

## ABSTRACT

In the process of sending data packets on a network, of course, an architecture that has high reliability is needed. This is needed to make sure the speed of delivery and the absence of data that failed to be sent to the destination. Many available paths will certainly increase the variety of data transmission on the network, but will not guarantee an increase in the speed or integrity of the data that is successfully sent to its destination. The large variety of paths that can be used allows for uneven traffic distribution and traffic accumulation at a gateway. To avoid this, a gateway balancing method will be carried out.

Currently, a new paradigm in computer networks is developing, namely Software Defined Network (SDN). SDN is a network architecture concept that separates the control plane and data plane and is programmable. So the implementation can optimize the network to be more flexible, and efficient because it is easier to configure.

In this research, a software defined network network simulation with the OpenDayLight controller was carried out by implementing gateway balancing using two scheduling algorithms, namely the Random Early Detection algorithm and Ant Colony Optimization. UDP Flows will be streamed on traffic with these two algorithms alternately for performance testing. The QoS parameters used in this research are throughput, delay, jitter, and packetloss. From the test results, it was found that traffic performance with the Ant Colony Optimization algorithm resulted in a better speed increase compared to using the Random Early Detection algorithm with a difference of 4.46% in the optimization results. While the Random Early Detection algorithm produces an increase in data integrity that is better with the difference in optimization results of 3.55% on throughput and 5.85% on packet loss.

**Keywords:** Ant Colony Optimizatio, Gateway Balancing, OpenDayLight, Random Early Detection, SDN.