University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

STANLEY OKEKE

BEng (University of Nigeria, Nsukka, 2011)

"Thermal-Aware and Uniform Priority with Scaled Routing for High-Performance Network-on-Chip"

Department of Electrical and Computer Engineering

Wednesday, August 30, 2017
9:00 A.M.
Engineering Office Wing
Room 430

Supervisory Committee:
Dr. Fayez Gebali, Department of Electrical and Computer Engineering, University of Victoria (Supervisor)
Dr. Mihai Sima, Department of Electrical and Computer Engineering, UVic (Member)

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Prof. Ajtony Csaba Szakacs, School of Music, UVic

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Abstract

3D-NoC architecture is an amalgamation of a 3D integration (die stacking of 3D-IC technology) with the increased scalability found in NoC and was propose to tackle the problem of increasing the number of cores in the 2D plane which seems incompetent due to long distanced interconnect. This architecture is aimed to optimize performance, power consumption, achieve low latency and increase the network bandwidth. As more dies were being stacked vertically, IC operating frequency increases and this leads to some thermal issues which includes high power density which increase average temperature, and longer heat dissipation path and thereby results to different heat dissipation in each layer of the die. Increase in the average temperature increases the power consumption, reduce performance and reliability. Concentrating more on the over-head region of the 3D-NoC, A thermal management scheme we propose which is adaptive and thermal-aware of the state of the network. This propose protocol employs the thermal state of intermediate nodes, it property in a random uniform distributive way for routing the packet. The propose algorithm increases network availability and tends to distribute the temperature of the system evenly and uniformly within the network and making sure that packet are not forwarded to the hotspot node and only packet within certain it property in the distribution are forwarded to the hotspot node. before or during transmission, this two distribution must be calculated alongside the current node temperature to knowing which distribution that node belong to. Simulation shows this gave better performance in throughput and availability of network by the number of received its. The propose algorithm also reduces Power consumption which is function of temperature by reducing the number hotspot nodes in the network.