Performance Evaluation of Q- LEACH on Cluster Head Selection Techniques in Wireless Sensor Networks

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ABSTRACT

Energy utilization is major issue in wireless sensor network. The wireless sensor network is diverse network to deploy for collection of critical information in geospatial location. The sensor network basically used tiny battery for uses of energy. The maximum consumption of energy expires the life of network[2]. For the improvement of life cycle of sensor network used energy based routing protocol. in series of energy based routing protocol such as LEACH, QLEACH and many more routing protocol. The LEACH protocol basically based on the clustering technique. the cluster head during the communication change it take more energy.The proposed method made in two factor one is measurement of power during formation of cluster head and in second phase used the process of data aggregation with sensor node. The deployment model of sensor node is distributed in different section. The distribution of these sensor node in random fashion according to mobility model of senor network.The modified protocol simulated in MATLAB software. For the process of simulation used two different file one is GUI file is scripted in the form of prob.m direct implemented in the form of EM model.

Keywords: - *WSN, LEACH, EM Model, Routing Algorithms, Communicating Network*.

INTRODUCTION

Wireless Sensor Network(WSN) is a prevalent and have capacity to high enter with a few applications zones. It comprises of little hubs having constrained detecting, calculation, and remote correspondences abilities. Sensor hubs regularly detected information and forward detected information to the base station, for example, temperature, sound, vibration, weight, movement or poisons[4-7]. Sensor hubs are asset imperative kind of system and contain extremely modest size of fundamental and not chargeable batteries WSN organize is separated into sub networks\clusters and each group has bunch head which is capable to gather the detected information from his group and forward it to the base station.WSN is the main most reasonable and simple method for sending in remote and hard ranges. Directing is the fundamental costly operation for hubs vitality utilization [1].The LEACH convention are extremely effective in worry of vitality sparing and life of system. In any case, the procedure of information proliferation in type of bidirectional and a large portion of hub going in period of rest mode this reason this convention likewise required some change. During the time spent change one convention are accessible is called Q-LEACH convention[3]. The Q-LEACH convention in light of quad bearing of LEACH convention and the procedure of convention in light of variable edge idea. Fundamentally the Q-LEACH convention depend on the idea of area based directing and hierarchal grouping head preparing system. In that period of convention one expand are issue the data of system to the bunch head of system. The fill this expand and adjusted these convention is called M-Q-L-LEACH Protocol[15-16]. The procedure of change in view of the model of likelihood for the procedure of learning in light of the handling of group head and system for the preparing of information[8]. The rest of paper discuss as section II. LEACH and Q-LEACH. In section III. Discuss Modified Proposed Protocol. In section IV discuss the Simulation Process and Result and finally discuss conclusion & future work.

II. Q-LEACH

In this area the examine pervious Q-LEACH calculation prepare. They examine arrange attributes and working standard of proposed plot for effective execution. So as to upgrade a few components like bunching process, dependability period and system life-time for improved execution of WSNs. As per this approach sensor hubs are sent in the region. Keeping in mind the end goal to get better bunching we parcel the system into four quadrants. Improving scope of the entire system is accomplished[9-10]. Furthermore, correct circulation of hubs in field is likewise very much characterized. Depicts ideal approach of load circulation among sensor hubs. Besides, it likewise shows a thought of productive bunching component which yields essentially in better scope of entire system. We sent irregular hubs in a 100m×100mfiled. Based on location information, network is divided into four equal parts i.e, (a1, a2, a3, a4). Defining overall network area as below:

A = a1 + a2 + a3 + a4……… (1)

an = A(xm, ym)………..(2)

Where, n = 4. And m = 100. Hence, overall field is distributed as follows:

Ym=0:50 lim Xm=0:50 an + Ym=0:50 limXm=51:100 an +Ym=51:100limXm=0:50an +Ym=51:100

limXm=51:100an ……..(3)

Distributing of system into quadrants yields in proficient vitality use of sensor hubs. Through this division ideal places of CHs are characterized. Additionally, transmission heap of other sending hubs is likewise diminished. In customary LEACH bunch are subjective in size and a portion of the group individuals are situated far away. Because of this dynamic group development more remote hubs endures high vitality seepage and along these lines, organize execution corrupts. Though, in Q-LEACH arrange is parceled into sub-areas and consequently, groups framed inside these sub-segments are more deterministic in nature[12-14]. In this manner, hubs are very much appropriated inside a particular group and results in productive vitality seepage. Idea of randomized grouping as given in [1] for enhanced vitality waste is connected in every segment. Doling out CH likelihood P = 0.05 we start clustering process. In every individual round nodes decides to become CH based upon P and threshold T(n) given in [1] as:

Algorithm 1 Setup Phase

1: begin

2: if node "G −→ G =nodes which did not become CHs in current EPOCH then

3: if (NODE BELONGS TO ==′ areaA′) then

4: if (NUMBEROFCHs <= _ NK _) then

5: TEMP=random number (0-1)

6: if (temp <= P

1−P(r,mod1/P)) then

7: node=CH A

8: NUMBER OF CHs = NUMBER OF CHs+1

9: end if

10: else if (NODE BELONGS TO ==′ areaB′) then

11: REPEAT STEP 4: 8

12: else if (NODE BELONGS TO ==′ areaC′) then

13: REPEAT STEP 4: 8

14: else if (NODE BELONGS TO ==′ areaD′) then

15: REPEAT STEP 4: 8

16: end if

17: end if

18: end if

Algorithm.1 characterizes CHs choice system. General system is isolated into four regions as: Area A, B, C and D. At first every hub chooses whether or not to end up noticeably a CH. Hub picks an arbitrary number in the vicinity of 0 and 1. In the event that this number is less then certain limit T (n), and condition for craved number of CHs in a particular region is not met, at that point the hub turns into a CH. So also a similar procedure proceeds for rest of the parts and ideal number of bunches are shaped. Choice of bunches will rely on Received Signal Strength Indicator (RSSI) of commercial[11]. After choice of bunches, hubs must educate CHs concerning their affiliation. On the premise of accumulated data from appended hubs, ensured schedule openings are designated to hubs utilizing Time Division Multiple Access (TDMA) approach. In addition this data is again communicated to sensor hubs in the bunch. Algorithm.2 characterizes relationship of hubs with their suitable CHs. Non-CHs hubs will find themselves in determined range they have a place with. At that point they will look for all conceivable CHs, and on the premise of RSSI they will begin affiliation. This procedure will proceed until the point when affiliation stage arrives at an end. When bunch setup stage is finished and hubs are doled out with TDMA spaces each hub imparts at its assigned time interim. Rest of the time radio of each non-bunch take hub will stay off so as to upgrade vitality usage. At the point when all hubs information is gotten at the CHs at that point, the information is packed and is sent to BS. The round finishes and new determination of CHs will be started for next round. In proposed thought, we actualize previously mentioned idea of confined coordination in each sectored territory[10]. We utilized same radio model as talked about in [1] for transmission and gathering of data from sensor hubs to CHs and afterward to BS. Bundle length K of 2000 bits is utilized as a part of our reenactments. As indicated by previously mentioned stream diagram, at first all hubs send their area data to BS. BS performs consistent dividing of system on the premise of assembled data. System is separated into four quadrants and communicates data to hubs. On the premise of edge a few hubs are chosen as CH in every division. Ordinary hubs pick their CHs inside their own particular quadrant in light of RSSI. For affiliation hubs sends their solicitations to CHs. TDMA spaces are appointed to each hub for fitting correspondence without blockage. Each hub imparts in its distributed opening with its characterized CH.

Algorithm 2 Node Association in Q-LEACH

1: N ∈Group of normal nodes

2: GC ∈Group of CHs

3: if N ∈(A, a1) then

4: Where

5: A = a1, a2, a3, a4

6: Check all possible ACHs

7: Check RSSI of CHs

8: Associate with ACHs

9: then

10: transfer of data occurs

11: end if

12: if N ∈(A, a2) then

13: Repeat step from 5: 8 for BCHs

14: end if

15: if N ∈(A, a3) then

16: Repeat step from 5 : 8 for CCHs

17: end if

18: if N ∈(A, a4) then

19: Repeat step from 5 : 8 for DCHs

20: end if

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III. MODIFIED PROPOSED PROTOCOL

In this area talk about the enhanced convention of Q-LEACH convention. The Q-LEACH convention not measures the earlier learning of bunch head choice amid transmission of information for base station. The choice of bunch head handle done by utilizing EM estimation system. The EM strategy assess the vitality level and utilization level amid transmission and determination of bunch hub in singular bunch gathering. The procedure of individual gathering of hub for choosing the bunch head relies upon least vitality required for the development procedure. Presently procedure of that decreases the vitality utilization and increment the life time of the system. In all aspects of bunch head determination utilizing the gathering of hub utilizing estimation of most extreme entropy for the era of data amid choice of group head and information conglomeration for the transmission of information frame sensor hub to base station. The working calculation talk about in two stage in first stage disk the estimation strategy of vitality and second stage examine the procedure of information accumulation of calculation.

Steps of algorithm

1: Assign values to the coefficients W_1, W_2, W_3, W_4, W_5;

2: For any node $n_i \in \mathrm{G}$ make:

3: n_i forms a list of its neighbors $N(i)$ through the Message $\{who\_are\_neighbors\}$;

4: $N(i) = \varphi$;

5: Calculate its energy P_i :

6: $P_i = w_1 * BL_1 + w_2 * BL_2 + w_3 * BL_3 + w_4 * BL_4 + w_5 * BL_5$;

7: Initialize EM factor of all nodes $n_i \in \mathrm{G}\, Vector\_State\ (Id, CH, Weight,\ \ List\_Neighbors, Size, Nature)$

8: $CH = 0, Size = 0$;

9: $Nature = $ “$None$”;

10: $\boldsymbol{Repeat}$

11: Any node $n_i \in$ G $Broadcastsamessage$ "$Hello$";

12: $\boldsymbol{IfN(i)}$ <> $\boldsymbol{\varphi Then}$

13: Choose $v \in N(i)$;

14: $\boldsymbol{Weight(v) = max\ \{weight(w)\ /\ w \in N(i)\}}$;

15: $\boldsymbol{Else}n_i$ is a CH of itself.

$\boldsymbol{EndIf}$

16: Update the state vector of the elected CH;

17: CH = ID;

18: Size = 1;

19: Nature = CH;

20: Send the message "CH_{msg}" by CH to its neighbors ($N[CH]$);

21: $J = Count(N\ [CH])$;

22: $\boldsymbol{For}I = 1\ to J\boldsymbol{Do}$

23: $If\ (n_i \in N\ [CH]\ receivesthemessage \&\& n_i \rightarrow CH = 0)$

24: $\boldsymbol{Then}\, n_i\, sendsamessage$ "$JOIN_{msg}$" $toCH$

25: $If\ (CH \rightarrow Size < THRESHOLD\_MAX\ )$

26: $ThenCHsendsamessage$ "$ACCEPT_{msg}$" $toNoden_i$;

27: $CHexecutestheaccessionprocess$;

28: $CH \rightarrow Size = CH \rightarrow Size + 1$;

29: $n_i\, executestheaccessionprocess$;

30: $ni \rightarrow CH = CH \rightarrow Id$;

31: $\boldsymbol{Else}goto$ 10;

$\boldsymbol{EndIf}$

$\boldsymbol{EndIf}$

$\boldsymbol{EndFor}$

32: $Until(CH \rightarrow Size = THRESHOLD_{MAX})orexpired\ (Time\_Cluster)$;

$\boldsymbol{End}$.

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IV. SIMULATION PROCESS AND RESULT

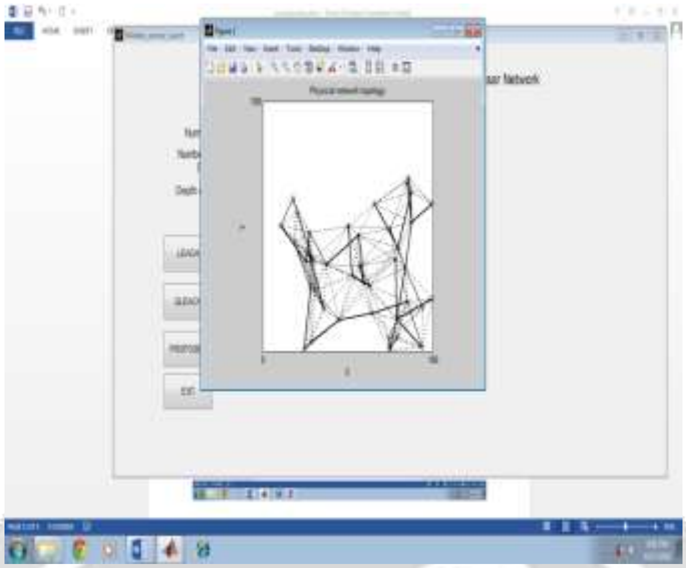

Figure1 :Shows that the window of Leach Method output figure 1 when we give input of number of node, number of maximum child and depth of network.

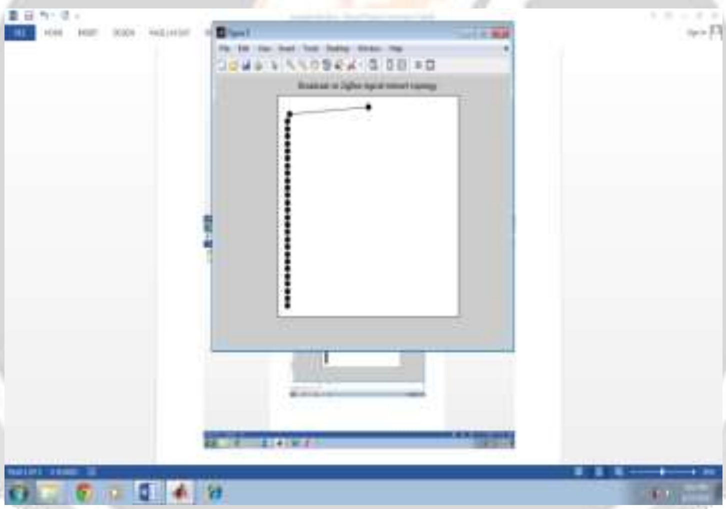

Figure 2 : Shows that the window of Qleach Method output figure 5 when we give input of number of node, number of maximum child and depth of network.

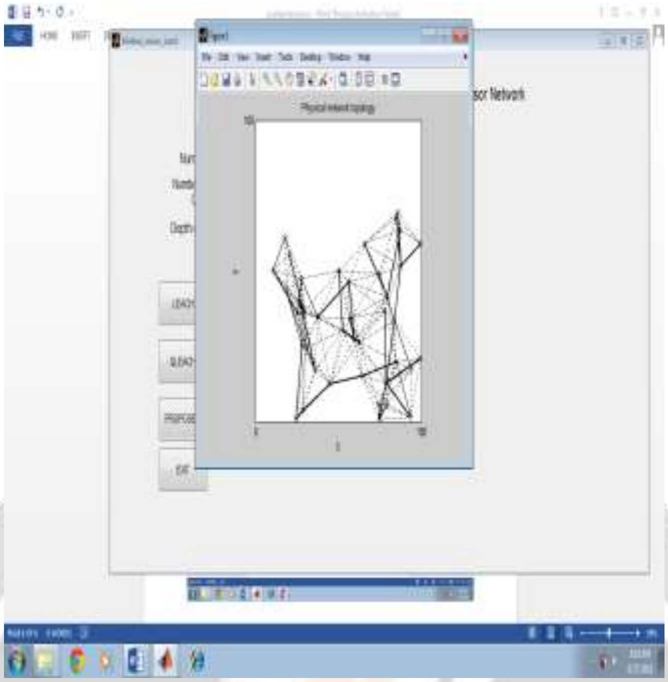

Figure 3: Shows that the window of Proposed Method output figure 1 when we give input of number of node, number of maximum child and depth of network.

Method	PDR	Routing Overhead	End_to_End_Delay	Hop-count
LEACH	0.1567	300	0.5500	470
Q-LEACH	0.2567	280	0.1500	460
PROPOSED	0.3567	270	0.0500	455

Table 1 : Shows the comparative evaluation of Leach method, Qleach method and Proposed method.

Method	PDR	Routing Overhead	End_to_End_Delay	hopcount
LEACH	0.7740	100	0.0059	774
QLEACH	0.8740	80	0.3941	764
PROPOSED	0.9740	70	0.5941	759

Table 2 : Shows the comparative evaluation of Leach method, Q-Leach method and Proposed method.

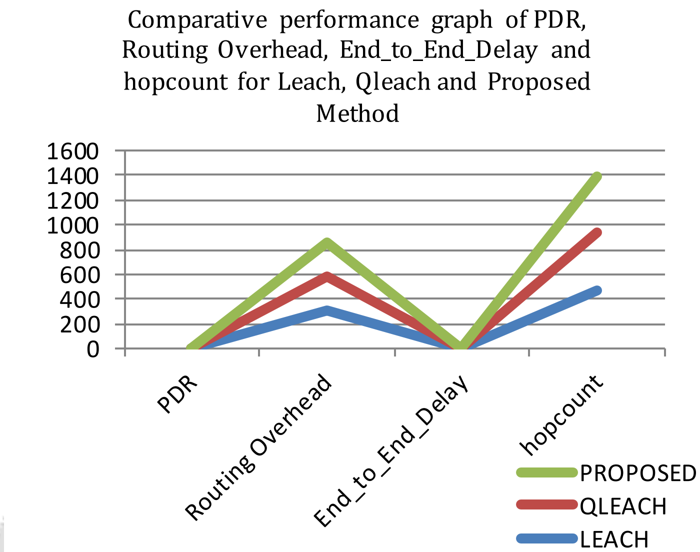

Figure 4 : Shows the comparative performance of PDR, Routing Overhead, End_to_End_Delay and Hopcount using Leach, Qleach and Proposed Method with input value of number of node, number of maximum child (cm) and depth of network (LM).

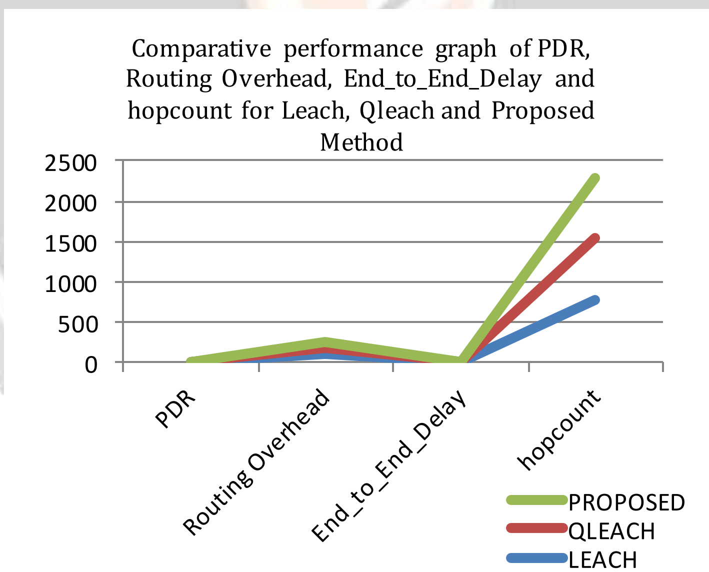

Figure 5 :Shows the comparative performance of PDR, Routing Overhead, End_to_End_Delay and Hopcount using Leach, Qleach and Proposed Method with input value of number of node, number of maximum child (cm) and depth of network (LM)

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V. CONCLUSION & FUTURE WORK

This dissertation provides minimization of energy for wireless sensor network in concern of power consumption and life time of network. The proposed models give a better energy utilization factor for wireless sensor network. The proposed model M-Q-LEACH implies in two section one is base node and another node as sensor. The sensors end request for communication for next node in installed location of BS. M-Q-LEACH is a hybrid model of very famous EM model and LEACH protocol for energy saving in wireless sensor network. Basically M-Q-LEACH work as a power filter, because in modern trend traffic apply by the flooding a power that power is consumed by sensor node. Flooding blocks a provided bandwidth of communication and our network are jam without generation of any interference attack and jamming attack. So we design strong filter for unknown control request power on the time of node mobility. In this process our methods generate a link for connecting a mobile node with their respective speed and all nodes connect our base node, basically base node is a nothing, this is a control section of M-Q-LEACH and maintains all links from mobile node. Link of synchronization provided by clock. Clock maintains network ability for all nodes during communication. If unknown mobile node sends a request to any node, node not reply, node transfer that message to chock section chock scan their power and find this is normal or abnormal and take action for blocking and generating a security alarm for all node.

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