ABSTRACT

Quantum key distribution (QKD) is a security enhancement mechanism for solving the key distribution problem. QKD has network characteristics that require the process of authentication and encryption of information so that during the process, it requires a short processing time and a secure quantum key continuously generated during the transmission process.

The existing QKD network has used open shortest path first (OSPF) routing. OSPF has disadvantages, such as the use of many quantum-secure keys. But currently, there is a software-defined networking (SDN) concept that is bringing about changes in the centralized control of the network so that the routing scheme can be adjusted by the controller, which has the task of controlling the routing so that the use of quantum secure keys in the network becomes more efficient. This thesis used an OpenDaylight controller to optimize finding paths link states and distance vectors.

Based on the results of tests conducted on SD-QKDN using a ring topology, the distance vector routing scheme uses fewer quantum keys, and the processing time required during transmission is faster than the link state routing scheme. The distance vector routing scheme is 2.68 ms, and the link state routing scheme is 3.43 ms. Based on the results of routing performance testing, the routing link scheme state is faster in finding alternative paths with an average convergence time of 10.51 ms, an average throughput of 9.34 ms, and an average delay of 0.75 ms, while the distance vector routing scheme with an average convergence time of 10.61 ms, an average throughput of 9.22 ms, and an average delay 0.76 ms.

Keywords: QKD, SDN, ODL, Link state, Distance vector.