AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Electronics and Communication Engineering Department

Emerging Technologies in ATM Domain

A Thesis submitted by

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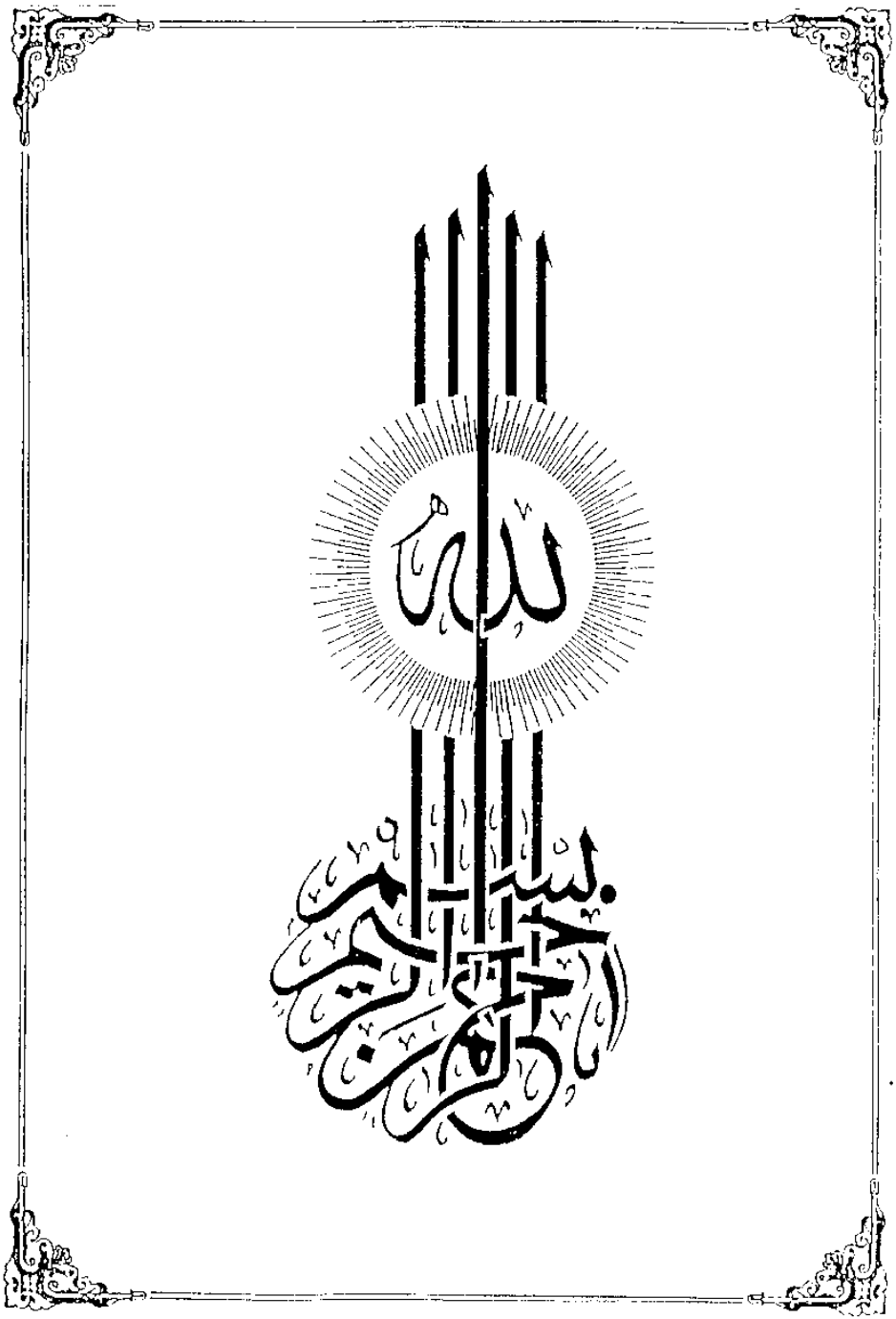

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M.Sc. Thesis

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Title : Emerging Technologies in ATM Domain

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Abstract of an M.Sc. Thesis

Name: **Noha Mohamed Safy El-Din Ahmed**
Title: **Emerging Technologies in ATM Domain**

Abstract

Asynchronous Transfer Mode (ATM) is the base on which Broadband - Integrated Services Digital Network (B-ISDN) stands. The B-ISDN protocol reference model consists of physical layer, ATM layer, ATM adaptation layer, and higher layers. Two important interfaces that are defined in ATM are the User-Network Interface (UNI) and the Private Network-Network Interface(PNNI). Routing in ATM networks is specified by the ATM forum in its PNNI specification. PNNI includes two categories of protocols; one for distributing topology information between switches and clusters of switches. This information is used to compute paths through the network. A second protocol is defined for signalling, that is message flows used to establish point-to-point and point-to-multipoint connections across the ATM network.

Key emerging technologies in the artificial intelligence domain are neural networks, genetic algorithms, and intelligent agents. Neural networks applications in the ATM domain include intelligent traffic control, link admission control, Modeling Aggregate Heterogeneous ATM Sources, and traffic prediction. Genetic algorithms can serve simultaneous climbing of peaks in optimization problems. They are usedto predict maximum cell loss in ATM networks and can also be used for optimal message routing. Intelligent agents are a new software paradigm. They are relatively small pieces of autonomous software that act in various roles on behalf of a specific function or user. Multi-agent systems allow for independent development of agents that are then used as components in systems; also, they account for diversities in knowledge levels and specializations; moreover, they are more robust and are simpler to design. For these reasons a multi-agent architecture is proposed for solving the routing problem in ATM networks. A simulation environment is developed for this problem.

Keywords: Asynchronous Transfer Mode, ATM, Artificial Intelligence, AI, Neural Networks, Genetic Algorithms, Intelligent Agents, Private Network-Network Interface, PNNI, Routing

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