World Journal of Engineering Research and Technology
WJERT
www.wjert.org
SJIF Impact Factor: 4.326

A NOVEL BASED APPEAR FOR RANGE OF CLUSTER HEAD USING POWER EFFICIENT AND LOAD MATCHING CLUSTER BASED ROUTING ALGORITHM IN WSN

***B. Mahesh M. E., T. Abinaya M. E. and S. Meena M. E.**

Assistant Professor, Department of Electronics and Communication Engineering, Nadar Saraswathi College of Technology- Theni.

Article Received on 18/11/2017 **Article Revised on 09/12/2017** **Article Accepted on 30/12/2017**

***Corresponding Author**
B. Mahesh M. E.
Assistant Professor, Department of Electronics and Communication Engineering, Nadar Saraswathi College of Technology- Theni.

ABSTRACT

Wireless sensor network (WSN) requires robust and energy efficient communication protocols to minimize the energy consumption as much as possible. Sensor nodes are resource constrained in term of energy, processor and memory and low range communication and bandwidth. However, the lifetime of sensor network reduces due to the adverse impacts caused by radio irregularity and fading in multi-hop WSN. Limited battery power is used to operate the sensor nodes and is very difficult to replace or recharge it, when the nodes die. This will affect the network performance. A Dual Cluster based resource sharing scheme is proposed as a solution for this problem. The proposed scheme extends ELC algorithm and enables multi-hop transmissions among the clusters by incorporating the selection of cooperative sending and receiving nodes. The performance of the proposed system is evaluated in terms of energy efficiency and reliability. Simulation results show that tremendous energy savings can be achieved by adopting hard network lifetime scheme among the Dual Cluster clusters. Due to the limited energy and communication ability of sensor nodes, it seems especially important to design a routing protocol for WSNs so that sensing data can be transmitted to the receiver effectively. An energy-balanced routing method based on forward-aware factor (FAF-EBRM) is proposed in this paper. In FAF-EBRM, the next-hop node is selected according to the awareness of link weight and forward energy density.

I. INTRODUCTION

A Wireless Sensor Networks (WSNs) is a self-organization wireless network system constituted by numbers of micro sensors with limited energy. They are deployed to monitor the sensing field and collect information from physical or environmental condition and to co-operatively pass the collected data through the network to a main location. Due to the limited energy and communication ability of sensor nodes, it is important to design a network topology, routing algorithm and protocol for large-scale WSN communication system. Energy consumption is an important factor in system designs of WSNs. Traditionally, there are two approaches to accomplish the data collection task: Direct communication, and Multi-hop forwarding. In one hop wireless communication, the sensor nodes upload data directly to the sink, which may result in long communication distances and degrade the energy efficiency of sensor nodes. On the other hand, in multi-hop forwarding, data are transferred from the nodes to the sink through multiple relays, and thus communication distance is reduced. However, since nodes closer to the sink have a much heavier forwarding load, their energy may be

1.1 Wireless Sensor Network

A typical WSN consists of a number of sensing nodes that collect information from the surrounding environment and forward it to a collector (referred to as the BS) for further processing. Sensing nodes are normally small, inexpensive, and have limited processing, computing and energy resources. Each of the sensing nodes has a data processing unit, a communication unit and a power unit. Depending on the type of application, these nodes are equipped with different kinds of sensors, such as temperature, humidity and motion detectors. The sensors gather information from the environment which will be processed and transferred to the BS or another node via a wireless link. An example of a WSN is shown in Fig. 1.1 in which the system components of a sensor node are also illustrated. WSNs have been widely used in recent years due to the low-cost and ease of deployment. Moreover, a WSN is self-organizing and can be left unattended once deployed.

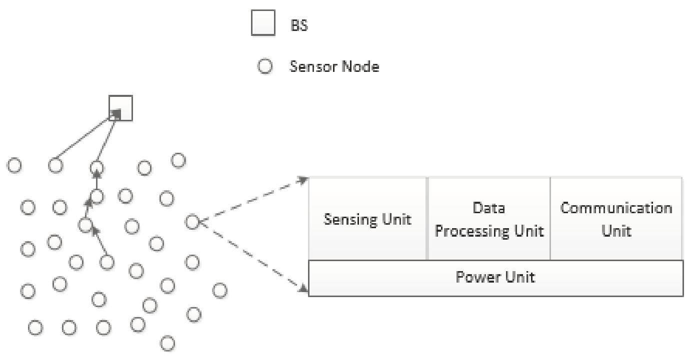

Fig. 1.1: A WSN and system components of a sensor node.

1.2. Applications

1.2.1. Area Monitoring

Area monitoring is a common application. In area monitoring, the is deployed over a region where some phenomenon is to be monitored. A military example is the use of to detect enemy intrusion a civilian example is the geofencing of gas or oil pipelines. For military users, a primary focus has been area monitoring. WINS (wireless integrated networked) will replace single high value assets with large arrays of distributed for both security and surveillance applications. WINS 1 is smaller and more capable than assets presently in the inventory. The added feature of robust, self-organizing networking makes WINS deployable by untrained troops in essentially any situation. Distributed sensing has the further advantages of being able to provide redundant and hence highly reliable information on threats as well as the ability to localize threats by both coherent and incoherent processing among the distributed nodes. WINS will be used in traditional network applications for large area and perimeter monitoring and will ultimately enable every platoon, squad, and soldier to deploy networks to accomplish a myriad of mission and self-protection goals. The Rockwell WINS team has been very active in working with the U.S. Marine Corps and the U.S. Army to test and continuously refine WINS performance in desert, forest, and urban terrain. For the urban terrain, WINS will dramatically improve troop safety as they clear and monitor intersections, buildings, and rooftops by providing continuous vigilance for unknown troop and vehicle activity.

1.2.2. Environment/Earth Monitoring

The term Environmental networks, has evolved to cover many applications of to earth science research. This includes sensing volcanoes, oceans, glaciers forests etc. Some of the major areas are listed below.

1.2.3. Air Quality Monitoring

To protect humans and the environment from damage by air pollution, it is of the utmost importance to measure the levels of pollutants in the air. Real time monitoring of dangerous gases is particularly interesting in hazardous areas, as the conditions can change dramatically very quickly, with serious consequences. Environmental magnitudes: Temperature, Humidity, Light Gas & particle concentration: $O2$, CO, $CO2$, $SO2$, $H2S$, NO, $NO2$, $NH3$, $CH4$, PM-10, TVOC. Ambient monitoring: Rainfall, Wind speed, Wind direction, UV levels, Atmospheric pressure.

1.2.4. Interior Monitoring

The measurement of gas levels at hazardous environments requires the use of robust and trustworthy equipment that meets industrial regulations.

1.2.5. Exterior Monitoring

Outdoor monitoring of air quality requires the use not only of accurate, but also rain & wind resistant housing, as well as the use of energy harvesting techniques that ensure extended autonomy to equipment which will most probably have difficult access.

1.2.6. Air Pollution Monitoring

Wireless ad hoc networks have been deployed in several cities (Stockholm, London or Brisbane) to monitor the concentration of dangerous gases for citizens. These can take advantage of the ad-hoc wireless links rather than wired installations, which also make them more mobile for testing readings in different areas. There are various architectures that can be used for such applications as well as different kinds of data analysis and data mining that can be conducted.

1.2.7. Forest Fire Detection

A network of Ad hoc Nodes can be installed in a forest to detect when a fire has started. The nodes can be equipped with ad hoc to measure temperature, humidity and gases which are produced by fire in the trees or vegetation. The early detection is crucial for a successful action of the firefighters; thanks to Wireless ad hoc networks, the fire brigade will be able to know when a fire is started and how it is spreading.

1.2.8. Landslide Detection

A landslide detection system makes use of a wireless ad hoc network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide. And through the data gathered it may be possible to know the occurrence of landslides long before it actually happens.

1.2.9. Water Quality Monitoring

Water quality monitoring involves analyzing water properties in dams, rivers, lakes & oceans, as well as underground water reserves. The use of many wireless distributed ad hoc enables the creation of a more accurate map of the water status, and allows the permanent deployment of monitoring stations in locations of difficult access, without the need of manual data retrieval.

1.2.10. Natural Disaster Prevention

Wireless ad hoc networks can effectively act to prevent the consequences of natural disasters, like floods. Wireless nodes have successfully been deployed in rivers where changes of the water levels have to be monitored in real time.

1.2.11. Industrial Monitoring

Machine Health Monitoring

Wireless ad hoc networks have been developed for machinery condition-based maintenance (CBM) as they offer significant cost savings and enable new functionalities. In wired systems, the installation of enough ad hoc is often limited by the cost of wiring. Previously inaccessible locations, rotating machinery, hazardous or restricted areas, and mobile assets can now be reached with wireless ad hoc.

Data Logging

Wireless networks are also used for the collection of data for monitoring of environmental information. This can be as simple as the monitoring of the temperature in a fridge to the level of water in overflow tanks in nuclear power plants. The statistical information can then be used to show how systems have been working. The advantage of over conventional loggers is the "live" data feed that is possible.

1.2.12. Industrial sense and control applications

In recent research a vast number of wireless ad hoc network communication protocols have been developed. While previous research was primarily focused on power awareness, more recent research have begun to consider a wider range of aspects, such as wireless link reliability, real-time capabilities, or quality-of-service. These new aspects are considered as an enabler for future applications in industrial and related wireless sense and control applications, and partially replacing or enhancing conventional wire-based networks by techniques.

1.2.13. Water/Waste water Monitoring

Water monitoring involves many different activities, from ensuring the quality of surface or underground water, both for human beings and animal life, to the monitoring of a country's water infrastructure.

Water Quality Magnitudes: Temperature, pH, specific electrical conductance (EC), dissolved O2 (DO).

Water Distribution Network Monitoring: Flow & pressure levels, leakage detection, water levels, remote metering.

Natural Disaster Prevention: Flood & drought preemptive warning.

There are many opportunities for using wireless networks within the water/wastewater industries. Facilities not wired for power or data transmission can be monitored using industrial wireless I/O devices and powered using solar panels or battery packs and also used in pollution control board.

1.2.14. Agriculture

Using wireless networks within the agricultural industry is increasingly common; using a wireless network frees the farmer from the maintenance of wiring in a difficult environment. Gravity feed water systems can be monitored using pressure transmitters to monitor water tank levels, pumps can be controlled using wireless I/O devices and water use can be measured and wirelessly transmitted back to a central control center for billing. Irrigation automation enables more efficient water use and reduces waste.

2. PROBLEM STATEMENT

In wireless sensor network the Energy conservation and harvesting increase lifetime of the network. Those operations for a sensor to consume energy are target detection, data transmission and reception, data processing, etc. In single Cluster head for data transmission consumes most of the energy, and it heavily depends on the transmission distance and the transmitted data amount. The Cluster heads are selected by according to the probability of optimal cluster heads determined by the networks. If any cluster heads fails after that only, it will search another cluster Head for that process it will take more time.In the Dynamic cluster head selection it will consume more power select CH it will produce the Delay and packet loss in network.

3. CLUSTERING ROUTING TECHNIQUES

This chapter presents a literature review of clustering and cluster-based routing protocols. Section 4.1 introduces the concept behind clustering. Section 4.2 discusses the advantages of clustering. Section 4.3 presents the main aspects to be considered in designing a cluster-based routing algorithm.

4. THE CONCEPT OF CLUSTERING

4.1. The Concept of Clustering

To relay information from many sensor nodes towards one BS in an efficient manner, a hierarchical routing technique is usually employed. Cluster-based routing aims to form a network routing hierarchy based on a number of clusters as shown in Fig. 4.1. Grouping sensor nodes into clusters can simplify the method used in determining their communication, which can help to deal with scalability issues. Each cluster has a special node called Cluster Head (CH) and a number of Cluster Members (CMs). A CH is responsible for collecting the data of the CMs in the corresponding cluster. This will enable the data of each node to travel locally in its corresponding cluster rather than through the whole network. Each CH has the knowledge about CMs in its corresponding cluster and about other CHs that it might use to deliver data to the BS. On the other hand, each CM only needs to know about its own CH (but not about other nodes in the entire network). In this way, the network appears smaller in the view of each node in the network, whether it is a CH or a CM.

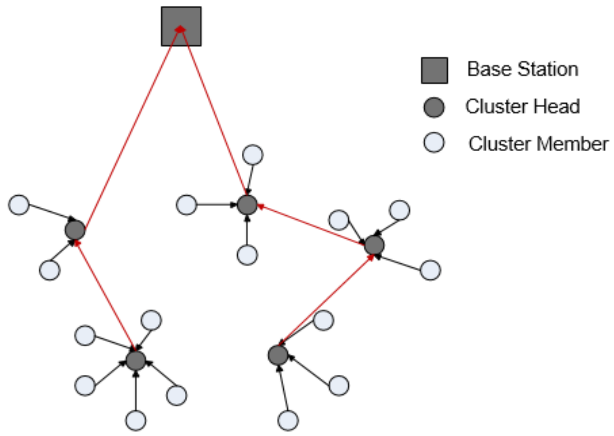

Fig.4.1: A Clustered Network.

4.2. Advantages of Clustering

Since CMs are usually located close to each other, the sensed data may have correlation due to similarities. Hence, a CH can perform data aggregation to eliminate redundant information by using functions such as suppression, maximum, minimum and average. This allows to differentiate between raw sensor data and useful data. For example, if CMs are sensing and sending the air temperature value, the corresponding CH can determine the average value and forward it in a single message. Data aggregation reduces the number of data transmissions in the network as well as the amount of data forwarded towards the BS. This contributes to reducing bandwidth demands, resulting in a better utilization of bandwidth. By recognizing that the energy consumed in computation is usually less than that used for communication, data aggregation can also reduce the total energy consumption in the network and extend network lifetime. Since only CHs perform routing, there is less exchange of routing information among the nodes in the network. The computations to determine the routing paths to deliver data to the BS are reduced. Also, the sizes of the routing tables as well as the routing overhead are reduced. This can enhance the network's energy consumption profile and thus extends network lifetime. In flat routing techniques where all the nodes have the same role in the network, data may end up going through many hops and nodes before reaching the BS. This can increase the travel time. On the other hand, in hierarchical routing techniques, data covers larger distances as it travels from one level into the other. This may indicate that data travels faster and latency can be reduced. The above discussion highlights some important characteristics of the clustering routing techniques. Note that, clustering also has some drawbacks. Configuring clusters and their maintenance require the exchange of messages among the nodes in the network, which may introduce overhead. Also, creating clusters requires resources that are not being used for data transmission. Furthermore, CHs may act as bottlenecks due to the extra functions they have to carry out. Overall, the benefits of clustering outweigh its drawbacks in terms of energy efficiency.

4.3 Aspects Considered in Designing a Cluster-Based Algorithm

A cluster-based algorithm can be executed either in a distributed manner or in a centralized manner. A distributed algorithm does not require a central point in order to be executed. The task of configuring the network is shared among all the nodes in the network. The nodes use only local information to make network configuring decisions. This might be advantageous since there is no need to keep global information about the network. However, nodes require computation resources to make decisions about network configuration. As for a centralized algorithm, the BS is usually employed as the central point that configures the network. This is because the BS does not have the issue of limited energy and computation capability, and hence, it is usually used to execute the operations that require a large amount of energy. Indeed, utilizing a centralized algorithm can provide a better control of the network roting. Whether the clustering algorithm is distributed or centralized, there are three important aspects to be considered: cluster head selection, cluster forming, and cluster communications.

4.3.1. Cluster Head Selection

CHs can be nodes with more resources or regular nodes. In case of CHs being regular nodes, it is important to perform re-clustering where new CHs are selected. This is to avoid the fast depletion of CHs' energy due to the different functions that CHs perform. Re-selecting CHs can also be a means of fault tolerance. For instance, if a CH dies, re-selecting CHs helps in establishing new communication links for the CMs that have lost their CH. There are different considerations in selecting CHs such as nodes' location and nodes' residual energy.

The number of selected CHs has an effect on the total energy dissipation in the network. A network with few CHs can result in some CMs being very far away from the corresponding CHs. This increases the energy consumed by CMs to reach their CHs. On the other hand, a network with many CHs can cause collisions and redundancy in their transmitted data. This is because CHs can be located very closely to each other, and data is assumed to be correlated. Also as CHs tend to consume more energy, having a large number of CHs increases the total energy dissipation. From this discussion, the number of CHs to be selected should be taken into consideration.

4.3.2. Cluster Forming

In cluster forming, the CMs of each of the selected CHs are identified to form different clusters. Clusters should be formed while ensuring that CMs do not consume a large amount of energy in transmitting data to their CHs. CMs contribute to the load of their CHs since each CH has to collect, aggregate and forward the data of its CMs. Thus, more CMs introduce more load and more energy consumption on the corresponding CH. To make sure that CHs do not deplete their energy too fast, clusters should be formed such that they have similar sizes and balanced load.

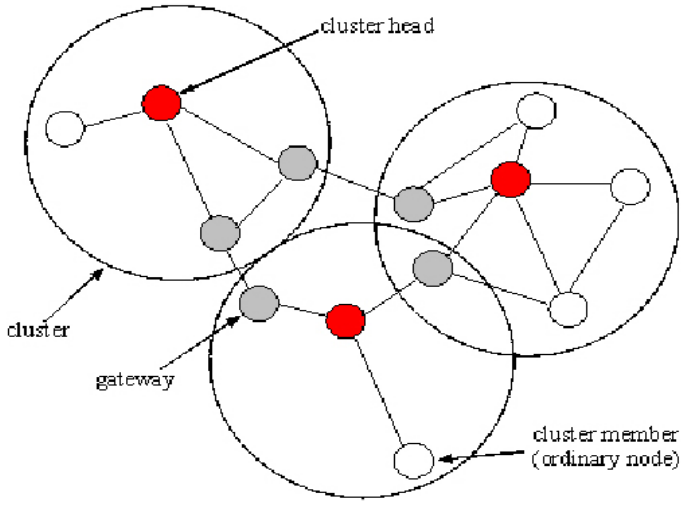

Fig.4.2: Cluster Formation.

4.3.3 Cluster Communication

There are two types of cluster communications, namely, intra-cluster communication and inter- cluster communication. Intra-cluster communication covers the interactions between each of the CMs and its corresponding CH. Typically, this type of communication includes a one-hop transmission between each of the CMs and its CH, which simplifies the communication. In some special cases where CMs have a very short transmission range and they cannot reach their CHs, multi-hop transmissions would be beneficial. Inter-cluster communication determines the path between each of the CHs and the BS to deliver data. Single-hop transmission can be used to deliver data to the BS, which can be beneficial in small networks where the BS is close to the CHs. When CHs are far away from the BS, multi-hop transmission can be more advantageous in forwarding data to the BS.

5. SYSTEM ANALYSIS

5.1 Existing System

Energy conservation and harvesting increase lifetime of the network. WIRELESS sensor networks consist of battery-powered nodes that are endowed with a multitude of sensing modalities including multi-media (*e.g.*, video, audio) and scalar data (*e.g.*, temperature, pressure, light, magnetometer, infrared). Those operations for a sensor to consume energy are target detection, data transmission and reception, data processing, etc. Among others data transmission consumes most of the energy, and it heavily depends on the transmission distance and the transmitted data amount. In Existing system, Cluster heads are selected according to the probability of optimal cluster heads determined by the networks. After the selection of cluster heads, the clusters are constructed and the cluster heads communicate data with base station.

5.2 Disadvantages

- After node failure only, it will search another cluster Head.
- Delay and packet loss will occurs.

6. PROPOSED SYSTEM

- To overcome the QOS loss, we proposed the Dual Cluster based resource sharing scheme. Initially two Cluster Head are selected depending on the probability of cluster member energy.
- Also we includes FAF, here CH will elect by which node is placed forward direction to the sink node.
- Generally one cluster head will transfer the data to the base station and another one in sleep mode operation carried. If it does more work means it will send awake message to neighbor cluster to carry their operation.
- Otherwise if it energy will be drain means its forward here energy to neighbor cluster to do the operation. It will overcome the delay and packet loss in data transmission.
- After a long time Dual Cluster cluster can drain means, it will select another pair of clusters can chosen depends on members energy and these process will carried till all nodes will died.

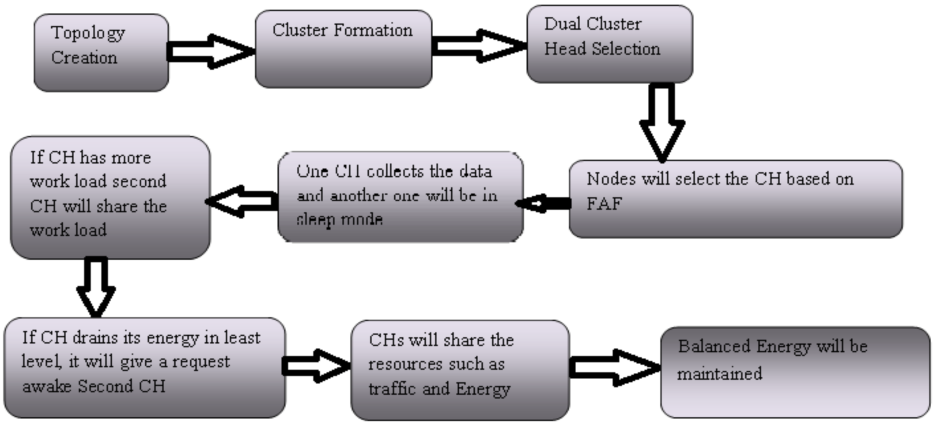

Fig 6.1: Architecture Diagram.

6.1 Dual Clustering Algorithm

- Here we use two clusters for data forwarding scheme.
- It will be sleep mode in idle state and check the status periodically.
- If cluster node had drain energy, it will send a request to the next CH node. That node can begin to carry their information from neighbor.

Advantages

- Does more work means, another cluster manage to work
- If node failure occurs, immediately another cluster awake to carry the data
- Delay and packet loss will be reduced

6.2 Algorithm Steps

- Cluster Formation
- Cluster Head(CH) Selection
- Cluster Head selects by the all the sensor nodes
- ✓ All the nodes share their energy level to all the neighbors
- All nodes check their energy into received energy level
- ✓ If I have high energy
- ✓ Yes, intimate all the nodes and share I am CH
- ✓ No, waiting for the CH request
- Cluster Members (CM) send the data to CH.
- CMs observe the one hop neighbor activities.
- Periodically it will forward to CA through CH
- TA validate the evidence

- If the evidences are strong against the any sensor node
  - ✓ If yes means eliminate the node
  - ✓ If no continue the node as a CM.
- Continue the Process.

6.3 Enhanced Forward Aware Factor–Energy Routing Methods

In this module we propose an Enhanced Forward Aware Factor-Energy Balanced Routing Method (EFAF-EBRM) based on Data aggregation technique that has some key aspects such as a reduced number of messages for setting up a routing tree, maximized number of overlapping routes, high aggregation rate, and reliable data aggregation and transmission. According to data transmission mechanism of WSN, we quantify the forward transmission area, define forward energy density which constitutes forward-aware factor with link weight. For energy efficient transmission in event-driven WSN, Data should be reduced. It requires proper routing method for reliable transmission of aggregated data to sink from the source nodes. This paper propose a new communication protocol based on forward-aware factor in order to determine next-hop node and Data Routing for In-Network aggregation(DRINA) protocol to reduce the number of transmissions and thus balancing the energy consumption, prolonging the network function lifetime and to improve QoS of WSN.

The Routing Algorithm Can be Divided into Seven Stages as Follows

- ➢ Determine and all of the possible next-hop nodes of node. First, take as the communication radius, determine the set of all of the nodes that have edges with. Select the nodes that closer to Sink than does, which constitute the set of all of the possible next-hop nodes and the furthest node determine.
- ➢ Determine and of each possible next-hop node. Determine as we determined. Plug the furthest distance between and nodes in FTA and the distance between and *Sink* into and obtain.
- ➢ Calculate of each possible next-hop node. Plug all of the nodes' energy into and get.
- ➢ Calculate the weight of edges between and each nodes according to.
- ➢ Plug the parameters of 3 and 4 and calculate FAF of each possible transmit link. Choose the next-hope Node.
- ➢ If there is no node closer to Sink than in, directly compare FAF of all of the nodes in, and choose the next-hop node. If there is no node in will increase the transmit power to get a longer radius than until connected with another node, or will abandon the packet.

- If Sink is among the forward transmit nodes, will transmit data directly to *Sink* and accomplish the procedure. In FAF-EBRM, the routing list structure of nodes. The information of the table can guarantee all of the parameters FAF-EBRM algorithm needed. The communication launch node can calculate the weight of edge between neighbors. Neighbors can get its own FED. It avoids the communication launch node doing all of the algorithms. Thus, each node's memory should storage its own ID, real time energy, distance to the Sink, and FED at any moment, which could be feed back to launch node quickly.

7. HARDWARE AND SOFTWARE FEATURES

7.1 Motivation for Simulations

- Cheap does not require costly equipment
- Complex scenarios can be easily tested
- Results can be quickly obtained

– More ideas can be tested in a smaller timeframe

- The real thing isn't yet available
- Controlled experimental conditions

– Repeatability helps aid debugging

- Disadvantages: Real systems too complex to model

7.2 NS Features

- NS is an object oriented discrete event simulator.

– Simulator maintains list of events and executes one event after another.

– Single thread of control: no locking or race conditions.

- Back end is C++ event scheduler

– Protocols mostly

– Fast to run, more control.

- Front end is OTCL

– Creating scenarios, extensions to C++ protocols

– Fast to write and change.

7.3 NS Programming Structure

- Create the event scheduler
- Turn on tracing
- Create network topology
- Create transport connections
- Generate traffic
- Insert errors.

7.3.1 Event Scheduler

In this Event scheduler while we processing many data's at a time it will process one by one (i.e) FIFO concept, so there is no congestion while transfering the packets.

7.3.2 Packets

It is the collection of data, whether header is called or not all header files where present in the stack registers.

Cmn header
Ip header
Tcp header
Rtp header
Trace header

7.3.3 Turn on Tracing

Trace packets on individual link Trace file format.

7.3.4 Create Network Topology (Physical Layer)

The Physical Layer is the first and lowest layer in the seven-layer OSI model of computer networking. The implementation of this layer is often termed PHY.

The Physical Layer consists of the basic hardware transmission technologies of a network. It is a fundamental layer underlying the logical data structures of the higher level functions in a network. Due to the plethora of available hardware technologies with widely varying characteristics, this is perhaps the most complex layer in the OSI architecture.

The Physical Layer defines the means of transmitting raw bits rather than logical data packets over a physical link connecting networking nodes. The bit stream may be grouped into code words or symbols and converted to a physical that is transmitted over hardware.

7.3.5 Transport Connection (Transport Layer)

Transport layers are contained in both the TCP/IP. Which is the foundation of the INTERNET. And the OSI model of general networking. The definitions of the Transport Layer are slightly different in these two models. This article primarily refers to the TCP/IP model, in which TCP is largely for a convenient application programming interface to internet hosts, as opposed to the osi model of definition interface.

The most well-known transport protocol is the (TCP). It lent its name to the title of the entire internet protocol suite TCP/IP. It is used for connection-oriented transmissions, whereas the connectionless user datagram suite(UDP) is used for simpler messaging transmissions. TCP is the more complex protocol, due to its stateful design incorporating reliable transmission and data stream services.

7.3.6. Generate Traffic (Application Layer)

In TCP/IP, the Application Layer contains all protocols and methods that fall into the realm of process-to-process communications via an Internet Protocol (IP) network using the Transport layer protocols to establish underlying host-to-host connections. In the OSI model, the definition of its Application Layer is narrower in scope, explicitly distinguishing additional functionality above the Transport Layer at two additional levels: session layer and presentation layer OSI specifies strict modular separation of functionality at these layers and provides protocol for each layer.

7.3.7 Insert Errors

Start debugging of errors.

7.4 Hardware Specifications

Main processor	: Single pc
Hard disk capacity	: 20 GB
Cache memory	: 1 GB

7.5 Software Specifications

Operating system	: Linux(ubuntu 10.04)
Scripting language	: Network Simulator 2.34
Protocol developed	: C++
Scripting	: Tool Command Language

7.6 Software Descriptions

7.6.1 Network Simulator 2.34 (NS2)

Network simulator (NS2) is a discrete event driven simulator developed at UC Berkeley. It is part of the VINT project. The goal of NS2 is to support networking research and education. It is suitable for designing new protocols, comparing different protocols and traffic evaluations.NS2 is developed as a collaborative environment. It is distributed freely and open source. A large amount of institutes and people in development and research use, maintain and develop NS2.This increases the confidence in it.

Versions are available for Free BSD, Linux, Solaris, Windows and Mac OS X.NS2 is built using object oriented methods in C++ and OTcl (Object Oriented variant of Tcl) in Figure 7.1

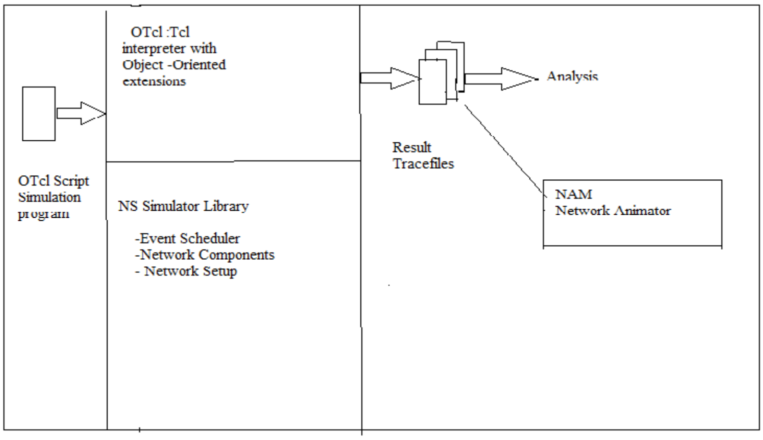

Fig.7.1: Simplified User's View of Ns.

NS2 interprets the simulation scripts written in OTcl. A user has to set the different components (e.g. event scheduler objects, network components libraries and setup module libraries) up in the simulation environment. The user writes his simulation as a OTcl script, plumbs the network components together to the complete simulation. If he needs new network components,he is free to implement them and to set them up in his simulatiomn as well. The event scheduler as the other major component besides netwok components triggers the event of the simulation (e.g, sends packets, start and stop tracing),some parts of NS2 are written in the C++ for efficiency reasons. The data path (written in C++)is separated from the control path (written in OTcl). Data path object are complied and then made available to the OTcl interpreter through an OTcl linkage(tclcl)which maps methods and member variables of the C++ object to the method and variables of the linked OTcl object. The C++ object are controlled by OTcl objects. It is possible to add methods and member variables to a C++ linked OTcl object.

Network simulator (NS) is an object-oriented, discrete event simulator for networking research. NS provides substantial support for simulation of TCP, routing and multicast protocols over wired and wireless networks. The simulator is a result of an ongoing effort of research and developed. Even though there is a considerable confidencein NS, it is not a polished product yet and bugs are being discovered and corrected continuously. NS is written in C++,with an OTcl interpreter as a command and configuration interface. The C++ part, which is fast to run but slower to change, is used for detailed protocol implementation. The OTcl part on the other hand, which runs much slower but can be changed very fast quickly, is used for simulation configuration. One of the advantages of this split-language program approach is that it allows for fast generation of large scenarios. To simply use the simulator, it is sufficient to know OTcl. On the other hand, one disadvantages is that modifying and extending the simulator requires programming and debugging in both languages.

7.7 Implementation Environment

Network simulator 2 is used as the simulation tool in this project. NS was chosen as the simulator partly because of the range of features it provides and partly because it has an open source code that can be modified and extended. There are different versions of NS and the latest version is ns-2.1b9a while ns-2.1b10 is under development NS can simulator the following:

1. Topology : Wired, Wireless.
2. Scheduling Algorithm : RED, Drop Tail.
3. Transport protocols : TCP, UDP.
4. Routing : static and dynamic routing.
5. Application : FTP, HTTP, Telnet, Traffic generator.

7.8. User View of NS-2

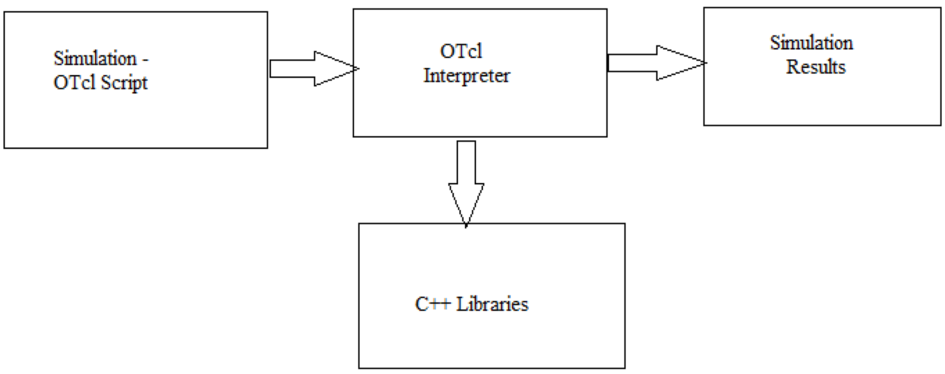

Fig.7.2: Block diagram of Architecture of NS -2.

7.9 Network Components

This section talks about the NS components, mostly compound network components.Fig.7.3 shows a partial OTcl class hierarchy of NS, which will help understanding the basic network components.

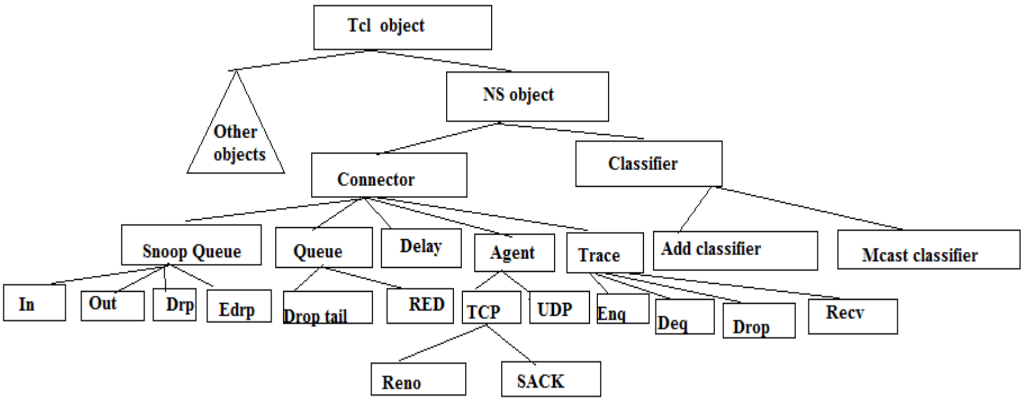

Fig.7.3: OTcl clas Hierachy.

The root of the hierarchy is the Tcl Object class that is the super class of all OTcl library object (schelduer, network components, timers and the other objects including NAM related ones).As an ancestor clas of Tcl object, NS object class is the super class of all basic network component objects that handle packets, which may compose compound objects such as node and links. The basic network components are further divided into two subclasses, connector and classifier, based on the number of the possible output DATA paths. The basic network and objects that have only one output DATA path are under the connector class, and switching objects that have possible multiple output DATA paths are under the classifier class.

8. SIMULATION RESULT

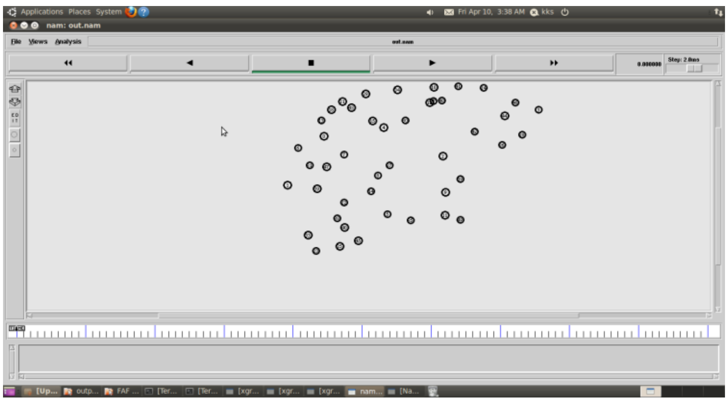

Fig. 8.1: Node Formation.

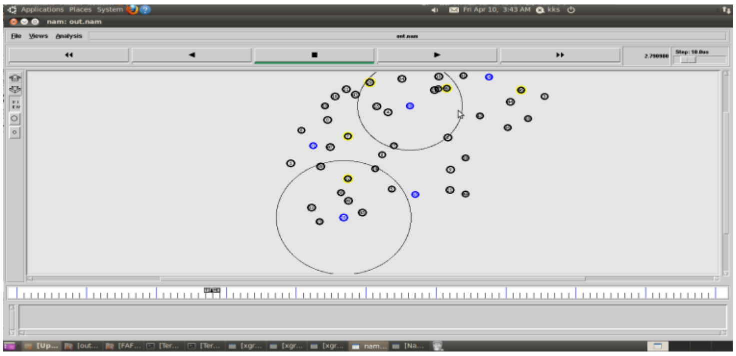

Fig. 8.2: Cluster Formation.

Fig.8.1,Shows that all nodes are deployed uniformly and there are totally 49 nodes Fig.8.2,Nodes are represented in different colors.Each color Shows various Cluster.

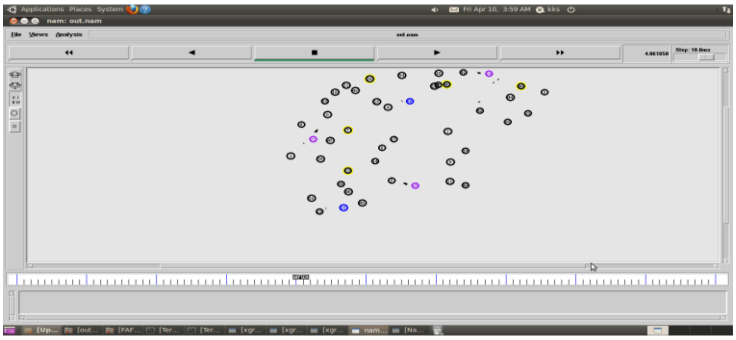

Fig. 8.3: Data Tranamission.

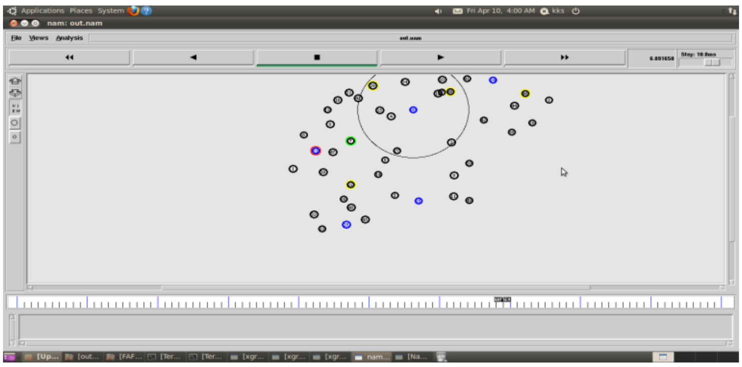

Fig. 8.4: Second CH in Active Mode.

Fig.8.3, The collected data from every nodes is sent to the Cluster Head (CH) and the CH aggregates the data and transmits to the Sink.

Fig.8.4, One cluster node had drain energy, it will send a request to the next CH node. That node can begin to carry their information from neighbor.

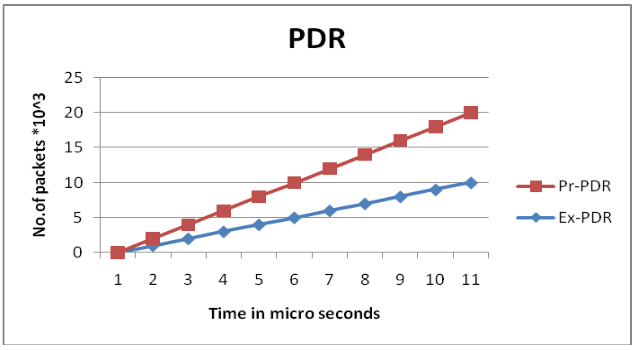

Fig.4.2 illustrates comparision of packet delay rate. Here introducing time delay between packets, we are reducing packet loss. So that the transmitted no.of packets will be increased from 16952 to 17600.So that, in proposed system packet delivery ratio is high.

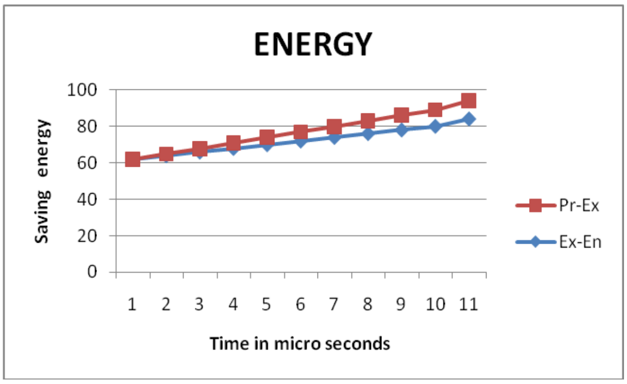

Fig.4.2 illustrates Energy comparision of both existing and proposing system. Here the energy saving is achieved from 62.12 to 75.12.This is because in proposed system, if one CH drains its energy another CH will share the resources such as traffic and energy. Hence consume less transmission and less energy.

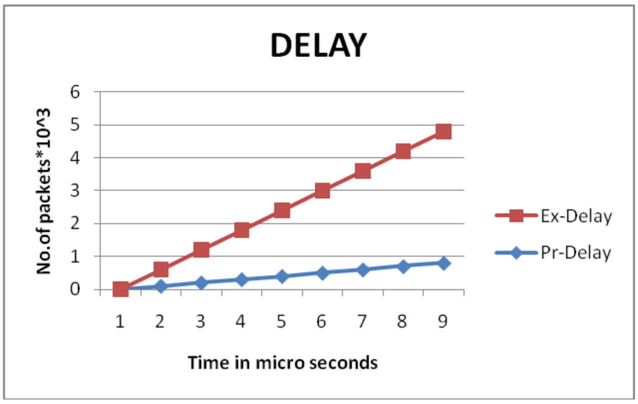

Fig.4.3. Here we are comparing delay. In existing system the delay is very high. we have reduced the delay with respect time from 1.985 to 0.885.

CONCLUSION

This paper proposes a Dual clustering algorithm extended from Energy-efficient and Load-balancing Cluster-based (ELC) routing algorithm for CSMA-based WSNs. Dual clustering algorithm takes into consideration both distance and residual energy in the CH selection. In addition, Dual clustering algorithm balances the load and energy consumption among CHs by employing the number of members in cluster forming and in the multi-hop inter-cluster communication. The simulation results show that Dual cluster algorithm can reduce the total energy dissipation and extend network lifetime while sustaining the performance in terms of the amount of data delivered to the BS.

REFERENCE

1. Akhtar et. al. has presented - Energy Aware Intra Cluster Routing for Wireless sensor networks, in 2010.
2. Zijian Wang et. al. has presented-Energy Efficient Collision Aware Multipath Routing for Wireless sensor networks, in 2009.
3. Ming Liu et. al. has presented An Energy-Aware Routing Protocol in Wireless sensor networks, in 2009.
4. Lu Su et. al. has presented Routing in Intermittently Connected sensor networks, in 2009.
5. K. Akkaya et. al. has presented A survey on routing protocols for wireless sensor networks, in 2005.
6. Basil Etefia et. al. has presented Routing Protocols for Wireless sensor networks, in Berkeley Information. Technology (SUPERB–IT) 2004.
7. A.P.Subramanian et. al. has presented Multipath Power Sensitive Routing Protocol for Mobile Ad hoc Networks in 2004.
8. Charles E.Perkins et. al. has presented Ad-hoc On- Demand Distance Vector Routing in 2003.
9. Fan Ye et. al. has presented A Two-Tier Data Dissemination Model for Large-scale Wireless sensor networks, in 2002.
10. Maurice Chu et. al. has presented Scalable Information-Driven sensor Querying and Routing for ad hoc Heterogeneous sensor networks, in 2002.
11. Sameer Tilak et. al. has presented “A Taxonomy of Wireless Micro-sensor Network Models, in 2002.
12. Ian Fet. al. has presented A Survey on sensor networks in 2002.

13. M. Younis et. al. has presented Energy-Aware Routing in Cluster-Based sensor networks, in 2002.
14. Schurgers et. al. has presened Energy Efficient Routing in Wireless sensor networks, in 2002.
15. Curt Schurgers et. al. has presented Energy Efficient Routing in Wireless sensor networks, in 2001.