ABSTRACT

Quality of Service (QoS) is an important thing that must be considered in a communication system. Many considerations need to be considered in order to get a good quality network. The creation of a large bandwidth is one of the alternatives, but it is ineffective because of the passed traffic does not constantly have a large value of traffic. There are some ways that can be done to improve the network performance such as multi protocol label switching (MPLS) and the use of routing management.

Multi-Protocol Label Switching (MPLS) is a data forwarding method over a network by using the information in the label attached to the IP packet. With this type of routing which is applied to the MPLS network, it is expected to be able to provide increased QoS value to the network. Since the use of VoIP applications over the Internet rapidly increased, the MPLS network offers efficient traffic-engineering function by utilizing an optimal network utility. The utilization is done by MPLS TE, by finding the routing path that has the lowest utility link in order to minimizing the queue at the router. In MPLS TE with additional features equal load balancing and unequal load balancing which will allowed the link with high density to be rerouted or shared to another path with a specified comparison, so the sent packets do not need to wait which will make the QoS value drop. If the packet was sent quickly and there is no queue at the router, the it will produce a better QoS on VoIP service.

In this final task, implementing MPLS TE technology equal load balancing and unequal load balancing in a small network, and using the PC Router GNS3 as MPLS Router. The result of the *testbed* showed that the increase in background traffic value causes QoS parameters, such as packet loss, delay, and jitter which has a high/bad value, because increase in background traffic make utility of each link will be higher. The use of MPLS TE equal load balancing is suitable for links which have the same bandwidth.

Keywords : MPLS, MPLS-TE, VoIP, *equal load balancing, unequal load balancing*