Chapter 5

Conclusion

In this study, the potential of using genetic algorithm to solve the shortest path problem in Open Shortest Path First (OSPF) hop-by-hop routing, and Multiprotocol Label Switching (MPLS) explicit-routing has been explored.

There are several primary objectives to this project. First, We have gained understanding of the use of genetic algorithm in solving the shortest path problem. Secondly, we have investigated the shortest path problem in two network routing protocols, which consist of Open Shortest Path First (OSPF) and Multiprotocol Label Switching (MPLS). Here, two shortest path problem domains have been defined, i.e. OSPF hop-by-hop routing and MPLS explicit-routing. Thirdly, we have developed two genetic algorithm solutions to the above two problem domains, i.e. Previous-node-based Encoding and Priority-based Encoding.

For each of the shortest path problem domain, the proposed solution model has been tested on 10 randomly generated networks with different weights setting using mesh topology of 9 nodes and 36 edges using the routing simulator. The test runs are performed with tuning of the genetic algorithm parameters.

From the testing and results analysis, the genetic algorithm solution has achieved the following results:

(a) In OSPF hop-by–hop routing, genetic algorithm is able to find the optimum solution, which is the shortest path with the minimum weight.

(b) In MPLS explicit-routing, genetic algorithm is able to find the optimum solution, which is the shortest path that meets the resource requirements (constraints) of the traffic flow.

In this project, evaluation of the relative merits of a genetic algorithm solution is focus on the optimal solution which minimizing the space, which is the total weight. If the genetic algorithm solution can optimize the space, then the genetic algorithm solution is justified to be a potential alternative for such problem.

As a conclusion, the goal of this project has been achieved, which is to demonstrate the potential of using genetic algorithm to solve the shortest path problem in optimizing the weight in OSPF and MPLS. This solution can provide a potential alternative for such problem.

In the long term, as with natural evolution, the strengths of this mutation may be combined with the strengths of current practices to yield a superior hybrid protocol. The eventual result of this work, when combined with other ongoing research, will be improved reliability and performance on tomorrow's networks.