# Enhancement of Grid-based Virtual Infrastructure for Efficient Data Dissemination in WSN

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***Abstract*- Wireless Sensor Network is a new scenario of network in that energy consumption is more crucial issue for this network. In WSN, there are several types of nodes that are classified into tiny nodes and special events nodes. A huge sensor network has several techniques to divide a network into small grids. The proposed scheme facilitate the energy saving and time efficiency for both cluster head and base station. The simulation results and theoretical analysis exhibit that the proposed circular grid based scheme performs better rather than the existing data dissemination scheme such as rectangular grid based scheme. This research work focuses on energy conservation and time efficient in WSN using data dissemination techniques.**

***Keywords- Wireless Sensor Network, Data dissemination, Dissemination node, Energy, cluster.***

## I. INTRODUCTION

Wireless Sensor Networks (WSNs) [1, 2] is an emerging area of research with an overwhelming effect on practical application developments. They permit fine grain observation of the ambient environment at an economical cost much lower than currently possible. In hostile environments where human participation may be too dangerous sensor networks may provide a robust service. Sensor networks are designed to transmit data from an array of sensor nodes to a data repository on a server. The advances in the integration of micro-electromechanical system (MEMS), microprocessor and wireless communication technology have enabled the deployment of large-scale wireless sensor networks. WSN has probable to outline numerous new applications for handling crisis, military and disaster relief operations that obliges real time information for proficient coordination and arranging.

WSN [3, 4] generally comprises a huge number of small sensors deployed over a vast field to obtain sensed data. These small sensors are typically powered by batteries and communicate via wireless channels. A WSN can be used in many applications such as target tracking, object detection, and environment monitoring. Although sensors continuously sense and propagate data in an environment, the power supply of each sensor is constrained. It is infeasible to recharge or replace the batteries of the sensors in such a large-scale sensor network, yet a WSN is designed to last.

This work describes the system architecture of opportunistic mobile peer-to-peer data dissemination in [5, 6]. Firstly, content is disseminated from a content server over the Internet to users that are connected to fixed infrastructure networks or wireless access networks e.g. wireless LAN access points or cellular radio networks. Secondly, content is also disseminated to users over opportunistic contacts during user mobility and vehicle mobility in a peer-to-peer manner. In terms of content source, on one hand users download traditional Internet content published by professional content providers from servers in the Internet. On the other hand, thanks to Web 2.0, it becomes more and more popular that users publish their personally featured content to all other users by both the infrastructure network and opportunistic direct contact with other users.

In contrast to traditional TCP/IP architecture, mobile peerto-peer system does not require network layer functions, as the routing function is replaced by an opportunistic forwarding and caching function at the application layer. The cache of mobile device is divided into public and private cache which stores public interest content and private interest content respectively.

## II. LITREATURE SURVEY

Jisha Mary Jose et al. [15] describe Wireless Sensor Networks is a wide and open area in networking research, which is increasingly being deployed for monitoring applications. This demands the need for quickly and efficiently disseminating data and code to sensor nodes to reprogram them to suite the current needs of the application. This is achieved by making use of data dissemination protocols. In this paper, a brief survey work is done on the existing various data dissemination protocols for wireless sensor networks and their performances were compared. It can be concluded that none of these methods provide any security to the data that is disseminated. So there is a need of developing secure dissemination protocols.

Brij Bihari Dube et al. [16] Depending upon particular road condition and the vehicle condition, the protocol is trading as every protocol has its own particular favorable circumstances and hindrances. Some protocol needs high priority as they are giving welfare to the vehicles in which packet forwarding delay is not reasonable, on the other hand some other protocols may be used at the condition where trivial delay is tolerable. Simultaneously since there is constrained bandwidth, protocol used should not allow the repetitive packets so that full data can be disseminated over the system, which is a major experiment. In future they will attempt to device an algorithm which can

work for together push and pull based data transmission and which can diminish the excess data transfer so that maximum data can be disseminated terminated the road and efficient utilization of existing bandwidth could be done. In future they will work on the selection conditions that in which case the vehicle should contribute in the broadcasting. They expectation that this concise work will help to make created understanding to those analysts who are new to applications of VANETs and clear their technique for developing new ideas to enhance the occupied of these networks

Nidhi Gautam et al. [17] They focus on wireless sensor network is a network of tiny nodes with wireless sensing capacity for data collection processing and further communicating with the Base Station in this paper they discusses the overall mechanism of data dissemination right from data collection at the sensor nodes, clustering of sensor nodes, data aggregation at the cluster heads and disseminating data to the Base Station the overall motive of the paper is to conserve energy so that lifetime of the network is extended this paper highlights the existing algorithms and open research gaps in efficient data dissemination.

Daniel Barbara [18] this paper is an effort to survey these techniques and to classify this research in a few broad areas. Mobile computing has built up a fertile area of work for researchers in the scopes of database and data management. The inherent confinements of mobile computing frameworks present a challenge to the traditional issues of database management. As should be obvious, the amount of exploration around there in the most recent couple of years has been surprising. Then again, a few issues continue open for research. There is a requirement for better protocols in the region of data sharing and transaction management, better interfaces, clever algorithms that accomplishment locality to shape the responses to queries. Undoubtedly, we will bear on seeing a steady number of research contributions later on.

Hee Sook Mo et al. [19] proposed grid-based virtual infrastructure for efficient data dissemination to mobile sink group considering multiple sources. A localized virtual infrastructure termed a ‘pipe’ is used as the rendezvous point between a source and the moving sinks as a group. The member sinks in the group retrieve data directly from the pipe allocated for each source within the group region while roaming. Compared with other schemes that support mobile sink group, the proposed scheme greatly decreases the energy consumption because it eliminates the retransmission caused by flooding and it significantly reduces the path for the data delivery using localized virtual storage. The performance evaluation in a simulation showed that the proposed scheme outperforms the existing flooding-based schemes in terms of energy consumption and data delivery ratio. In the future, they will study more about in the case of unequal virtual storage pipes or data aggregation at the virtual pipe nodes for optimizations according to applications.

Neng Chvng Wang et al. [20] propose power efficient data dissemination (PEDD) arrangement for wireless sensor networks (WSNs) with mobile sinks. A source proactively ideal models a grid structure to disseminate data to the mobile sinks. For every network point, an expense capacity is connected to pick a dissemination node to serve it. Only the dissemination nodes are in working mode, while the other sensor nodes simply fall into rest mode to spare energy. A way along grid points is hailed from a sink to the source for forwarding inquiries and disseminating data. To consistently distribute energy load in the WSN, the dissemination node with the best residual energy is chosen for the upstream node in the query forwarding way. Reproduction results demonstrate that PEDD beats going before scheme.

Prabhat Singh et al. [21] describe EEGBDD is a novel gridbased data dissemination arrangement which makes utilization of virtual framework foundation for question and information sending. EEGBDD is an energy-efficient arrangement for addressing the issues of dissemination hubs disappointment and extreme flooding of packets in WSNs. Virtual grid infrastructure constructed over randomly deployed large scale wireless sensor network has proven very useful for handling sink and event movements. The proposed scheme exploits location information of sensor nodes to build grid structure over entire sensor field. In the proposed scheme the random deployment of sensor nodes is considered during the grid construction. Dissemination nodes are selected on the basis of their residual energy levels. The proposed network model ensures query and data forwarding through the shortest path between source and sink. The proposed scheme is energy efficient and robust as it reduces the energy consumption in query and data forwarding and dissemination node failure handling.

## III. A NOVEL ENERGY AWARE PROPOSED DATA DISSEMINATION SCHEME

In proposed data dissemination scheme, a virtual grid of circular size is constructed for data forwarding. The proposed novel energy aware data dissemination scheme illuminates the problem of efficient data dissemination in a large scale senor network.

*a) Circular Grid Construction*

a) First we can create a grid in a circular form.

b) Then we can divide the grid onto sectors on the basis of radius of gird.

c) Grid is divided into clusters.

d) We can create a Base station in the middle of grid and the each cluster head contain nodes.

*b) Data Dissemination and Cluster node formation*

a) Cluster head selection on the basis of energy and distance from each node in the grid.

b) Each time we check energy of cluster head and change cluster head for that we will apply round robin technique.

c) Cluster heads are behaved like data dissemination nodes.

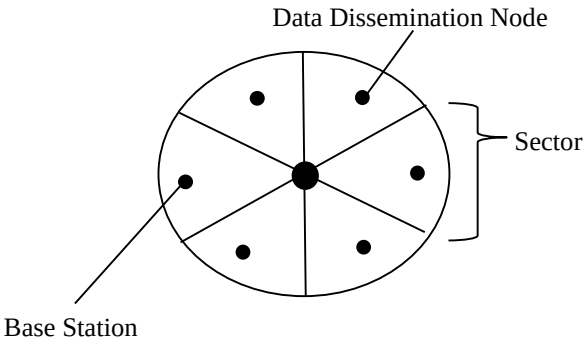


Figure 1: Circular Grid Construction

*c) Query Forwarding*

In this approach the query forwarding is taking into the virtual grid infrastructure. Every information source has its own novel source id and the source id acknowledged to all the dissemination hubs of the cell in which the information source is untruthful. The question from a sink incorporates reference directions of the source, and reference directions of the following scattering hub which is anticipated that would forward the inquiry. At the point when a sink needs information, it surges an inquiry inside of the neighborhood cell region. The inquiry compasses to the nearby dispersal hub of that cell. Presently it is sent on the matrix towards the source. Every hub keeps up the data about every one of the inquiries got by neighboring hubs and when it gets the information then it advances the information to every one of the hubs from where it had gotten the question for that information thing.

- The inquiry from a sink incorporates the sink id, source id of the wellspring of intrigued information, reference directions of the following spread hub.
- When a sink needs information, it surges an inquiry inside of the nearby cell region.
- The inquiry spans to the nearby spread hub of that cell.
- Now it figures the reference coordinates of next dissemination node and redesigns the inquiry bundle and forwards on the grid to the source.
- All dissemination nodes keep up the data of the hub from which it has gotten a specific question.
- If a dissemination node gets inquiries for the same information from diverse sinks, then it sends one query.

*d) Algorithm*

1: Generate Query (Source_id (Ps, Qs),
C_Dnode (Pj, Qj), N_Dnode (Pn, Qn)
2: Transmit (Query, N)
3: while (Pj=!Ps & Qj=!Qs)
{
4: if (Pj =Pn&Qj =Qn)
{
5:if ( Q_list (Source_id ) = TRUE )
7: else{
8: Update Q_list (Source_id, C_Dnode)
9: Update_query(Pn, Qn)
10: forward the query}
}
11: else abandon the query.
}
12: end

Where,
Ni: immediate neighbors of node i
C_Dnode: current dissemination node
N_Dnode: next dissemination node
Q_Iist: query list maintained by each dissemination node

*e) Calculating the next dissemination node' reference coordinates*

- $Pn = Pi + p.a$
- $Qn = Qi + q.a$

Where,
a is the cell size.

*f) Calculating p & q*

(Ps, Qs) are the reference coordinates of the source node.

- If $(P_i = P_s)$ $p = 0$ & $q = (Qs - Q_i)/|Qs-Qi|$;
- else if $(Q_i = Q_s)$ $p = (P_s - Q_j)/|P_s-P_i|$ & $q = 0$;
- else $p = (Ps-Qi) /|P_s-P_i|$ & $q= (Qs - Qi) /|Qs-Qi|$;

## IV. RESULTS

In this section, we appraise the performance of a novel energy aware data dissemination protocol through simulation. We evaluate the performance of circular grid based data dissemination with flexible number of cluster head. The results

confirm the energy efficient and time conservation. We also compare the performance of circular grid based data dissemination with rectangular based data dissemination.

*a) Effect of Communication of Base Station and Data Dissemination Node on Total Energy Consumption*

Numbers of rounds are varied from 1 to 10 to study their on overall energy consumption. Figure 2(a) shows how to consume total energy in rectangular grid and figure 2(b) shows overall energy consumption while circular grid is used.

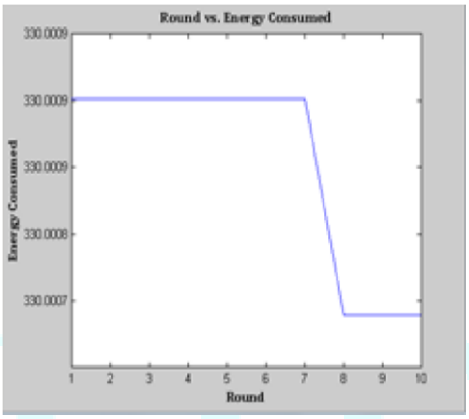


Figure 2(a). Plot between number of Round and Total energy consumption in rectangular grid construction

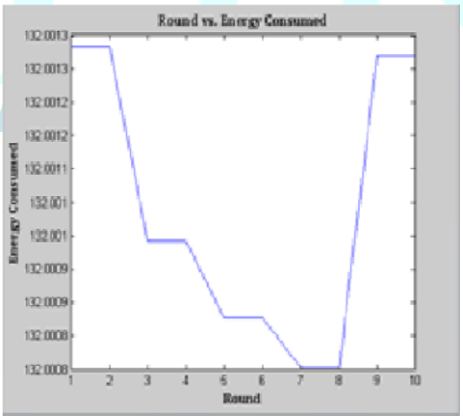


Figure 2(b). Plot between number of Round and Total energy consumption in circular grid construction

*b) Effect of Communication of Base Station and Data Dissemination Node on time delay*

When data are transferring in between base station and data dissemination node most of the time the data packet follows the shortest path between base station and data dissemination node.

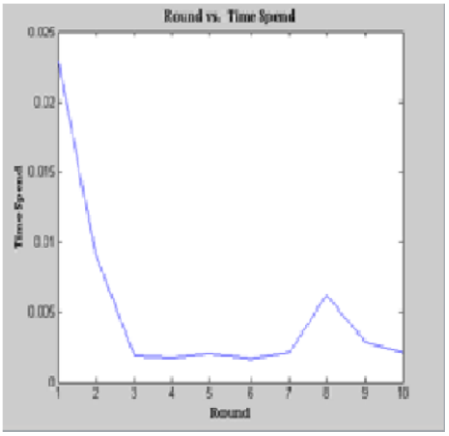


Figure 3(a). Plot between number of Round and Time Spend in rectangular grid construction

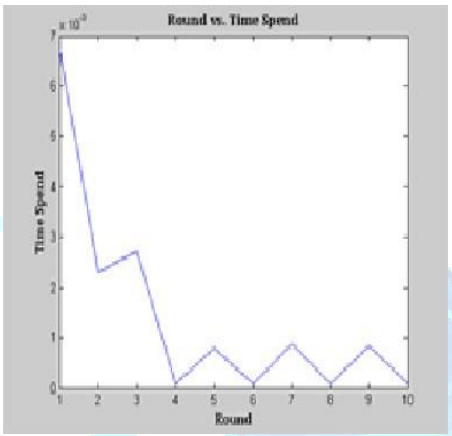


Figure 3(b). Plot between number of Round and Time Spend in circular grid construction

Figure 3(a) shows time delay in rectangular grid and figure 3(b) shows time delay in circular grid. Which is provide ultimately result in reliable data delivery.

## V. CONCLUSION

Proposed work provides a way for efficient energy management in WSN and sectors of grid is enhanced the performance of dissemination technique for saving energy of sensor node and base station. These demands the need for quickly and efficiently disseminating data and code to sensor nodes to reprogram them to collection the current needs of the application. This is achieved by making use of data dissemination protocols. The proposed scheme is to provide a way current need of application makes demands for efficient data dissemination of modified provision for efficient diffusion in wireless sensor network and analysis wireless sensor network in terms of energy conservation, and time efficient of transferring the data packet.

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