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RESEARCH ARTICLE

An ACO Optimized Routing Scheme for Energy Hole Infected WSN

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Abstract

A sensor network is energy adaptive organized network defined with limited constraints and resources. To optimize the QoS over the network, an energy adaptive communication is required. One of critical problem in sensor network is energy hole. The energy hole can occur because of congestion, some attack or the broken link. To provide the optimize communication in such network an energy adaptive ACO approach is presented in this work. The work has performed the neighbor node analysis under energy and load parameters. The work is defined to generate the optimize route and to improve the network life and communication over the network. The obtained results show the work has reduced the communication hop count and energy consumption over the route.

Keywords – ACO, Energy Adaptive, Hop Count, Optimized

1. INTRODUCTION

A sensor network is defined as the integrated communication between the energy specific, multi-functional sensor nodes. These sensor nodes are restricted in terms of size, distance and bandwidth parameters. Because of the limited processing and computing capability, the organized architecture as well communication is required. The improved form of sensor node is able to take the low level decision at node level such as rout identification. A sensor node is defined as the electro mechanical device that can sense and quantify the environmental signals and convert it to the voltage or current form so that the observer can identify the signal and based on it the communication will be carried on over the network. The critical parameters of sensor nodes include the limited memory and the processing capabilities.

Sensor network is considered as the self organized network with or without the infrastructure. They have the central control device to control long distance communication and to connect two or more similar or dissimilar networks. These sensor nodes are defined specific to the particular request. In the standard communication architecture, it is defined with communication device, micro controller and the energy source such as battery.

A wireless sensor network is a typically an ad hoc network, which requires every sensor node be independent and flexible enough to be self-organizing and self-healing according to different situations. There is no fixed infrastructure available for the purpose of network management in a sensor network. This inherent feature brings a great challenge to wireless sensor network security as well. For example, the dynamics of the whole network inhibits the idea of pre-installation of a shared key between the base station and all sensors. Several random key pre-distribution schemes have been proposed in the context of symmetric encryption techniques. In the context of applying public-key cryptography techniques in sensor networks, an efficient mechanism for public-key distribution is necessary as well. In the same way that distributed sensor networks must self-organize to support multi-hop routing, they must also self-organize to conduct key management and building trust relation among sensors. If self-organization is lacking in a sensor network, the damage resulting from an attack or even the hazardous environment may be devastating.

A) Time Synchronization:

Most sensor network applications rely on some form of time synchronization. In order to conserve power, an individual sensor's radio may be turned off for periods of time. Furthermore, sensors may wish to compute the end- to end delay of a packet as it travels between two pair wise sensors. A more collaborative sensor network may require group synchronization for tracking applications, etc. The authors propose a set of secure synchronization protocols for sender-receiver (pair wise), multi-hop sender-receiver (for use when the pair of nodes are not within single-hop range), and group synchronization.

B) Network Localization:

Often, the utility of a sensor network will rely on its ability to accurately and automatically locate each sensor in the network. A sensor network designed to locate faults will need accurate location information in order to pinpoint the location of a fault. Unfortunately, an attacker can easily manipulate non-secured location information by reporting false signal strengths, replaying signals, etc.

A technique called verifiable multilateration (VM) in which, a device's position is accurately computed from a series of known reference points. In authenticated ranging and distance bounding are used to ensure accurate location of a node. Because of distance bounding, an attacking node can only increase its claimed distance from a reference point. However, to ensure location consistency, an attacking node would also have to prove that its distance from another reference point is shorter. Since it cannot do this, a node manipulating the localization protocol can be found.

In this paper, An ACO optimized route generation is defined for sensor network. The work is defined to generate an optimize route under energy, distance and fault constraints. In this section, the sensor network is defined along with architecture specification and communication constraints. In section II, the work defined by the earlier researchers is discussed. In section III, the work presented research work is defined along with algorithmic specification. In section IV, the results obtained from the work are discussed and presented. In section V, the conclusion obtained from the work is discussed.

2. REVIEW OF LITERATURE

In this section, the work defined by the earlier researchers is discussed. Ajinkya Kher[1] has defined an effective routing schedule with communication delay in sensor network. Author defined the energy effective communication in sensor network. Author defined the work to improve the duty cycle and to improve the transmission under defined range. Author has presented the minimum delay effective communication in sensor network so that the communication in the network is reduced. Author defined the topology specific communication in sensor network. Author defined two main scheduling algorithms to reduce the communication delay and to improve the network life. Author has defined the communication under delay parameters and the performance parameters. Author has defined the effective communication over the network. Zhe Zang[2] has defined effective route generation in sensor network. Author improved the routing under the reliability and low cost communication in sensor network. Author defined hop effective communication so that the reliable

communication will be drawn. Author improves the hop effective routing policy so that the effective route quality will be improved. Author defined the network topology specific route generation in sensor network. Author provided the effective packet communication to reduce the communication cost. Author defined work to improve the network life time, reliability and communication by reducing the overhead. Qing Wang[3] has improved the routing and scheduling approach by reducing the communication delay. Author defined the scheduling for sensor network under link scheduler specification. Author defined work for time slot specific communication to minimize the channel communication. Author defined the data rate specific, delay bound communication under probability violation. Author defined the multi path routing in structured form so that the counting capacity and model will be improved. Author defined the communication in sensor network so that the effective route will be generated. Author defined the integer optimized communication to reduce the computation efforts. Chunsheng Zhu[4] has improved the geographic routing and duty cycle specific sensor network. Author defined a greedy forwarding communication over the sensor network. Author defined the greedy based approach to optimized the routing for long distance communication. Author defined the algorithm analysis under different parameters that shows the significant improvement. Chunsheng Zhu[5] has defined a duty scheduled communication in mobile sink specific communication network. Author defined the geographic routing to improve the network performance and to improve the communication over the network by restricting the path length of generated route. Rossi Kamal[6] has defined a routing approach for implanted sensor network. Author defined the complex communication under the human body specific routing. Author defined the work to improve the packet communication under human critical tissue effective network. Author defined the thermal aware routing in sensor network. Author defined the route under hotspot creation and computational complexity analysis. Author defined the hop traversal specific communication in sensor network. Author defined the network under the energy constraints so that the effective network communication is drawn over the network. Jinbao Li[7] has defined channel specific multi parameter specific routing in sensor network. Author defined the power control effective routing under optimal route generation and to handle the opportunities to reduce the communication loss. Author defined the performance effective routing in sensor network. Author defined the communication in concurrent transmission and to improve the routing in sensor network. Author defined a study on routing, scheduling and channel assignment. Author defined a NP hard specific approach for optimal route generation under linear programming problem. Author defined the power control problem to improve the communication in route generation and to generate the random walk specific route generation. Author defined the work to improve the communication under the computational complexity analysis. Author improved the data transmission to improve the efficiency and transmission delay.

Shuguang Xiong[8] has defined an effective routing in sensor network for structured communication. Author defined the sensor deployment specific communication in sensor network. Author defined the work to perform effective deployment of nodes and network. Author defined the deployment of nodes in classified sensor network. Author improved the communication under location specific and deployment specific communication network. Author defined the route generation and optimization in effective structured sensor network. Author defined the coverage specific routing to provide effective deployment of nodes under constraint specification. M. M. Chandane[9] has defined a quality aware routing in sensor network. Author defined the communication for effective route generation so that the route optimization will be achieved. Author defined the multipath fading over the network. Author defined a path analysis approach for energy effective route generation. Chunsheng Zhu[10] has defined the geographic routing in scheduled routing in sensor network. Author defined the potential routing scheme so that the scalability and efficiency is the effective routing constraints. Author defined the energy effective communication in sensor network under geographic forwarding scheme. Author defined two phase routing approach to improve the communication. Ming-Shing Kuo[11] has defined an opportunistic routing over the sensor network. Author defined a challenging framework to improve the network communication in sensor network. Author improved the route generation and optimization. Author has reduced the energy consumption and generate effective route.

3. RESEARCH METHODOLOGY

A Sensor network is the small area network with large number of communicating nodes. These nodes are defined with energy specification and lot of data communication is performed over the network. With each communication some amount of energy is lost. To optimize the sensor network architecture, it is required to optimize the communication in network. The communication in sensor network is performed using some optimized route. In this present work, the optimization to the routing approach is provided using energy adaptive ACO approach. The ACO is here defined under different constraints. These constraints include the energy, distance and sensing range. The work is defined to provide the multi hop route in

sensor network having the problem in terms of congestion as well as energy holes. The work is optimized using ACO approach to generate the adaptive communication route over the network.

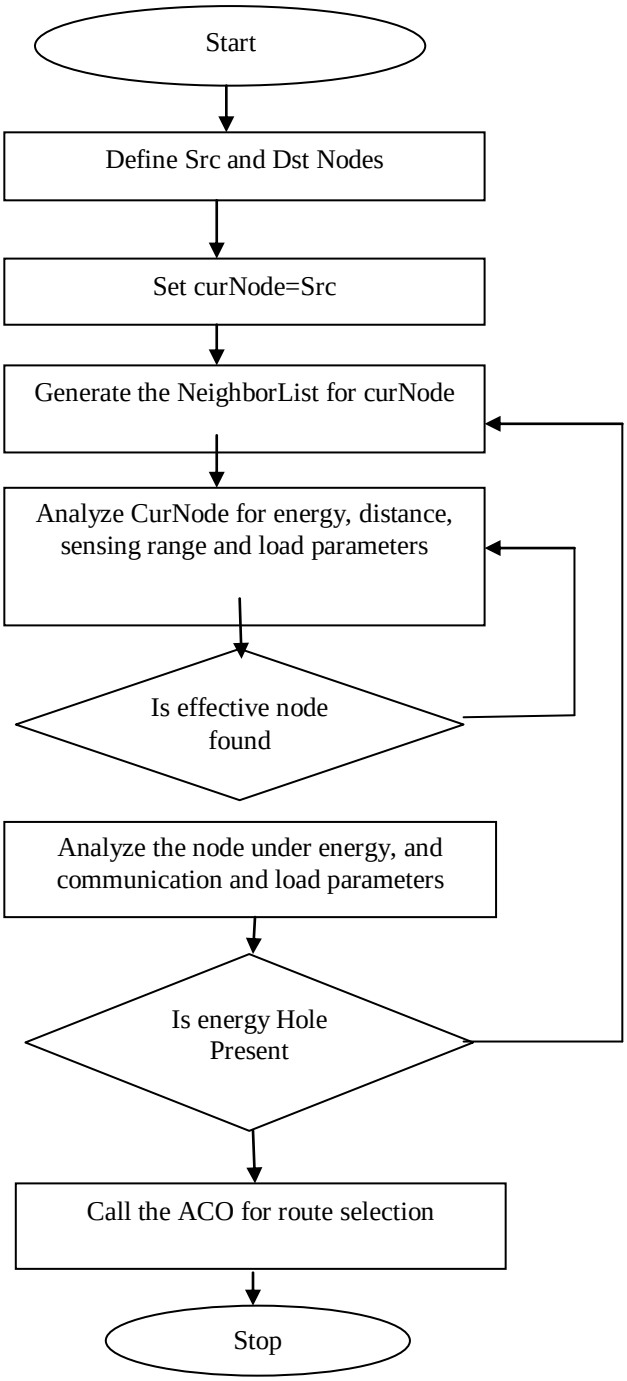

Figure 1 : ACO Adaptive Routing

As the algorithm begins, the source and destination nodes are defined to perform the communication. All the network nodes are energy adaptive nodes. Over these nodes, the distance and energy matrix is generated under light of sight parameters. Once the matrix is generated, the communication is taken place between these nodes under the optimized route. To perform the communication, the neighbor node analysis is performed under distance, energy, load and fault parameters. The work is defined to generate the optimize route between these two nodes. To optimize the route, the ACO algorithm is implemented.

4. RESULTS

The presented work is implemented in Matlab environment to generate the optimize path between the node pair. The work is about to improve the network QoS and to reduce the energy consumption. The network scenario considered in this work is given here under

Table 1 : Network Parameters

Parameter	**Value**
Number of Nodes	20
Topography Dimension	100 m x 100 m
Topology	Fixed
Initial Node	1
Destination Node	10
Transmission Energy	50 nJ
Receiving Energy	50 nJ
Forwarding Energy	10 nJ

The work is here defined to generate the optimize route between the node pair. The route is here generated between node 1 and 10. The analysis of work is performed under energy and distance parameters. The results obtained from the work are shown in figure 2 & figure 3.

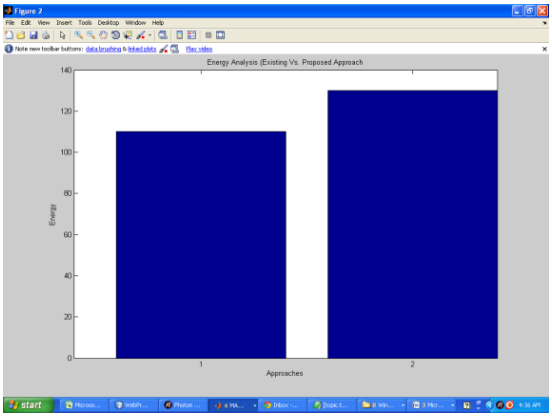

Figure 2 : Hop Count Analysis

Here figure 2 is showing the hop count analysis of existing and proposed approach. As shown in the figure, the proposed work has reduced the number of intermediate nodes. It will reduce the energy consumption and improve the network life.

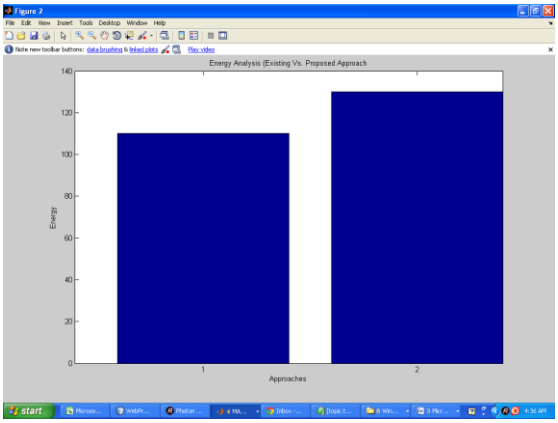

Figure 3 : Energy Consumption Analysis

Here figure 3 is showing the energy consumption analysis of existing and proposed approach. As shown in the figure, the proposed work has reduced the energy consumption over the network.

5. CONCLUSION

In this paper, an ACO optimize route generation is defined for energy hole affected sensor network. The work is generate the energy adaptive route over sensor network using ACO approach. The work is here analyzed under energy and hop count parameters. The work has reduced the energy consumption and hop count.

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