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A Wireless Sensor Network

Jaipriya[1], Kamal Kumar Sharma[2], Sharad Chauhan[3]

[1]Student, M. Tech, ESEAR, Ambala
[2]Professor, Dept. of ECE, E-Max group of Institutions, Ambala
[3]Assistant Professor, Dept. of CSE, E-Max group of Institutions, Ambala

Abstract—Greedy Perimeter Stateless Routing (GPSR) is a proven efficient geographical routing protocol for wireless sensor network. It provides routing support for Wireless Sensor Network. However, Greedy Perimeter Stateless Routing is designed for the symmetric links usually bidirectional in nature, but sensor networks are often asymmetric in nature. In Wireless Sensor Network the nodes are not designated through their IP addresses but they are marked with their destinations. But when the destination node is outside the boundary, GPSR suffers in energy inefficiency because it has to trace all the nodes in the location to reach the destination node. In addition to this, another key problem is data dissemination which becomes a major challenge in deploying GPSR in Wireless Sensor Networks. In this paper various versions of GPSR are analyzed for optimal path based on energy consumption and overcome problems in GPSR so that the feasibility of using GPSR in asymmetric WSN can be increased.

Keywords -- **Wireless Network, Routing Protocol Technique, VANET**

I. INTRODUCTION

Wireless sensor networks are attracting increased interest for a wide collection of applications, such as vehicle tracking, health monitoring etc. vehicular ad hoc networks(VANETs) as a vehicle-to-vehicle or a vehicle-to road-side-unit network architecture that can be easily deployed without relying on expensive network infrastructure. Nevertheless, enabling communication between vehicles and preexisting fixed infrastructure such as gateways to the Internet opens up a plethora of interesting applications to both drivers and passengers.

These applications and the cost effectiveness of VANETs constitute major motivations behind increasing interest in such networks [1]–[3]. Vehicular ad hoc networks (VANET) represent a particularly challenging class of Mobile Ad Hoc Networks being a rapidly emerging research field, used for communication and cooperative driving between cars on the road. VANET have particular features like: the distribution and the speed of these nodes, distributed processing and a great number of nodes, organized networking, a constrained but highly variable network topology, communication conditions and signal transmissions blocked by buildings, mobility patterns, and finally there are no significant power constraints, frequent partition due to the high mobility.

WITH the growing popularity of positioning devices(e.g., GPS) and geographic routing protocols are becoming an attractive choice for use in mobile ad hoc networks [1], other localization schemes[2]. The underlying principle used in these protocols involves geographically closest to the destination, which selecting the next routing hop from among a node's neighbors.

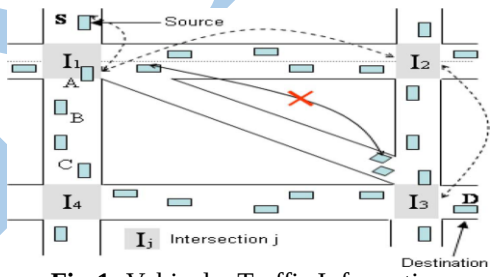

Fig-1: Vehicular Traffic Information

II. DIFFERENT ROUTING PROTOCOL TECHNIQUE:-

(A) Geographic Source Routing

Geographic Source routing is a position based routing with topology information. Geographical routing states that each node knows its own location by using the global positioning system (GPS) or some other indirect, localization technique [15]. It uses the destination's location to find neighbor that is closest in geographical distance to the destination and forwards the packet to that neighbor and closer than itself, a source wants to send a packet to a destination. The neighbor repeats the same procedure and until the packet makes it to the destination.

(B) Data Dissemination Routing Technique

In the data dissemination routing technique, as high delivery ratio and low delay. For the data dissemination in v2v communication a mobility-centric data dissemination algorithm has been a partitioned and highly network deliver. Data Dissemination algorithm combined the idea of trajectory-based forwarding and geographic forwarding, opportunistic forwarding.

(C) Greedy Perimeter Stateless Routing

Greedy perimeter stateless routing protocol specifies the geographic existence of a location and forwarding strategy. GPSR data forwarding algorithm consist the two component i.e. greedy forwarding and perimeter routing. GPSR [12] uses the default forwarding mechanism to forward the packets.

(D) On-Demand Routing Protocol

On-demand routing protocols for ad hoc networks, it has a packet to send to that destination when a node attempts to discover a route to some destination. On demand routing protocols have been demonstrated to perform better with significantly lower overheads than periodic or proactive routing protocols in many situations. Since they are able to react quickly to the many changes that may occur in node connectivity, it able to reduce (or eliminate) routing overhead in periods or areas of the network in which changes are less frequent.

(E) Position Based Routing Protocol

Position based routing consists of class of routing algorithm. Position based routing is beneficial since no global route from source node to destination node need to be created and maintained. They share the property of using geographic positioning information in order to select the next forwarding hops. It send packet without any map knowledge to the one hop neighbor which is closest to destination. It is beneficial since no global route from source node to destination node need to be created and maintained. It is broadly divided in two types:

Delay Tolerant Protocols, Position based greedy V2V protocols.

(F)Intersection-based Geographical Routing Protocol (IGRP)

IGRP chooses the routes based on fixed points, which are the road intersections (i.e., junctions). This increases the stability of the constructed routes. Specifically, IGRP chooses the path that maximizes connectivity probability while satisfying the QoS constraints regarding hop count, end-to-end delay and BER,. Between any two intersections on the geographical forwarding selected path is used to transfer packets, it reducing the path's sensitivity to individual node movements.

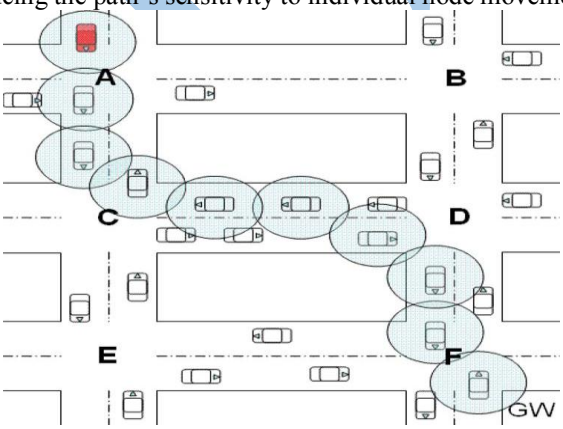

Fig-2 Message routing in VANETs using IGRP.

(G) Global positioning system (GPS)

Geographical position from a global positioning system (GPS) receiver or other location service such as in [15]. Vehicles also have access to a digital map of the area using an onboard navigation system to determine the position of its neighboring road. Such kind of digital map has already been commercialized.

III CHARACTERISTICS :

- Nodes using for power consumption constrains batteries or energy harvesting
- Ability to cope with node failures
- Mobility of nodes
- Dynamic network topology
- Communication failures
- Heterogeneity of nodes
- Large deployment of scalability
- Ease of use

IV Algorithm Comparison :

a) **Genetic algorithm (GA) :** It search John Holland in 1980 which is field of artificial intelligence. Simulation and Numerical results show that the protocol achieves an optimal or a near-optimal solution, particularly in sparse networks. Genetic algorithm (GA) to solve NP-complete optimization problem. Therefore, it stands out as a compared to the well-known protocols: GPSR [11], GPCR [12], and OLSR [6]. The QoS routing problem as an optimization problem and present a GA to solve it. GA converges to the near-optimal or the optimal solution after a few iterations. GA is useful to solution to optimization and search problems.[1] GA find the application in bioinformatics, engineering, chemistry.GA belong to the large class of evolutionary algorithms(EA).GA is search that mimics the process of natural selection.

b) **Fig-3** Flowchart of the proposed GA

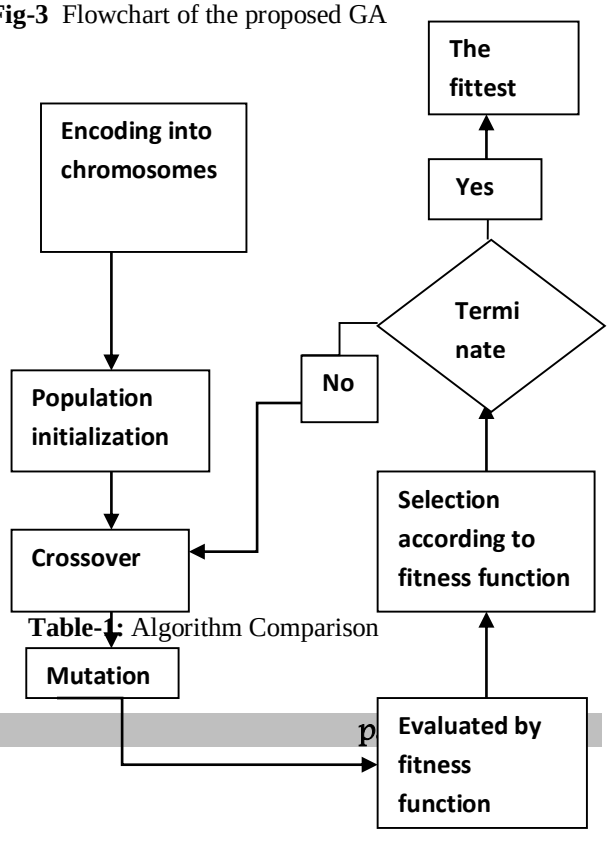

Table-1: Algorithm Comparison

Algorithm	Author & Year	Problem Solving	Field
GA	John Holland in 1980	NP-complete optimization	Artificial intelligence
PSO	James Kennedy and Russell C, Eberhart in 1995	Candidate problem	Computer graphics
Greedy Algorithm	Leiserson and Rivest in 1990	Travelling Salesman problem	Statistics
DFS	Charles Pierre Tremaux in 19th century	P\ -complete	Artificial intelligence

c) **PSO Algorithm**: Particle Swarm Optimization (PSO) is a computational method that optimizes a problem by having a population of candidate solution, here dubbed particles around in the search space according to simple mathematical formulae over the particle's position and velocity. The PSO algorithm was first described by in 1995 James Kennedy and Russell C, Eberhart for simulating social behavior , as a stylized representation of the movement of organisms in a bird flock.

d) **Greedy Algorithm**: Greedy Algorithm introduce Cormen, Leiserson and Rivest in 1990.Greedy algorithm is an algorithm that follows the problem solving heuristic of making the locally optimal choice at each stage[1] with the hope finding a global optimum. In many problem, a greedy strategy does not in general produce an optimal solution .for example, a greedy strategy for the travelling salesman problem. Greedy algorithm produce good solutions on some mathematical problem.

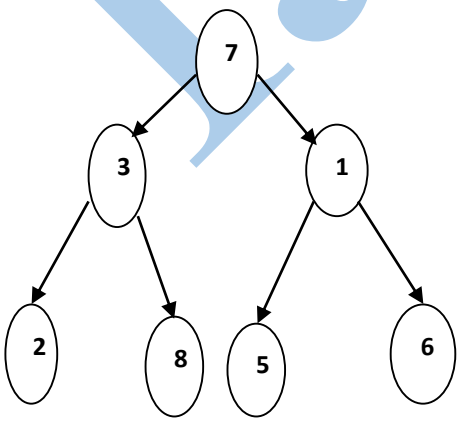

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Fig-4

e) DFS: Depth-first searching (DFS) is an algorithm for traversing or graph data structures or searching tree. One starts at root and explores as far as possible along each branch before backtracking. The time and space analysis of DFS differs according to its application area.These algorithm to use depends less on their complexity. A version of DFS was investigated in the 19th century by French mathematician Charles Pierre Tremaux as a strategy for solving mazes.DFS order of a rooted graph is P-complete(parallel processing).It is used the solving puzzles with only one solution.

V LITERATURE SURVEY :

C. Intanagonwiwat and R. Govindan and D. Estrin [6] argued in favor of designing localized algorithms and present directed diffusion as a set of abstractions that describe the communication patterns underlying such algorithms. The design features differ from traditional wireless networks and are data-centric and application-specific. Data-centric refers to the fact that sensor networks have focus in retrieving information matching certain attribute values and very rarely focus only in data from a specific node.

D. Braginsky, D. Estrin [7] the authors introduced Rumor routing as a logical compromise between query and event flooding. With Rumor Routing paths (possible multiple and non-optimal) are created leading to each event. Whenever a query is generated it is sent on a random walk until it crosses one of the paths leading to the event of interest.

W. Adjie-Winoto and E.Schwartz and H. Balakrishnan and J. Lilley [8] the authors proposed an intentional naming system to address all these considerations. This system is an application level overlay network which integrates name resolution and message routing. The only assumption about the underlying network layer is that it provides IP unicast. The overlay network is comprised of International Name Resolvers (INR's).

A. Ephremides [9] The author focuses on the major energy efficiency issued in ad-hoc networks (not only sensor networks) which are defined as infrastructure less networks that require multiple hops for connecting all the nodes to each other. Vertical layer integration and critically of energy consumption are the two main characteristics of ad-hoc networks that drive their design.

E. Gafni and D. Bertsekas [10] proposed that the problem of maintain communication between the nodes of a data network and a central station in the presence of frequent topology, for example, in mobile packet radio networks. They argue that flooding schemes have significant drawbacks for propose a general class of distributed algorithms for establishing new loop- free routes to the station for any node left without a route due to changes in the network topology.

VI. CONCLUSION

The routing in vehicular Ad hoc Networks (VANET) has attracted many attentions during the last years. This paper mainly focused on the routing concepts for the VANET like decomposition of the routing function and requirement, principles for routing. The data delivery through Vehicular Ad-hoc Networks is challenging since it must efficiently handle rapid topology changes and a fragmented network. Geographic Source routing is a position based routing with topology information. In order to guarantee the traffic safety, road safety and passenger safety the Inter-Vehicle Communication is one of the most important factor to be considered.

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