

## ABSTRACT

Today, conventional computer networks still have significant shortcomings. Such a device is still difficult to configure because it uses a low level configuration and a configuration that takes a long time especially for large scale networks. With the Software Defined Network (SDN) technology, all network devices will be centered on one controller that can control, manage and monitor the network more effectively.

In this final project SDN technology is applied using the Open Network Operating System (ONOS) which is able to separate the control plane and the data plane on a network device. ONOS is installed on Raspberry-Pi 3 devices to minimize the use of Personal Computer (PC) devices on SDN networks. ONOS also supports Virtual Private LAN Service (VPLS) features. VPLS is software on ONOS that is able to create a network on another Layer 2 network with the help of the OpenFlow protocol. Software is connected to the host network by connecting to network overlays that are connected to the OpenFlow data plane protocol. VPLS can maximize the existing bandwidth when there is communication between remote network devices and as if they were on a local network.

This Final Project has designed a system that is able to facilitate network administrators in controlling, managing and monitoring the network using a centralized controller based on Raspberry-Pi 3 with the implementation of VPLS services. The test results show QoS in this Final Project has good results based on the Telecommunication and Internet Protocol Harmonization Over Network (TIPHON) standard with measurements without background traffic and with background traffic of 200 Mb, 400 Mb, 600 Mb, and 800 Mb. The throughput value without background traffic is 3.623 Mb / s and the highest throughput value for background traffic is 3.473 Mb / s. The value of packet loss without background traffic is 2.1% and the value of packet loss on the highest background traffic reaches 7.2%. The average value of delay without background traffic is 2.75 s and the average value of delay on the highest background traffic reaches 3.59 s. The average

value of jitter on no background traffic is 0.0352 s and the average value of jitter on the highest background traffic is 0.0414.

Keywords: Software Defined Network, VPLS, data plane, control plane, OpenFlow, Raspberry-Pi 3, ONOS, TIPHON.