Ain Shams University
Faculty of Engineering

Improving the Performance of Broad Band Integrated Service Digital Network

By

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A Thesis

Submitted in Partial Fulfillment for the requirements
of the PH. D. Degree
In Computer Engineering

Supervised by

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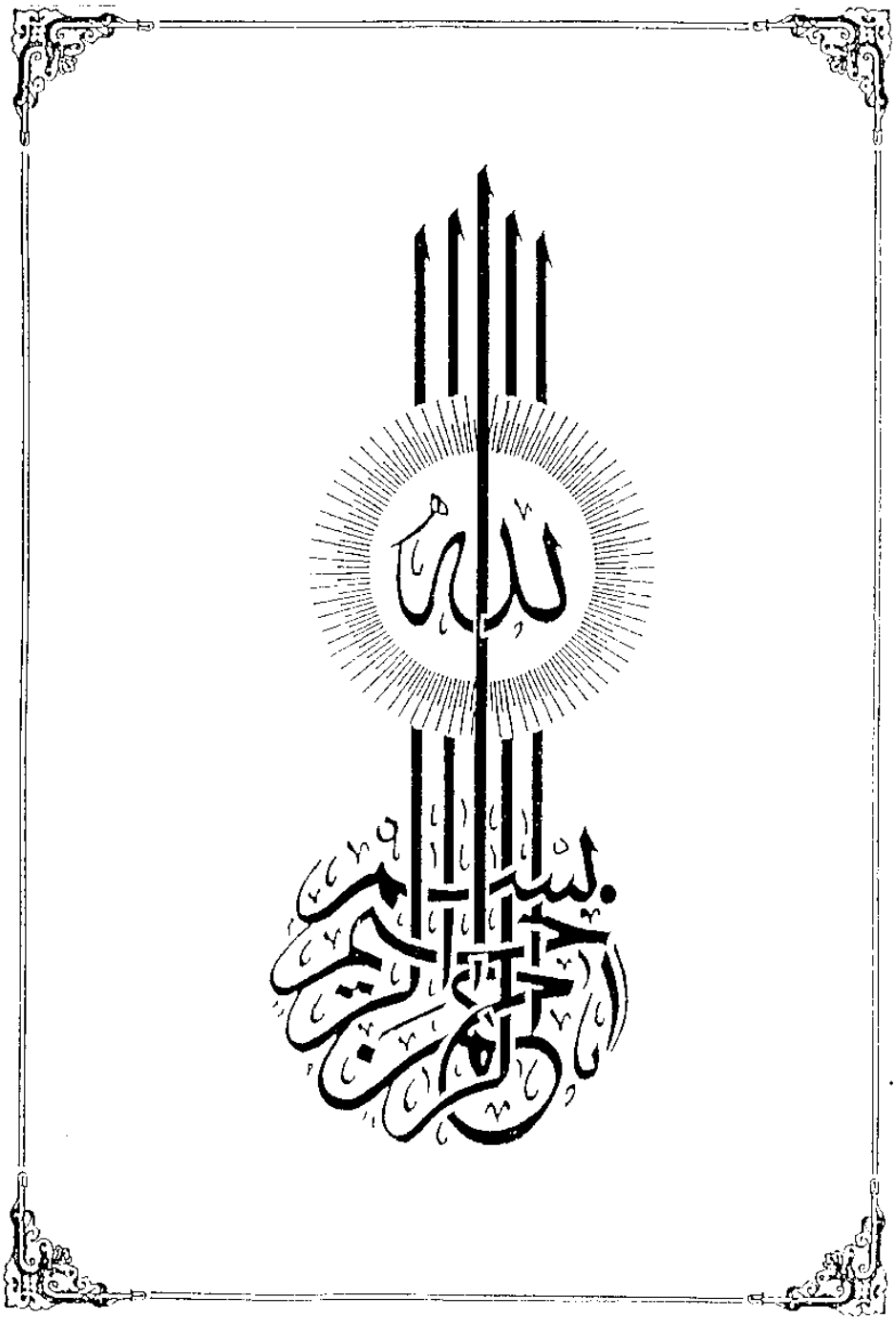

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Statement

This dissertation is submitted to Ain Shams University for the degree of PH. D. OF Science in electrical Engineering (Computer and Systems Engineering).

The work included in this thesis was carried out by the author at the Computer and Systems Department, Ain Shames University.

No Part of this thesis has been submitted for a degree or qualification at other university or institution.

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ABSTRACT

The central goal of this dissertation is to improve the performance of Broadband integrated service digital network. The improvement is done by using a Scalable ATM Switch, with Multicast application (SASM). The switch has a unified infrastructure such that voice, video and data, can be switched simultaneously.

The objective is to design the ATM switch, which can merge the capability of changing its size range from few hundreds to thousands of ports. A Nonblocking ATM Switch Module (NASM) which considered as the basic building block of the scalable ATM switch is presented. The multicast capability is satisfied through containing a multicast network in each NASM. A three level hierarchical control system for the ATM switch module is proposed. A new traffic overflow control scheme on the multicast network outputs is applied through the control system.

A new interconnection architecture for the scalable ATM switch is presented. The architecture is designed in a way such that the hardware needed for constructing the switch is reduced, specially the interconnection modules. The channel grouping concept is applied to interconnect the switch modules constructing the scalable switch such that the cell loss probability can be reduced. To distribute the traffic over the links of each group without contention, a traffic distribution and output contention resolution network is proposed. Finally, the evaluation of the scalable ATM switch is presented. This evaluation is done in two main approaches, functional evaluation and structural evaluation. The structural evaluation is done by calculating the hardware needed for constructing the scalable switch .and achieves the allowable cell loss probability. The functional evaluation is done by studying the improvement of the cell delay and cell loss within the proposed system. This can be done by calculating the storage size of each multicast translation table which needed for reducing

the search time. Also the performance of SASM is investigated under unicast and multicast traffic. Finally, the numerical results of the proposed system are compared with the up-to-date previous works.

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