سامية محمد مصطفى



شبكة المعلومات الحامعية

بسم الله الرحمن الرحيم



-Caro-

سامية محمد مصطفي



شبكة العلومات الحامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





سامية محمد مصطفى

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسو

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة يعيدا عن الغيار



سامية محمد مصطفي



شبكة المعلومات الجامعية



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سامية محمد مصطفى

شبكة المعلومات الحامعية



بالرسالة صفحات لم ترد بالأصل



Menoufiya University

Faculty of Electronic Engineering

Dept. of Computer Sciences & Engineering

DESIGN AND PERFORMANCE EVALUATION OF OPTICAL COMPUTER NETWORKS

Thesis submitted in accordance with requirements of the University of Menoufiya for the degree of M.Sc. in

(Computer Sciences and Engineering)

By

Eng. Emad EL-Deen Hassan Atia Masameer

Demonstrator at Mathematics Department,

Faculty of Science, Al-Azhar University

Examiners Committee

Prof. Dr. Mahmoud E. Maree

Dept. of Systems & Computer Science

Faculty of Engineering

Al-Azhar University

(Man, &)

Prof. Dr. Farag Z. El-Halfawy

Dept. of Electronic and Elect. Eng.

Faculty of Electronic Eng.

Menoufiya University

El-Hala Rond

Prof. Dr. Mohamed Z. Abd-El Megeed

The Head of Systems & Computer

Science Dept. Faculty of Engineering

Al-Azhar University

(H. Zola-)

3. El-Serafi

Ass. Prof. Dr. Hamdy M. Kelash

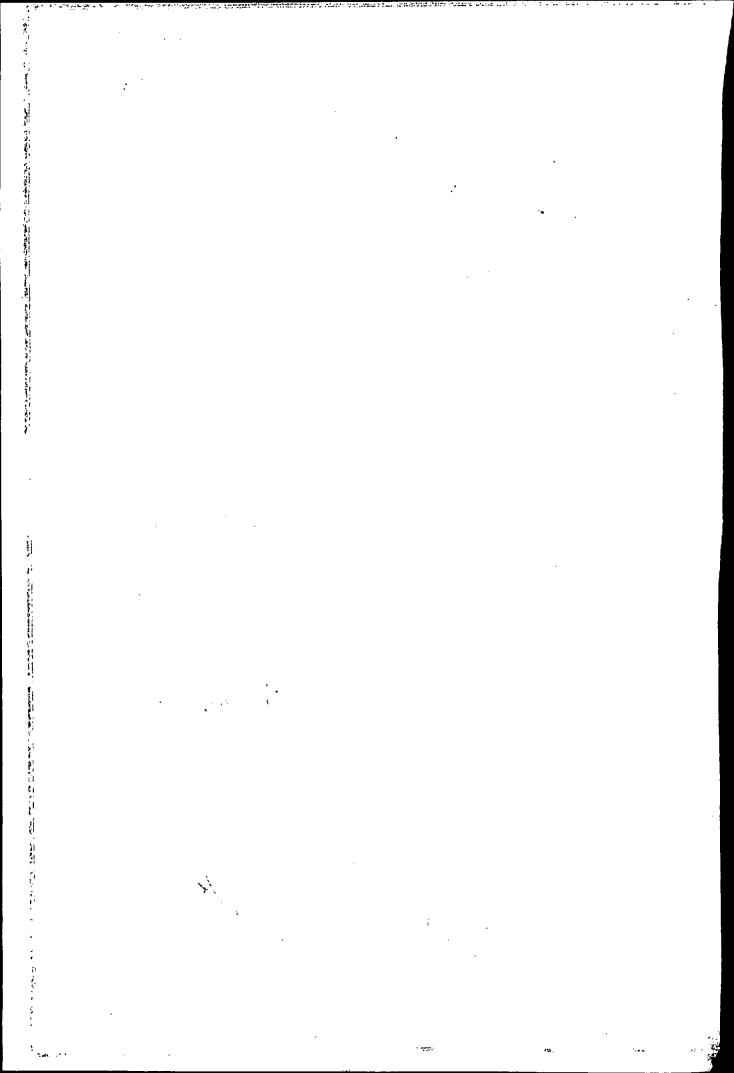
Acting as the Head of Comp. Sciences

and Eng. Dept. Fac. of Electronic Eng.

Menoufiya University

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Menoufiya University Faculty of Electronic Engineering Dept. of Computer Sciences & Engineering

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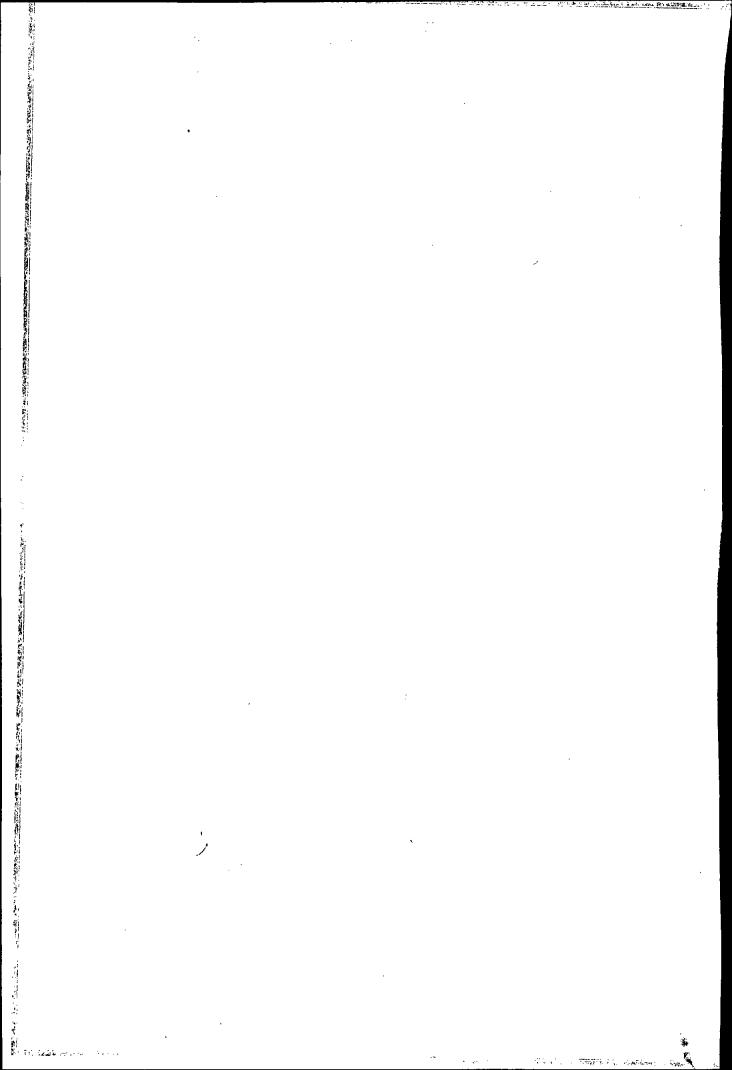
Supervised by

Prof. Dr. Mohamed Z. Abd-El Megeed
The Head of Systems & Computer
Science Faculty of Engineering
Al-Azhar University

(M.ZaK)

Ass. Prof. Dr. Hamdy M. Kelash
Acting as the Head of Comp. Sciences
and Eng. Dept. Fac. of Electronic: Eng.
Menoufiya University

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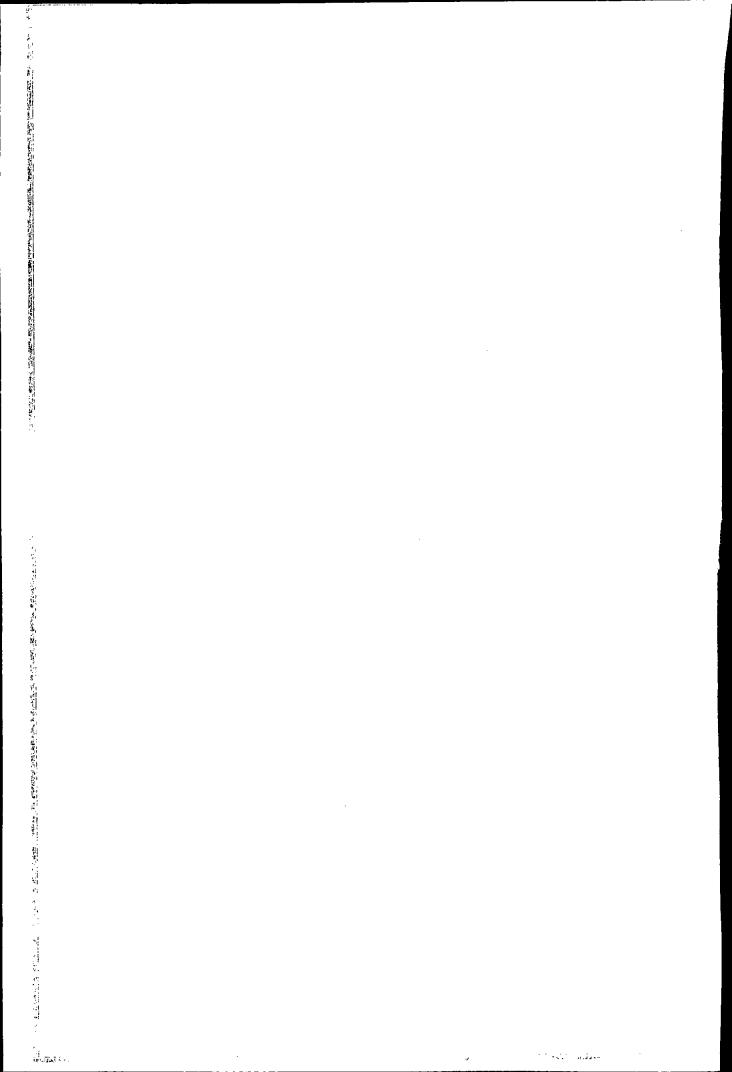
بسمرانك الرحن الرحير

"قالوا سبحانك لا علم لنا إلا ما علمتنا

إنك أنت العليم الحكيم

صلق الله العظير

سورة البقرة–آية ٣٢



BIBLIOGRAPHY

Name	Eng. Emad El-Deen Hassan Attia Masameer
Birth Date	17/04/1967
Born in	Abo-Alshokaf Hosh esa AL-Bohira
Qualifications	B.Sc. in Systems & Computer Engineering,
	Faculty of Engineering, Al Azhar University,
	May 1992.
Occupation	Demonstrator at Mathematics Department,
	Faculty of Science, Al-Azhar University
Appointment Date	05/11/1994
E-mail	e atia@hotmail.com

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ABSTRACT

Existing networks are becoming increasingly congested as a growing number of users seek access to the vast amount of information available on the Internet. At the same time, emerging multimedia applications, such as video conferencing, interactive television, and video-on-demand are expected to further test the limits of current network infrastructures. There is an immediate need for the development of new, evolutionary high-capacity networks, which are capable of supporting these growing bandwidth requirements. Wavelength-division multiplexing (WDM) is a promising solution for satisfying this bandwidth bottleneck. As WDM deployment becomes widespread, new network architectures and protocols, which take advantage of WDM's capabilities, will need to be developed. This dissertation investigates network architectures and protocols for WDM network, with the goals of measuring the performance of existing approaches and developing new architectures and protocols, which provide improved performance.

This work provides an in-depth case study of a single-hop protocol used in WDM local lightwave network that has been built, viz., the IBM Rainbow network. Specifically, the study focused on a quantitative analysis of the performance characteristics of Rainbow's in-band polling protocol.

The Rainbow system is difficult to be analyzed directly, because each station can be in any large number of states. The size of the state space therefore growth exponentially with the number of stations in the system. A framework for analyzing the Rainbow protocol was provided using the equilibrium point analysis (EPA) technique. By assuming that the system remains at its equilibrium point, we can reduce the complexity of the

problem and obtain analytical results for an otherwise intractable system. Our analysis investigates the effect of system parameters, such as message arrival rate and timeout duration, on the performance of the system.

The EPA technique was found to provide good results when the arrival rates are high, but it was not very accurate for lower arrival rates. This is because the model doesn't properly capture the deadlock phenomenon for low arrival rates. It was also found that, for a given set of system parameters, there exists an optimal timeout duration which will maximize the throughput of the system.

The Rainbow protocol was modified such that if a source node, upon tuning its receiver to the destination node's channel, finds that the destination node is requesting a connection with the source node, and then, instead of sending a request, it sends an acknowledgement to the destination node's request. It was found that for a same given set of system parameters, this modification will improve the throughput of the system.

In general, this optimal timeout duration seems to be independent of the message length and the number of stations, but depends on the arrival rate of messages.