

System Architecture for On-Chip Networks

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Summary

Societal Impact

- Lower NRE costs (integration and verification): lower barrier to entry
 - Enable new powerful edge-devices with applications to health care, communication, personalized services
- OCIN can help cost effectiveness of the business enterprise and integration in Grid environments
 - Simplify configuration management of partitionable systems

Application requirements : Performance, Partitioning, QoS

Support for virtualization

Support for heterogeneity

Technology constraints : Power consumption, Temperature, Area, Fault tolerance

Self configuring systems (self healing, self adaptive)

Complexity/Productivity

Profiling, monitoring, debugging support

Software driven adaptation : active topology, routing and load balancing

Sample Research Agenda

- Congestion control with bounded or limited buffering
 - Efficient buffering and flow control
- Network interface
 - Light weight, generic: low latency, tightly coupled, general programming, flexible and general purpose
 - Virtualized network interface
- Adaptive flow control/ switching for multi-modal traffic and time varying application requirements
- Automatic reconfiguration in the middle of failure
- Self tuning links and switches to process variation, soft errors
- Network reconfiguration to adapt to application requirements
- Support for out of order delivery
- Technology-aware topologies : higher dimensions
- Support for partitioning and virtualization: isolation, performance across domains, accelerators, traffic heterogeneity
- Support for monitoring, debugging