

The Network is Moving into the Socket

Lloyd Dickman *Bay Storage Technology*

Hot Interconnects

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It Is Happening

- Integration of capabilities onto single silicon die and supporting chip sets is a natural progression of technology
- Motherboard integration is an intermediate step to chipset and then processor integration
- It is already happening -- Floating Point, Graphics, Memory controllers, PCIe, SATA/SAS, 1/10 GbE
- Embedded processor / mobile computing spaces are now leading the way

There Are Good Reasons To Integrate

- Economics
- Size
- Power
- Performance - Close integration with the memory hierarchy is essential for high performance interconnects

What About the Fabric?

- Represents the major opportunity for innovation
- Topologies will be richer
 - Driven by changing data center application requirements and need to scale
 - May need numerous fabric links
 - Reduce chip IOs - Silicon photonics integration permits extreme high-bandwidth interconnects to directly use a narrow interface
 - Adaptive Routing / Scheduling
- Separate / integrated / hybrid ?
 - Locality aware
 - Different internal / external architectures for interoperability

Questions / Predictions

1. Will the on-chip network dramatically change the processor design?
Primarily, will affect integration with the “un-core”.
2. What will happen to the data center ? ***Integration of high bandwidth adapters will drive change throughout the data center. Data Centers will move to richer topologies as they become economically attractive.***
3. What will happen to HPC? ***We will see more systems with complete interconnect fabric integrated into the logical and physical system structure.***
4. Will the integration of the network on-socket generate a monopoly and kill the bio-diversity that allowed the existence of many small networking companies. ***Network integration will disrupt today’s networking data center eco-system.***