

بسم الله الرحمن الرحيم



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شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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لم ترد بالأصل



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MENOFYIA UNIVERSITY
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Computer Engineering and Computer Science Dep.

**ENHANCED IMPLEMENTATION OF AN
ACTIVE NETWORK SWITCH FOR
MULTIMEDIA APPLICATIONS**

A Thesis Submitted for the Partial Fulfillment
Of the Requirements for the Degree of
MASTER OF SCIENCE

B1EQA E

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ

لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ

أَنْتَ الْعَلِيمُ الْحَكِيمُ

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ABSTRACT

During the last two decades with increasing the users of internet and the real time applications such as, audio and video conferences, chatting, home cinema, and all multimedia applications which need a powerful network to support all this services. Hence conventional network with its problems form slow network evolution and cripple of conventional equipments or hardware parts to go with the growing of number of users and their requests. This is the reason, which pushes scientists to think in new fashion of network, which is able to fulfill all users requirements and over come the weakness of conventional network. Active networking is a step beyond the conventional networking technology in which the routers have the role to merely forward datagrams and update routing tables. Its primary goal is to modify the switching infrastructure of the network on the fly, and more generally, to allow customized computation to be run in the network. The need for active technology has been asserted from the contradiction of conventional network protocols with a number of widely used applications, which need the multicast operation such as web proxies, firewalls, media gateways, and overlay networks. Also, the active technology has the flexibility and expandability for network upgrading more than the conventional network, which passed through the slow process of standardization. Then in this thesis we study the different designs of the multicast switch from fixed path and multi-path network, apply a new routing algorithm to enhance their speed. These designs have been implemented in the FPGA and comparison among them for using the best one in the implementation of a new architecture for an active multicast switch. It provides the capability to execute customized code, which goes beyond the common header processing signals in multicast switches. It can mainly be used for building computer active networks that is recommended to satisfy users need for future Internet applications. The switch is implemented using Field Programmable Gate Array (FPGA) technology and Virtual Hardware Description Language (VHDL) language. This means that it can easily reprogrammed. Active switches usually reduce the overhead processing time required to process software in computer networks; hence they increasingly accelerate the performance of the network. Performance evaluation of the switch including throughput and max delay is achieved. Factors affecting the switch design such as time complexity and expandability are analyzed. Results show that the active multicast switch is reliable and suitable for networks that supports multimedia applications.

ABBREVIATIONS

ADC	: Analog to Digital Converter
ANEP	: Active Network Encapsulation Protocol
ANN	: Active Network Node
ANPE	: Active Network Processing Element
APU	: Active Processing Unit
ASIC	: Application Specific Integrated Circuit
ARM	: Active Reliable Multicast
CPLD	: Complex Programmable Logic Device
DAC	: Digital to Analog Converter
DAN	: Distributed Code Caching for Active Network
DSP	: Digital Signal Processing
EE	: Execution Environments
FPGA	: Field Programmable Gate Array
IPC	: Input Port Controller
LB	: Logic Block
LUT	: Lookup Table function Generator
LE	: Logic Element
MGN	: Multicast Grouping Network
MIN	: Multi-path Interconnection Network
NACK	: Negative Acknowledge
NCA	: Netlist Constrain Application
NCD	: Netlist Constrain Design
NCF	: Netlist Constrain File
PAR	: Programming and Routing
SE	: Switch Element
SSM	: Small Switch Module
RM	: Routing Module
UCF	: User Constrain File
VHDL	: Virtual Hardware Description Language

CONTENTS

Bibliography	IV
ACKNOWLEDGMENTS	V
ABSTRACT	VI
ABBREVIATIONS	VII
CHAPTER 1: INTRODUCTION	1
1.1 MOTIVATION.....	2
1.2 PROBLEM DEFINITION.....	2
1.3 THESIS OVERVIEW	3
CHAPTER 2: ACTIVE NETWORKS COMPARATIVE STUDY	4
2.1 ACTIVE NETWORK DEFINITION	5
2.2 ACTIVE NETWORK FUNCTION	6
2.3 ACTIVE NETWORK ARCHITECTURE.....	6
2.3.1 Active Packet Approach	6
2.3.1.1 Smart Packet	7
2.3.1.2 Active IP-option	7
2.3.2 Active Nodes Approach.....	8
2.3.2.1 DAN ARCHITECTURE	8
2.3.3 HYBRID SYSTEM.....	9
2.4 ACTIVE NETWORK APPLICATION	9
2.4.1 NETWORK MANAGEMENT	9
2.4.2 CONGESTION CONTROL	9
2.4.3 Caching.....	10
2.4.4 NETWORK AND DATA PROTECTION.....	10
2.4.5 MULTICASTING	10
2.5 COMPARISON CONVENTIONAL NETWORK AND ACTIVE NETWORK.....	10
2.6 ACTIVE NETWORK HARDWARE	11
2.6.1 FUNCTIONAL DESIGN.....	12
2.6.2 ANPE DESIGN	13
2.6.3 DATA FLOW	13
2.6.4 CONCURRENCY ISSUES	13
2.6.5 PERFORMANCE ISSUES.....	14
2.6.6 ACTIVE PROCESSING UNIT	14
2.7 DESIGN ISSUES TO ACHIEVE GOOD OVERALL PERFORMANCE	15
2.7.1 FUNCTIONALITY	15
2.7.2 PERFORMANCE.....	15
2.7.3 SCALABILITY	15
2.8 ACTIVE HARDWARE IMPLEMENTATION.....	16
2.9 ACTIVE NETWORKING ROUTER HARDWARE DESIGNED FOR HIGH PERFORMANCE REQUIRES:	16
2.9.1 SCALABILITY IS GUARANTEED THROUGH.....	17
2.9.2 ANPE ARCHITECTURE	17
2.10 ACTIVE SWITCH WARE	19
2.11 SUMMARY	20
CHAPTER 3 MULTICASTING NETWORKS.....	21
3.1 MULTICAST DEFINITION	22
3.2 HOW YOU CAN IMPLEMENT MULTICASTING?.....	23
3.3 USES OF MULTICAST	23

3.4 MULTICAST SWITCH ARCHITECTURE	23
3.4.1 AN ARCHITECTURE FOR CASCADED MULTICAST SWITCH FABRIC	24
3.4.2 Single Module Multicast switching fabric Designs	25
3.4.2.1 Fixed path (pipelined) multicast switch	25
3.4.2.2 Multi-path Interconnection Network MIN switch fabric	26
3.4.2.2.1 Tandem Switch fabric	27
3.4.2.2.2 Reversed banyan switch	28
3.4.3 Multicast Switch limitation	29
3.5 Active Reliable Multicast "ARM"	29
3.6 Application of Active Multicast on Internet	30
3.7 Summary	31
CHAPTER 4: SOFTWARE IMPLEMENTATION TOOLS AND METHODOLOGY USING FPGA	32
4.1 FPGA ARCHITECTURE	33
4.1.1 General Logic Block Architecture	34
4.1.2 LOGIC BLOCK OPERATION MODES	34
4.1.3 INTERCONNECTION NETWORKS	34
4.2 FPGA APPLICATIONS	34
4.3 FPGA VENDORS	35
4.3.1 LATTICE SEMICONDUCTOR CORPORATION	35
4.3.2 ALTERA	35
4.3.3 QUICK LOGIC	36
4.3.4 ATMEL CORPORATION	36
4.3.5 XILINX INCORPORATED	36
4.3.5.1 XILINX FPGA	37
4.3.5.2 XILINX IMPLEMENTATION TOOL KITS	37
4.3.5.2.1 XILINX FOUNDATIONS	37
4.3.5.2.2 FPGA ADVANTAGE 5.0	39
4.4 DESIGN METHODOLOGIES	40
4.5 SUMMARY	41
CHAPTER 5: ENHANCED ARCHITECTURES FOR MULTICAST SWITCH DESIGNS AND IMPLEMENTATIONS	42
5.1 FIXED PATH (PIPELINED) MULTICAST SWITCH	43
5.2 CASE STUDY FPGA IMPLEMENTATION FOR 8X8 PIPELINED MULTICAST SWITCH	44
5.3 SWITCH IMPLEMENTATION	44
5.3.1 PIPELINED MULTICAST SWITCH SIMULATED PROGRAM	46
5.3.2 DESIGN STATISTICS:	50
5.3.3 THE TIMING DIAGRAM FOR PIPELINED MULTICAST SWITCH	51
5.4 MULTI-PATH INTERCONNECTION NETWORK MIN SWITCH FABRIC	52
5.5 PROPOSED MULTI-PATH INTERCONNECTION NETWORK SWITCH FABRICS	52
5.5.1 MULTI-PATH NETWORK ROUTING ALGORITHM	54
5.5.2 OMEGA NETWORK SWITCH FABRIC	55
5.5.3 FLIP NETWORK SWITCH FABRIC	56
5.5.4 BANYAN NETWORK SWITCH FABRIC	57
5.5.5 BASELINE NETWORK SWITCH FABRIC	58
5.6 COMPARISON AMONG THE DIFFERENT TECHNIQUES FOR THE MULTICAST SWITCHING FABRIC	59
5.7 -Discussion	59
5.8 -Summary	59

CHAPTER 6: AN ACTIVE MULTICAST SWITCH DESIGN AND IMPLEMENTATION WITH FPGA	60
6.1 OPERATION PROTOCOL	61
6.2 ACTIVE MULTICAST SWITCH IMPLEMENTATION	63
6.2.1 IMPLEMENTATION OF SWITCH ELEMENT	63
6.2.2 SWITCH ELEMENT SIMULATION PROGRAM	64
6.2.3 BASELINE NETWORK IMPLEMENTATION	66
6.2.4 BASELINE NETWORK SIMULATION PROGRAM	67
6.2.5 MULTICAST SWITCH	71
6.2.6 ACTIVE MULTICAST SWITCH	73
6.3 TIMING ANALYSIS	76
6.4 SUMMARY	77
CHAPTER 7: PERFORMANCE EVALUATION	78
7.1 MULTICAST SWITCH PERFORMANCE EVALUATION	79
7.2 RELATED WORKS	80
7.2.1 TANDEM MULTICAST SWITCH	80
7.2.2 RESERVED BANYAN SWITCH	80
7.3 ACTIVE MULTICAST SWITCH	80
7.3.1 SWITCH IMPLEMENTATION	80
7.3.2- THE SWITCH THROUGHPUT	80
7.3.3-SWITCH EXPANDABILITY	80
7.3.3.1 COMPLEXITY ANALYSIS OF THE MIN SWITCHING FABRIC	81
7.3.3.2 ACTIVE MULTICAST SWITCH DELAY TIME COMPLEXITY	82
7.4 SWITCH PERFORMANCE VERIFICATION	82
7.4.1 IN CASE OF NON-ACTIVE SWITCH	83
7.4.2 IN CASE OF ACTIVE NETWORK	83
7.4.3 ANALYTICAL ANALYSIS	83
7.5 EXPERIMENTAL IMPLEMENTATION	84
7.6 SUMMARY	89
CHAPTER 8: CONCLUSIONS AND FUTURE RESEARCH	90
8.1 CONCLUSIONS	91
8.2 FUTURE WORK	92
REFERENCES	93