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Instigating Novel Protracted Energy Proficient Transmission (PEPT) Method Using Mobile Sink for Wireless Sensor Networks

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Abstract: Wireless sensor networks (WSN), called wireless sensor and actuator networks (WSAN), and is spatially distributed self-governing sensors to monitor physical or environmental conditions, such temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. Recent times networks are bi-directional, which enable control of sensor activity. The progress of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. Routing is the process of the sequential steps which governs the internet traffic efficiently. When a packet of data leaves its source, there are many different paths it can take to its destination. One of the applications in this network, gathering and sending sensed data to the base station. The main restraint of sensor nodes is their limited battery energy, while restricting the lifetime. Hence, the protocol running on sensor networks must efficiently reduce the node energy consumed in order to achieve a prolonged network lifetime. Data congregation has to be done in an energy proficient way to ensure good lifetime for the network. Hence, data congregation protocols play an important role in wireless sensor networks keeping in view of severe power constraints of the sensor node. Therefore, a foremost part of the research work concentrates on prolonged life time of networks by designing energy proficient protocols, which is the core of this research. Wireless Sensor Networks (WSN) is spatially distributed self-governing sensors to monitor physical or environmental conditions, such as temperature, sound, pressure. Routing algorithms play a crucial role in WSN sensors lifetime. This research proposes a novel proficient routing algorithm Protracted Energy Proficient Transmission (PEPT) Protocol for Wireless Sensor Networks which uses the bi-cluster based approach for getting prolonged lifetime of the sensor nodes. This algorithm works in two fold where the sensor nodes are clustered using heuristics and then bi-clustering (parent and child hierarchy). Results are promising which considerably improves the lifetime of the sensor nodes and cluster heads. The proposed method improves the efficiency of the energy consumption along with the improvement of the node lifetime values. The bi-clustering strategy helps in improving the dynamic updation of the routing table which may overcome the problem of the dead node sensing and cluster head value updating.

Keywords: Node Lifetime, Energy Consumption, PEPT, LEACH Protocol, Mobile Sink.

I. INTRODUCTION

WSN (Wireless Sensor Network) is the best standard services working in commercial and industrial applications, because of its practical development in a processor, communication, and low-power usage of embedded computing devices. The WSN is built with nodes that are used to notice the surroundings like temperature, humidity, pressure, position, vibration, sound etc. These nodes can be used in several real-time applications to perform various tasks like smart identifying, a discovery of neighbor node, data processing and storage, data collection, target tracking, monitor and controlling, synchronization, node localization, and effective routing between the base station and nodes.

A Wireless Sensor Network is one kind of wireless network contains a large number of circulating, self-directed, minute, low powered devices named sensor nodes called motes. These networks surely cover a huge number of spatially distributed, little, battery-operated, embedded devices that are networked to kindly collect, process, and transfer data to the operators, and it has controlled the capabilities of computing & processing. The tiny computers are the nodes, which work jointly to form the networks.

Wireless sensor networks can include frequent different types of sensors like low sampling rate, seismic, magnetic, thermal, visual, infrared, radar, and acoustic, which know to monitor a wide range of ambient situations. Sensor nodes

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are used for constant sensing, event ID, event detection & local control of actuators. The applications of wireless sensor network mostly consist of

- Health,
- Environmental,
- Military,
- Environmental,
- Home and other Commercial areas.

Implement one technique called PEPT in Wireless Sensor Network plays a vital role to develop the lifetime of the sensor node and battery level using some routing protocols and Bi-clustering methods.

II. RELATED WORK

A. Energy Efficient Communication Protocol for Wireless Micro sensor Networks

This paper [1] describes an adaptive clustering routing protocol that minimizes the energy drain in wireless sensor network. Leach is a clustering based protocol that defines a whole WSN in form of different clusters. Leach divides a network into finite number of cluster. In every cluster there are various members and one cluster head or coordinator exists. Cluster head collect the data from source node and send to sink. Leach protocol has a several round and each round contains two phase. Cluster formation and head selection phase is done in first part and Data is dissemination occur between source node to cluster head and cluster head to mobile sink in done in the next part. Leach uses randomization approach to balance the load on sensor nodes.

WSN have a wide range of applications but they are dominated with many challenging problems and complications that need to be addressed. The energy consumption of the nodes and the extension of the network lifetime are the core challenges and the most significant features of the routing protocol in order to make it suitable, effective and efficient for WSNs. As the sensor nodes are basically battery powered devices, so the top concern is always to how to reduce the energy utilization to extend its lifetime. In the past few years WSNs has gained a considerable amount of attention from both the research community and the real users. Many authors proposed lots of different energy efficient routing protocols to achieve the desired network operations. In this paper there is an attempt to give a wide comparison of the routing protocols in WSNs focusing on the hierarchical or clustering based routing protocols. Moreover, extracting the strengths and weaknesses of each protocol, providing a comparison among them, including some metrics like scalability, mobility, power usage, robustness etc. to make it understandable and simple to select the most suitable one as per the requirement of the network.

WSNs can play an important key role for the data efficient selection and delivery. The energy efficiency is a very most important issue for the networks particularly for WSNs which are described by “limited battery capabilities”.

They focal point was on the energy efficient hierarchical protocols that have been developed for WSNs. They converse with reference to a large network; the flat protocols become “infeasible” because of link and the processing overhead. So the hierarchical protocols try to solve it and as a result produce scalable, efficient and effective solutions. They split the network into “clusters “to proficiently maintain the energy consumption of sensor nodes and also perform “data aggregation and fusion” to lessen the number of transmitted messages to the sink. The energy backup of sensors and sensor’s nearness to the CH is important because the clusters are arranged based on that. Thus, we can conclude that the hierarchical protocols are appropriate for sensor networks with the heavy load and wide coverage area. To increase a scheme that will extend the lifetime of the WSNs is required to enhance the energy consumption of the sensors within the network. As a result, the function of the appropriate routing protocol will improve the lifetime of the network and at the same time it wills assurance the network connectivity and effective and efficient data delivery.

B. Increasing lifetime of wireless sensor networks using controllable mobile cluster heads

In this paper [6] we have examined the current state of various proposed clustering algorithms with respect to energy requirements. Duration of the wireless sensor network is unwavering by residual energy of the system and hence energy is the valuable resource. The algorithms outlined in this paper offer a potential improvement over conventional algorithms. However there is still a long way to go and much work need to be done. Major concentration is necessary in defining clustering strategies yielding optimal clustering algorithm. An optimal clustering algorithm should take into consideration all the possibilities of reducing energy consumption, eliminate all the overhead of cluster head selection process as well as cluster member selection thereby prolonging lifetime of wireless sensor network. Author suggested the framework where cluster mobility strategies are proposed. A wireless sensor network field is divided into equal number of cluster. Node having a higher residual energy chosen as cluster head which move node to node and collects the data. A Popular day by day due to its application in various fields like agriculture, environment monitoring, military etc in becoming WSN. In such applications huge numbers of sensors are deployed in remote areas where human intervention is not possible. Consistency of wireless sensor network is deliberated as amount of time for which the sensor network is functioning. To improve lifetime of wireless sensor network by reducing energy utilization by using the key technique of clustering. Grouping partitions sensor network into groups called as cluster, with high energy node

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acting as cluster head. This document provides investigation of various clustering algorithms highlighting their objectives and features. This document, they have analysed the current state of various proposed clustering algorithms with respect to energy requirements. The algorithms outlined in this paper offer a potential improvement over conventional algorithms. However there is still a long way to go and much work need to be done. CH selection process as well as cluster member selection thereby prolonging lifetime of wireless sensor network.

C. An energy aware grid based routing scheme for wireless sensor networks

An energy aware grid based routing scheme protocol (EAGER). EAGER protocol based on time -scheduling method (round robin scheduling) to allow all equal grid head or coordinator to sleep for specific period of time . In each grid, there is a grid head. Node sends the data to head node. If sinks moves from one node to other node path is updated. Paper result show that EAGER perform better than the existing grid algorithm in term of both energy efficiency and delivery delay. To design the energy efficient routing protocols to conserve the poser supply of sensor node and prolong its lifetime. Sink mobility has been exploited in numerous schemes to prolong the lifetime of wireless sensor networks (WSNs), but sink mobility bring a new challenges in wireless sensor network; such as sink location maintenance, continuous data delivery, avoiding/reducing detour problem etc. In this paper, in order to reduce energy consumption and minimize the overhead of rerouting frequency, we propose an Energy-Efficient Routing scheme using Mobile Sinks (EERS-MS) in Wireless Sensor Networks. This scheme uses the grid that is constructed by the sink appearing first in the sensor field or when no valid grid exists. In this scheme source(s) utilizes the sink location information to communicate with sink(s). Data is disseminated to the sink through grid nodes (GN) using greedy geographical forwarding techniques. Analytical and simulation study reveals significant improvement in term of both energy efficiency and routing performance in comparison to existing schemes. Proposed Energy-Efficient Routing Scheme using Mobile Sinks (EERS-MS) in Wireless Sensor Network is an energy efficient scheme which prolong the network life time using mobile sinks. In EERS-MS, the grid is constructed by the source node appearing first in the sensor field or when there exists no valid grid. Compartment size is entirely determines using the transmission range T, so that any source/sink appears thereafter can detect the valid grid using single hop communication. In this scheme sink location is used to setup up the shortest path between sources and sink. Trouble occur thus conversing the sensor node energy and increasing the network lifetime. Simulation results also indicate that EERS-MS consumes less energy as compared to EAGER when observed for different numbers of sensor nodes, sinks, and sink mobility.

D. GBDD: Grid Based Data Dissemination in Wireless Sensor Networks

Proposed a dual radio based grid formation method which deploy dual radio mode of a sensor node to design grid architecture across wireless sensor network. Depend on their transmission range of radio node , cell size is decide and all nodes of these cell form cluster and one of node at corner behave as a cluster head. Source dissemination node set up the path by sending path setup message and also handles the occurring of multiple events in sensor field. Mobility and excess of sinks and actions is accurately managed through message passing and path sharing information between the nodes. [9]

Dissimilar data propagation methods have been planned over the years to decrease energy consumption in wireless sensor networks. One thing familiar and essential to every dissemination approach's performance is the network topology used underneath. Moving sink and moving event pose major challenge while developing data dissemination schemes for wireless sensor networks. In this paper, suggest a dual radio based grid construction scheme which exploits dual radio mode of a sensor node to form a grid across sensor field. Grid construction is initiated by the sink appearing in the sensor field when no valid grid is present. A few sink appearing during valid grid period shares existing grid and thus obviate the need to construct new grid. Both short and long radio transmission ranges of a dual radio decides the cell size and all nodes with in a cell form a cluster with one of nodes at corners of the cell acting as cluster head. To develop novel methods for handling multiplicity and movements of sinks and events in sensor field so as to ensure continuous data delivery from source nodes to sink or sinks. We conducted simulation experiments to evaluate GBDD in different scenarios and compared it with Two-Tier Data Dissemination (TTDD) approach. Results clearly show significant improvements in performance in most of scenarios as compared to TTDD.

E. An Energy-Efficient Data-Dissemination Protocol in Wireless Sensor Networks

The paper [10] describes a two level architecture virtual grid based protocol adopted to increase the lifetime of wireless sensor network. The two level architecture is classified into: Coarse and Fine level. In the coarse level, several nodes are one for detecting the event and rest nodes are in sleep mode. In the fine level, grid is divided into a lot of sub grid and nodes of each sub grid are alternative going on and off mode according to their plan. In the EEDD, there are three approaches for data dissemination .i.e. Target location aware, Target area aware and Target location unaware. In Target location aware approach, Target is known so query is directly send using Diagonal-first routing approach. In Target area aware approach, query is forwarded to all sub grids where the source resides. In Target location unaware, query forwarding is done throughout the sub grid and it reaches all grid heads in the field and the nodes which have event in their sensing field sends the relevant data.

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This manuscript presents a new event-based communication model for wireless multi-hop networks of energy-constrained devices such as sensor networks. The network is set as an event dissemination tree, with nodes subscribing to the event types they are interested in. An event scheduler dynamically allocates and multiplexes upstream and down-stream time slots for each event type. Power consumption among wireless nodes is reduced by allowing each node to power down its radio during the portions of the schedule that do not match its particular event subscription. The event dissemination schedule can be determined in both a centralized and distributed fashion, and is highly dynamic to suit the changing rates at which events are generated and distributed through the network. The document also presents preliminary performance results that demons trade the power savings achieved by the proposed protocols. TD-DES, describes an integrated scheduling and data dissemination model and protocol for multi-hop networks of energy-constrained devices such as sensor networks. We argue that while TD-DES is efficient from a power consumption perspective, it clearly suffers generally from worse multi-hop dissemination latencies for generated events than does its non-scheduled counterpart network (which provides optimal latency at the expense of maximal power consumption). In addition to conducting a more comprehensive quantitative study of the proposed approaches.

III.WIRELESS SENSOR NETWORKS AND ROUTING PROTOCOLS

Design of protocols which should be energy efficient and hence, enhancing the network life time is important for better performance. Centralized algorithms are affected badly when a critical node stops working and thus, results in a serious protocol failure. In contrast, distributed protocols can handle such failures more efficiently and can be a suitable solution. Clustering structured routing protocol capable of data aggregation is designed for energy efficiency of a network. Within a cluster localized algorithms can operate without any wait of control messages and hence, reducing the delay. Better scalability is also achieved through these localized algorithms when compared with centralized ones.

A. WSN Significant Feature

WSN is composed of multiple unattended ultra-small, limited-power sensor nodes deployed randomly in the area of interest such as inaccessible areas or disaster places for gathering of useful information. Miniature sensor nodes capable of sensing, processing useful information from, and transmitting to destination have opened many research issues. These battery powered sensor nodes are mounted with limited processing and storage facilities. As WSNs are exposed to dynamic environments, due to such configuration connectivity loss of nodes may degrade the performance of network. Design of protocols which should be energy efficient and hence, enhancing the network life time is important for better performance. Centralized algorithms are affected badly when a critical node stops working and thus, results in a serious protocol failure. In contrast, distributed protocols can handle such failures more efficiently and can be a suitable solution. Clustering structured routing protocol capable of data aggregation is designed for energy efficiency of a network. Within a cluster localized algorithms can operate without any wait of control messages and hence, reducing the delay. Better scalability is also achieved through these localized algorithms when compared with centralized ones.
In this research, it is evaluated the performance of clustering algorithms on the basis of stability period, network life time and throughput for WSNs. This research enhances the above mentioned parameters. Information from sensor nodes is forwarded to cluster heads (CHs) and these CHs are responsible to transmit this information to base station (BS) which is placed far away from the field.
Clustering algorithms like LEACH and DEEC for sensor networks have achieved reasonable goals regarding better performance of networks. Following their thoughts they proposed a new pairing concept based on applications and specified distances between the sensors which will yield significant improvements in the efficiency of network.

B. Benchmark WSN Routing Protocols: LEACH, PEGASIS, DEEC, SEP, E-SEP

Clustering for energy protection is established as competent method for wireless sensor networks. When a sensor network is organized, nodes institute clusters and suggest one node from each cluster as a cluster head. These cluster head nodes are dependable for getting data from additional nodes of collect, do data aggregation/ combination of expected data and pass on it to base station. In this way, bandwidth utilization and life time of network is optimized. The authors give concept of inter cluster communication. They prove that regardless of allocation fused data direct from cluster head to base station, if data is transmitted in multiple hopes i.e. from one group head to another and in conclusion to base station, it would further improve network life time. Allowing for cluster standard algorithms, today several protocols are urbanized, each having dissimilar attributes and enhancements mainly in cluster head selection algorithms. Though one obsession is common, all protocols focus on energy protection and data aggregation. M. Tahiret.al initiates connection excellence metric to partition a network into three reasonable sections resulting in lower steering transparency. Authors conserve energy in WSN's by distinguished idle and prepared manner of a sensor node.
LEACH, TEEN, SEP, DEEC and PEGASIS are famous routing methods for wireless sensor networks. Main procedure of electing a cluster head was given by LEACH and that is additionally improved by SEP and DEEC. TEEN introduces the concept of thresholds that provides good results in network life time by viewing immediate environment. These thresholds can be implemented in any routing procedure to enhance its presentation with respect to value or function.

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Considering LEACH, the algorithm is divided into three parts, i.e. advertising phase, Cluster Set up phase and Scheduling phase. Based on LEACH, SEP and DEEC, frequent protocols are projected. Q-LEACH [16] optimizes network life time of homogenous wireless sensor network. A detailed comparison analysis on different variants of LEACH as A-LEACH, S-LEACH and M-LEACH in terms of energy efficiency and applications. A very interesting comparison analysis between LEACH, Multi level Hierarchal LEACH and Multi hop LEACH is undertaken. Authors can enhance SEP in terms of heterogeneity. They suggest a replica that gives a three level heterogeneity. Whereas a new method that works enhanced than SEP in terms of system strength and life time having two stage heterogeneity. Some authors modified DEEC protocol in terms of system constancy, throughput as well as system life time.

Many clustering algorithms e.g., LEACH, PEGASIS, DEEC, SEP, E-SEP etc. have been proposed which discuses the efficient usage of energy in sensor networks. CHs in LEACH protocol are selected periodically and energy drains uniformly by role rotation. In PEGASIS energy load is distributed by forming a chain itself or being organized by BS. For such chain formation global knowledge about the network is essential and results in wastage of resources. In DEEC, sensor nodes are independently elected as CHs based initial energy and residual energy. SEP is designed to deal with heterogeneous networks which introduced the concept of advance and normal nodes for cluster head election.

Performance is evaluated on the basis of network stability period, clustering process and throughput. In our EESAA, keeping homogeneity in mind we tried to enhance all these parameters. EESAA keeps the merits of distributed clustering as well. Manufacturing of cheap wireless sensor nodes having sufficient computation and transmitting/ receiving powers are available now. Hence hundreds of nodes can be deployed in a network for any required application. These sensor nodes have a limited power which must be utilized in very precise manner to increase node's life. Table 1 represents the comparison of hierarchical routing schemes.

Table 1 Comparison of Hierarchical Routing Schemes

Scheme	**Advantages**	**Drawbacks**	**Scalability**	**Mobility**	**Route Metric**	**Periodic Message Type**	**Robust**
LEACH	Low energy, ad-hoc, distributed protocol	It is not applicable to networks deployed in large regions and the dynamic clustering brings extra overhead	Good	Fixed BS	Shortest Path	None	Good
LEACH-C	The energy for data transmission is less than LEACH.	Overhead	Good	Fixed BS	The best route	None	Good
PEGASIS	The transmitting distance for most of the node is reduced	There is no consideration of the base station's location about the energy of nodes when one of the nodes is selected as the head node.	Good	Fixed BS	Greed route selection	None	Good
TEEN	It works well in the conditions like sudden changes in the sensed attributes such as temperature.	A lot of energy consumption and overhead in case of large network	Good	Fixed BS	The best route	None	Limited

C. Routing Protocols in WSN

In WSN, collection of sensor nodes into a cluster is well-known as clustering. Every cluster contains a leader called cluster head. A cluster head may be selected by the group of cluster. A cluster head collects the information from the nodes within cluster and send this information to the base station (destination). The clustering procedure in WSNs is shown in figure 1. Clustering can be used as an energy well-organized communication procedure.

The major aspire of grouping is to reduce the whole broadcast control combined over the nodes in the elected path, and to balance the load between the nodes for extend the network lifetime. Cluster-based routing algorithms are growing to be an essential part of routing technology in wireless sensor networks on account of a form of advantages, such as larger scalability, less load, a smaller amount energy consumption and extra robustness. In figure 1 cluster based routing in WSN is denoted.

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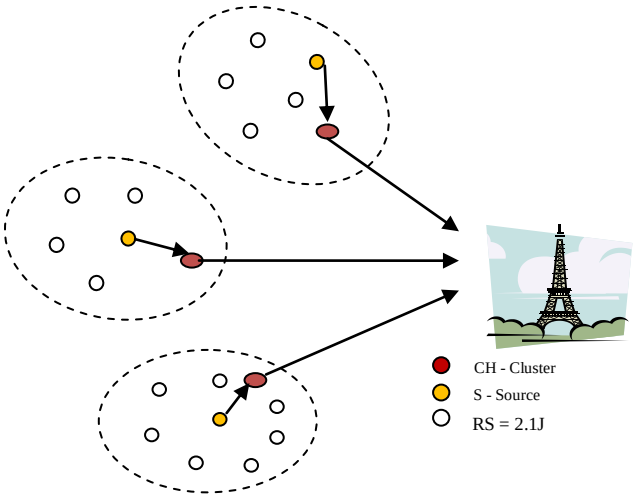

Figure 1. Cluster based routing in WSN

IV. MOTIVATION OF THE PROBLEM

In clustering procedures as LEACH, nodes utilize similar magnification power to broadcast information in spite of distance between transmitter and receiver. To protect energy, there should also be a communication method that specifies essential magnification power for converse with cluster head or base station. For example, transferring a packet to cluster head with same magnification power level as required by a node positioned at farthest end of network to base station results in consumption of energy.

One solution can be having global knowledge of network and then nodes decide how much they need to amplify signal. Positioning and scheming detachments with in full network topology wants lot of routing and so, this approach do not work for saving energy. To solve above mentioned problems, we propose two mechanisms i.e. efficient cluster head replacement and dual transmitting power levels.

V. PROPOSED WORK

The PEPT_WSN algorithm works with a two-fold strategy which helps the route table to keep update the changes in node state. In first fold the nodes will be clustered based on the neighbour details. In second fold the cluster head will be calculated and based on that the bi-clustering of the parent and child node will be carried out. Besides limiting energy utilization in cluster formation, we also introduce two different levels of power to amplify signals according to nature of transmission. Fundamentally there can be three modes of transmission in a cluster based network.

1) Intra Cluster Transmission
2) Inter Cluster Transmission
3) Cluster Head to Base Station Transmission

Intra Cluster Transmission deals with all the communication within a cluster i.e. cluster member's sense data and report sensed data to cluster head. The transmission/ reception sandwiched between two clusters heads can be phrased as inter cluster broadcast while a cluster head transmitting its information directly to base station lies below the caption of cluster head to base station transmission.

VI. IMPLEMENTING PEPT WSN ALGORITHM

The PEPT_WSN algorithm works with a two-fold strategy which helps the route table to keep update the changes in node state. The nodes will be clustered based on the neighbour details in first fold technique. The cluster head will be calculated and based on that the bi-clustering of the parent and child node will be carried out in second fold technique. PBP_{CH} is the clusters head selection formula:

$$PBP_{CH} = \frac{RS_x}{\sum \text{Links connectiong to x } (RQ_y + \alpha)} - \frac{RS_x}{\sum \text{Links connectiong to x } (Dist(x)^2 + \beta + \alpha)}$$

Where RS_x refers the residual energy of node x and RQ_y refers the required energy for sending 1 bit from node x to y, α is the number of bits to be sent from node x to y, $Dist(x)$ is the distance from node x to node y, β is the transfer power for 1 bit.

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Sample Cluster Head values calculation for Network portrayed in Figure 3 will be as follows.

$$PBP_{CH(A)} = \frac{2.1j}{1.2^2 + 1.2^2 + 1.1^2 + 0.4^2} = 0.4941$$

$$PBP_{CH(B)} = \frac{2.3j}{1.2^2 + 1.2^2 + 0.5^2 + 1.4^2} = 0.4518$$

$$PBP_{CH(C)} = \frac{1j}{0.8^2 + 0.4^2} = 1.25$$

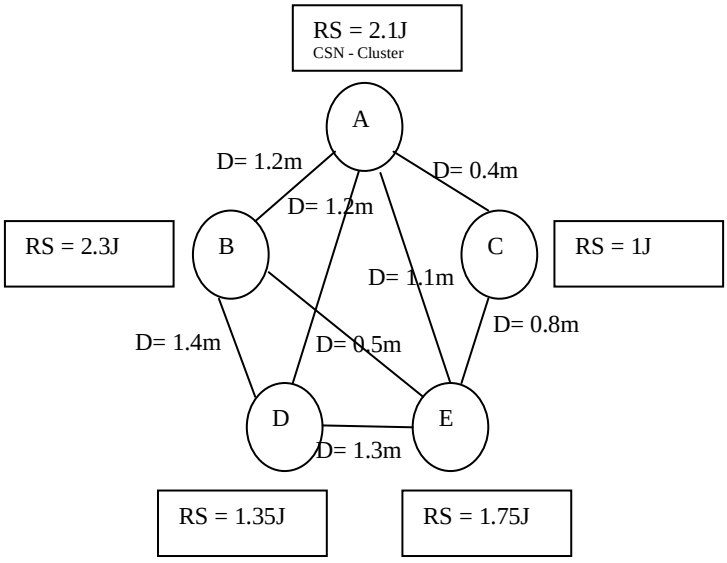

Figure 2. WSN sample scenario

$$PBP_{CH(D)} = \frac{1.35j}{1.3^2 + 1.4^2 + 0.5^2} = 0.3461$$

$$PBP_{CH(E)} = \frac{1.75j}{1.3^2 + 0.5^2 + 1.1^2 + 0.8^2} = 0.4617$$

The algorithm for the PEPT_WSN is as follows:

Algorithm : PEPT_WSN
for all nodes
do
{
Status = Ready
Broadcast RS_Alert to all neighbor nodes
Receive RS_Alert from all neighbor nodes
Compute distance from all neighborhood
Update neighborhood table
Function Compute_BiClus_Head
{
if Clus_Head > all neighborhood Final_Clus_Head = Clus_Head
Status = Cluster Head
else
{
Status = Cluster Member
if (node exist in more than one cluster head range)
Node joins to closer cluster head
}
}
Function Compute_Parent _Cluster
{
if (Parent _Cluster > all neighborhood) then Parent_clus = Parent _Cluster
Status=Parent Node

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else
Status=Child Node
Parent _Cluster broadcast TDMA to Child node
}
}
End do

Thus the algorithm works in two fold which initially creates a cluster and then subsequently cluster head creation is performed which leads to the parent and child node formation.

VII. RESULT AND DISCUSSION

The process of LEACH is broken up into rounds, where each round begins with a set-up phase, when the clusters are organized, followed by a steady-state phase, when data transfers to the base station occur. Organize to reduce overhead; the steady-state phase is long compared to the set-up phase. Our MATLAB simulations described above based on that we are confident that LEACH will outperform conventional communication protocols, in terms of energy dissipation, ease of configuration, and system lifetime/quality of the network. Providing such a low-energy, ad hoc, distributed protocol will help pave the way for future micro sensor networks.

Figure 2. Dead Nodes

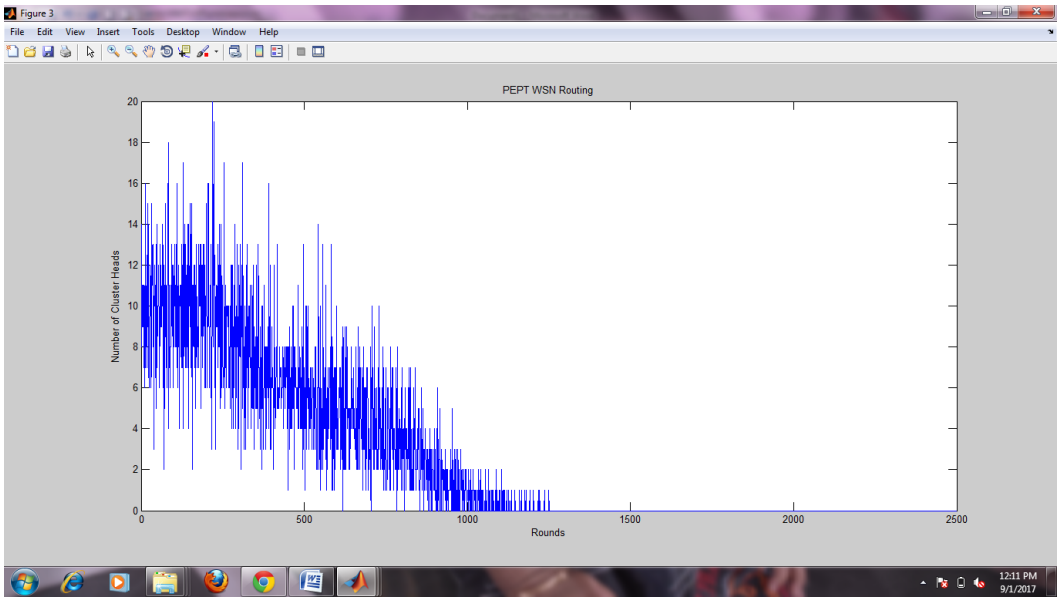

Figure 3. Cluster Head Formation

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Figure 4.Alive Nodes

Above figures: 2,3,4 shows how many dead nodes and alive nodes present and how the clusters are formed while the packets are sending from the source to the base station.

VIII. CONCLUSION

Overall, the method gives an increased efficiency and increases lifetime of the network. The proposed algorithm proves energy efficient and maximizes the lifetime of entire network. In this research, protracted bi-clustering based protocol is proposed for the wireless sensor networks. It improves the efficiency of the energy consumption along with the improvement of the node lifetime values. The bi-clustering strategy helps in improving the dynamic updating of the routing table which may overcome the problem of the dead node sensing and cluster head value updating.

IX. FUTURE WORK

Further extension of this scheme by dividing network into different regions on basis of power Threshold and assign power level to each node in three regions on basis of current number of nodes and desired number of nodes help to adapt transmitter power according to link quality variation and increase network lifetime. Combining both open-loop temperature-aware compensation and close-loop feedback control cause significant reduction overhead of transmission power control in a WSN.

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