A Performance Enhancing Hybrid Locally Mesh Globally Star NoC Topology

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AT A GLANCE

- Rapid decrease in size in CMOS technology → severe challenges to classical design technology for convergence towards subatomic dimension
- Necessity of portable high end communication system by market continues
- Network-on-Chip (NoC) has come up as a sustainable solution for SoC, MPSoC, and, large scale CMP based designs.
- NoC provides a massively parallel communication intensive architecture for future large scale SoC design for high performance
- Underlying network interconnection architecture (topology), router architectural design, and routing policy play important roles towards the overall system performance enhancement

PROPOSED TOPOLOGY

Proposed Hybrid Locally Mesh Globally Star (HLMGS) NoC Topology

TOPOLOGY METRICS

Proposed Hybrid NoC Topology

- Important parameters of an M × M sized proposed architecture are as follows (where, M = 2^n for m = 2, 3, 4, . . . , n.)
  - Bisection width = M + 4
  - Maximum node degree of non-leaf router = 7
  - Maximum node degree of leaf router = 9, when N = 4
  - Maximum number of IP cores connected to a network = M × M × N
  - Where, N represents the numbers of IP core connected to each leaf level router.

EXPERIMENTAL RESULTS

- Simulated result on important performance centric parameters like packet delay, throughput, packet drop ratio has been calculated and compared with Mesh topology, and with some other hybrid topology viz. SD2D[2], L2STAR [3], and Diametrical 2D Mesh[4]

Expressed in: $A = \frac{N_{A}C \times \sin k}{\sin \Phi}$

CONCLUSION & FUTURE WORK

- Proposed topology improves system performance in terms of latency and throughput
- Future works may be extended to minimize this area overhead as well as reduction of channel contention
- Observed result may be verified further by other NoC specific simulator to prove novelty of the proposed work
- System performance can be improved further by forwarding packets in some congestion aware dynamic way

REFERENCES


A green light to greatness.