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ENHANCEMENT OF NODE ENERGY LIFETIME & BATTERY CONSUMPTION IN WIRELESS SENSOR NETWORK

Kanika Nagpal*, Dr. Rakesh Dhiman
*R N College of Engineering & Technology, Panipat

Keywords: WSN, DSN, MAC , TDMA

Abstract
In this research paper to study the difference between the WSN and Ad-Hoc networks were also covered. It is important to realize that the two networks occupy different areas and applications, but that there is minimal overlap. In this protocol there is a comparison between conventional approach and our approach. This paper presents here “Enhancement of Node Energy lifetime & Battery Consumption in wireless sensor network” through the routing protocol. In this thesis we have concentrated on less consuming energy issue & save battery consumption or to develop a larger the lifetime of system in data transmission. The proposed approach enables a high rate of successful delivery of messages and it results in short route lengths to recover from packet losses.at the two networks occupy different areas and applications, but that there is minimal overlap.

Introduction
In WSN, Each node typically consists of the five components: sensor unit, analog digital convertor (ADC), central processing unit (CPU), power unit, and communication unit. The sensor unit is responsible for collecting information as the ADC requests, and returning the analog data it sensed. ADC is a translator that tells the CPU what the sensor unit has sensed, and also informs the sensor unit what to do. Communication unit is tasked to receive command or query from, and transmit the data from CPU to the outside world. CPU is the most complex unit sensor node is a node in a wireless sensor network that is capable of performing some processing, gathering information and communicating with other connected nodes in the network.

Literature Survey
Most of them are focused on energy consumption, Throughput improvement and life time of the nodes

K. P. Sampoornam et. AI discussed that A power efficient scheduling scheme extending the life time of sensor nodes on wireless sensor networks has been proposed in this paper. This power efficient sleep scheduling algorithm is based on the connected dominating set approach. This approach first constructs a connected dominating set for parent selection and uses the conjugative sleep scheduler scheme for data aggregation. The re-calculation of connected dominating set when the node is in ON condition and in OFF conditions have been discussed. Finally, the performance of connected dominating set approach is compared with minimum spanning tree approach. By simulating the network with different node density, it is observed that, our proposed approach performs better than spanning tree topology.

W. R. Heinzelman et. AI, proposed that Energy- Efficient Communication Protocol for Wireless Microsensor network , WSNs differ from traditional wireless communication networks in several of their characteristics. One of them is power awareness, due to the fact that the batteries of sensor nodes have a restricted lifetime and are difficult to be replaced. Therefore, all protocols must be designed in such a way as to minimize energy consumption and preserve the longevity of the network

Nikolaos et. AI stated that Intelligent Energy efficiency is an important research topic for ad-hoc Wireless Sensor Networks (WSN). Power saving makes it possible to guarantee basic levels of system performance, such as connectivity, throughput and delay, in the presence of both mobility-immobility and a large number of sensor nodes. A large variety of approaches for intelligent energy-efficient schemes have been proposed in the literature focusing on different performance metrics

R. Shah et. AI, stated that Energy- Aware Routing is designed to choose sub optimal paths using a probability function, which depends on the energy consumption of each path. By doing this, the hope is that the network lifetime will be extended to its fullest. One assumption that the protocol places on the overall network is that the nodes themselves are addressable via a class based addressing scheme, which includes the location and type of the node.

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B. Heinzelman et. AI,propose that Centralized Hierarchical Routing:- In e processing, gathering information and communicating with other connected nodes in the network centralized routing, the base station is responsible for formation of cluster head. LEACH-C A centralized version of LEACH, LEACH-C, is proposed Unlike LEACH, where nodes self-configure themselves into clusters, LEACH-C utilizes the base station for cluster formation. During the setup phase of LEACH-C, the base station receives information regarding the location and energy level of each node in the network.

Problem formulation

The proposed algorithm is used to remove the problems of the previous algorithms and compare the already existing centralized hierarchical routing protocol. This algorithm extends the system lifetime of the network and consume the energy. One of the most critical issues in wireless sensor networks is represented by the limited availability of energy on network nodes thus, making good use of energy is necessary to increase network lifetime. Simulation results indicate the new algorithm has the advantages of reducing energy consuming and prolonging the lifetime of the sensor network

Algorithm description

Step 1: Initally enter the number of nodes and number of rounds in the sensor field of the network area.

Step 2: The Base station deploy the nodes in Network area with constant energy E.

Step 3: Base Station sends a START message to all the nodes in the sensor field, to obtain information about the every nodes.

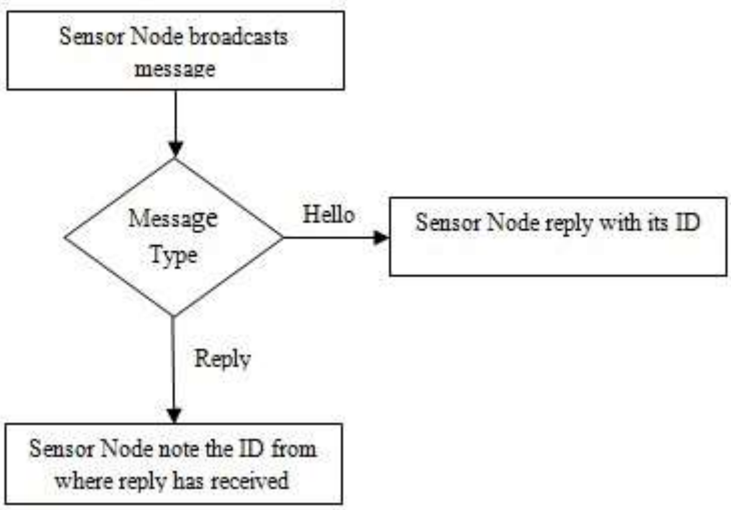

Figure: 4.2 Message transferring process

Step 4: After receiving the “START” message, each node broadcasts the hello message “HELLO” and the nodes receiving hello message “HELLO” sends “REPLY” message containing its ID.

Step 5: After receiving the information about their neighbours the nodes, for which the base station is within their range, sends a STATUS message to the base station. This STATUS includes ID, routing table, and Energy of the node. Base station sends an acknowledge (ACK) to all sending nodes.

Step 6: After acquiring acknowledge ACK, the nodes declare itself as cluster head node and broadcast to all its neighbouring nodes.

Step 7: The node receiving the cluster head node’s message will check their status whether it is cluster node or not, if it is not a cluster node then it will become other node of the cluster, from where it has received the cluster node message first.

Step 8: Cluster nodes send the STATUS to its other cluster nodes which are near to the base station, or direct to the base station.

Step 9: The nodes which are directly sending the STATUS to Base Station, becomes the Cluster Head for the current round. Steps 6-8 are repeated until single node is active.

Step 10: For second round the nodes directly communication with Base Station and having max. Energy becomes the cluster head.

Step 11: Cluster Head will receive data from nodes that comes in its cluster area.

Step12: After collecting data, Cluster Head sends the aggregated data to the Base Station.

Steps 11-12 are repeated until system is active

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Result &Analysis

Result analysis is a critical component of systems research that allows evaluation of new ideas, identification of problems and bottlenecks and optimization of existing systems. There are three approaches to result analysis.

Network node configuration	0:20:140
No. of round activity	0 :15:150
MAC	802.11e
Initial energy	2 joule
Simulation Time	50 sec
Routing Protocol	BCDCP, SHPER
Mobility Model	Random Way Point
Speed & data packet size	5 m/s , 40
Signal	500

Average energy dissipation of BCDCP and BECH:

In these figure, the average energy dissipation of the protocols under study over the number of rounds of operation. This plot clearly shows that BECH has a much more desirable energy expenditure curve than that of BCDCP .

Avg(kk)=aggeregation(rounds)+ energy_received(rounds)+ energy_transmitted(rounds);

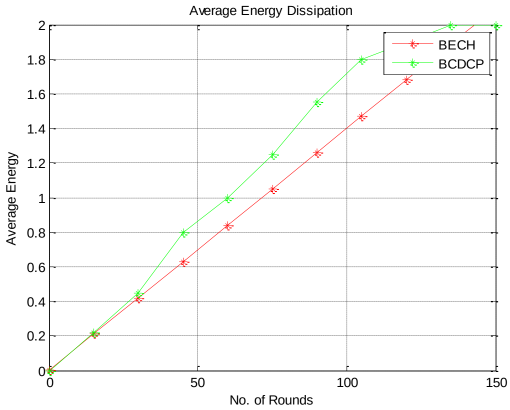

Figure 5.2 Comparison of average energy in BCDCP and BECH

Table 5.2 To calculate and show the performance of the average energy dissipation of BCDCP and BECH routing protocol. In these table to activate the number of rounds after every 15 interval i.e.15,30,45 and measure the average energy of these point.

No. Of rounds	**0**	15	30	45	60	75
Average energy of BCDCP	**0**	0.22	0.45	0.8	1	1.25
Average energy of BECH	0.0010	0.2110	0.4210	0.6310	0.8410	1.0510

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Average Energy Dissipation of SHPER and BECH:

In these figure 5.3, to the average energy dissipation of the protocols under study over the number of rounds of operation. This plot clearly shows that BECH has a much more desirable energy expenditure curve than that of SHPER .

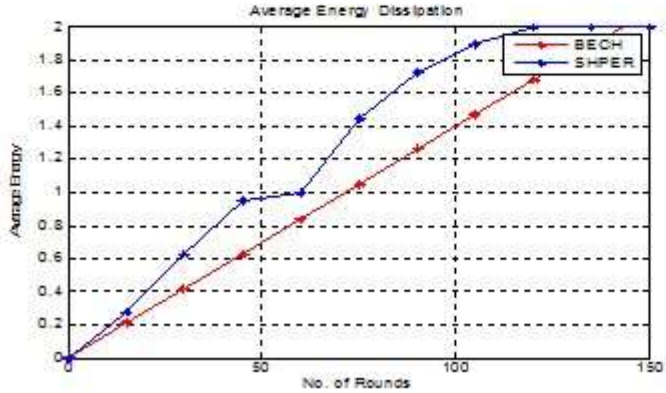

Figure5.3 Comparison of average energy in SHPER and BECH

Table 5.3 To calculate the average energy dissipation the of SHPER and BECH routing protocol. In these table to activate the number of rounds after every 15 interval i.e.15,30,45 and measure the average energy of these point.

Table 5.3 Performance to compare BECH and SHPER routing protocol

No. Of rounds	0	15	30	45	60	75
Average energy of SHPER	**0**	0.28	0.63	0.95	1	1.45
***Average* energy of BECH**	*0.0010*	0.2110	0.4210	0.6310	0.8410	1.0510

System lifetime

The improvement gained through BECH is further exemplified by the system lifetime using MATLAB graph in Figure 5.4. This plot shows the number of nodes that remain alive over the number of rounds of activity for the 100 m × 100 m network scenario. With BECH, 80% of the nodes remain alive for 60 rounds, while the corresponding numbers for BCDCP is 70% and for SHPER is 50% respectively. And With this, 45% of the nodes alive for 105 rounds while the corresponding numbers for BCDCP is 41% and in case of SHPER 0% node alive i.e. all the nodes are dead for SHPER after 105 rounds. Furthermore, if system lifetime is defined as the number of rounds for which 75 percent of the nodes remain alive; BECH exceeds the system lifetime of BCDCP and outperforms that of BCDCP by 30 percent.

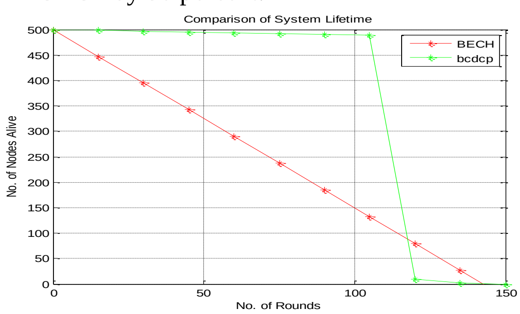

Figure 5.4 Comparison of system lifetime in BCDCP and BECH

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To calculate the system lifetime of BCDCP and BECH routing protocol. In these figure to activate the number of nodes alive after every20 interval i.e.20,40,60 and measure the system lifetime of these point.

Table 5.4 Compare the system lifetime of BCDCP and BECH

No. Of rounds	0	15	30	45	60	75
System lifetime of BCDCP	500	497	495	493	492	490
System lifetime of BECH	500	450	395	345	295	245

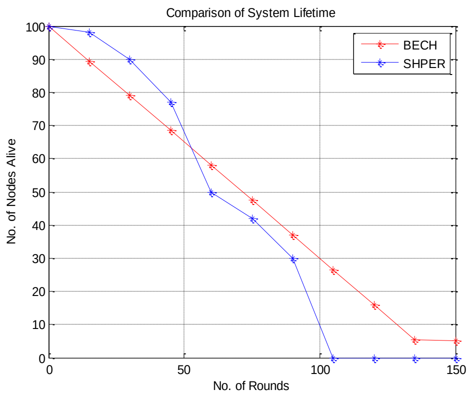

Figure5.5 Comparison of system lifetime in SHPER and BECH

To calculate the system lifetime of SHPER and BECH routing protocol. In these figure to activate the number of nodes alive after every20 interval i.e.20,40,60 and measure the system lifetime of these point

***Table 5.5 Compare* the system lifetime of SHPER and BECH**

No. Of rounds	0	15	30	45	60	75
System lifetime of SHPER	100	98	90	77	50	42
System lifetime of BECH	100	90	78	69	58	47

Conclusion

In BECH, the base station first collects information about the logical structure of the network and residual energy of each node. So, with the global information about the network base station does cluster formation better in the sense that it has information about the residual energy of each node.

Future scope

The main issue in WSN is energy limited characteristic of the sensor node. So the problem is to have the routing protocol in such the manner that it should be energy efficient in order to increase the life span of the whole WSN. The base station performs computation to form the better cluster in such a way that there is less energy consumption.

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