Hybrid Network-On-Chip Design with RF Interconnects for Chip Multiprocessors (CMPs)

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SUMMARY

Scientists at UCLA in the Computer Science and Electrical Engineering Departments have designed a hybrid network of RF interconnects and traditional mesh architectures for advanced network-on-chip (NoC) communications for chip multiprocessors.

BACKGROUND

The continued scaling of CMOS devices and the transition to multiple processing cores increases the amount of on-chip interconnects that are required for inter-core communications. Repeated RC wires or RC wire based NoC provide current on-chip communications. However, the RC wires scale poorly and result in increased latency and power consumption.

INNOVATION

Researchers at UCLA have demonstrated that hybridizing RF interconnects (RF-I) into RC wire based network-on-chip (NoC) designs for chip multi-processors (CMPs) allows significant acceleration of communication, decreased power consumption, and great amount of flexibility for compile-time or runtime reconfiguration of NoC topology for communication optimization.

APPLICATIONS

- Global interconnects for network-on-chip(NoC) communications
- Chip multi-processor (CMP) communications
- On-chip and off-chip communications

ADVANTAGES

- Use of RF-I overcomes limitations of traditional repeated RC wire communications
- Enables high bandwidth, low latency, and low energy consumption
- Application-specific reconfiguration of NoC designs

STATE OF DEVELOPMENT

Plans to implement a RF-I NoC prototype chip.

RELATED MATERIALS

- M. Chang, J. Cong, A. Kaplan, M. Naik, G. Reinman, E. Socher and S.W. Tam, CMP Network-on-Chip Overlaid With Multi-Band RF-Interconnect, The 14th International Symposium on High-Performance Computer Architecture, Salt Lake City, UT, February 2008 - [more]
- M.-C. F. Chang, E. Socher, S.-W. Tam, J. Cong, and G. Reinman, RF Interconnects for Communications On-chip, Proceedings of the 2008 ACM International Symposium on Physical Design, Portland, Oregon, pp. 78-83, April 2008 - [more]

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,270,316	09/18/2012	2008-716

INVENTORS

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OTHER INFORMATION

KEYWORDS

Communication, Computer Hardware, Electrical, Process/Procedure, Chip Multiprocessors, Network-on-Chip, RF-interconnects, Interconnect Optimization, Communication Infrastructure

CATEGORIZED AS

- Semiconductors
  - Design and Fabrication

RELATED CASES

2008-716-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ Improved Programmable Logic Circuit Architecture Using Resistive Memory Elements

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