ABSTRACT

Internet connectivity is a very important life support factor today and if there is a disruption in internet connectivity, it will have a considerable impact on losses. So that handling of disturbances that occur needs to be done quickly so that the losses that occur can be reduced. The current handling still takes a long time and is inefficient. When there is a connectivity disruption, it is necessary to check and analyze before finding a solution to the problem.To handle the problem, rerouting technique can be done, rerouting is a technique to change the main routing to the backup routing. However, rerouting techniques still require time in execution, so to deal with this, fast rerouting techniques are used for time efficiency when rerouting.

In this research, a P4 Adaptive Fast Reroute (P4AFR) technique is proposed that can be integrated with common network devices and can make quick and efficient decisions when something goes wrong on the network. The proposed method will be implemented on the data plane and written in the P4 programming language. P4 itself is an open-source programming language that can be used to organize how a packet will be processed, so that the P4AFR system can be more flexible.

This thesis employs multiple scenarios and parameters to evaluate the proposed fast rerouting method, P4AFR. Experimental results demonstrate that P4AFR achieves a faster recovery time of approximately 4.21 milliseconds, significantly outperforming existing MPLS fast reroute techniques, with a recovery time improvement of 57.88% compared to InFaRR, 137.94% with MPLS IS-IS and 297.72% relative to MPLS OSPF. Furthermore, adaptive testing with InFaRR in path selection scenarios involving more than two paths demonstrates that P4AFR is more adaptive and does not merely switch between two paths. Additionally, the routing overhead generated by P4AFR is 0.67%, compared to 0.86% for MPLS-OSPF, indicating that P4AFR outperforms MPLS-OSPF by approximately 0.2%. Quality of Service (QoS) testing has also been conducted, yielding results that show P4AFR performs better than the other techniques.

Keywords: Data Plane, Fast Rerouting, Open-source, Programming Protocol-Independent Packet Processors (P4), RTT calculation.