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A Review: Improvement of Link Permanency

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***Abstract*- Vehicular Ad hoc Networks (VANET) are highly mobile wireless ad hoc networks that provides communication between vehicles. As a promising technology it plays an important role in public safety communications and commercial applications. Due to the rapidly changing of topology and high-speed mobility of vehicle, routing of data in vanet becomes a challenging task. One of the critical issues of VANETs are frequent path disruptions caused by high-speed mobility of vehicle that leads to broken links which results in low throughput and high overhead. This paper argues with how to maintain the reliable link stability between the vehicles without any packet loss using two separate algorithms besides position, direction, velocity and digital mapping of roads. In this paper we propose a reliable position-based routing approach called Reliable Directional Greedy routing (RDGR) which is used to obtain the position, speed and direction of its neighboring nodes through GPS and as well as the well-known Ad-Hoc On-Demand Distance Vector (AODV) which includes vehicles position, direction, velocity with link stability. This approach incorporates potential score-based strategy, which calculates link stability between neighbor nodes for reliable data transfer in this paper we use both RDGR and AODV approach in order to provide reliable link stability and efficient packet delivery ratio even in high-speed mobility and changing of topology.**

***Keywords*- Ad-Hoc on-Demand Distance Vector (AODV), Reliable Directional Greedy Routing (RDGR), Revival Mobility Model (RMM).**

I. INTRODUCTION

VANETs is a class of wireless ad-hoc network which is a form of mobile ad hoc network providing communications among nearby vehicles as well as between vehicles and also between the vehicles and road side units. Vehicles are becoming “computer networks on wheels” and acts as mobile nodes of the network.

VANET technology integrates ad hoc network, wireless LAN and cellular technology to achieve intelligent Inter-Vehicle Communications and Roadside-to-Vehicle Communications.

VANETs are a special case which is also class of MANETs and both are characterized by the movement and self-organization of the nodes. Due to the fast moving of vehicles the vanet is unique by its characteristics that are different from the traditional mobile ad-hoc network. The cooperation between the vehicles and the road transportation system in the vanet technology can improve the driver’s safety and also reduce the environmental impact.

VANET applications include on board active safety systems that helps in avoiding accidents by assisting the drivers. It is beneficial in providing intelligent transportation system. Due to recent developments in the VANET field, a number of attractive applications, which are unique for the vehicular setting, have emerged. In VANET, the quality of the wireless channel is not stable as they are affected by many factors including road side units. And also, the link stability between the vehicles is not reliable and also increases the packet loss. There are more challenges and difficulties that are to overcome. Vehicle velocities are also restricted for certain speed limits, level of congestion in roads, and traffic control mechanisms.

In this paper we propose a stable routing protocol called Ad-Hoc on Demand Distance Vector (AODV) which is used to determine velocity of the vehicle along with the reliable routing approach named Reliable Directional Greedy Routing (RDGR) approach that is used to provide high link stability and also determine the direction of the neighboring vehicles. This design involves individual vehicle motion, channel state between the vehicles, position, direction, velocity of the vehicles in order to provide better delivery ratio and high link stability compared to the previous routing protocols used. Simulation experiments have been performed to evaluate the performance of our proposed scheme.

II. LITERATURE REVIEW

A Reliable Routing Protocol for VANET communications: Vehicular Ad-hoc Network (VANET) is an emerging new technology to enable communications among vehicles and nearby roadside infrastructures to provide intelligent transportation applications. In order to provide stable connections between vehicles, a reliable routing protocol is needed. Currently, there are several routing protocols designed for MANETs could be applied to VANETs. However, due to the unique characteristics of VANETs, the results are not encouraging. In this paper, we propose a new routing protocol named AODV-VANET, which incorporates the vehicles' movement information into the route discovery process based on Ad hoc On-Demand Distance Vector (AODV). A Total Weight of the Route is introduced to choose the best route together with an expiration time estimation to minimize the link breakages. With these modifications, the proposed protocol is able to achieve better routing performances.

1. A stable routing protocol to support ITS services in VANET networks: There are numerous research challenges that need to be addressed until a wide deployment of vehicular ad hoc networks (VANETs) becomes possible. One of the critical issues consists of the design of scalable routing algorithms that are robust to frequent path disruptions caused by vehicles' mobility. This paper argues the use of information on vehicles' movement information (e.g., position, direction, speed, and digital mapping of roads) to predict a possible link-breakage event prior to its occurrence. Vehicles are grouped according to their velocity vectors. This kind of grouping ensures that vehicles, belonging to the same group, are more likely to establish stable single and multihop paths as they are moving together. Setting up routes that involve only vehicles from the same group guarantees a high level of stable communication in VANETs.

The scheme presented in this paper also reduces the overall traffic in highly mobile VANET networks. The frequency of flood requests is reduced by elongating the link duration of the selected paths. To prevent broadcast storms that may be intrigued during path discovery operation, another scheme is also introduced. The basic concept behind the proposed scheme is to broadcast only specific and well-defined packets, referred to as ldquobest packetsrdquo in this paper. The performance of the scheme is evaluated through computer simulations. Simulation results indicate the benefits of the proposed routing strategy in terms of increasing link duration, reducing the number of link-breakage events and increasing the end-to-end throughput.

2. Validation of a non-line-of-sight path-loss model for V2V communications at street intersections: In this paper a non-line-of-sight (NLOS) path-loss and fading model developed for vehicle-to-vehicle (V2V) communication at 5.9 GHz is validated with independent and realistic measurement data. The reference NLOS model is claimed to be flexible and of low complexity, and incorporates specific geometric aspects in a closed-form expression. We validated the accuracy of the model with the help of realistic channel measurements performed in selected street intersections in the city of Lund and Malmö, Sweden. The model fits well, with a few exceptions, to the measurements. Those are in turn made in different intersections having variable geometries and scattering environments. It is found that the model can be made more general if an intersection dependent parameter that depends on the property and number of available scatterers in that particular intersection is included in the model.

3. Vehicular Networking: A survey and tutorial on requirements, architectures, challenges, standards and solutions: Vehicular networking has significant potential to enable diverse applications associated with traffic safety, traffic efficiency and infotainment. In this survey and tutorial paper we introduce the basic characteristics of vehicular networks, provide an overview of applications and associated requirements, along with challenges and their proposed solutions.

In addition, we provide an overview of the current and past major ITS programs and projects in the USA, Japan and Europe. Moreover, vehicular networking architectures and protocol suites employed in such programs and projects in USA, Japan and Europe are discussed.

Investigation of routing reliability of vehicular ad hoc networks: In intelligent transportation systems, the cooperation between vehicles and the road side units is essential to bring these systems to fruition. Vehicular ad hoc networks (VANETs) are a promising technology to enable the communications among vehicles on one hand and between vehicles and road side units on the other hand.

However, it is a challenging task to develop a reliable routing algorithm for VANETs due to the high mobility and the frequent changes of the network topology. Communication links are highly vulnerable to disconnection in VANETs; hence, the routing reliability of these ever-changing networks needs to be paid special attention. In this paper, we propose a new vehicular reliability model to facilitate the reliable routing in VANETs. The link reliability is defined as the probability that a direct communication link between two vehicles will stay continuously available over a specified time period.

Furthermore, the link reliability value is accurately calculated using the location, direction and velocity information of vehicles along the road. We extend the well-known ad hoc on-demand distance vector (AODV) routing protocol to propose our reliable routing protocol AODV-R. Simulation results demonstrate that AODV-R outperforms significantly the AODV routing protocol in terms of better delivery ratio and less link failures while maintaining a reasonable routing control overhead.

III.EXISTING SYSTEM

The existing system provides a comprehensive overview in vehicular networking and introduces the limitations of the proposed routing protocols and the key challenges in designing forwarding algorithms for vanet that is to provide reliable packet transmission with minimum delay, maximum throughput and low communication overhead.

The authors have proposed a routing algorithm named AODV by utilizing the vehicles movement and information like position speed acceleration and velocity of the vehicles through the GPS devices. AODV approach involves both the Highway mobility modle and Stochastic Large-Scale Fading Model.In AODV approach; the network is silent until connection starts. If there is no existing route between source node and destination node, the source node sends routing request (RREQ) in the form of broadcast.

Network layer addresses of initiating node and the destination node are recorded in the RREQ packets. When adjacent node receives the RREQ, it firstly determines whether the target node is itself. If so, then it will send a route-reply message (RREP) to the initiating node as response. Otherwise, it finds out whether there exists a route to the destination node in the routing table. If there exists a route, it uni-casts RREP to the source node, otherwise it continues to forward RREQ to other nodes to find out a suitable route.

In the case where network resource is sufficient, AODV protocol can maintain routing by broadcasting the hello message regularly. Once a link broken fails, the node will send ERROR messages to inform the inaccessible nodes to delete the corresponding records or to repair the existing routing.

IV. DRAWBACKS

- AODV does not minimize the number of required broadcasts.
- It does not create the routes on-demand basis.
- Need lower delay for connection setup.
- Does not follow the unidirectional links.
- Periodic route formation creates unnecessary bandwidth consumption.

V. PROPOSED SYSTEM

In order to avoid the drawbacks and also to utilize the characteristics of AODV approach in an efficient way we introduce the routing protocol named RDGR (Reliable Directional Greedy Routing) approach that can be used along with AODV. VANETs involve similar or different radio interfaces technologies that involves short-range to medium-range communication systems. The range of VANETs is several hundred meters which is typically between 250 and 300 meters. The effective vehicular communications design involves a series of technical challenges. An important step toward the realization of effective vehicular communications is that guaranteeing a stable and reliable routing mechanism over VANETs.

Existing routing protocols that are traditionally designed for MANET do not make use of the unique characteristics of VANETs. And also, these routing protocols of MANET are not suitable for vehicle-to-vehicle communications over VANETs. Indeed, the route update timers in proactive protocols and control messages in reactive protocols are not used to anticipate link breakage. They indicate only the presence or absence of a route to a given node.

Consequently, only after a link-breakage event taken place the route maintenance process in both protocol types is initiated. When a path breaks, not only portions of data packets get lost, but also there is a significant delay in establishing a new path. This delay depends on whether another valid path already exists (in the case of multipath routing protocols) or whether a new route-discovery process needs to take place. In order to avoid these drawbacks, we use two separate routing approaches in this paper such as AODV and RDGR.

By using the features of both these algorithms the link stability can be increased and the packet loss as well as the end-to-end packet delay can be reduced. Reliable Directional Distance Greedy routing (RDGR) which is used to obtain the position, speed and direction of its neighboring nodes. Mainly it is used to select the successive node. AODV is used to determine velocity of the vehicle including position, acceleration of the velocity.

By using the RDGR along with AODV the unidirectional link between the vehicles along with less bandwidth consumption can be succeeded. This provides better delivery ratio and high link stability compared to the previous routing protocols used. Simulation experiments have been performed to evaluate the performance of our proposed scheme.

1. Advantages:

- Unlimited transmission power
- Highly dynamic topology
- Predicable Mobility
- Potentially large scale
- Network connectivity
- High link Stability
- Less bandwidth consumption

2. Architecture:

This architecture involves the working of both algorithms AODV and RDGR. Initially AODV approach has been used to determine vehicles position, direction, velocity with link stability. Through this every vehicle detail can gathered through the sensors.

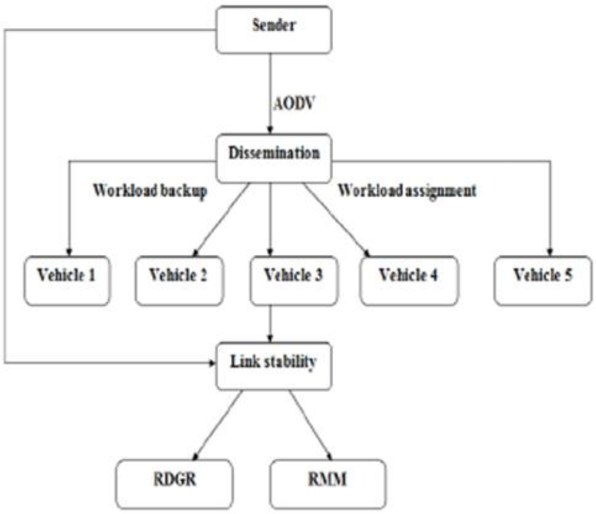

Fig 1. Architecture of working model.

After that the RDGR approach is used compare and selects the successive node or vehicle through which the packet can be transferred successfully without link breakage. Dissemination node is used to transfer the packet to all other nodes in the link. RDGR approach uses the RMM model that helps in keeping the link stable and reliable even when vehicle speed or velocity gets changed. According to the architecture specified sender sends the packets to be transferred to its destination. By using the AODV and RDGR specified earlier the dissemination node is chosen through which the packets can be transferred to other nodes without any packet loss or link breakage. This is shown through the simulation that the link stability with reliable data transfer has been improved.

3. Algorithm:

3.1 Reliable Directional Greedy Routing (RDGR):

RDGR is an extended version of DGR approach. It is a reliable position based greedy routing approach which uses the position, speed, direction of motion and link stability of their neighbors to select the most appropriate and successive next forwarding node. It obtains position, speed and direction of its neighboring nodes from GPS (i.e through the sensitive devices). If neighbor node with most forward progress towards destination node has high speed, in comparison with source node or intermediate packet forwarder node or even any other node that is close to it, then the packet loss probability is increased.

In order to improve its reliability, the proposed strategy introduces some new metrics to avoid loss of packets. The packet sender or forwarder node, selects successive neighbor nodes. That node is checked using velocity vector to know whether it have forward progress towards destination node, and checks link stability of those node. And this velocity can be determined by AODV approach. Finally, it selects one of them which has more link stability and sends packet to it. The node which has been selected act as the dissemination node sends or distributes the packets to other nodes or to its destination. It uses combination metrics of distance, velocity, direction and link stability to decide about to which neighbor the given packet should be forwarded. This approach also considers all neighbors' position, speed, direction of motion information and link stability including the one hop neighbor's position, direction of motion information and its speed. This routing approach incorporates potential score-based strategy, which enhances reliability of the route, improves packet delivery ratio and reduces link breaks.

3.2 Revival Mobility model (RMM):

We use Revival Mobility model (RMM) in RDGR approach which is used to simulate the movement pattern of vehicles on streets or roads. Revival Mobility model (RMM), can be when the road comprises of two or more lanes. It is based on the linear node density where the Vehicles or nodes are randomly distributed with it. Each vehicle can move in different speed with different velocity. The Revival Mobility Model (RMM) allows the movement of vehicles in two directions. i.e. east/west for the horizontal roads and north/south for the vertical roads. In cross roads, based on the shortest path vehicles choose desired direction. Between two subsequent vehicles in a lane a security distance should be maintained in order to avoid accidents. Overtaking mechanism is also applicable and one vehicle can able to overtake the preceding vehicle where the link breakage or packet loss may occur. This model helps to overcome these drawbacks. Packet transmission is possible between vehicles moving in both directions i.e both the front hopping and back hopping of data packet is possible by using this model.

VI. CONCLUSION

In this paper we have examined how to improve the link stability and reduction in end-to-end packet delay or packet loss in VANETs. We have identified the properties of VANETs in previous studies. We have commented on their contributions, and limitations.

By using the uniqueness of VANETs, we have proposed Revival Mobility Model and a position based greedy routing approach RDGR along with a reactive protocol AODV approach. We have proposed AODV along with a Reliable Directional greedy routing approach that uses potential score-based strategy. And this strategy calculates link stability between neighbor nodes for reliable forwarding of data packet. We have simulated AODV and RDGR in ns2 using Revival Mobility model and similar models used in AODV approach in previous paper. A simulation result reveals the protocol's effectiveness in terms of high mobility, reduced end to end delay and packet loss rate. By using the features of both AODV and

RDGR, a new algorithm can be created is our future extension.

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