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MODIFIED SECURE SPIN USING CLUSTER HEAD SELECTION FOR DATA CENTRIC WIRELESS SENSOR NETWORKS

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ABSTRACT

Routing protocols are proposed for the development of the data transmission in wireless sensor networks. Many protocols were proposed to transmit the data in an efficient manner. This Paper uses clustering algorithms to send the data over different geographic regions. This paper works on the data gathering and data aggregation to base station which is important and critical task in DCWSN. Based on user application for example: battle field environment, clustering algorithm is used. This paper assumes that sensor nodes were uniformly distributed and coordinates of the base station and nodes are known. This paper uses the cluster head based selection scheme and a proposed protocol known as SSPIN. Proposed scheme having better data gathering, energy efficiency, throughput, etc. compared to the standard LEACH protocol. The proposed scheme is implemented and simulated in NS2.34.Simulation shows proposed protocol performance through put is better than the existing system.

Keywords: DCWSN (data centric wireless sensor networks), cluster head, energy efficacy, SSPIN, throughput, routing protocol, data gathering and data aggregation, NS2.

1. INTRODUCTION

The wireless sensor networks commonly known as WSNS is made up of several sensor nodes [1]. Each node consists of information or data, the wireless sensors can do the following operations such as 1.they can sense the data from environment 2.It can gather the data from all the sensor nodes 3. The processed data is aggregated etc. [2] the sensor nodes are redundant capable, in order to improve the capability we assign some roles and protocols to the nodes. The role assignment of nodes, is based on node properties i.e. information about the network data assignment from source to the destination using the address of each node by routing protocols, the senor nodes can calculate the physical parameters around the environment and can be used in real time world.

[3] In WSN each node guarantees the delivery of specific information from the source node to the sink node. Sink nodes are the destination nodes it may be a part of the sensor network or it can be outside the system. They transmit the data in the form of packets, in order to transmit the data it requires energy example: it can use energy battery source or solar cells etc. It must have enough battery power during the process of data delivery from the source to sink nod. During the transmission, the large amount of energy is consumed by the electronic devices and the sensor nodes; if the energy consumption by the nodes decreases it leads to the dead nodes due to the decrease in power of the battery source supplied to the nodes. To overcome this problem, there is a special approach at the point of electronic devices and there had been number of attempts for data routing such that energy expenditure during transmission among the nodes is less to reserve their energy until the network life time period, instead of routing the data to a path that increases the energy expenditure. One of the key factors which make sensor networks more fault-tolerant is energy backup. If the sensor node has

sufficient energy, it would be able to remove itself from failure.
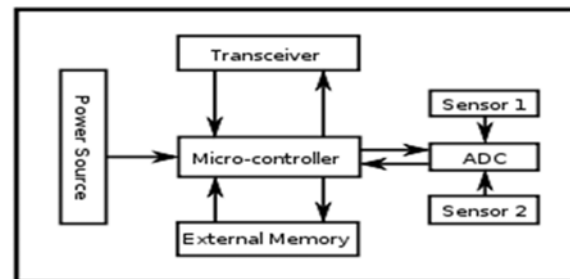
Figure-1. Block diagram of a simple wireless sensor networks.

In this paper, a modified approach of cluster head selection scheme is proposed. This Scheme uses a security protocol known as SPIN which successfully transfers the data delivery from source node to base station. For the data transmission, the proposed scheme does not send the data packet throughout the network but the data is send in the form of clusters which uses clustering algorithms. The proposed scheme, executes less number of packet transmissions. The algorithms used will consume less energy and the amount of total energy can be saved and hence it is energy efficient. Cluster head selection scheme is implemented with the help of TCL/C++programminglanguageandNs2.34simulator and the operating OS as Ubuntu.

2. PROTOCOL DESCRIPTION AND ROUTING TECHNIQUE

a) Spin protocol

[8] SPIN (Sensor Protocols for Information via Negotiation) protocol it is one of the flat routing protocol used in wireless sensor networks. It is a protocol that

disseminates all the data from each and every sensor node in the network. This is a data centric routing protocol. In SPIN protocol the sensor nodes works efficiently and conserves energy by sending the data that describes the sensor data instead of sending all the data. SPIN protocol operates in three stages using three types of messages ADV, REQ, DATA. In ADV stage broadcasting of new data to the neighbour nodes is done. In REQ stage, the neighbour nodes request the actual node to share the data. In DATA stage, the data is send to the neighbour nodes and then to all other nodes which they want to share the data will communicate each other, in this way all the nodes in the network share the data.
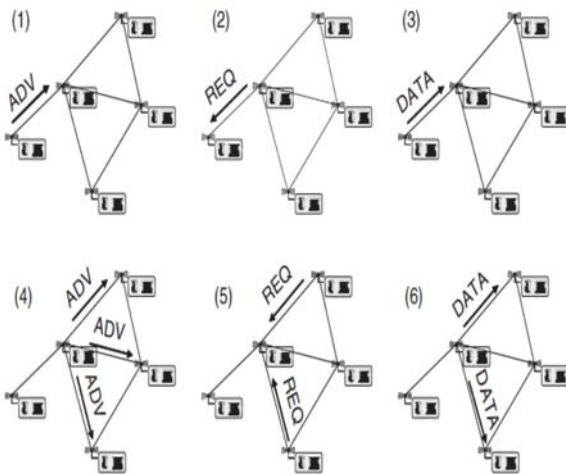

Figure-2. The operation of the spin protocol.

b) Routing technique

a. Dynamic source routing

[9]This is a reactive based routing technique, it can manage the wireless networks without the help of the routing table updates, this was designed for the purpose of multi-hop wireless networks.

In the DSR the source node calculates the whole path from source to the sink node, and stores the addresses of the intermediate noes in the form of packets. The DSR contains two phases a. Route discovery

b. Route maintenance

i. Route discovery

When a source node wants to find the path to the sink node then the source sends a Route Request to the sink node and when the sink node traces the request then it sends a Route Reply to the source node which it contains the list of possible routes and the source node saves it in route cache and in this way they the packets are transmitted.
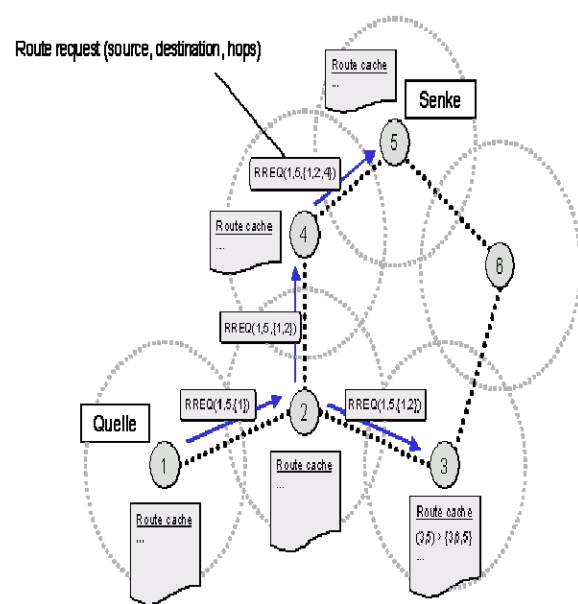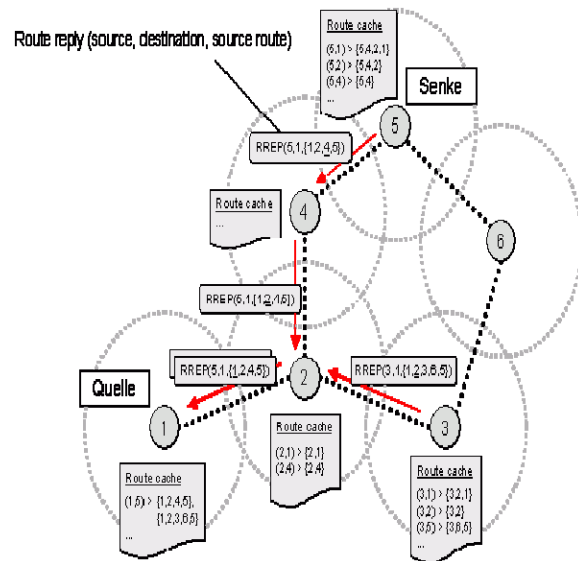

Figure-3. Path finding route request.

Figure-4. Path finding route reply.

3. EXISTING SYSTEM AND PROPOSED SYSTEM

A. Existing system

In this system a protocol SPIN which is a three stage protocol all the sensors nodes used are in the form of clusters and a base station is used .when a data starts transmitting from source node to the base station, it transmits the data from one node to another node in the form of link state and this continues along all the nodes until it reaches the base station and in this way the data is transmitted to the base station.

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Disadvantages

a) In cannot create a path between the source node to the base station.

b) Many of the cluster members will be idle at any particular time.

c) Redundancy increases

d) Energy consumption is more and it is energy deficient.

B. Proposed system

In order to overcome the disadvantages of the existing system, the proposed system uses a scheme known as cluster head selection. Aim of the proposed scheme is to reduce the intercommunications distance between the nodes and also distances between the cluster head by means of shortest route. Proposed scheme is divided into three stages. In First stage, cluster head generation among the sensor nodes within a cluster around 50m distance, based on the energy efficiency. To generate the cluster head we send the 'hello' packet to all the nodes and select the cluster head with in the 50 m distance. Second stage is negotiation, this decides the cluster head to rotate after every round of communication. The Cluster head consumes more energy as compared to other sensors in the cluster. In this way the life time of network and sensor node is increased, in the cluster head selection, the cluster head of each cluster varies or rotates according to the energy levels, the sensor which is having the highest energy level in a cluster that becomes the cluster head.

In final stage all the cluster heads communicates with each other and finally transfers the data from all the clusters to base station. This scheme ensures the delivery of data to base station/sink but only for such nodes who are the member of cluster along with cluster head. Each and every node in a cluster will become a cluster head exactly once every **1/t** rounds. These cluster head increases in each round and becomes equal to 1. In every round it can enable a time interval where all cluster members attempt to transmit the data to their cluster head once, and hence in this scheme the energy consumption is less, network lifetime is more and time consumption is also less and hence it is efficient.

4. SIMULATION AND RESULTS

A. Simulation model for existing system

[6-7] the simulation is done by using network simulator NS-2 with incorporation of MITuAMP [11] project (NS2 Extension). We transmit the data or message as 'hello' packet this message is passed from one sensor node to other sensor node and finally to the base station.
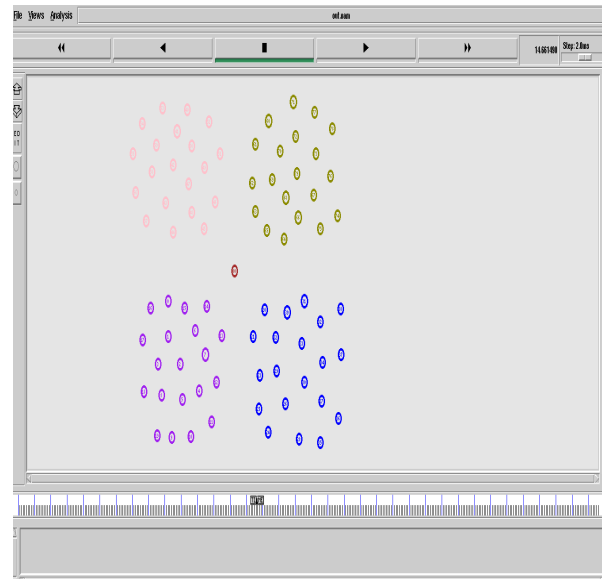

Figure-5. Simulation of existing system using 80 sensor nodes transmission of 'hello' packet from each and every node.
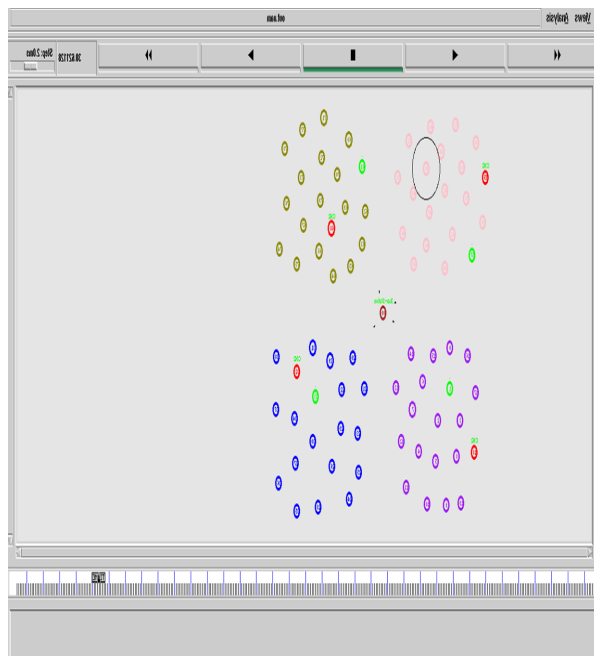
B. Simulation model for proposed system

The cluster head selection scheme is implemented in the network simulator by sending the message as 'hello' packet, we use 80 sensor nodes and a base station. For transmission of the data, this scheme does not send the data packet throughout the network, it selects a cluster head in the cluster network and collects the data using clustering algorithms and implementation of both protocols has been written in TCL and C++ programming language, and finally the data reaches the base station.

This network simulator simulates the implemented code in an NAM and produces the xgraph as outputs and the output calculates the throughput and pdr of the network.

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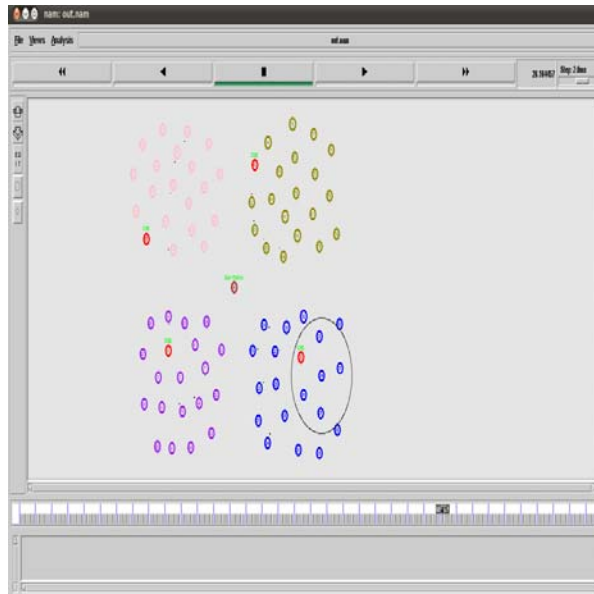
Figure-6. simulation of the proposed system for 80 sensor
nodes transmission of hello packet, selection
of cluster heads in each cluster.

**Table-1.** Parameters table.

Parameter	Scenario
Number of nodes Attempted	80
Propagation mechanism Used	Tworay Ground
Type of Traffic considered	Constant Bitrate
Agent kind	UDP
Initial energy	50J
MAC type	IEEE802.11
Propagation model	Tworay Ground
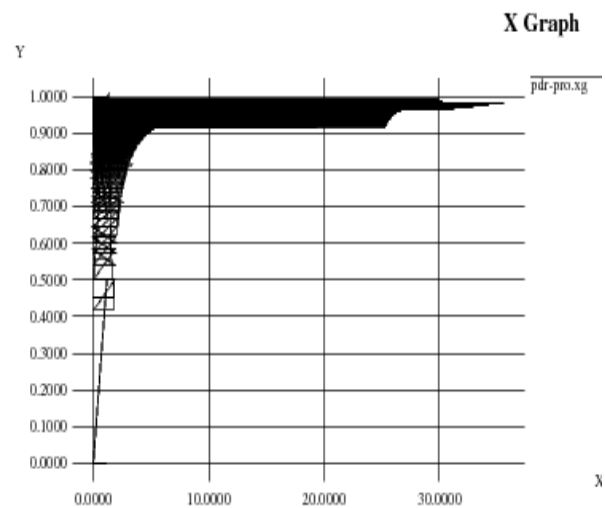
Figure-8. output xgraph of pdr for the proposed system.

Figure-7. simulation of proposed system the hello packet
reaching the base station from the
cluster heads.
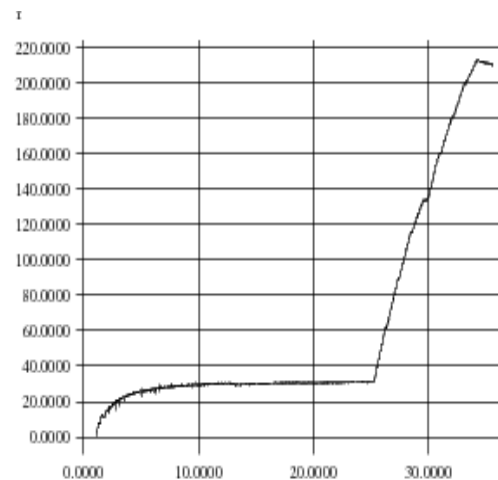
Figure-9. Output x graph throughput for the proposed
system.

5. CONCLUSIONS

In this paper, Cluster head selection of SSPIN protocol proposed using cluster algorithms. This scheme attempts to provide the security and delivery of the data to base station along with stability and better network life time, the cluster head network used is static. In future it may be enhanced to dynamic replacement of node and cluster head in network after the dead and provide the better solution.

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