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التوثيق الالكتروني والميكروفيلم

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لم ترد بالأصل

HOSSAM MAGHRABY

MENOFYIA UNIVERSITY
FACULTY OF ELECTRONIC ENGINEERING
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

By

Eng. Mohamed Abbas Ahmed Afify

Demonstrator at the National Center for Radiation
Research and Technology NCRRT,
Atomic Energy Authority AEA.

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Radiation Engineering Dept., NCRRT,
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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ
لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ
أَنْتَ الْعَلِيمُ الْحَكِيمُ

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[1] Abdul Hamid M. Ragab, M.A. Ashour, and M. A. Ahmed, "Enhanced Architectures for Multicast Switch FPGA based Design and Implementation" , Accepted for publications in Egyptian Organization for Computer Science Magazine, Aug, 2002.

[2] Abdul Hamid M. Ragab, M.A. Ashour, and M. A. Ahmed, "An Active Multicast Switch FPGA Based Design and Implementation", Accepted for publications in Faculty of Engineering, El-Azhar University Magazine, Aug, 2002.

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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

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