

ROUTING PROBLEM IN RECTANGULAR MESH NETWORK USING DIJKSTRA'S BASED GREEDY METHOD

NORAZIAH ADZHAR¹, SHAHARUDDIN SALLEH², YUHANI YUSOF³ AND MUHAMMAD AZRIN AHMAD⁴

1,3,4Applied & Industrial Mathematics (AIMS) Research Cluster, Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia.

2Department of Mathematical Sciences, Faculty of Science, Universiti Teknologi Malaysia (UTM), 81310 Johor Bahru, Johor, Malaysia

[*noraziahadzhar@ump.edu.my](mailto:noraziahadzhar@ump.edu.my)

ABSTRACT

A supercomputer can have thousands of replicated processor-memory pairs which are called processing pins. Each of these pins is connected to each other through networks and passes message using a standard message passing mechanism such as Message Passing Interface. In this research, we consider the routing problem in rectangular mesh network. Each terminal pin in the network needs to be connected with its destination pin for it to function properly. Thus, maximizing the number of connection for each pair of pins and keeping the total energy throughout the network minimum becomes our main objective. In order to achieve this objective, each net need to be routed as shortest as possible. Therefore, developing a shortest path based routing algorithm is in need. In this research, Dijkstra's algorithm is used to establish the shortest connection for each net. While this method guarantees to provide the shortest connection for each single net (if exists), however each routed net will become the obstacles and block later connections. This will add complexities to route later nets and make its routing longer than optimal or sometimes impossible to complete. Therefore, the routing sequence need to be rip-up and all nets need to be re-routed. This paper presents a complete routing algorithm which can further refine the solution by using Dijkstra's based greedy method. The outcomes from this research is expected to benefit engineers from electric & electronic industry

Keywords: routing problem, rectangular mesh, single source shortest path method, Dijkstra's algorithm, Greedy method