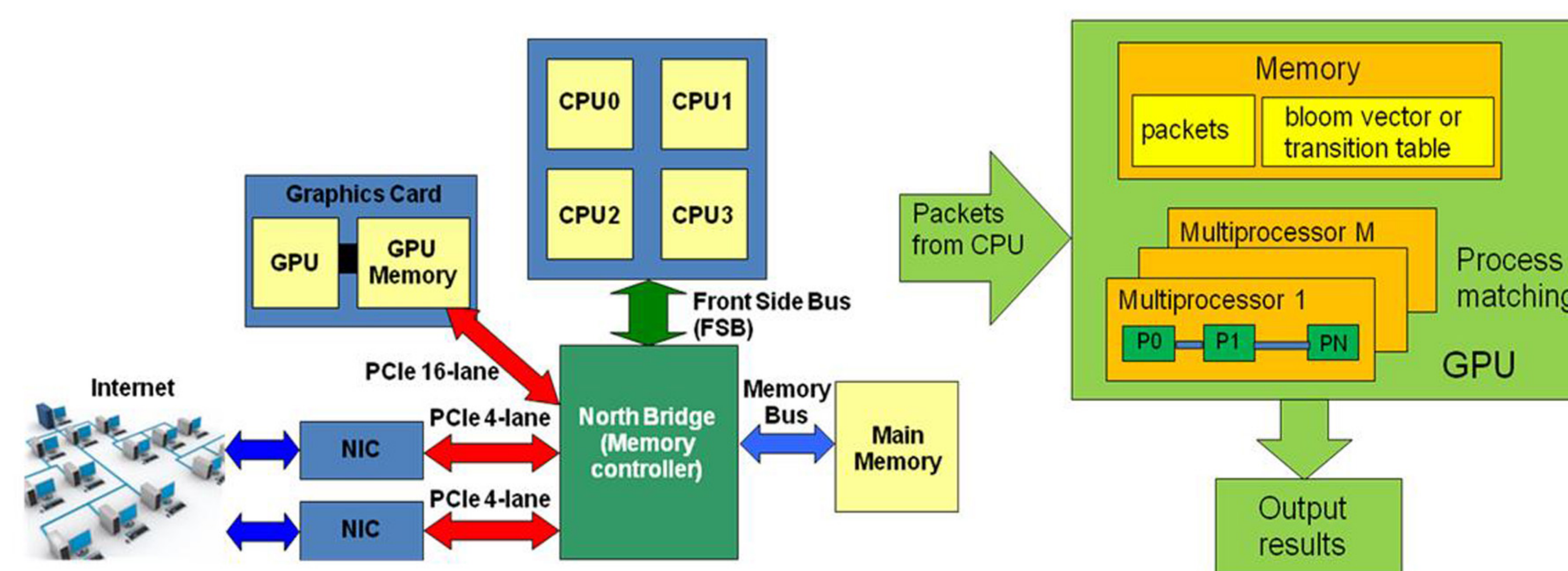
But magnitudes slower



GPUs provide a cost-efficient, high-performance computing platform



## Internet Routing Processing on NVidia GPUs - Reconciling Throughput and Programmability

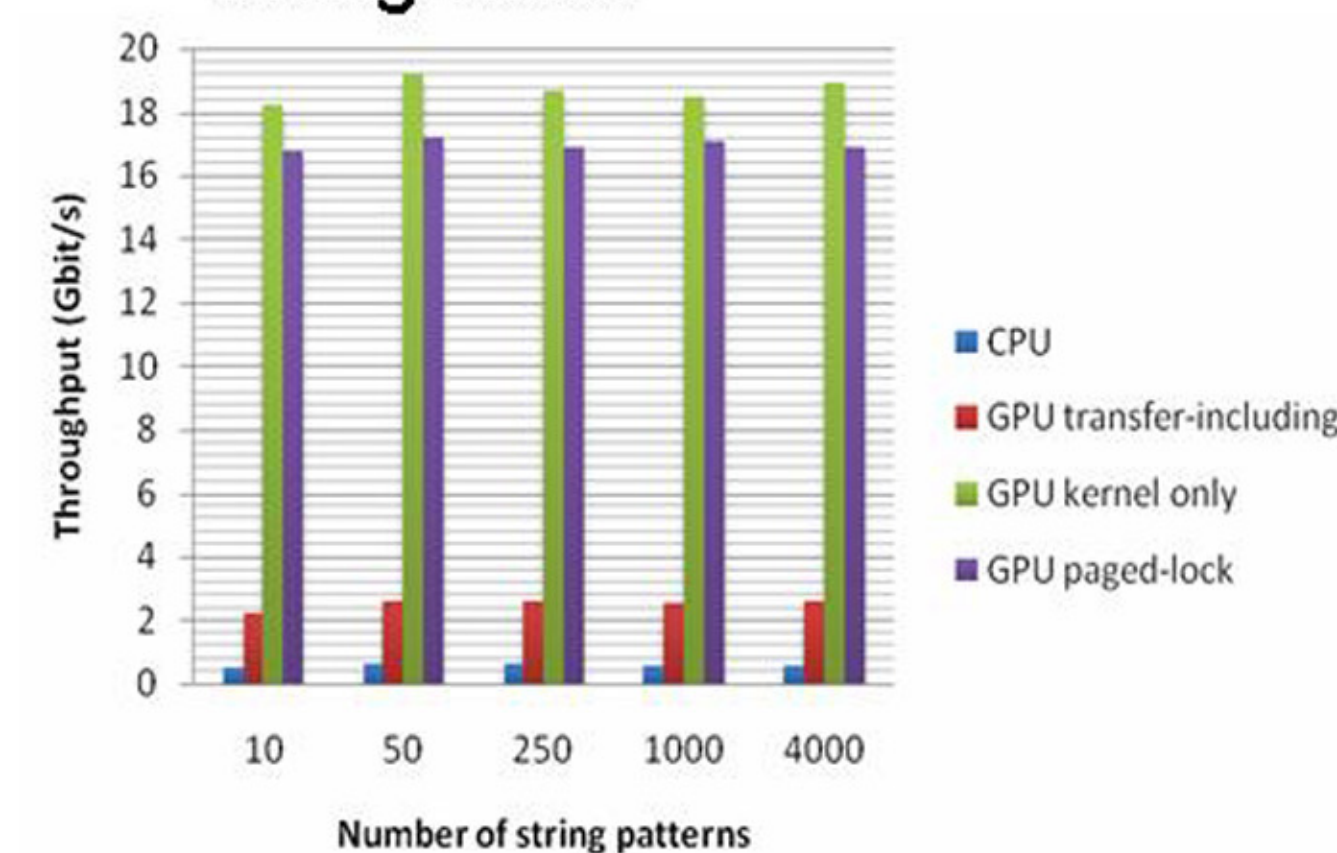


### Router applications

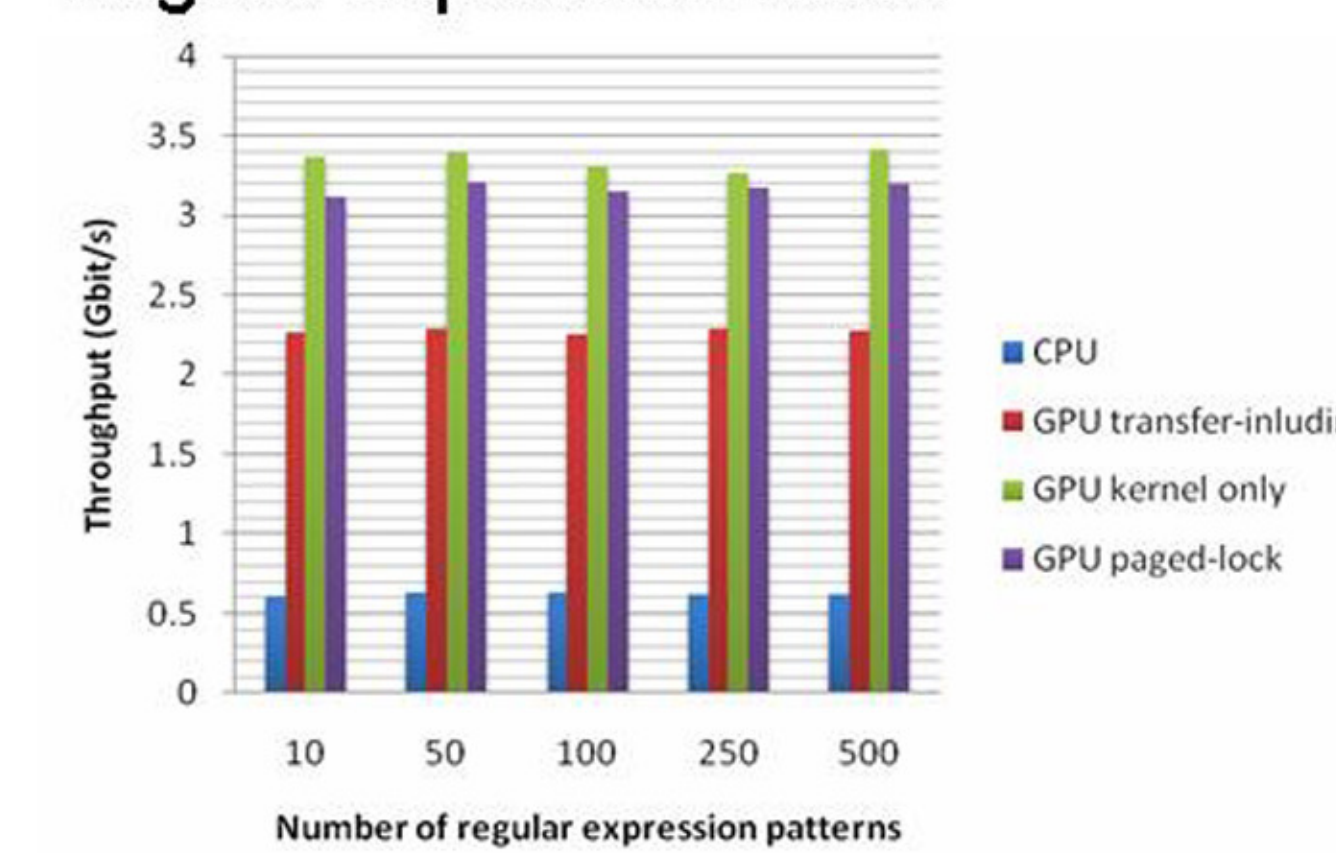
- Route table lookup
  - Trie based longest prefix matching
- Network intrusion detection
  - Bloom filter based string matching
  - Aho-Corrick algorithm for regular expression matching

## Results

String Match



Regular Expression Match

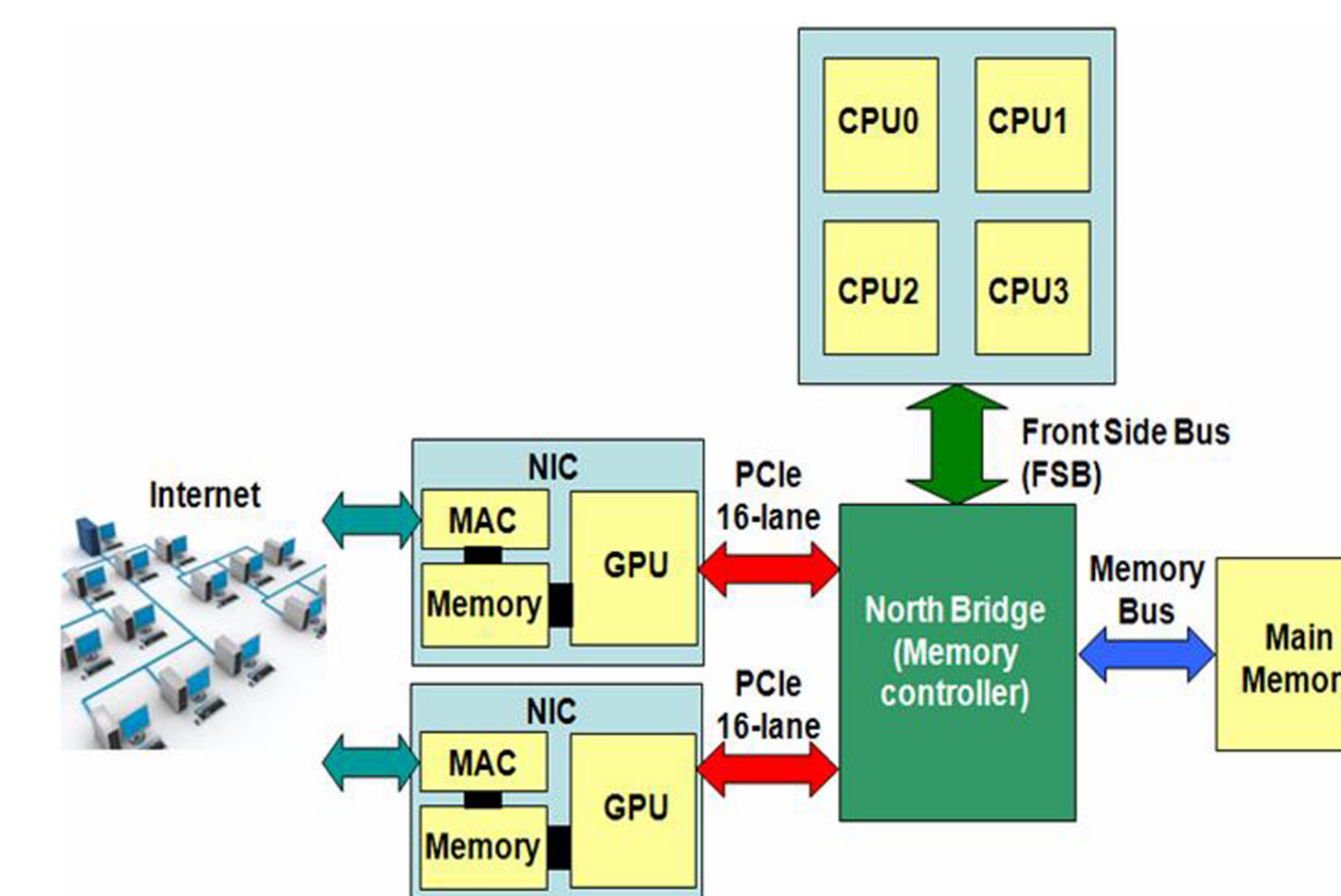


Hardware	Algorithm	Throughput (Gbit/s)
NVidia GTX280 GPU	AC	9.3
NVidia GTX280 GPU	Bloom filter	19.2
Xilinx FPGA	AC with Bloom filter	10
NVidia 8600GT GPU	Gnort AC2	1.4
Intel P4 3.4GHz	Snort AC	0.6

### Route Table Lookup

Packet trace	# entries of route table	# packets of traces	CPU time (ms)	GPU time (ms)	Speed up
FUNET	41 709	99840	22670	3459	6.6X
RIS 1	243667	121465	24875	3827	6.5X
RIS 2	573810	144908	25637	4135	6.2X

## A Look into the Future



### GPU Based Software Router?!

- Smarted packet scheduling
  - Remove need to batch packets
- Shorter latency for packet processing
  - Integrate GPU on linecard?
- Better integration
  - 3-D VLSI