ABSTRACT

Mobile broadband technology develops very rapidly. It is stimulated by the various increasing demands of the users for multimedia services requiring broadband networks. These services require a high-capacity backhaul to support the evolution of network technology. Mobile backhaul has important roles in the cellular network; it connects the Radio Access Network (RAN) and core network (core).

The implementation of MPLS VPN technology in the mobile backhaul is expected to overcome the problem of QoS for broadband services. The advantages of having MPLS-VPN are scalability, flexible, Multiprotocol, traffic engineering, and these support SLAs.

This thesis reviewed the technology layer 3 MPLS-VPN implemented in small networks using *Modeler 14.5* OPNET. In addition, it analyzed the influence of network backhaul topology on the QoS performance and the investment value of setting up backhaul network.

This study showed that the implementation of MPLS-VPN had positive influence on the performance of QoS. The results of throughput, delay, packet loss, and jitter from the network using MPLS-VPN technology were better than those of

the non-MPLS network. As for the network topology, the mesh produced better performance value than the ring one. However, the economic analysis showed that the implementation of ring topology was more feasible than the mesh one's because of the values of NPV, IRR, and payback period. Then, considering the values of business and the performance, the most suitable method applied was the ring method by increasing the link capacity to meet the needs of the traffic which was only supporting the transit at a certain node.

Keywords: LTE, backhaul, MPLS-VPN, QoS, NPV, IRR.