AN ENERGY EFFICIENT ROUTING MECHANISM IN WIRELESS SENSOR NETWORK

by

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DEDICATION

Dedicated this work to Allah; my lord; the Master and my Creator; my great teacher and messenger, Mohammed (May Allah bless and grant him), who taught us the purpose of life; my homeland Jordan; my great parents, who never stop giving of themselves in countless ways; my dearest husband, who leads me through the valley of darkness with light of hope and support; my beloved brothers and sisters; my beloved Mother whom I can't force myself to stop loving. To all my family, the symbol of love and giving; my friends who encourage and support me, all the people in my life who touch my heart,

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LIST OF ABBREVIATIONS

Symbol	Description
ARPANET	Advanced Research Projects Agency Network
BS	Base-Station
CH	Cluster Head
CMT	Cable Mode Transition
CMU	Carnegie Mellon University
CS_pop	Cluster_Sub_population
CSM	Clustering Selection Method
CV	Cluster Value
DARPA	Defense Advanced Research Projects Agency
DEEC	Distributed Energy-Efficient Clustering
DGs	Designated Gateways
DSN	Distributed Sensor Networks
GAs	Genetic Algorithms
GPS	Global Positioning System
HT	Hard Threshold
LEACH	Low-Energy Adaptive Clustering Hierarchy
MESP	Minimum Energy and Shortest Path
MIT	Massachusetts Institute of Technology
NFER	Near-field electromagnetic ranging
PEGASIS	Power-Efficient Gathering in Sensor Information Systems
pop	population
PSO	Particle Swarm Optimization
RIM	Radio Interferometric Measurements

RSSI	Received Signal strength Indicator
ST	Soft Threshold
STD	standard deviation
TDoA	Time Difference of Arrival
TEEN	Threshold sensitive Energy Efficient sensor Network protocol
ToA	Time of Arrival
TSP	Traveling Sales Person
WSN	Wireless Sensor Networks

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ABSTRACT

The Wireless Sensor Networks (WANs) has several methoeds such as PEGASIS, LEACH, TEEN and other methoeds to create, connect and communicate with sensor network nods. A new methoed operator method, called Minimum Energy and Shortest Path (MESP) routing method has been proposed. We focused on the choose of shortest path minimum number of nodes, connection from sink till Base-Station to improve and increase the performance of the methoed. Such a proposed method is to be implemented using the Clustering Selection Method (CSM) which has been adopted for 100 nodes with a 10000 different arrange of nodes location to test the proposed method MESP opposite of others. MESP methoed is used to select, manage and connect the nodes between Base-Station (BS) and sink with best performance and minimum power consumption too. It has been tested and compared with other methoeds such as PEGASIS, LEACH, DEEC, CH-leach and TEEN. Also, we suggested in MESP two ways of

connection for future works. The experiments' tests found that MESP methoed achieved the best results with less number of dead nodes compared with the other different methoeds. Moreover, from the experiments' results, we found that MESP was the best methoed and more efficient than TEEN with 13.6% after test them on 10000 different scenarios at 100 nodes.

CHAPTER ONE

INTRODUCTION

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1.1 Introduction

A Wireless Sensor Network (WSN) is a wireless network organized system created up of spatially assigned personal devices known as indication nodes to keep a history of real or ecological conditions and able to work with little client lifestyle [1, 2,3, 4, 5]. That in the server a historical table of data and nodes information. Wireless sensor network operates in a cooperative and distributed manner called sensor nodes. These nodes report sensed data to a central Base-Station. It sense and collect data from a target domain, process the data, and transmit the information back to specific station. The communication among these nodes achieved by means of a unique channel. Thus, shared access of the channel requires the establishment of a MAC protocol among the sensor nodes.

Usually, nodes equipped with a:

- sensing device,
- low capacity processor,
- short-range wireless transceiver,
- sensor embedded in the physical environment,
- their inherent limited energy resource storage,
- the characteristic of the channel that only a single node can transmit a message at any given time.

Special kinds, it harvests ambient energy from the sensor's environment, and there a various number of ambient energy sources, and offering the potential for self-powered;

power source into a package currently about two cubic inches in size - networked autonomous sensor nodes. The power consumption in wireless sensor nodes is worst. Even if data rate through nodes are least [6, 7, 8, 9, 10].

A WSN system incorporates a gateway that provides wireless connectivity back to the wired world and distributed nodes. How to reduce the energy consumption of WSN so that the lifetime of WSN can be prolonged is one of the hottest spots. Routing protocols have significant impact on the overall energy consumption of sensor networks. Energy consumption for the routing protocols with direct communication, minimum transmission energy and low adaptive energy clustering hierarchy.

1.2 Overview

A routing protocol uses software and routing algorithms to determine optimal network data transfer and communication paths between network nodes. Routing protocols facilitate router communication and overall network topology understanding. A routing protocol is also known as a routing policy [16].

Every network routing protocol performs three basic functions [17]:

- Discovery - identify other routers on the network
- Route management - keep track of all the possible destinations (for network messages) along with some data describing the pathway of each
- Path determination - make dynamic decisions for where to send each network message

The sensor nodes communicate together by many wirelessly strategies. These strategies administrated by routing protocols. There are different types of routing protocols that can be categorized depending on set of metrics like [18]: