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A Genetic Improved Routing Approach to Optimize Mobile Communication

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Abstract

Routing in Mobile network is one of the critical challenge because of adhoc and open network features. QoS is the important criteria to optimize the routing in these networks. In this present work, an improved genetic approach is defined to optimize the route selection in mobile network. The optimization is here defined under the parametric specification. These parameters considered in this work are distance, energy and hop count vector. The presented work will try to identify the effective route that will cover the minimum hop along with distance and energy optimization. In this paper, the complete framework for genetic improved routing approach is defined. The obtained results shows the effective generation of route over the mobile network.

Keywords: *Mobile Network, Flat Routing, Routing Challenges*

I. Introduction

A Mobile network is one of the most effective public adhoc network. The main properties of this network is the mobility of nodes along with decentralized system. It means, the mobile nodes can move over the network perform the communication by using the intermediate nodes. This kind of network involves the mobile devices such as laptop, mobile phones, PDA etc. Each node of network behaves like a host or server or the router. The nodes are able to take the routing decisions without generating the specific communication network[1]. The main concern of mobile network is the security. The security is more challenging in these network because of the dynamic nature of nodes. It means, any node can enter to the system. These kinds of network are very critical under different kind of active and passive attacks. As the network does not have any centralized security mechanism, the criticality of network increases. These kind of network suffers from different kind of attacks because of open communication medium, open access network and the cooperative communication over the network. Because of these characteristics, the network suffers from different kind of attacks such as black hole, worm hole, DOS attacks etc. These kind of attacks, makes the network unreliable and there is the requirement of some security mechanism so that the effective communication will be drawn over the network. The network is having the limited resources and the changing topology so that the network management is not effective. This kind of network requires the some authorization or the secure routing mechanism to provide the reliable packet delivery over the network[1].

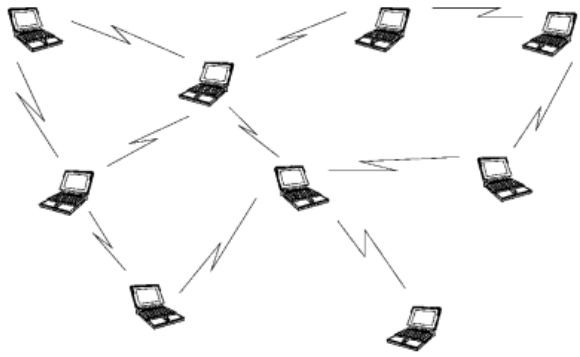

Figure 1: Mobile Networks

A Mobile network is busiest public area network that provides the wide range communication. A Mobile network itself is divided in different types under scenario and network specification. Because of public nature and cooperative communication nature, the network faces number of associated challenges. These challenges

include the QoS optimization, Route optimization, security etc. As the network is defined without any centralized controller, the cooperative communication is performed over the network. To improve the effectiveness of network, it is required to optimize the particular communication feature of network. In this paper, the main concern is given to optimize the route generation over the cooperative mobile network[1][2][3]. In this section, the study of the different optimization factors are been discussed. These all factors are shown in figure 1. The parameters considered for route optimization are divided in two broader categories called physical parameters and the communication parameters. The physical parameters are generally the static parameters that represent network or node capabilities[4][5][6]. These all parameters are described in this section. In this paper, a genetic improved algorithm is presented to generate the effective route for mobile network. In this section, an introduction to mobile network and its architectural specification is given. In section II, earlier work defined by the different researchers is presented. In section III, the proposed work is defined along with algorithmic specificaiton. In section IV, the results obtained from the work are defined. In section V, the conclusion of this study work is explained.

II. Related Work

Mauro Conti[1] performed a work, "A Randomized, Efficient, and Distributed Protocol for the Detection of Node Replication Attacks in Wireless Sensor Networks". Author has defined a work to identify the replication attack in sensor network. Author has provided the solution to generate the effective communication between nodes. Author performed the energy and memory demanding approach to generate the effective path. Author has defined the model to provide the energy effective solution. Garima Gupta[2] performed a work," Reference based approach to Mitigate Blackhole Attacks in Delay Tolerant Networks". Author provided the improved network performance under different behavior attacks over the network. Author has provided the probabilistic solution against the black hole attack. Author provided the solution to mitigate the network solution. Abhijit Das[3] performed a work," Energy Aware Topology Security Scheme for Mobile Ad Hoc Network". In this work, author has analyze the network topology under security threats so that the false communication rate detection will be performed. Author provided the false communication loss analysis to improve the communication and to reduce the network overhead. Peter J. J. McNerney[4] performed a work," A 2-Dimensional Approach to QoS Provisioning in Adversarial Mobile Ad Hoc Network Environments". This paper attempts to address these two issues together by proposing a 2-Dimensional Adaptation ARChitecture (2-DAARC) for achieving QoS in MANETs containing blackhole attackers. The architecture supports two forms of adaptation: single-path adaptation (SPA) and multi-path adaptation (MPA). The architecture is evaluated against the INSIGNIA QoS framework, which uses a single-path bandwidth adaptation approach. Enrique Hernández-Orallo[5] performed a work," Evaluation of Collaborative Selfish Node Detection in MANETs and DTNs". Author has defined a collaborative communication analysis to avoid the selfish node attack. Author presented the analysis over the network nodes by applying the watchdog over the network nodes. Author performed the analytical study over the network so that the network communication overhead. Kevin A. Li[6] performed a work," PeopleTones: A System for the Detection and Notification of Buddy Proximity on Mobile Phones". Author has presented a application based analysis over the network to improve the network communication. The network has defined the effective analysis on the noise and power consumption analysis so that the network effectiveness will be improved. M.Shobana[7] performed a work," Geographic Routing used in Manet for Black Hole Detection". The paper has included the node communication associatively analysis to provide the effective communication. Author improved the protocol and achieve the safe communication over the network. Ítalo Cunha[8] performed a work," Measurement Methods for Fast and Accurate Blackhole Identification with Binary Tomography". Author has defined perpath probing technique to reduce the communication loss and to improve the data rate over the network. Poonam[9] performed a work," Misbehaving nodes Detection through Opinion Based Trust Evaluation Model in MANETs". Author presented a trust aware routing over the mobile network to reduce the forwarding attack over the network. Author defined the node behavior analysis so that the trustful communication will be obtained. Xueying Zhang[10] performed a work," The Security in Cognitive Radio Networks: A Survey". Author has defined a security system to ensure the communication security by monitoring the network parts under specific communication parameters and specialized

characteristics. Piyush Agrawal[11] performed a work," Cooperative Black and Gray Hole Attacks in Mobile Ad Hoc Networks". Author has monitored the controlled collaborative communication by avoiding the node disruption and by performing the block communication analysis over the network. S Madhavi[12] performed a work," Survey of Attacks on AODV and MAODV". Author has discussed various issues related to the mobile network. Author provided a study again different network attacks. These attacks includes the routing attacks and the communication over the network.

III. Research Methodology

MANET is considered as the generalized public network with dynamic inclusion of nodes. Because of large number of network nodes as well as dynamic nature of network, the network traffic becomes heavy. This kind of communication results the heavy data transmission over the network and it increases the congestion. The congestion problem can occur over the network in case of some bad node that can intentionally increases the network traffic. This kind of communication increases is identified as DOS attack. The congestion results the degrade QoS and the lesser communication throughput over the network. In this present work, an effective preventive route identification approach is defined for congested mobile network. In this work, a layered model is presented to perform dual communication analysis over the network. In first stage, the current communication between the node pair is analyzed whereas in second stage a periodic aggregative analysis is considered to perform long term analysis. QoS is one of the major requirements of any network or the transmission. QoS is required in all activities associated with a network to attain the effective throughput. This feature requirement becomes more critical in sensor network where the QoS itself represents the life of a node as well as network. One of the most critical sensor network activity is the routing. In this present work, an optimization to the routing approach is suggested so that the QoS will be improved. Here the QoS will be analyzed in terms of communication throughput, delay and the energy loss. Genetic is the optimization algorithm that will accept the possible communication routes between two nodes as the initial population. From this population set, the optimized route will be identified by performing the series of genetic operation. The presented work will improve the genetic approach at different operating layer. The first optimization will be defined in objective function, where the route selection will be done under different vectors. These vectors include the distance, energy and hop count vector. The presented work will try to identify the effective route that will cover the minimum hop along

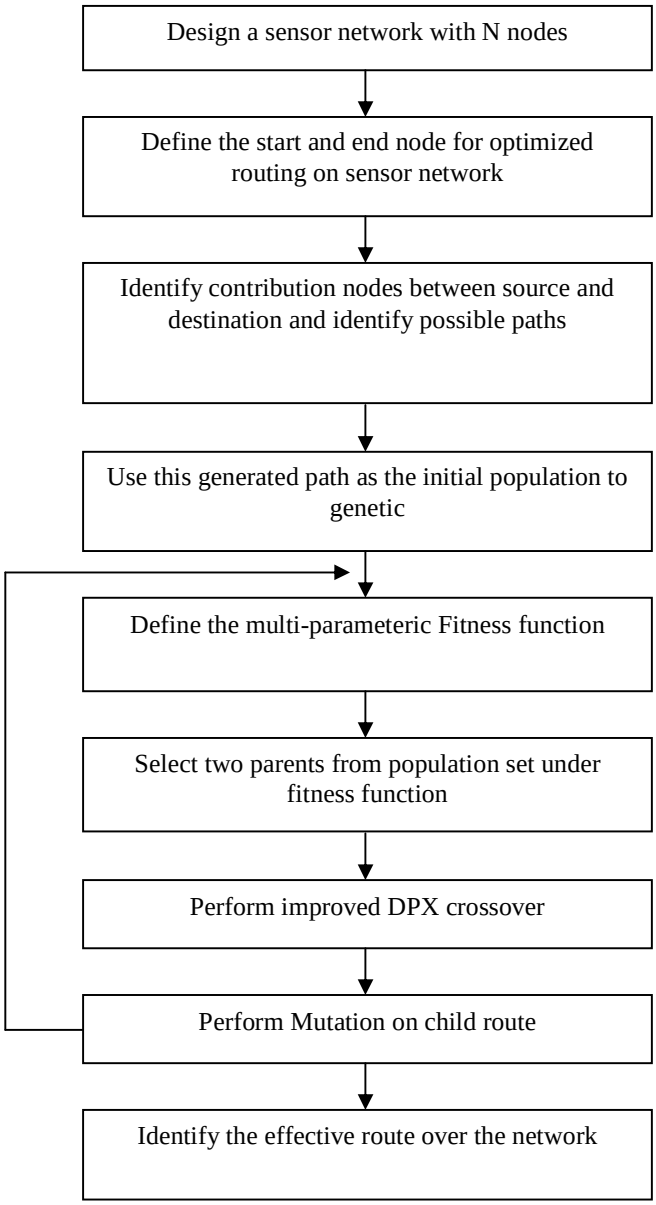

Figure 2 : Proposed Work

with distance and energy optimization. Another optimization in the work will be in the crossover operator where instead of using PMX crossover, DPX (Distance Preserving Crossover) crossover will be used. Here the crossover parameters will include the distance and energy. The presented work be able to identify the effective route so that the minimum energy consumption will be done as well as the communication delay will be reduced. The work will improve the network life and the network throughput. In this present work, an optimization to the routing algorithm is presented for sensor network. The sensor network is a small network of large number tiny sensors distributed at random locations. Each sensor node is defined with some energy. As the communication is performed, each participated node to the communication releases some energy. These operations includes the data transmission, receive and the forwarding. Because of this there is the requirement of some approach that can reduce the energy consumption over the routing in sensor network. The optimization is here required not only required for energy but also on different parameters. These parameters includes

- Distance
- Energy Consumption
- Hopcount

The optimization is here required to identify the effective route between two nodes. There are number of possible paths between two nodes. It is not feasible to analyze each path and identify the effective QoS optimized path. To perform the route identification or selection, an improved genetic approach is suggested in this work. Here, the optimization will be performed under on two main stages of genetic approach called crossover and the fitness function. The basic flow of the network is given in figure 2.

IV. Results

The presented work is implemented environment with n number of nodes with random placement. The parameters considered in this work are given here under

Table 1 : Communication Parameters

Parameter	Value
Number of Nodes	60
Source Node	1
Destination Node	60
Topology	Random

The network formation along with node localization is shown here in figure 3.

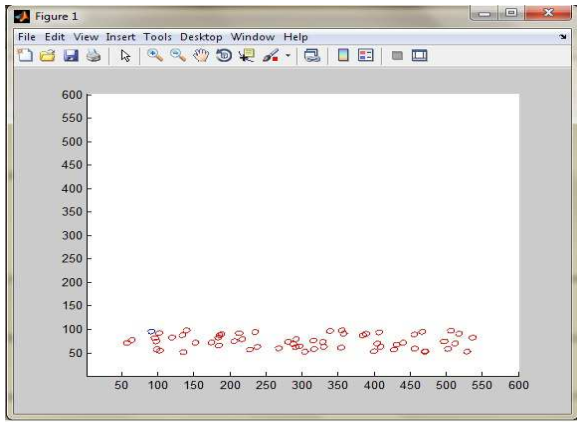

Figure 3 : Node Localization

Once the nodes are placed at random position, the next work is to generate the aggregative path over the network. In this work, a genetic approach is defined for path generation. The geneated path result is shown in figure 4. The aggregative path is describted here with source and destination specificaiton. The path has covered all the other network nodes as the intermediate nodes to the path.

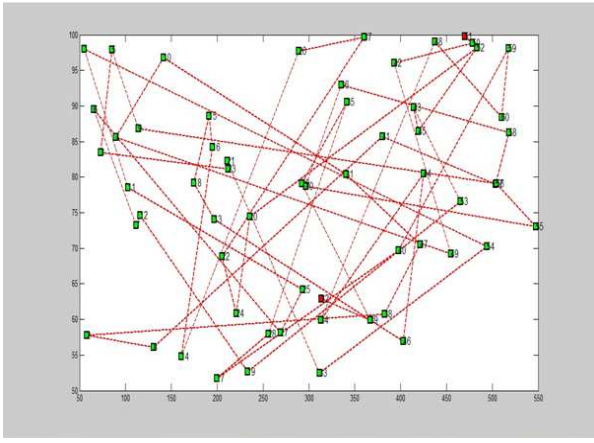

Figure 4 : Generated Aggregative Path

The work is here compared with existing algorithmic approach adapted by DSDV protocol. The comparative analysis of the work is here performed under distnace and energy parameters. The aggregative path generated over the network is analyzed with proposed approach is given in figure 5.

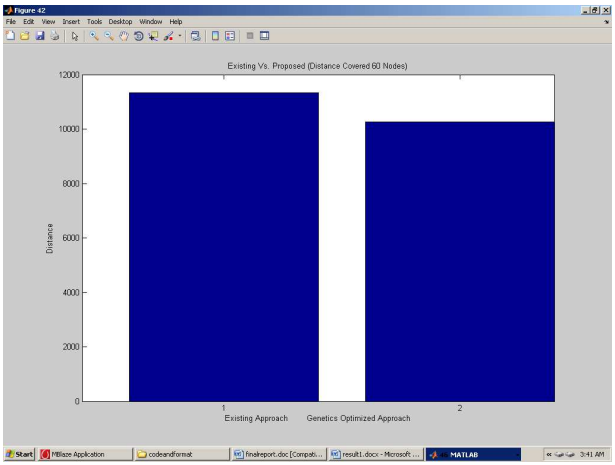

Figure 3 : Analysis (Existing Vs. Proposed)

The figure 3 is showing the results obtained by existing approach as well as the proposed approach. The network taken is of 60 nodes. As we can see the proposed approach has optimized the network and gives an effective low distance path over the network.

V. Conclusion

In this paper, a genetic based approach is defined to generate the optimal path in wireless networks. The work is defined under the fitness rule specification. The paper includes the algorithm and the associated implementation results. The results shows that the work has improved the existing network.

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