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基于拓扑划分的片上网络快速映射算法

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A Fast Topology Partition Based Mapping Algorithm for Network-on-Chip (NoC)

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摘要 该文针对片上网络建立了以能耗和流量均衡为优化目标的映射模型，提出一种基于拓扑划分的快速映射算法(TPBMAP)。该算法不仅考虑芯片的布局特性从而产生规整的拓扑，还采用虚拟IP核技术修正通信核图以完成IP核和网络节点数不等的映射；通过引入以流量均衡为目标的优化模型同时将通信量大的IP核映射到拓扑边缘区域，有效地降低了网络中心的流量；采用迭代的拓扑划分方法以及将通信量大的IP核映射到网络相邻位置，可快速完成低能耗映射。仿真结果表明，相比现有算法，该文提出的算法在映射速度、全网能耗以及网络中心流量等方面有较大优势。

关键词：　片上网络　映射优化　拓扑划分

Abstract：　A fast mapping algorithm, named Topology Partition Based MAPping (TPBMAP), is proposed considering the energy consumption and traffic balance for the Network-on-Chip (NoC). The proposed algorithm not only generates topology automatically by taking the characteristic of chip layout into consideration, but also achieves the mapping when the number of network nodes is not equal to that of IP cores, using the technology of virtual IP core. Introducing the optimized model, the goal of which is the balance of traffic, the IP cores with heavy traffic are mapped to the edge region to reduce effectively traffic in the center of network. TPBMAP uses iteration of topology partition and makes the IP cores map to the nodes with neighboring in each iteration process, in order to complete rapidly mapping with low energy. According to the experimental results, the proposed algorithm can achieve mapping result with a fast rate, low energy consumption and balanced traffic.

Keywords：　Network-on-Chip (NoC)　Mapping optimization　Topology partition

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