Improving Performance and Energy Savings in Wireless Heterogeneous Sensor Networks using EgyHet Routing Protocol

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Abstract— Due to altered requirements in appliance environment, Wireless heterogeneous sensor networks (WHSNs) formed by sensors with assorted capacities are built. Data routing in WHSNs poses appropriate challenges. First, it should be redesigned since the current ones may not be straight forwardly utilized because of asymmetric links caused by different sensor transmission ranges. Second, it should agreement an assured data rate because data is routed through lossy links. Third, it should to be energy efficient because of the constraint of sensor batteries and the trouble of supplanting them after arrangement. This projects presents how to achieve low energy consumption and assured delivery rate with new routing protocol called EgyHet an energy-efficient Routing protocol for wireless sensor systems. The performance of existing system and proposed system are compared and appraised in this work using Network Simulator (NS2) in terms of matrices like overhead, packet delivery ratio and energy throughput. The graph results represents these metrics shows that EgyHet routing protocol achieve much better performance than existing routing protocols.

Key words: WHSNs, EgyHet, GBHHR

I. INTRODUCTION

Wireless sensor networks are arrangement that contains an amount of nodes to accept and transmit information over interested area. Sensing and communicating are two principle exercises performed by sensor nodes. Sensor systems have extensive variety of utilizations in military and the day by day lives of people. The key issue in examination of remote sensor systems is the means by which to enhance in energy capacity and life time of sensor hubs and in this manner WSNs.

EgyHet an energy-efficient routing protocol for remote heterogeneous sensor systems. EgyHet is a layer-based convention whose layer data of a sensor installs the number of hops of shortest path routing between the source node and the destination (sink). The reason for utilizing layer data is to avoid longer paths to save energy and enhance the delivery ratio of packets. Unlike regular acquisition protocols, EgyHet takes advantage of the asymmetric links in routing by establishing reverse paths. It guarantees an assured delivery rate by allowing the source node broadcast H times so that at least one neighbour can receive the message. It makes network energy efficient by considering remaining energy in sensors and reducing the number of forwarding nodes.

II. LITERATURE REVIEW

Routing is a crucial issue for remote sensor systems. A considerable measure of routing algorithms have been proposed for remote systems and some of them have been broadly utilized. Wireless sensor networks comprises of little nodes (hubs) with detecting, processing, and remote communicating capabilities. Acquisition protocols in WSNs may vary based on the appliance and system structural architecture [1]. A Geography-based Heterogeneous acquisition agreement for Wireless Sensor Networks. This work presents a geography–based heterogeneous hierarchy routing (GBHHR) agreement. GBHHR convention is new kind of directing convention protocol for remote Sensor networks and is designed to reduce energy and broadens the lifetime of sensor hubs [2]. A Power Efficiency Routing Protocol for wireless sensor systems called PER convention. PER embraces a various levelled structural (hierarchy) planning. Sensor hubs in the wireless amalgamate sensor systems are categorized into two parts namely header nodes and ordinary sensor nodes. [3]. A Probabilistic routing convention for heterogeneous sensor network systems, which takes advantages of asymmetric connections in the network and works in dispersed way with low control overhead and assured delivery rate. The ProHet protocol, consists of two main parts, discovering an opposite route way for each asymmetric or unbalanced edges in the network and designing routing algorithms [5].

III. PROPOSED SYSTEM

The proposed system EgyHet mainly includes three building blocks namely network model, preparation model and routing model.

Fig. 1: System block diagram

A. Network Model

Network model gives details about how the arrangements of nodes are formed. The essential usefulness of remote sensor systems is to sense the environment and transmit the obtained data to a base station for next processing. Each Sensor hub comprises of detecting unit, processing unit, Trans receiver unit, and power unit. In this cardboard accept a wireless sensor network arrangement accepting small set of sensor hubs. The sensors are sent consistently at irregular over the territory of interest. Once conveyed, they self-sort out into a system that is required to work unattended. The system is partitioned into addressable locales. Every locale contains an arrangement of sensor nodes. A sample of such an association can be given utilizing a base station, or a sink, that serves as a focal point of a polar coordinate system. The separation between a sensor and the sink is resolved taking

into account the base-station sign level, as abstinent by the sensor node.

B. Preparation Model

This section, presents the preparation model of EgyHet convention, which consists of three parts. Discovering a reverse course way for each asymmetric edges in the network, choosing beginning layer numbers and adjusting layer numbers periodically. Discovering an opposite directing way is the basic stride to handle asymmetric connections of heterogeneous sensor systems. Critical percent of connections in heterogeneous sensor systems are asymmetric and the strong connectivity of the system can be up to 97% if the most extreme reverse steering way length (length implies the number of nodes) is situated to be 3. Taking into account their perception, it's easy to find an opposite way for each asymmetric connection by following back three hops.

C. Routing Model

After the preparation, the routing part of EgyHet that is directed by the remaining energy of sensors to accomplish a guaranteed delivery rate using local information can be carried out. The guaranteed delivery rate is initially pre-set to some demand value Δ. The routing part contains three parts: Broadcasting H times, message forwarding, and periodically updating packet loss rates. In routing initially the H value is calculated i.e. how many times source node broadcasts the messages. To calculate H value we consider set of hubs with accomplished highest remaining vitality and with whom packet loss rates are known through random setting initially value is the minimum integer that can satisfy delivery rate which is initially presented to some value Δ. After source node broadcasts the information messages H times, packets are transmitted to one or added forwarding nodes with top likelihood. After the H value is known, source node broadcasts the message that it needs to send to the destination (sink) via intermediate nodes in the network.

IV. IMPLEMENTATION

The implementation of the system for EgyHet routing protocol for WHNs with energy efficiency and assured delivery rate and its output characteristics is implemented using network simulator 2(NS2).The system architecture includes the 3 number of stages as follows

- Node deployment
- Preparation in the network
- Routing process

A. System Architecture

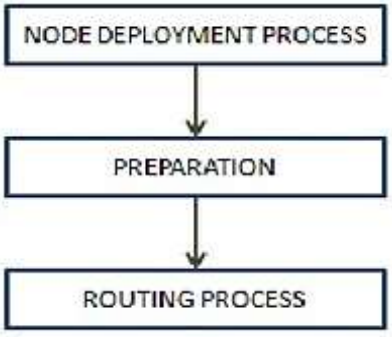


Fig. 2: System Architecture

B. Routing

Routing part includes calculating H value, broadcasting H times, forwarding messages and updating packet loss periodically. We utilize an illustration in Fig3.5 to clarify routing in EgyHet protocol. Each dark spot speaks to a sensor which is in charge of gathering of information. The left most node is source U which sends information to sink through intermediate nodes and node in the layer 0 represents the sink which is in charge of processing information after accumulation.

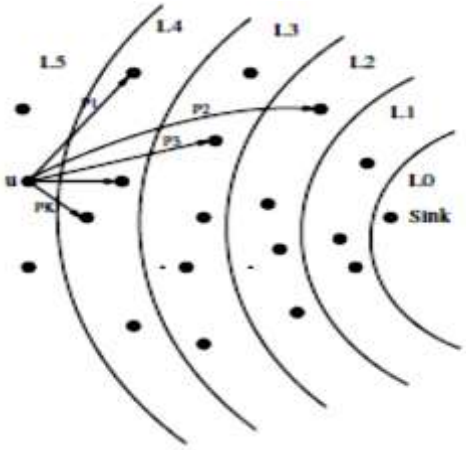
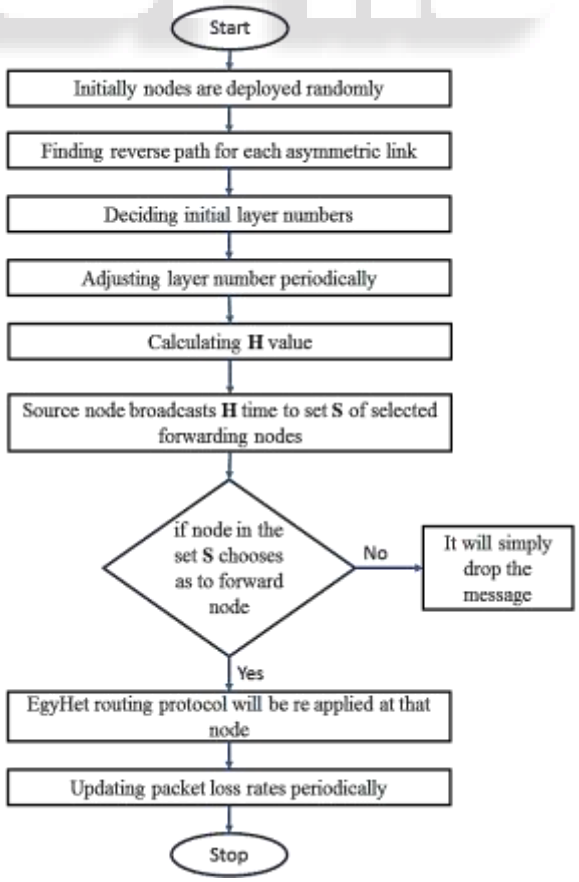


Fig. 3: Data forwarding senario.

Prior to any steering in the system starts The guaranteed delivery rate is pre-set to Δ. hubs are out into distinctive layer numbers with respect to sink and the bundle misfortune rates of the connections between source node U and its K In-out-neighbors or Out-neighbors are produced arbitrarily.

C. Flow Chart



D. Output Parameters

The proposed system is compared with the existing system depending upon the output parameters such as packet delivery ratio, bit error rate, throughput, and control over head.

1) Packet Delivery Ratio (PDR):

It is or else called, the proportion of amount of information bits received send from source to the sink. The amount of packets essentially transmitted from source to the destination is shown by Packet Delivery Ratio parameter.

2) Control Overhead:

It is characterized as the proportion of the control data sent to the real information got at every node.

3) Throughput:

It is characterized as how quick a node can basically transmit the data through a system. So throughput is the normal rate of successful message delivery over a correspondence channel.

4) Bit Error Rate:

It is defined as number of bit errors per unit time.

V. RESULTS AND DISCUSSIONS

The proposed work shows the implementation of new energy efficient routing protocol called as EgyHet. This implementation is carried out in network simulator 2 using tool command language (Tcl). The result includes snapshots and graphs of simulation of proposed and existing system in terms of network animator, trace file, throughput, energy efficiency, control overhead and packet delivery ratio.

The deployment of sensor nodes in the network model is shown in below figure.

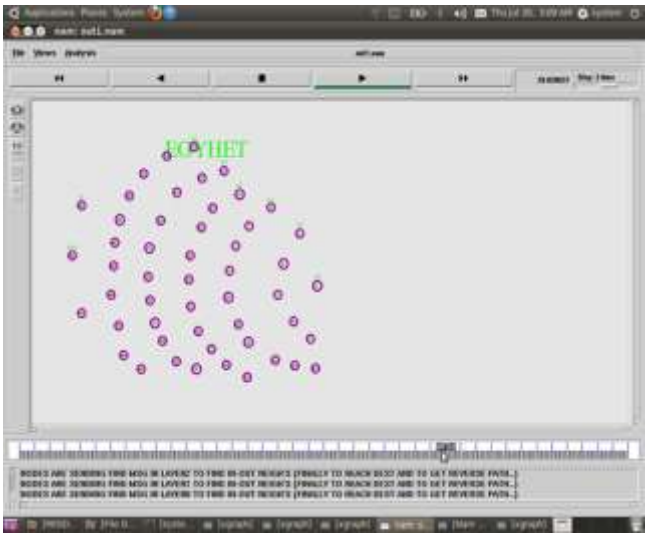


Fig. 4: Node deployment

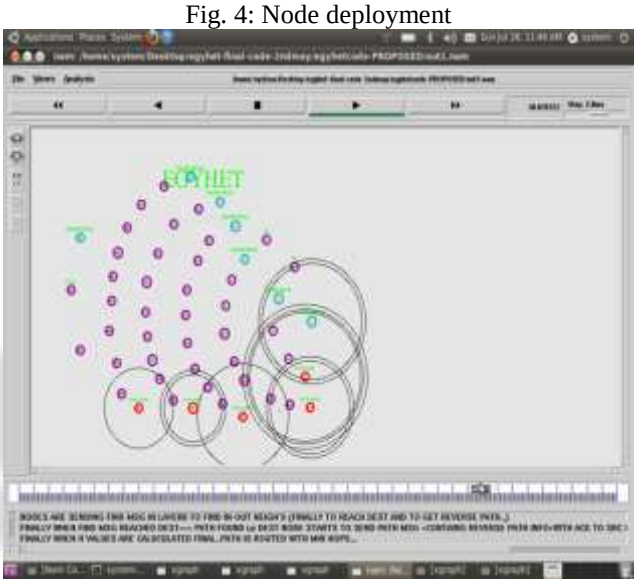


Fig. 5: Successful packet transmission in EgyHet Routing Protocol.

Fig. 6: Throughput of existing system

Fig. 7: Throughput of EgyHet Routing Protocol

VI. CONCLUSION

The conclusion part includes the performance of EgyHet routing protocol for reliable WSN using network simulator .This modified scheme with new routing protocol so called EgyHet provides energy efficiency and assured data delivery rate compared to existing routing protocols in WSN. The work also shows that, the output metrics such as energy, packet delivery ratio and throughput have higher values in performance of EgyHet routing protocol.

In this work only broadcast routing is taken into an account. But in the future work multicast routing is considered for the distributive network since it is very important and interesting issue.by considering the probability of each node to forward message. In proposed work broadcasting of messages is taken in account, so that more one or more nodes receives messages. If all the nodes forward the messages then it creates flooding in the network. In future flooding can be avoided by considering the probability of each forwarding node to forward the message in the network.

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