



TECHNOLOGY

One-sided Binary Tree-Based Crossbar Switch Fabrics

OVERVIEW

Background:

One-sided crossbar fabric is well-suited to interconnecting active ports such as line cards in network routers and peripheral devices in computer systems where ports serve both as inputs and outputs. Its simple topology and straightforward routing makes it more attractive for network-on-chip and system-on-chip designs compared to other non-blocking fabrics such as one-sided crossbar switches with the following limitations: (1) a direct realization of an n -port, one-sided crossbar results in a fan-in and fan-out of $n - 1$ per port; (2) an indirect realization using a cross-point array leads to communication latency that varies between 1 and n because of the capacitive effects of physical paths between the ports.

Innovation:

Researchers at the University of Maryland have designed a one-sided binary tree-crossbar switch fabric with a fan-in and fan-out of two and the minimum number of columns of cross-points and wiring segments. The invention solves the problems related to one-sided crossbar fabric by transforming the one-sided crossbar switch into what the inventors call a one-sided, binary tree-crossbar switch. The communication latency of this new switch fabric grows only logarithmically with the number of ports and remains fixed for all pairs of ports while the fan-in and fan-out of its ports and intermediate switching elements are fixed to two. The invention also provides a layout that minimizes the number of columns of wires to facilitate paths between all pairs of ports.

APPLICATIONS

- Circuit and packet switching
- On-chip network routers
- Multicore computer chips

ADVANTAGES

- Congestion-free unicast and multicast packet switching
- Potential for faster networks and routers
- Lower cost network servers and routers

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Additional Information

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PATENT STATUS

Pending

CATEGORIES

- Engineering
- Power Electronics
- Microelectronics
- Devices

EXTERNAL RESOURCES

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