

DESIGN OF ROUTING AND MESSAGE-DEPENDENT DEADLOCK AVOIDANCE SCHEME FOR NoC

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ABSTRACT

Network-on-Chip (NoC) is the most advanced technology to address the communication bottleneck of System-on-Chip (SoC). Routing algorithms using wormhole packet switching is best for NoC as it provides high throughput, low latency and requires small buffers. But it can cause deadlock during the system operation. Ensuring deadlock-free operation of NoC is a major challenge. This paper presents a combined method to make the network routing-dependent deadlock-free by using hold-release tagging method and message-dependent deadlock-free by adding virtual channels. This uses wormhole switching and supports adaptive and multicast routing. The data body flits of multicast packets will follow the same path made by the multicast headers which are sending in advance. An additional Identification (ID) field is packetized together with the flits belongs to the same packet. These methods are supported by the NoC router which controls the deadlock in tree-based multicast routing.

KEYWORDS: Deadlock-Free Routing, Network-on-Chip (NoC), Wormhole Packet Switching, VLSI Technology