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SMART COMMUNICATE NODE POINTING AND COMPLEX OPTIMIZATION SCHEME OVER IDS SYSTEMS

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Abstract: The main trouble in wireless sensor network is node placement and coverage. It focused on the efficient deployment of sensor nodes within the networking region. The work mainly focused on the performance upgrading of sensor network. The major objective of this work considered as using minimum number of relay nodes for better connectivity between the two areas. Relay nodes are the supportive nodes which set up the connectivity between the source and base station, in any cases the neighbor node is getting difficult over the connectivity on that time the relay node are take action and solve the problem and make the connectivity more perfect. The proposed work consists of three metrics there are, Rayleigh representation, SINR, Discover outage probability. This work mainly focused on improves the network lifetime and enhance better connectivity by placing the relay nodes (RN) and make a successful communication among two nodes.
Key words: Connectivity; Coverage; Relay Node; Sensor Node; IDS

I. INTRODUCTION

A Wireless sensor networks (WSNs) is a collection of sensor nodes (SN) which are deployed in a given area of interest. After deployed the sensor nodes the sensed information are transmit to base station (BS) via multi-hops. The sensor node is based on the energy of the battery so the major concern is to conserve the energy of the sensor nodes. Sensor nodes are providing only limited power supply, relay nodes are deployed to forward the collected data from the sensor nodes to base station. Most research has been focused on the relay node placement, relay nodes are most active research area in sensor networks has focused on the energy management issue after the network deployed. Another category of research has focused on the placement of sensor nodes in a sensor network before its deployment. The objective of this research is to address the node placement problem in sensor networks, which is to determine a set of locations for the sensor nodes within a sensor network. If sensor nodes are placed at these locations, the network may remain operational with the available energy resources, for a period of desired lifetime, using a minimum number of nodes but ensuring high coverage of the sensed area as well as resilience to failure. The aim is to minimize the energy consumption and maximize the network lifetime. The relay node placement model can be considered as two phases: single tiered and two-tiered. In this work considered as second category, it is more efficient than the single tiered model.

Considering the optimal solution for the two tiered model is NP hard. In proposed relay node placement is focused Rayleigh representation it based on the channel conditions. The Rayleigh representation used for finding the path loss between the transformations, if any interference is occurred, SINR to derive the noise. These works have focused on achieving varieties of objectives, including balanced data gathering within the networks, maximizing the lifetime of the networks.

II. RELATED WORK

Many research works have studied WSN with single-tiered topology. The authors of [1-4] consider the relay node placement problem such that a survivability requirement is achieved.

In this problem, the aim is to determine the location of the minimum number of relay nodes such that each sensor is connected to a base station through several node-disjoint paths, which provides fault tolerance in case of node failure. The authors of [4] propose an algorithm that deploys a minimum number of nodes such that a predefined level of survivability is achieved. The solution reached by the algorithm, which has a single-tiered topology, is proven to be within a constant factor from the global optimum. The connectivity problem in WSN is addressed in [5]. In the connectivity problem, the target is to find the minimum number of relays such that each sensor is connected with a BS. The authors of [5] aims to find a tradeoffs between performance in terms of network lifetime and cost. The problem is modelled by a Steiner tree with minimum number of Steiner points and bounded edge-length. Two approximation algorithms are proposed and their performance is analysed. Reference [6] is one of the first works that studied the Steiner tree problem with minimum number of Steiner points and bounded edge-length and proved that this problem is NP-complete. The authors present a polynomial time approximation algorithm whose ratio is equal to 5. Authors in [8] suggest a solution that uses artificial bee colony technique for placing RNs in the network. The RNs can be placed anywhere in the network without any restriction. The authors claimed that the proposed solution increases the network lifetime by selecting the best positions for the new added relays. However, the SNs can participate in the data forwarding, which reduces dramatically the network lifetime. In [4], the authors consider the problem of constrained relay node placement, where the relay nodes can only be placed in a set of candidate positions. Previous work focused on the unconstrained version of the problem where relay nodes can be deployed anywhere. However, in practice there might be some physical constrains on the placement of relay nodes which makes the constrained version of the problem more realistic. In [4], the authors address the connectivity and the survivability problem in the context of constrained relay node placement. Approximation algorithms for solving these two problems are presented in [4] and their complexity is discussed. It is shown that these algorithms have a polynomial time complexity and a small approximation ratio. The obtained solutions for these problems have a single-tiered topology.

III. RESEARCH METHOD

Relay Nodes One category of research on sensor networks has focused on the energy management issues after the network has been deployed, i.e. it considers that the placement of nodes is fixed by deployment, and then aims to minimize the energy consumption so that the lifetime of the network is maximized. Another category of research has focused on the placement of sensor nodes in a sensor network before its deployment. The objective of this category of research is to address the node placement problem in sensor networks, which is to determine a set of locations for the sensor nodes within a sensor network such that, if sensor nodes are placed at these locations, the network may remain operational with the available energy resources, for a period of desired-lifetime, using a minimum number of nodes but ensuring high coverage of the sensed area as well as resilience to failure.

In sensor networks, the transmission power dissipated by a sender node to transmit each bit of data to a receiver node is given by $\alpha + \beta dm$, where α and β are distance-independent constants, d is the distance between sender and receiver and m is the path loss index such that $2 \leq m \leq 4$. This cost model makes direct communication between two distant nodes much more energy consuming than communicating via a multi-hop path with smaller hop distance. The effect of multi-hop communications in sensor networks have been studied in many research papers in the past few years, on both flat and hierarchical architecture of sensor networks. Although multi-hop communication may reduce overall energy consumption, some nodes can be overloaded and drain out their energy more quickly (and die), as compared to some other nodes in the network. This may produce undesirable effect on the functionality of the networks, even causing the network to become inoperable. Many studies have been conducted to address this problem and various methods have been proposed to minimize the effect produced by the death of such burdened nodes. One of the techniques that have been proposed to reduce the burden on the overloaded nodes is to deploy some special nodes, known as relay nodes, within the network so that they can share some of the load with the overloaded nodes. Most of the research area focused on the performance improvement of sensor network with an assumption that the networks have already been deployed. The node placement and coverage problems in sensor networks have focused on the efficient deployment of sensor nodes within the networking field. Each and every sensor node in a sensor network monitors a small area from its vicinity. One of the approaches is to use a special type of node in sensor networks as called as relay nodes, and the job is only to relay data generated by other sensor nodes, without sensing the environment. The relay nodes in sensor networks aims that prolonged the network lifetime and remove some burden from the over loaded nodes. The relay nodes may also shorten the transmission distance between a pair of distantly located nodes.

3.1 System Design

Relay Nodes [RN] are the supportive nodes which establishes the communication between two nodes (acts like a bridge) as well as in any case the neighbor node getting trouble over the connectivity, on that point relay nodes are formed and solve the issue and makes the connectivity more perfect. In this proposed system, our concentration is more on these points such as: improving the network lifetime, enhancing the Quality of Service [QOS] and reducing the path loss by minimizing the Signal-to-Interference Noise Ratio [SINR].

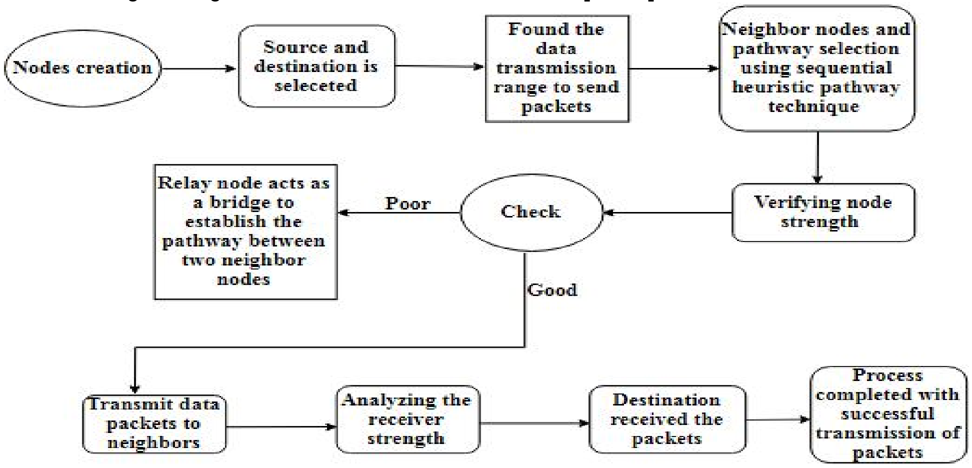

Fig.1 Relay Node Placement Technique

The overall scenario starts with forming the number of nodes in random positions and allows the user to select the source and destination nodes for communication. The relay node placement: once the nodes are selected for communication, the path between source and destinations are determined sequentially such as N0, N1, N2...Nn. In this case the relay nodes are also available for identifying the correct misgain nodes and avoid the connection failures and establish the connection between those affected node and the next neighbor to precede the communication until the destination is reached. In the existing work Heuristic algorithms are used, it does not provide accurate solutions. So in proposed method designed a new protocol called "Sequential Heuristic Pathway Technique", which proposes the path sequentially and provides the exact path without any failure cases as well as guarantees the quality of service. IRPL is used for selecting and placing the Relay Nodes in Wireless Sensor Network. For all our experimental results prove that the gain is high in terms of extending the network lifetime, reducing the end-to-end- delay, and increasing the throughput. The main objective of this system is to improve the network lifetime and enrich the connectivity by placing the relay nodes in network environment and makes a successful communication between nodes.

3.2 Modules

a. Wireless Network Formation
b. Sequential Path Discovery
c. Node Energy Management
d. Smart Relay Assistance

a. Wireless Network Formation

In this module, Wireless Network Formation are allows the user to formulate the number of nodes in the wireless network environment. The nodes are randomly placed into the locations as well as allow the user to select the source and destination nodes for establishing the path and perform communication between one another.

b. Sequential Path Discovery

The Sequential Path Discovery module helps to establish the path between source and destination. This module is replicated by Sequential Heuristic Pathway Technique, which is derived from classical Heuristic Search process. In the classical technique the success ratio is not guaranteed. So that the future scenario: proposed a new algorithm and sort out the path sequentially to make a communication between one and another.

c. Node Energy Management

The Node Energy Management module maintains the technique called Energy Analyzer and extracts the energy level of each and every derived node in the wireless network environment and maintains it into the trace file for further analysis, whenever the Smart Relay Module requires the energy level, in that time this will be helpful to acquire or know the energy level from the active traces.

d. Smart Relay Assistance

The smart relay node establishments are based on the timely scenario, means the energy of each and every nodes are analyzed by the energy analyzer module, whenever the supportive or neighbor nodes fails to retain the transmission, the relay nodes immediately takes action to establish the bridge between the affected node and the next neighbor to propose the communication without any failures as well as this module the guarantees the Quality Of Service [QOS].

IV. RESULTS AND ANALYSIS

4.1 Delay analysis

In this section, focus on the delay analysis; consider that the nodes in the network are equipped with a buffer to store the packets before transmission. This will allow controlling the packet flow in the network and reducing network congestion. We analyse in this section the average sojourn time in the buffer and the average waiting time for a data packet. The amount of time an object is expected to spend in a system before leaving the system for good. The average sojourn time in the buffer is the average time elapsed from the arrival of the packet to a node until its successful reception at the next node in the tree.

4.2 End-to-End delay measured

End-to-end delay and energy consumption are the two key issues in WSNs. End-to-end delay measured in terms of the time that a packet spends to travel from source to base station. The proposed algorithm IRPL is compared against three competitive solutions. IRPL uses more relay node than RNPEC, ACRN and TTCR, which creates long paths between source and base station. The end to end delay measured by, average time taken by a data packet to arrive in the destination.

$$\text{End-end delay} = \frac{\Sigma(\text{arrival time} - \text{send time})}{\Sigma(\text{no.of connections})}$$

4.2.1 Number of Sensor Nodes Deployed

Figure.2 shows that, the Number of nodes is deployed in random positions. Compare to other three solutions, IRPL using minimum number nodes and provides a better connectivity between the nodes.

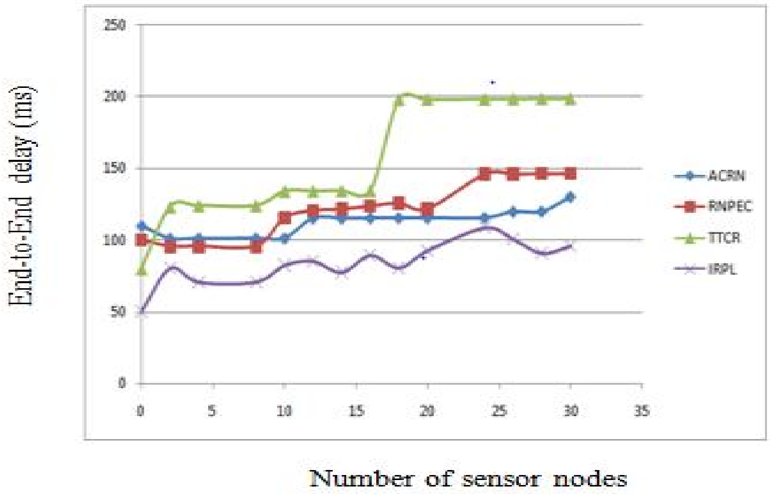

Figure.2 Finding Number of sensor nodes deployed

4.2.2 Finding Maximum Number of Retransmission:

Figure.3 shows that for each packet, the number of retransmissions varies from one data packet to another data packet. It is depending on the channel conditions and the interference level. Compare to the other solutions IRPL transmits less number of retransmission.

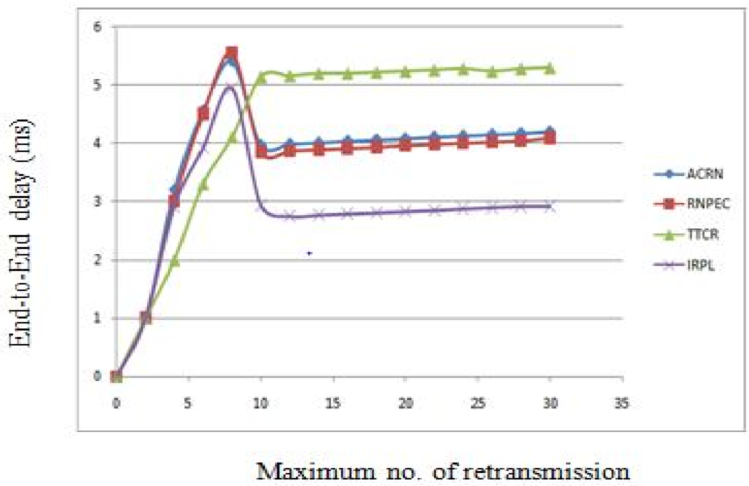

Figure.3 finding maximum no. of transmission

4.2.3 Receiver Sensitivity

Fig.4 shows, IRPL does not have good performance for small values of receiver sensitivity threshold. IRPL uses more relay nodes than RNPEC, TTCR, ACRN, which creates long paths between source and base station. For small values of receiver sensitivity threshold, all the links succeed to forward the packets without many retransmissions.

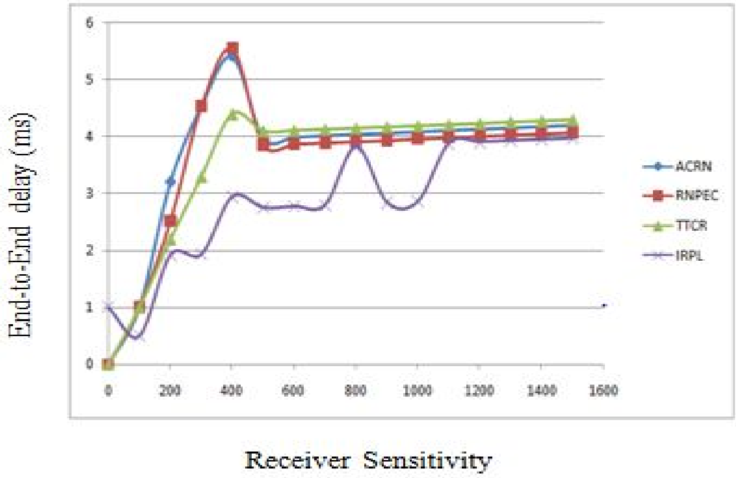

Figure.4 Compute receiver sensitivity

V.CONCLUSION

In proposed work the problem of enhancing the QoS while deploying the minimum number of relay nodes in the network are considered. Using IRPL, the utilization of physical model and outage probability to deploy the minimum number of relay nodes that have efficient links for handling the network traffic and the computation of End-to-End delay measurement for number of sensor nodes are deployed and identification of the maximum number of retransmission between the source and destination are analysed.

VI. FUTURE WORK

Some of the future enhancements that can be done are:
1. The increasing the efficiency and throughput of the network will be analyzed to predict the performance of the network.
2. Network lifetime measurement is done to determine the battery life of the sensor node.
3. Cost measurement is done to predict the relay node and the connectivity between each node to establish the network.

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