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Survey of Greedy Routing Protocols in VANET

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Abstract— VANET have recently been the topic of extensive research due to its wide range of applications and unique characteristics. Routing is very important issue in VANET. Greedy forwarding is one of the most suitable solutions for routing in VANET. Due to its high mobility and frequent changing velocities of vehicles, greedy forwarding protocols are known to be more suitable and useful to VANET. In this paper we provide a survey of greedy routing protocols and discussed the advantage and disadvantages of these routing protocols.

Keywords— VANET, MANET, V2V, V2I.

I. INTRODUCTION

A vehicular ad-hoc network (VANET) is an emerging class of wireless network that provide communication between vehicles and road side units. VANET is a form of mobile ad-hoc network (MANET). A mobile ad-hoc network (MANET) is comprised of a group of mobile nodes which have the capability of self organization in a decentralized fashion and without fixed infrastructure whereas in VANET mobile nodes are the vehicles themselves [5]. Communication is possible between vehicles within each other's radio range. VANET is a part of intelligent transportation systems (ITS), are advanced applications which aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and smarter use of transport networks [6].

VANET provide vehicle to vehicle communication (V2V) and vehicle to infrastructure or roadside communication (V2I) .V2I can provide real-time information on road traffic conditions, weather and basic internet services. V2V can be used to provide information about traffic conditions and vehicle accidents. Vehicles are wirelessly connected in vehicle to vehicle communication environment using multi-hop communication without access to any fixed infrastructure. V2V are a main focus of research nowadays. VANET contain two type of devices RSU and OBU. RSU is a device that operates at a fixed position and OBU is a mobile device in a vehicle that supports information exchange with RSUs and other OBUs. In V2V communication vehicles communicate with each other through their OBUs.

Routing is very important issue in VANET and designing an efficient routing protocol is very difficult for all VANET application.

VANET has unique characteristics:

1. High dynamic topology: since vehicles are moving at high speed, topology formed by VANET is always changing.
2. Frequently disconnected network: The highly dynamic topology results in frequently disconnected network. This problem is caused by changing node density.
3. Unlimited battery power and storage: Nodes in VANET are not subject to power and storage limitation as in sensor networks. Nodes have ample amount of energy and computing power.
4. On board sensors: Nodes consists of sensors which provide useful information for routing. Many VANET routing protocols consists of GPS (global positioning system) unit which provides location information.

   Due to high mobility and frequently changing velocities of vehicles link breakage occurs repeatedly and packet loss occur. From these weaknesses greedy routing protocols are known to be more suitable and useful to VANET [1]. Routing is very important issue in VANET and designing an efficient routing protocol is very difficult for all VANET application.

II. GREEDY FORWARDING TECHNIQUE

All greedy routing protocols use greedy forwarding approach. Greedy forwarding is one of the most suitable solutions for routing in VANETs because it maintains local information of neighbours [1]. Routing algorithms based on greedy forwarding call for information about the physical position of the participating nodes. This position is made available to the direct neighbours via periodic transmissions from beacons. A sender can request the position of a receiver by means of a location service. The routing decision at each node is then based on the destinations position contained in the packet and the position of the forwarding node's neighbours. Greedy routing does not require the establishment of routes. Greedy routing protocols use the geographic position of vehicles to determine the direction for forwarding a data packet. Traditional greedy routing protocol use beacon message (each vehicle announces its address and geographic position to all of its neighbours through a radio broadcast). Whenever a vehicle receives such a beacon message from a neighbour, it

stores the address and position of that vehicle in a table known as neighbour table. Each vehicle uses the table whenever it has to forward a packet to know the neighbour the packet should be forwarded in order to reach the destination. The major advantage of greedy forwarding is that it holds current physical position of forwarding node. Thus by using this strategy total distance to destination becomes less and packets can be transmitted in short time period [4].

III. GREEDY ROUTING PROTOCOLS

Greedy routing protocols solve the problem of VANET such as high mobility and low transmission rate. Here is a list of greedy routing protocols as shown in table I.

TABLE II
LIST OF GREEDY ROUTING PROTOCOLS

GPSR	GSR	SAR	A-STAR
STAR	GPCR	GYTAR	GVGRID
VADD	CBF	DGRP	GPUR
RDGR	GPGR	RIPR	AMAR

These are the following routing protocols in VANET:

A. GPSR (greedy perimeter stateless routing)

It is the best known greedy routing protocol for VANET. GPSR makes greedy forwarding decisions using information about a router's immediate neighbours in the network topology. When a packet reaches a region where greedy forwarding is impossible the algorithm recovers by routing around the perimeter of the region. GPSR may increase the possibility of getting a local maximum and link breakage. These can be recovered in perimeter mode forwarding but packet loss and delay time may occur, this decreases VANET reliability.

B. GSR (Geographic source routing)

GSR is the first protocol to use a map of streets and is mainly proposed for urban environment to avoid the problem of GPSR. In GSR a source node computes the shortest path to an intended destination using Dijikstra's algorithm based on distance metric. GSR shows the advantage of map-based approach in realistic vehicular environments. But when it faces a local maximum then packets are directly discarded.

C. SAR (Spatially aware packet routing)

SAR overcomes weaknesses of the recovery strategy used in GPSR. Algorithms used in SAR include GSR-based packet forwarding. In SAR each forwarding vehicle maps the positions of its neighbours onto the graph model and chooses the neighbour with the shortest path along the GSR to the destination as the next hop. A packet will move successively closer to the destination along GSR from one vertex to the next vertex. However there is no guarantee that a forwarding vehicle can always find a suitable neighbour on the GSR. For this either the packet is suspended or greedy forwarding is used to recomputed GSR.

D. A-STAR(Anchor based street and traffic aware routing)

It is specially designed for V2V.it utilizes the city bus routes to identify an anchor path with high connectivity for packet delivery. A-star involves inserting a sequence of anchors into a packet, through which the packet must travel on its route to the destination. A-star is not an alternative for highway scenario.

E. STAR(Spatially traffic aware routing)

STAR is designed to fix the drawbacks of SAR algorithm. SAR uses street topology information received from geographic information systems and information about vehicular traffic.

F. GPCR(Greedy perimeter coordinator routing)

GPCR was proposed to improve the reliability of GPSR. It makes use of street and junctions to forward packets. It consists of two parts: a restricted greedy forwarding procedure and a repair strategy. Nodes on junctions are called coordinators. Packets are always forwarded to these coordinators rather than to nodes across the junction. If coordinators are not present, the packets are forwarded to node with the largest distance from the forwarding node. GPCR is effective as it does not need external information and graph planarization algorithm. If density of nodes is low or there is no connectivity to the destination, then the delay time increases and the local maximum problem go unresolved [2].

G. GyTAR (Greedy traffic aware routing)

It consists of two modules: dynamic junction selection through which a packet must reach destination and an improved greedy strategy used for forwarding. GyTAR reduces control message overhead and efficiently handle often occurring network partitions [2].

H. GVGrid

It is designed for dense regions with low-speed vehicles such as cities. It divides the geographical area into uniform-size squares called grid.

I. VADD (Vehicle-assisted data delivery)

VADD aims at improving routing in disconnected networks by using the idea of carry and forward together with vehicular mobility predication [2].This protocol relies mainly on three basic principles:

1) Whenever possible transmit through wireless link
2) Roads with highest speed should be chosen if the packet need to be forwarded along road.
3) Dynamic path selection is carried during the entire packet forwarding process.

VADD has high delivery ratio.

J. CBF(Contention-based forwarding)

In CBF, the next-hop is selected through a distributed contention process based on the actual positions of all the current neighbours. In contention process CBF make use of biased timers.

K. DGRP (Directional greedy routing protocol)

DGRP takes into account the moving directions and velocities of nodes as well as the position data of 1-hop neighbour of the transmitting node. However in VANET, the actual moving of a vehicular node is not constant, which creates numerous problems for DGRP to be applied.

L. GPUR(Greedy perimeter urban routing)

GPUR selects a relay node from nodes with 2-hop neighbours to reduce the routing error problem and the probability of local maxima in urban areas. The periodic beacon messages lead to serious transmission delay.

M. RDGR (Reliable directional greedy routing)

It uses the position, speed, direction of motion and link stability of neighbours to select the most appropriate next forwarding node. The routing approach incorporates a potential score-based strategy that reduces link breaks, enhances reliability of the route and improves the ratio of packet delivery.

N. GPGR (Grid-based predictive geographical routing)

It employs road segments based on a routing approach with street awareness and it uses knowledge of the road topology provided by a static street map. This method aims to improve the routing protocol for V2V. GPGR produces a very low likelihood of a local maximum, low link break probabilities, and a high packet delivery rate compared with GPSR, GPCR, and GPUR.

O. RIPR (Reliability- improving position-based routing)

RIPP algorithm predicts the positions, velocities and direction of vehicles after receiving beacon messages and estimates information about road characteristics to select the relay node. Thus it can reduce the possibility of creating a local maximum and link breakage.

P. AMAR (Adaptive movement aware routing protocol)

AMAR scheme makes use of additional information other than the position about vehicle movement to select an appropriate packet's next –hop that ensures the data delivery successfully. This scheme is suitable for highly mobile VANET and performs better even when pure greedy forwarding fails [3].

IV. CONCLUSIONS

The Routing is the main component for success of VANET applications. Hence a survey of different VANET protocols with greedy forwarding essential to come up with new proposals for VANET. Existing greedy-based routing protocols have been discussed and advantages and disadvantages of these routing protocols. All the approaches used by the protocol tend to focus on V2V and all these require GPS (global positioning system) in the Vehicles.

REFERENCES

[1] Kuk-hyun Cho and Min-woo Ryu "*A Survey of Greedy Routing Protocols for Vehicular Ad-hoc Networks*", Smart Computing Review, vol.2, no.2, April 2012.

[2] Lakshmi Ramachandran, Sangheethaa Sukumaran and Surya Rani Sunny "*An Intersection Based Traffic Aware Routing with Low Overhead in VANET*", International Journal of Digital Information and Wireless Communications, 2013.

[3] Monika, Sanjay Batish and Amardeep Dhiman "*Analytical Study Of Position Based Routing Protocols in VANET*", International Journal of Computer Applications volume 48-no.10, June 2012.

[4] Mrs. Vaishali D. Khairnar and Dr. Ketan Kotecha "*Simulation Based Performance Evaluation of Routing Protocols in Vehicular Ad-hoc Network*", International Journal Of Scientific and Research Publications, volume 3, issue 10, October 2013.

[5] Vimmi a gajbhiye, Ratnaprabha w.jasutkar "*Study of efficient routing protocols for VANET*" international journal of scientific & engineering research volume 4,issue3,march-2013.

[6] http://en.wikipedia.org/wiki/Intelligent_transportation_system.

