ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

Evaluation of Trusted Nodes in WSN Networks Using PDORP-LC

ADARSH KUMAR B[1], BIBIN CHRISTOPHER[2], ISSAC SAJAN[3], AJ DEEPA[4]

[1]PG Scholar, Department of Computer Science and Engineering, Ponjesly College of Engineering Nagercoil Tamil Nadu
[2]Assitant Professor, Department of Computer Science and Engineering, Ponjesly College of Engineering, Nagercoil Tamil Nadu
[3]Assitant Professor, Department of Computer Science and Engineering, Ponjesly College of Engineering, Nagercoil Tamil Nadu
[4] Professor, Department of Computer Science and Engineering, Ponjesly College of Engineering Nagercoil Tamil Nadu

Abstract: **Energy consumption is one of the constraints in Wireless Sensor Networks (WSNs). The routing protocols are the hot areas to address quality-of-service (QoS) related issues viz. Energy consumption, network lifetime, network scalability and packet overhead. In existing system a hybrid optimization based PEGASIS-DSR optimized routing protocol (PDORP) is presented which used cache and directional transmission concept of both proactive and reactive routing protocols. The performance of PDORP has been evaluated and the results indicated that it performs better in most significant parameters. The performance of the existing method is checked when it is evaluated and validated with the nodes which are highly dynamic in nature based on the application requirement. The current system finds the trusted nodes in the case of only static environment. To overcome the issue the proposed system is applied for dynamic WSN's with the location frequently being changed. The PDORP-LC is applied with local caching (LC) to acquire the location information so that the path learning can be dynamic without depending on the fixed location. The proposed work is performing in dynamic environment with the dynamic derivation of trusted nodes.**

Keywords: **PEGASIS-DSR optimized routing protocol (PDORP), quality-of-service (QoS).**

1. INTRODUCTION

In Wireless sensor networks (WSNs), the main source of lifetime for the hubs is the battery. Communicating with different hubs or sensing activities expends a great amount of energy in preparing the information and transmitting the gathered information to the sink. As several cases, it is undesirable to supplant the batteries that are draining or depleted of energy. Numerous scientists are in this field attempting to discover power-aware protocols for wireless sensor networks, keeping in mind the end goal to overcome such energy effectiveness issues but they have their own assumptions. For the optimization of WSN designs, researchers have proposed various approaches. To meet different design criteria, related researches into the optimization of wireless sensor network design can be grouped into three categories: 1) Optimization in the communication layers; 2) Node hardware optimization and 3) Cross-layer optimization. However, most of the optimization procedures do not take into account the principles, characteristics and requirements of WSN which is application defined. In existing approach energy optimization is done using hybrid algorithms i.e. GA and BFO method in DSR protocol. Within the application layer, the traffic load is usually squeezed to scale back the data size. Various algorithms such as in-network data processing is actually produced to scale back energy consumption when compared to transmitting the raw data towards end node. The routing layer as well as MAC layer is usually optimized by simply choosing appropriate. Protocols to gain productivity. Node optimization can be achieved by simply strengthening battery utilization as well as implementing power-aware equipment layout. Three different types of optimizations are

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

labeled: optimization of the communication layers; the actual node optimization; as well as cross-layer optimization. By using the dynamic WSN's with the location frequently being changed. PDORP-LC is applied with local caching (LC) to acquire the location information so that the path learning can be dynamic without depending on the fixed location

2. RELATED WORK

2.1 Hybrid Swarm Intelligence Energy Efficient Clustered Routing Algorithm for Wireless Sensor Networks [1]:

Currently wireless sensor networks (WSNs) are used in many applications, namely, environment monitoring, disaster management, industrial automation, and medical electronics. Sensor nodes carry many limitations like low battery life, small memory space, and limited computing capability. To create a wireless sensor network more energy efficient, swarm intelligence technique has been applied to resolve many optimization issues in WSNs. In many existing clustering techniques an artificial bee colony (ABC) algorithm is utilized to collect information from the field periodically. Nevertheless, in the event based applications, an ant colony optimization (ACO) is a good solution to enhance the network lifespan. In this paper, we combine both algorithms (i.e., ABC and ACO) and propose a new hybrid ABCACO algorithm to solve a Nondeterministic Polynomial (NP) hard and finite problem of WSNs. ABCACO algorithm is divided into three main parts: (i) selection of optimal number of sub-regions and further sub-region parts, (ii) cluster head selection using ABC algorithm, and (iii) efficient data transmission using ACO algorithm. We use a hierarchical clustering technique for data transmission; the data is transmitted from member nodes to the sub cluster heads and then from sub cluster heads to the elected cluster heads based on some threshold value. Cluster heads use an ACO algorithm to discover the best route for data transmission to the base station (BS). The proposed approach is very useful in designing the framework for forest fire detection and monitoring. The simulation results show that the ABCACO algorithm enhances the stability period by 60% and also improves the good put by 31% against LEACH and WSNCABC respectively.

2.2 A Novel Scheme for an Energy Efficient Internet of Things Based on Wireless Sensor Networks [2]:

One of the emerging networking standards that gap between the physical world and the cyber one is the Internet of Things. In the Internet of Things, smart objects communicate with each other, data are gathered and certain requests of users are satisfied by different queried data. The development of energy efficient schemes for the IoT is a challenging issue as the IoT becomes more complex due to its large scale the current techniques of wireless sensor networks cannot be applied directly to the IoT. To achieve the green networked IoT, this paper addresses energy efficiency issues by proposing a novel deployment scheme. This scheme, introduces: (1) a hierarchical network design; (2) a model for the energy efficient IoT; (3) a minimum energy consumption transmission algorithm to implement the optimal model. The simulation results show that the new scheme is more energy efficient and flexible than traditional WSN schemes and consequently it can be implemented for efficient communication in the IoT.

2.3 A Cross-Layer Channel Access and Routing Protocol for Medical-Grade QoS Support in Wireless Sensor Networks [3]:

One of principal design issues of a Wireless Sensor Network (WSN) for medical information systems is to classify received packets based on their priorities and guarantees so that they can be transmitted reliably, thus satisfying QoS requirements. In addition, when the target WSN requires multi-hop communications and the traffic load increases significantly, it is challenging to support both load balancing and suitable QoS at the same time. In this paper, we propose a new reliable protocol termed Cross-layer Channel Access and Routing (CCAR), which simultaneously supports both MAC and routing operations for medical-grade QoS provisions. CCAR initially determines the routing path with the lowest traffic load and low latency using newly defined channel quality factors. Concurrently, the source node allocates the predefined QoS Access Category to each packet and reserves the channel along the route. In addition, CCAR introduces an effective route maintenance scheme to avoid link failures in bottlenecked intermediate nodes, which prevents unnecessary packet drops and route rediscovery evocations. Finally, through both simulation studies and real test-bed experiments, we evaluate the performance of CCAR by comparing it with other conventional protocols, demonstrating that the proposed protocol can more efficiently support medical-grade QoS packets, especially when the network is heavily loaded.

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

2.4 A Dynamic Route Construction Method Based on Measured Characteristics of Radio Propagation in Wireless Sensor Networks [4]:

In this paper, we propose a dynamic route construction method based on measured characteristics of radio propagation in a real environment. Our method first measures characteristics of radio propagation for each link, and determine a communication route from every node to the sink node and its transmission power based on the measured characteristics. While operating the system, our method dynamically reconstructs communication routes according to the change in the characteristics of radio propagation. We conduct an experiment to verify that our method can construct efficient communication routes in terms of energy-efficiency and quality of communication even when the characteristics of radio propagation dynamically change.

2.5 A Novel Method of Modeling Wireless Sensor Network Using Fuzzy Graph and Energy Efficient Fuzzy Based k-Hop Clustering Algorithm [5]:

Clustering is one of the widely used methods to save energy, increase spatial re usability, and scalability. In this paper, we have proposed a new fuzzy graph based modeling approach for wireless sensor network which takes into account the dynamic nature of network, volatile aspects of radio links and physical layer uncertainty. The fuzzy graph constructs fuzzy neighborhoods which are used to identify all the prospective member nodes of a cluster. For computation of optimum centrality of a cluster, we have defined a new centrality metric namely fuzzy k-hop centrality. The proposed centrality metric considers residual energy of individual nodes, link quality, hop distance between the prospective cluster head and respective member nodes to ensure better cluster head selection and cluster quality. Finally, a new computationally inexpensive clustering algorithm has been developed. The simulation results demonstrate that the proposed algorithm resulted in prolonged network lifetime in terms of clustering rounds, scalability, higher energy efficiency and uniform cluster head and cluster members distribution, as compare to LEACH-ERE and CHEF.

3. SYSTEM MODEL

A network with limited number of sensor nodes, which are randomly deployed on a 2 - dimension area. All the nodes are homogeneous and they have initial energy ei, where ei > 0. All the nodes have one hop communication and hence they use short range radio transmission. Transmission between two nodes is possible only when the remaining energy of nodes is greater or equal to the threshold level of the energy. We have used the path loss model described in, which is most popular for theoretical analysis and network simulations. We have used the same equation as used in for computation of power reception by the distant node for distance of dist meters. Some other assumptions about the model which are as follows:

- Transmission power of node is adjusted by the node themselves and received signal strength (RSS) can be computed easily.
- Transmission and reception of packets are accomplished with the help of directional antennas.
- Nodes are naïve about their location.
- Nodes have the knowledge of their neighbors to transmit and receive the packets.
- Every sensor node is aware of the direction as per reference to local north.

3.1 Comparison based on various parameters with varying number of sensor nodes:

3.1.1 End to End Transmission Delay: This parameter signifies the total amount of time taken by a packet from source to destination including transmission delay, queuing delay, propagation delay and processing delay. However an increase in the numbers of nodes also increases the difference of delay. The delay in transmission of a data packet is the amount of time between sending data packet by source node and receipt of same at the destination node demonstrates the results for end-to-end delay with varying number of sensor nodes. It has been observed that end to end delay for OD-PRRP increases with increase in the number of nodes. In addition, results show that proposed routing protocol PDORP-LC marginally outperforms than PDORP while considering low packet delivery in dynamic environment.

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

3.1.2 Bit Error Rate: The metric defines the measure of the number of errors found in the network during packets sending. It has been seen that value of error rates has been enhanced in the attack clearly shows that DSR protocol has a less error rate as compared to the entire candidate routing protocols. Moreover the proposed algorithm PDORP-LC performs better than PDORP and sometimes from LEACH as well. When a node becomes more aggressive at the time of transfer and previously it was not in the cache memory, the other node is bound to receive a packet from it and in such a way it can cause damage to existing routes. So the proposed solution creates trusties for the first time in each round on the basis of the parameters allocated to the nodes which results in less chance of attack and less bit error rate even in the state of dynamic WSN nodes.

3.1.3 Energy Consumption: This generates lowering of the number of transmissions for the forwarded messages to all the group members. It is defined as the sum of units required for the key transmission throughout the duration of the simulation. The energy consumption formula for transmitting the data is:

$ETx\ (k, d) = Eelec * k + Camp * k * d2, d > 1$

Energy consumption formula of receiving data:

$ERx\ (k) = Eelec * k$

Where k is the data volume to be transmitted, d is the distance among the two sensors. $Eelec$ is the energy consumption to take out the data transmission in terms of n_J/bit. Therefore, the total energy consumed $=\Sigma\ ERx + \Sigma\ ETx$, i.e. the total consumed energy of data receiving + total consumed energy of data transmitting. From the below It has been observed that PRP and new routing protocol PDORP outperforms than DSR, LEECH and OD-PRRP. The energy consumption of proposed algorithm is almost stable even with increase in number of nodes. In terms of energy consumption parameter PDORP will act as optimal routing protocol.

3.1.4 Throughput: This metric describes the average rate of successful messages delivered over the network in a given time. LEACH protocol is better than all other candidate algorithms. DSR is also better than PRP, PDORP and OD-PRRP protocols. It is clearly indicated by the results that LEACH outperforms in throughput oriented applications. The performance of PRP, PORP and OD-PRRP is almost similar in case of throughput.

3.2 Comparison based on various parameters with varying number of rounds:

It has been observed that proposed method outperforms than OD-PRRP, LEACH, DSR, PEGASIS and PDORP-LC while considering bit error rate, end to end transmission delay and energy consumption metrics with varying number of nodes. In case of throughput metric LEACH is better than all other candidate routing protocols, on the other hand LEACH is unsuitable for the applications where energy consumption is a key constraint. . The energy consumption of proposed algorithm is almost stable even with the increase in number of rounds and nodes are in highly dynamic location in nature. In terms of energy consumption parameter PDORP-LC will act as optimal routing protocol. In addition, results show that proposed routing protocol PDORP-LC marginally outperforms than LEACH, DSR, and PEGASIS and even from OD-PRRP while considering low packet delivery delay.

4. PROPOSED WORK

4.1. Introduction:

In this work hybrid optimization based PEGASIS-DSR optimized routing protocol (PDORP) which has used cache and directional transmission concept of both proactive and reactive routing protocols is also compared with the proposed PDORP-LC. The simulation results of our proposed protocol show reduction in end to end transmission delay and bit error rate without compromising with energy efficiency even in the dynamic environment. In PDORP-LC, both the proactive routing and reactive routing methodology along with location caching is used in order to obtain fast and non-damaged path along with lower transmission delay with respective of each location.

4.2. System design:

In this section we discuss the network modeling and the proposed routing model PDORP-LC in detail. By using step A, (Network creation) we have created a network with randomly deployed nodes N (500). The nodes are kept in random position where the position of WSN nodes are changed within the given area at different time intervals, so that the location of nodes will be highly dynamic in nature. We have taken the area of 1000 square meters within the area the nodes are allowed to move freely based on time bound manner in the simulation process.

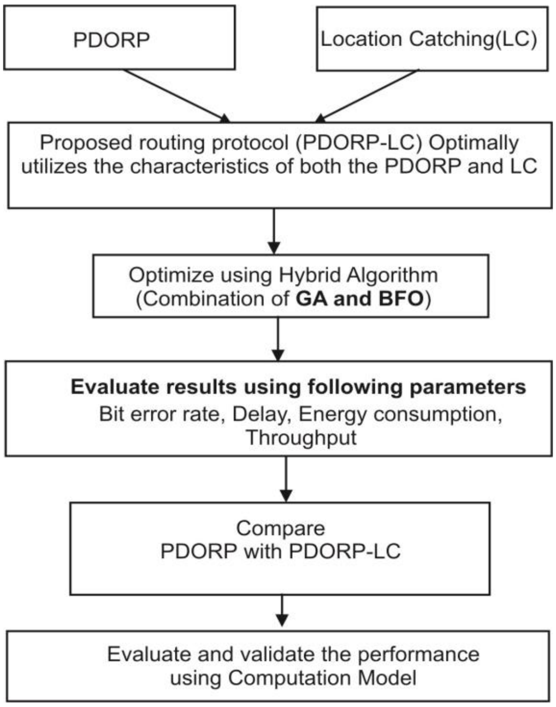

Fig1. System Model of Proposed LC

In the fourth step we have computed the distance ***d*** of all the nodes from their neighbors and we have compared their distance with the threshold ***th*** value of distance, so that they could be connected only when their distance is less than or equals to the threshold value. We have used this algorithm to make it sure that all the nodes are connected with a minimum distant value.

A. Network creation

Network. height=1000

Network.Width=1000;

N=Total_Nodes

Time Bound = 1 Hour to 5 Hours

To overcome the issue the proposed system is applied for dynamic WSN's with the location frequently being changed with the lower bound time of 1 Hour to upper bound time of 5 Hours. The PDORP-LC is applied with local caching (LC) to acquire the location information so that the path learning can be dynamic without depending on the fixed location. The LC learns the local view points of the each WSN nodes from its neighbors whereas all WSN nodes in the system design are inter related and the distance from the G-Router are indexed. The G-Router is a server which collects information from the WSN nodes.

5. ALGORITHM

LC-Pathfinding:

For i=1 :Network.Simulation.Rounds

Source=Initialize.Source;

Source.Id=Node.name(source); Path=[ ]; Pathelement =2; Path[1]=Source;

ISSN 2350-1022
International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

```
Source.Packet.count=1000;
LoC_Mark[1]=d[1]+nd;
IndexD[];
Destination.Id=Node.name(Destination);
Current_cov_set_source=cov_set(source.Id,:) dest_found=0; possible_nodes=[ ];
While(dest_found!=1)
If(periodic_update)
For each all n in current_cov_set
If(x(all n)>xloc(Source.Id) && (x(all n)-xloc(Destination.Id) < 0
Possible_nodes[possiblenoedcount] = all n;
Possiblenodecount+=1;
LoC_Mark[all n] = index[n] +nd
Endif
Selection=possiblenodecount*Random;
Selected_node=Possible_nodes[selection];
Possible_Nodes=[ ]; Path(Path element) =selected_Node
Endfor
Endif
```

6. EXPERIMENTAL EVALUATION

The experimental evaluation is done to prove the efficiency of the proposed system is equal even the nodes or in highly dynamic in nature. The new method is compared with the existing method in Delay, Energy consumption and Throughput parameter.

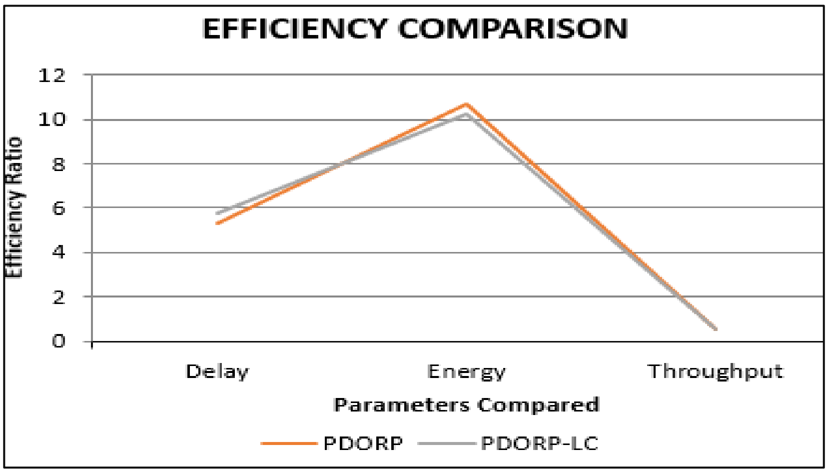

Fig 2. Efficiency Comparison

The below comparison table is used for efficiency comparison between parameters delay, energy and throughput for 200 nodes.

Parameters	Delay	Energy	Throughput
PDORP	5.287	10.66	0.509
PDORP-LC	5.8	10.25	0.51

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (98-104), Month: October 2016 – March 2017, Available at: www.paperpublications.org

7. CONCLUSION

In this system an optimized routing protocol (PDORP) along with local caching (LC) is presented, which uses cache and directional transmission concept of both proactive and reactive routing protocols in a dynamic WSN environment. The performance of PDORP-LC has been evaluated by comparing with existing available methods PDORP and the results indicated that it performs better in most significant parameters viz Bit error rate, end to end transmission delay, energy consumption and throughput. The proposed work is performing in dynamic environment with the dynamic derivation of trusted nodes.

REFERENCES

[1] Aarti Jain and B. V. Ramana Reddy."A Novel Method of Modeling Wireless Sensor Network Using Fuzzy Graph and Energy Efficient Fuzzy Based k-Hop Clustering Algorithm". Wireless Personal Communications. 2015, vol 82(1), pp. 157-181.

[2] Shallli Rani, Rajneesh Talwar, Jyoteesh Malhotra, S.H. Ahmed, M.Sarkar, & Houbing Song (2015). "A Novel Scheme for an Energy Efficient Internet of Things Based on Wireless Sensor Networks". Sensors, 15(11), pp.28603-28626.

[3] Young-Duk Kim, Kook-Rae Cho, Hui-Sup Cho, and Dongkyun Kim. 2014. "A Cross-Layer Channel Access and Routing Protocol for Medical-Grade QoS Support in Wireless Sensor Networks". Wireless Personal Communications,2014, vol. 77(1), pp 309-328.

[4] Akimitsu Kanzaki, Yasuhiro Nose, Takahiro Hara, & Shojiro Nishio, "Dynamic Route Construction Based on Measured Characteristics of Radio Propagation in Wireless Sensor Networks", International Journal of Advanced Computer Science, vol. 2, No. 3, Pp. 85-98, Mar. 2012.

[5] Aarti Jain and B. V. Ramana Reddy."A Novel Method of Modeling Wireless Sensor Network Using Fuzzy Graph and Energy Efficient Fuzzy Based k-Hop Clustering Algorithm". Wireless Personal Communications. 2015, vol 82(1), pp. 157-181.