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**Enhancing Multimedia Traffic Performance over MPLS  
Networks**

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B.Sc. of Electrical Engineering

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# STATEMENT

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This dissertation is submitted to Ain Shams University for the degree of Master of Science in Electrical Engineering (Electronics and Communications Engineering).

The work included in this thesis was carried out by the author at the Electronics and Communications Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

No part of this thesis was submitted for a degree or a qualification at any other university or institution.

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## ABSTRACT

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One of the most crucial problems in the Internet has been the quality of service (QoS) provisioning. Multiprotocol Label Switching (MPLS) technology guarantees real time and multimedia applications QoS using different resource allocation techniques. Also MPLS contributes high scalability in data network.

Today's IP networks are being enhanced using MPLS to carry multimedia traffic. MPLS technology has proven itself in providing QoS and seamless integration with the existing huge IP networks. This thesis aims to evaluate MPLS performance based on multimedia service average throughput, total number of packets received, end to end delay, jitter, and packet loss ratio using OPNET simulator. It also compares MPLS network performance to that provided by IP networks. This study shows the scalability of MPLS by simulating small and large networks under different loading conditions. The simulation also shows the performance of different MPLS QoS configurations.

Also, this thesis illustrates the multimedia traffic performance enhancement by investigating three different scenarios using OPNET simulator since it's almost impossible to convert the entire IP networks to a newer technology. Those scenarios are full IP network, full MPLS network, and hybrid IP/MPLS network. The simulation results point up the pros and cons of each scenario in terms of end-to-end delay, delay variation, packet loss ratio, packet delivery ratio, and voice MOS value. In short, full MPLS network provides the best performance for multimedia traffic but close results can be achieved using hybrid IP/MPLS network.

**Key words:** MPLS, QoS, TE, MPLS TE, MPLS DiffServ TE.

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