Idenfication and Rectification of Unstabilized Routes and Energy Optimization in WSN's

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Abstract—I**n the area of WSN issues of routing protocols and energy optimization techniques have been witnessed in the last few decades. The proposed study considers the bidirectional process of data transmission which identifies and rectify the unstabilized routes. Energy optimization offers assurance of delivery of data gathered. And reduces the time required for election of cluster head after gathering data.**

Wireless Sensor Network (WSN) consists of a set of randomly distributed minute devices also referred as nodes deployed within a specific human inaccessible region which are well-capable of communicating among each other and also with base station (BS) to transmit the desired information to the controller via internet. It has also emerged as a collaborative network with an aid of providing better communication scenario by deploying a large number of self-governing sensing nodes. WSN are largely being adopted into a wide range of applications and also become a constituent component of many event tracking, monitoring applications which are critical in nature. The distinguished characteristics of WSN in terms of its operational processes , capacity and deployment in a typical constraint of energy poses a challenge to handle the trade-off between quality of service and usage of resources more specifically *energy*

Keywords-component; routing, energy optimization, cluster,

I. INTRODUCTION

Sensor nodes in WSN are perceptible to physical factors like humidity pressure heat etc[1], and Quality parameters like timeliness delay, throughput, gathering capacity[2].. Sensor node has less availability of resources like energy (power), memory and frequency band. Using clustering process it does data gathering from surrounding nodes and forwards to next station [3]. Specific number of nodes with cluster head forms a cluster [4]. Forwarding of data by removal of redundancies is not an easy process [5] [6] [7]. It requires routing protocol main intension is to remove overhead towards base station which in turn saves the energy of nodes. On the defined test-bed APTEEN, TEEN, PEGASIS and LEACH are the standard routing protocol [8]. Maximum study in the area of WSN considers LEACH as routing protocol since it is implemented and tested using First order radio model and RF circuitry[9] rest were on simulation bed but still there are other enhancement of LEACH but not experimented hence all the manuscript chooses LEACH to compare. The cluster head (CH) selection in LEACH precisely defined in a way where a node having more amount of residual energy can become a CH within a round of communication. The work carried out gives a energy efficient scheme to control unwanted energy dissipation and achieves energy efficient gathering and increase in life time. Majority of the selection processes considers the concept of residual energy but many studies considers the non energy parameters also. In spite of all balancing clustering routing and traffic trade off is challenging. For every cycle of data gathering there will be a decrease in number of active nodes. Unfeasible routing causes uneven rate of dissipation of energy. This causes negative effect in multilevel i.e. on Quality of selection parameters. The problem will be more complex in WSN With Internet od Things that integrate cloud. Hence multilevel optimization is necessary.

II. PREPARE YOUR PAPER BEFORE STYLING

A. Routing

The main intension of the study is to provide efficient protocol with respect to energy and data gathering which is also reliable in WSN. Clustering is based on the simulation bed considering the parameters for cluster heat selection and data gathering, processing and reliable techniques in routing protocol use lesser number of control packets to build the routing tree. The new existing techniques mainly focus on election of cluster head and new routing methods. As more sophisticated algorithm is included leads to computational problems and also constraints on memory leads more usage of energy. The proposed system uses the surrounding nodes for data gathering and control. Combinatorial optimization tree is designed for mapping of operational behavior

B. Energy optimization

position variation of base station and length of data packet is considered. With the variation of position of nodes it ensures the no compromise in results. Rather than considering residual energy for cluster head selection different matrix used, which will be updated after gathering of data in turn increases the speed. Not all the nodes will become cluster head, decision will be based on stability of nodes.

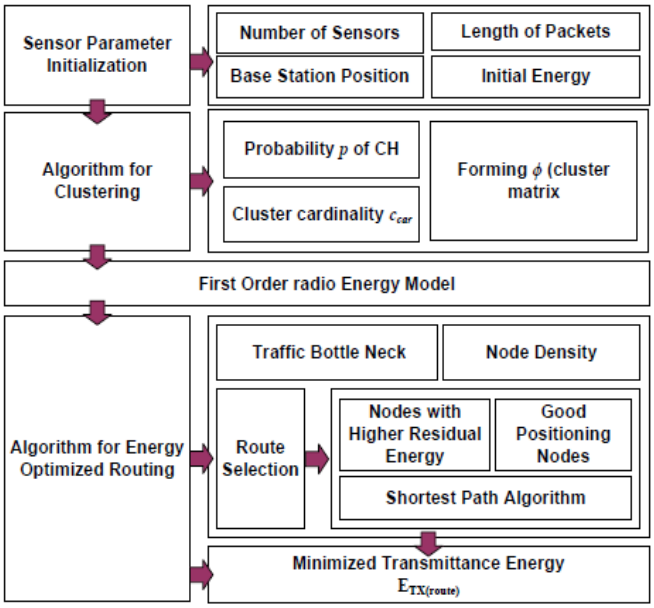

Figure.1 system architecture

The presented algorithm is compared with the first order radio model easily. Algorithm assumes cluster head has higher residual energy compare to other nodes and uses multiple hop criteria, node density and traffic of data. routes will be chosen that offer reduction possibility of transmittance energy

III. IMPLEMENTATION TECHNIQUES

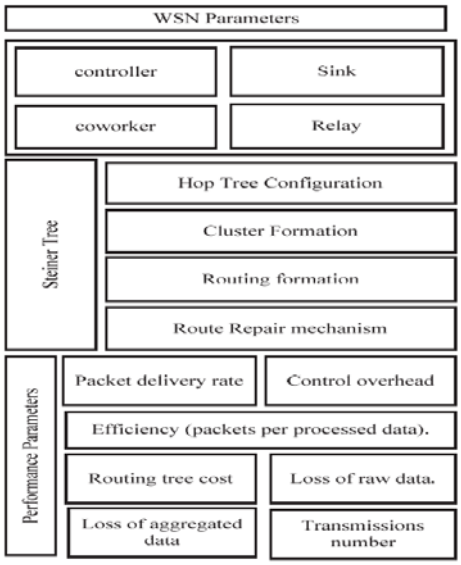

Figure 2 System Architecture

A. Graph Model

it is a spatial-based approach used for computing the distance from sensor nodes to the base station. The message contains *node identifier node distance from* base station and it maps hoping. Estimation is by Euclidean's concept.

B. Cluster Design

Incorporation of complex algorithms into routing operations of sensor networks resulted degradation in communication performance and also minimized network lifetime . One of the primary concerns for designing a system in case of probabilistic connected factors wherein the set belonging to probability calculates the various data sets to cluster heads depending on the distance between the sensor motes and the energy existing in residual form. The preliminary round judges the mote with the most substantial amount of residual energy content and is termed to be the cluster head. , the proposed framework not just facilitates the correct selection in the cluster head but also accommodates the cumulative lifespan that is concerned with applications derived from WSN network. A comparative analysis is held between the standard LEACH algorithm and the proposed work by highlighting the differences attained from three different performance factors, i.e., Throughput, Optimized energy rate and retention in energy.

C. Stabilization

It is done by founding a route between nodes considering residual energy, matrix is updated for every node route is tree like structure bonds base station and control node. Bidirectional data movement with Acknowledgement of control message is used to identify unstabilized route. Based on the acknowledgement reception node life time and Residual energy is calculated. If node residual energy is less than threshold it can never be a cluster head and death of node is faster. Hence, by avoiding routing through all the unstabilized routes, the system significant enhances the network lifetime

IV. Algorithm and results

Algorithm for Data Transmission Phase

1. **FOR** each round Do
2. **FOR** each subnet DO
   $W(i, j) = E_{send}(i, j) * \max\{E_{consume}(i), E_{consume}(j)\}$
3. Route=Dijkstra {W(i, j)}
4. **IF** $E_{residual}(k) <= 0$ then
5. **BREAK**
6. $N_i \rightarrow A_j$::{aggregated data}
7. **END IF**
8. **END FOR**
9. **END FOR**

We consider 50 sensors dispersed randomly in 1000x800 m^2 of simulation area. The base station can have variable position within the simulation area with 0.05 probability value of cluster head, 0.5 Joule as initial energy, 2000 bits as packet length, and 0.2 as traffic bottleneck.

Algorithm for Cluster Design

1. **FOR** each (node N)
2. **IF** node N has highest energy level
3. N becomes CH.
4. N broadcasts *msg* for its cluster nodes.
5. **ELSE**
6. N becomes a N_{CH} node.
7. N informs the CH & become a member of its cluster.
8. **END IF**.
9. **FOR** each (CH)
10. CH creates TDMA schedule for each cluster member.
11. Each node communicates to the CH in its time slot.
12. **END FOR**

Algorithm for Inter cluster routing

1. **FOR** each (*value* i)
2. **FOR** each CH
3. CH receives the data from the cluster member
4. Aggregate the data.
5. **IF** (i ==1)
6. CH transmits data to the BS.
7. **ELSE**
8. CH broadcasts data in the next level.
9. **END IF**
10. **END FOR**
11. **END FOR**

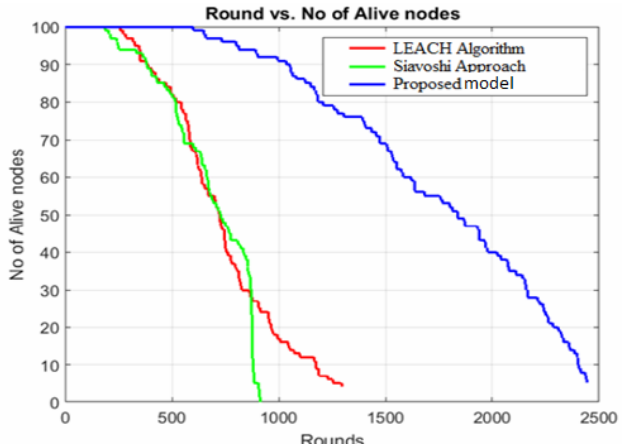

Figure.3 Number of alive nodes

All these variables can be amended to offer an increasing scope of assessment of proposed system . In order to perform assessment of its effectiveness, we consider comparing the outcome of the proposed with conventional LEACH algorithm [12]. The outcome of the study was hypothetically compared with EHE-LEACH too. The algorithm for sparse traffic retains all the nodes for around 1300 rounds and maintains a network lifetime up to 2500 rounds. When compared to the dense traffic the sparse type of network shows a longer lifetime to an extra of 500 rounds but the others show an extension of up to 100 rounds. This is because when the traffic is less the nodes lose less energy and hence can retain their energies for more rounds.

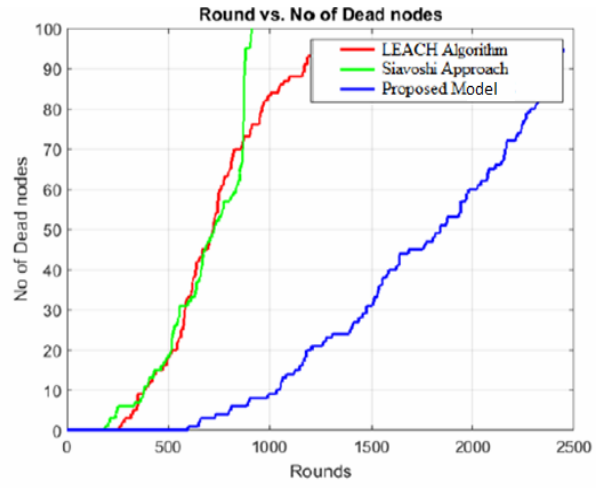

Figure.4 Number of Dead nodes

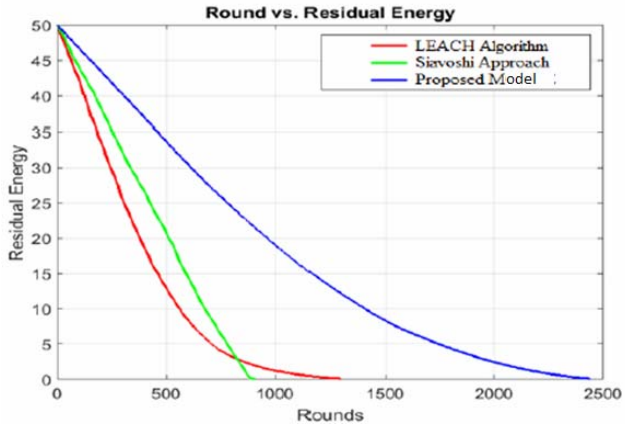

Figure. 5 Residual energy analysis

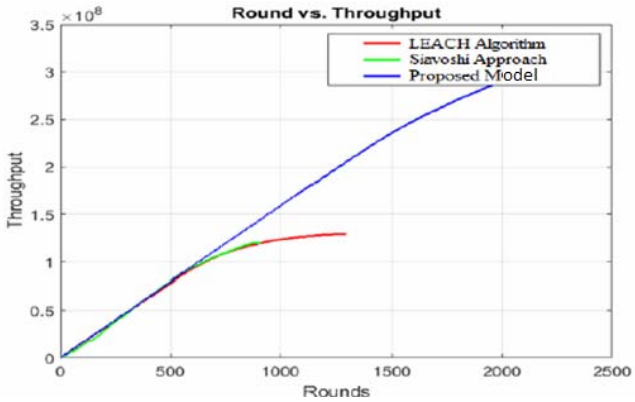

Figure.6 Throughput analysis

Conclusion: Therefore, the better design aspects of novel routing protocol certainly should consider better optimization to ensure optimal trade-off between energy consumption and computational complexity. The proposed study thereby emphasized on optimizing the routing strategies with

simplified strategies of energy efficient data aggregation which further helped enhancing the optimized network lifetime. Our future work will be to further consider these parameters for increasing the scope of outcomes on energy effectiveness. We are also planning to implement a novel design of energy optimization considering the physical level of the sensor network, which is quite challenging to achieve till date. We will also investigate the possible applicability of energy efficiency on existing security protocols frequently in used. As we strongly believe the security protocols do have higher consumption of energy, hence, it is important to ensure that our future work should address all these issues

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REFERENCES

[1] R. Faludi, “Building Wireless Sensor Networks: with ZigBee”, *XBee, Arduino, and Processing, O'Reilly Media, Inc,* 2010

[2] I. F. Akyildiz, M. C. Vuran, “Wireless Sensor Networks”, *John Wiley & Sons,* 2010

[3] S. Khan, A-S. K. Pathan, N. A. Alrajeh, “Wireless Sensor Networks: Current Status and Future Trends”, *CRC Press*, 2012

[4] J. J. J. H. Park, Y. Pan, “Future Information Technology”, *Springer Science & Business,* 2014

[5] A. K. Khan, S. Chakraborty, “Wireless Sensor Network Routing Protocol and Disaster Mitigation Usage”, *Omniscriptum Gmbh & Company,* 2014

[6] K. F arzad, “Designing New Routing Algorithms Optimized for Wireless Sensor Network”, *Lap Lambert Academic Publishing,* 2014

[7] Zaman, Noor, “Wireless Sensor Networks and Energy Efficiency: Protocols, Routing and Management: Protocols, Routing and Management”, *IGI Global,* 2012

[8] J. Zheng, Abbas Jamalipour, “Wireless Sensor Networks: A Networking Perspective”, *John Wiley & Sons,* 2009

[9] M. Kuorilehto, M. Kohvakka, J. Suhonen,, Ultra-Low Energy Wireless Sensor Networks in Practice: Theory, *Realization and Deployment, John Wiley & Sons,* 2008

[10] M.C. Rajalakshmi, A.P Gnana Prakash, “Energy Optimization for Large Scale Wireless Sensor Network using Real-Time Dynamics”, *International Journal of Computer Applications*, Vol.108, No.7, December 2014

[11] M.C. Rajalakshmi, A.P. Gnana Prakash, “MLO: Multi-Level Optimization to Enhance the Network Lifetime in Large Scale WSN”, *Springer-Emerging Research in Computing, Information, Communication and Applications*, pp 265-271, 2015

[12] M.C. Rajalakshmi and Gnana Prakash A P, "REEDA: Routing with energy efficiency data aggregation in wireless sensor network," *IEEE International Conference on Emerging Research in Electronics*, Computer Science and Technology (ICERECT), Mandya, pp. 174-179, 2015