



**Myricom**

*Extreme Performance*

***Hotl'12 Panel: The network is moving into the CPU socket***

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## Why Integrate a technology onto Socket

- Technically done time and time again, mostly business motivation that reflects demand and technology maturity
  - Discrete vs Integrated graphics, more recently software Raid
- Technology must be standardized, mature and widely accepted
  - Easier to integrate when techniques and interfaces are fixed
  - Technology must be overwhelmingly useful to target audience
    - Power savings are only gained if the underlying technology is used
  - May take multiple attempts: SMT/Hyperthreading
- The network presents a different challenge
  - The future of networking is also determined by interfaces that evolve (and continue to evolve) outside the realm of the Socket

## Integrate Networking opens up questions

- For High performance networking, design space on current architecture raises interesting questions
  - NIC integration can exacerbate effects demonstrated in asymmetrical NUMA architecture
- Can networking and its integration onto the processor evolve in lock step?
  - Networking has a rich/evolving ecosystem (PHYs, bitrates, switches, \$/port)
  - HPC can afford to stay in sync by using proprietary or special-purpose interconnects
  - Enterprise has more pressure for backwards compatibility, ecosystem is much richer and Enterprise presents many future interesting networking performance challenges

## Integrated NICs won't fit every shoe

- Discrete NIC vendors are here to stay
- “HPC-like NIC techniques” are being increasingly adopted by Enterprise applications
  - Cybersecurity, financial trading, cloud, video
- Higher level of coupling between Enterprise apps and specialized discrete NICs (and middleware) shows important performance gains
  - Harder to integrate such NIC techniques that leverage firmware and/or programmable logic for specialized applications
- Innovation in the discrete space likely to outpace integrated technology
  - Fertile innovation ground in the discrete NIC design space for vertical markets
  - Growing addressable market for performance-oriented networking apps that can leverage specialized NIC designs