ABSTRACT

Data center is the center of data traffic that has a large-scale network topology. The design of the data center network topology must meet the criteria of high bandwidth and low latency. Fattree is a smart choice. Traffic on the data center is very dense, unicast data transmission is not efficient anymore because it will cause the network becomes full with the same packet pile. Therefore multicast communication is required to transmit data to multiple hosts joined in a group that will increase the efficiency of bandwidth usage and prevent congestion. In addition to efficient use of bandwidth, data center networks require fast processing. SDN comes with a new architecture that separates the control plane and data plane functions, of course, the route processing becomes faster because it is only managed by the centralized controller. That way, the implementation of multicast networks in the data center with the concept of SDN create a more reliable network.

In this research, implemented multicast network at SDN in data center by using Fattree topology. Shortest path tree algorithm to form multicast tree from source to multiple destinations. POX controller acts as control plane and Mininet emulator as data plane. The application of multicast networks conducted using the IGMPv3 protocol to form four multicast groups. To test network performance, there are three scenarios, namely when normal network conditions, the occurrence of link failure, and the occurrence of node failure.

The test results obtained are a one-way delay parameter that meets ITU-T G.114 standard under 400 milliseconds or 150 milliseconds, jitter and packet loss that meets ITU-T G.1010 standard under 1 ms for Jitter and zero packet loss, as well as the maximum throughput value. This study also tested the parameters of recovery time in the condition of link failure and switch failure that have different time. In switch failure, the average recovery time generated is 86 milliseconds to 106 milliseconds, increasing with the number of switches being increased. In the link failure, the resulting time is erratic with an average of 11.7 seconds much different from the switch failure, this is due to the length of time detection of broken links.

***Keywords**: Multicast, SDN, POX, Fattree, IGMPv3*