Integration of Dual Probability in LEACH Protocol for Energy Minimization in Wireless Sensor Networks

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ABSTRACT

The acceptability and diversity of sensors in every field of engineering. The success story of sensors depends on the life of sensor network. Sensor network provides service of IoTs application on the user side. In a sensor network, the utilization of energy is measure issue. The sensors end request for communication for next node in installed location of BS. The diversity of network and service-oriented traffic in wireless sensor network further explored our research work in term of calculation of power node assignment, for the process as the base node for controlling a message request of all mobile sensor node in communicating network. Filtration process used a huge amount of power for the process of selection, now need some extra memory segment for the process of EM. Now exploding of this works and optimize the process of reference node allocation and reduces the capacity of the memory for the expanding of power allocation. The proposed model simulates in MATLAB environments and used different scenario of network density

Keywords: *Energy Optimization, Energy-Efficient Protocols Mesh Network Technology, LEACH.*

INTRODUCTION

Wireless Sensor Networks (WSNs) are accepting expanding consideration because of their few present and potential future applications in industry, Medicare and surveil-spear and so on. The lifetime of a WSN relies upon the level of energy that is being devoured at (for the most part) non-rechargeable battery-worked sensor hubs. A thorough audit of various works considering the issue of energy utilization of WSNs is given, where a few arrangements are likewise contemplated[1-3]. As a rule, the most elevated bit of energy is devoured by the radio correspondence unit of the sensor that is in charge of getting information from condition and conveying the perceptions to the combination focus (FC) or the following bounce. Consequently, it is definitely important to outline techniques to diminish the transmission energy of sensor nodes [1].

Among conceivable strategies for control decrease in WSNs is to apply pressure methods at sensor hubs, to diminish the length of the transmitted grouping and thusly lessen the transmission control. Various chips away at information pressure for WSNs show up in the writing. An overview on some of information pressure calculations specifically intended for WSNs is exhibited[6-9]. Specifically, four pressure strategies for coding by requesting, pipeline in-arrange pressure, low-many-sided quality video pressure, and dispersed pressure are audited. In coding by requesting strategy, total hubs in charge of directing information of various sensors drop information of a few sensors and use the request of parcels of the rest of the sensors to incorporate the data of dropped information. It is watched that for sensible system setups, more than 40%of parcels can be dropped by applying this straightforward calculation. Be that as it may, the calculation experiences a disadvantage due requiring a mapping table which exponentially increments in estimate, by expanding the quantity of totaled hubs. Then again, pipeline in-organize pressure works depend on the possibility that sensor estimations amid a period interim are associated[4, 5]; specifically the estimations generally share a prefix which contains the most-significant bits.

In this manner, it is proposed that a conglomeration hub gathers the sensor's information for a specific measure of time. This conglomeration hub at that point packs the information by transmitting the common prefix took after by the non-shared bits for every parcel. This calculation prevails to accomplish low transmission vitality (great pressure) to the detriment of high information transmission inactivity (since a few parcels are cushioned before transmission)[15]. The low-multifaceted nature video pressure conspire introduced depends on JPEG information pressure and is specifically intended for the wire-less video observation framework. Moreover, the conveyed pressure strategy depends on the way that in a field of perception, sensors' information are associated and this connection can be abused to pack the transmitted information [1].

In the rest part of this research work, section II – Probabilistic Model, Section-III Modified Protocol, Section-IV experimental analysis and finally discussed the conclusion and future work in section V.

II. PROBABILISTIC MODEL

The procedure of probabilistic model depicts in this area, this model enhanced the procedure of group head choice amid the procedure of bunch development for the remote sensor organize. The probabilistic model work based on EM procedure. This procedure evaluates the learning of system before the preparing. Desire Maximization (EM) is an outstanding probabilistic model for estimation of cloister information, strong, iterative calculation used to get the Maximum-Likelihood gauges, for our situation of the parameter vector μ measure the connection factor for the estimation of group head. A depiction and down to earth utilizations of EM is discovered [12-13]. EM emphasizes more than two stages. After introduction, an augmentation step (M-step) is performed, for our situation finding the MAP evaluate, ˆx. At that point, the desire (E-step) finds the greatest of the log-probability work (of the back circulation) over the decision of μ(p), for the pth emphasis of EM, holding steady the latest x from the M-step.

The introduction of the calculations is vital since nearby minima arrangements can be discovered which fulfill the advancement criteria. One can pick discretionary beginning stages, or a few evaluations can be made of the information to begin the calculation. The EM calculation is reliably utilized as a part of this joint estimation strategy, and is portrayed in Section we likewise depict our new augmentations required for constriction remuneration. On account of remote sensor organize, we need to isolate between the base and most extreme vitality utilization for group head development. For this we utilize information of the vitality of system and group leader of the remote sensor arrange. To accomplish this objective, we will utilize factual strategies to iteratively discover the locally ideal group head, given a model of the vitality and streamlining criteria [14].

III. MODIFIED PROTOCOL

III. Dual probability Function(DPF)

The dual probability function measures the energy value of all sensor node in three different categories of energy levels. In first level measure the value of high energy, in second level measure the average energy and finally measure the low energy of sensor nodes. The energy factor decides the selection of cluster head. If the measured value of energy level is low the process of cluster head selection is terminated. The process of energy estimation is described here.

- $P - DP\,(n)$: measure the probability of sensor nodes of same energy level
- $energy\,(level - Dp(n))$ of a sensors node n with respect to another sensors node n $level - prop_k(p,e) = \max\{n - probablity\,(e), n(l,e)\}$ (1)
  where $n(l,e)$ is the similar energy level of sensors node?
- $average\ energy$ (avg) of a sensors node n
  $$avg(E) = \left(\frac{1}{k}\sum_{o\in N_{(p,k)}} level - energy_k(l,e)\right)^{-1}, \qquad (2)$$
  where $N_{(p,k)}$ is the set of n node of same energy of n.
- $low\ energy$ of a sensors node n

$$low(p) = \frac{1}{k}\sum_{0\in N_{(p,k)}} \frac{avg(E)}{\max(E)} \qquad (3)$$

The value of lower energy sensor node cannot participate in selection of cluster head.

Algorithm 1. DP_E estimation

1. Input: a sensors node n_t at level energy e
2. Output: $energy$ value $sensors_{ch)}$
3. Estimate $N_{(n_t,k)}$ and $p - probab(ch)$

for all $n \in N_{(n_t,k)}$ do
Estimate $level - prob(p_t, e)$ using Equation (1)
end for
$S_{\text{node}} \leftarrow Pn_{(n_t,k)}$ $\{the\ set\ of\ high\ enegy\ node\ n_t\}$
for all $n \in S_{\text{node}}$ and $q \in P_{(o,k)}$ do
Node $k - prob(o)$ and $level - prob(l, e)$
if o $N_{(q,k)}$ then
$S_{\text{node}} \leftarrow S_{\text{node}} \cup \{q\}$
end if
end for
for all $o \in S_{\text{node}}$ do
Node $avg(o)$ and $sensors(\{l.e\})$
end for
Estimate $savg_{(n_t)}$ and $low(e)$
return $low(CH)$

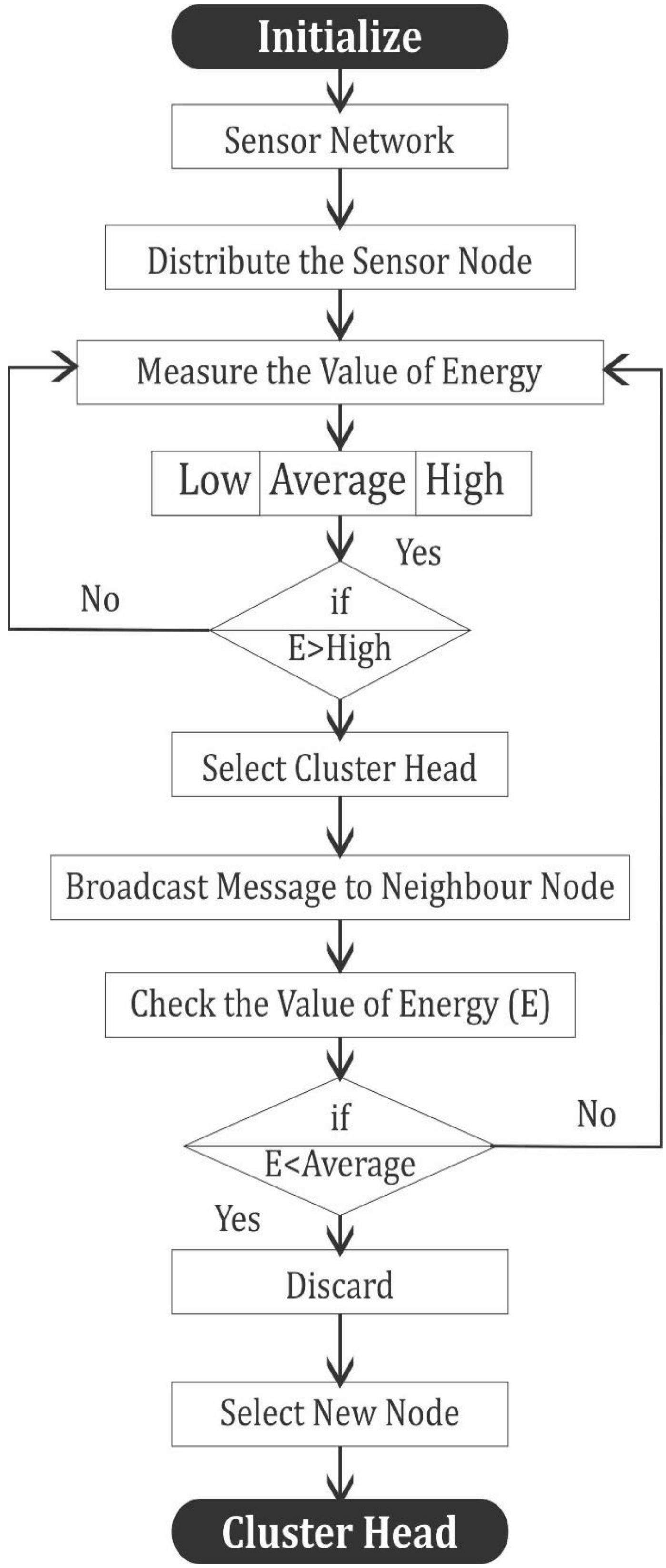

Figure 1 process block diagram of cluster head selection based on energy function.

IV. EXPERIMENTAL ANALYSIS

In this section discuss the experimental process of modified protocol of wireless sensor network. The modified protocol enhances the utilization of energy factor for the process of cluster head selection. For the validation of proposed algorithm used some standard parameters such as PDR, HOP, overload and throughput. The process of experiment performs in MATLAB software. The maximum capacity of simulation node is 200.

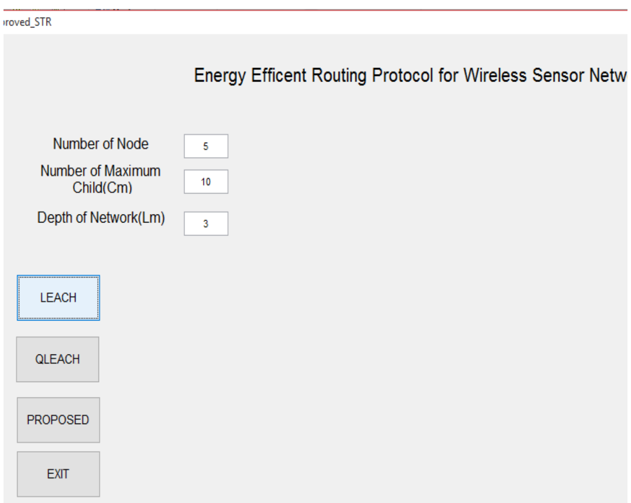

Figure 3: window show that the initial stage of energy efficient routing protocol for wireless sensor network implementation with number of node(5), number of maximum child(10), depth of network(3) input fields and Leach, Qleach and Proposed method button.

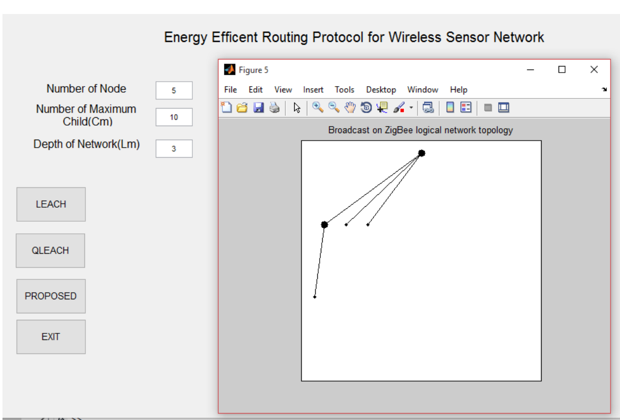

Figure 4: window show that the initial stage of energy efficient routing protocol for wireless sensor network implementation with number of node(5), number of maximum child(10), depth of network(3) input fields and click-on Q-Leach button.

RESULT ANALYSIS

METHOD	PDR	END_TO_END DELAY	HOP-COUNT	ROUTING OVERHEAD
Leach	0.0017	0.9450	5	300
Q-Leach	0.1017	0.4924	5	280
Proposed	0.2017	0.4922	10	270

Table 1: Tabular format show our result analysis of our energy efficient routing protocol for wireless sensor network with input value of number of node is 5, number of maximum child is 10 and depth of network is 3.

METHOD	PDR	END_TO_END DELAY	HOP-COUNT	ROUTING OVERHEAD
Leach	0.037	0.0018	37	100
Q-Leach	0.137	0.0014	27	80
Proposed	0.237	0.0012	22	70

Table 2: Tabular format show our result analysis of our energy efficient routing protocol for wireless sensor network with input value of number of node is 8, number of maximum child is 12 and depth of network is 5.

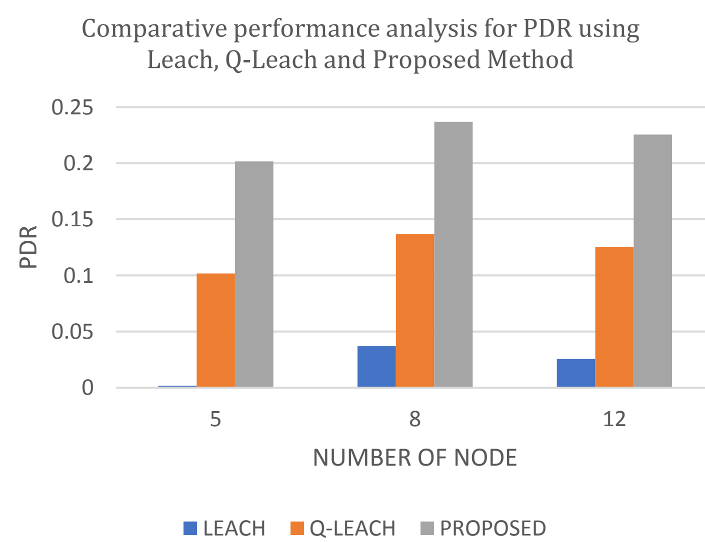

Figure 5: Window show that the Comparative performance analysis for PDR using Leach, Q-Leach and Proposed Method with input of number of node is

5, 8, 12, number of child node is 10, 12, 20 and depth of network is 3, 5, 8 sequentially.

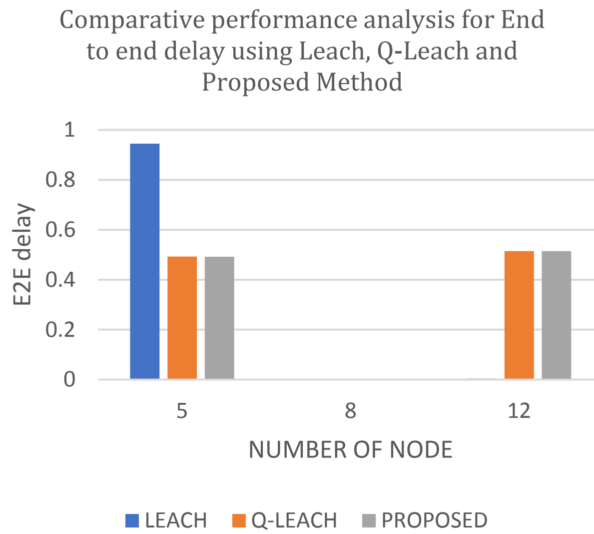

Figure 6: Window show that the Comparative performance analysis for End to End delay using Leach, Q-Leach and Proposed Method with input of number of node is 5, 8, 12, number of child node is 10, 12, 20 and depth of network is 3, 5, 8 sequentially.

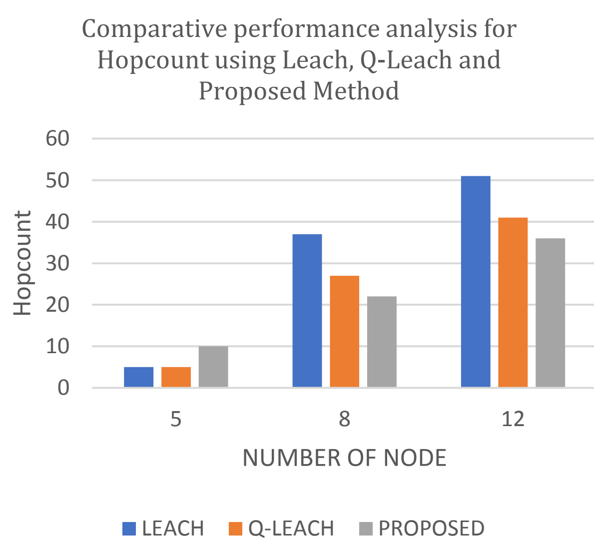

Figure 7: Window show that the Comparative performance analysis for Hopcount using Leach, Q-Leach and Proposed Method with input of number of node is 5, 8, 12, number of child node is 10, 12, 20 and depth of network is 3, 5, 8 sequentially.

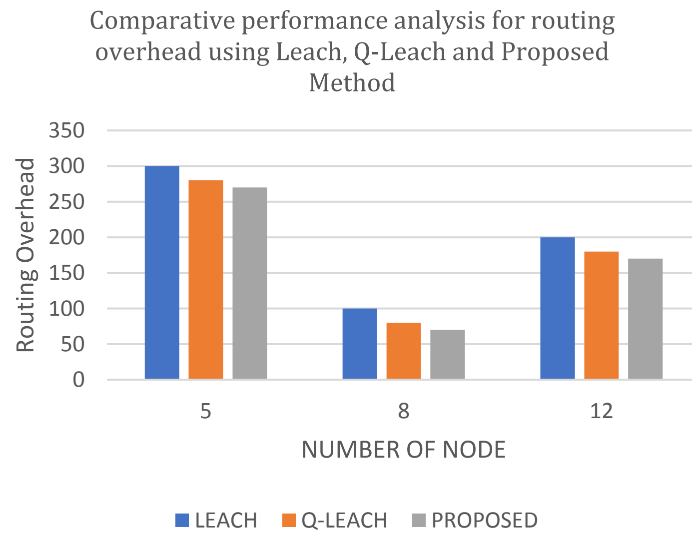

Figure 8: Window show that the Comparative performance analysis for Routing overhead using Leach, Q-Leach and Proposed Method with input of number of node is 5, 8, 12, number of child node is 10, 12, 20 and depth of network is 3, 5, 8 sequentially.

V. CONCLUSIONS

The dual probability-based function measures the expected value of energy for the transmission of data. The dual probability function creates sub group of networks based on energy function. The dual probability-based function changes the operation of energy management in scenario of sensor node data processing. The dual probability function integrates the cloud-based services with sensor network. The dual probability-based function works in the mode of energy level of sub group of sensors node. The filtration process used huge amount of power for the process of selection, now need some extra memory segment for the process of EM. Now exploding of this works and optimized the process of reference node allocation and reduces the capacity of memory for the expanding of power allocation.

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