A COMPREHENSIVE REVIEW OF VARIOcomUS SECURITY AWARE ROUTING PROTOCOLS

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ABSTRACT: VANETs facilitate the broadcasting of status information among vehicles. In the IEEE 802.11p/WAVE vehicle network environment, the strict periodic beacon broadcasting of safety messages requires status advertisement to assist drivers in maintaining safety. The beacon broadcasting is required for real-time communication, and for avoiding the degradation of communication channels in high vehicular density situations. However, a periodic safety beacon in the IEEE 802.11p/WAVE standard can only transmit packets on a single channel using the MAC protocol. In high vehicular density situations, there exist several kinds to attackers who drops the packets communicated by vehicles. Many studies have indicated that appropriate attack algorithms are essential to provide secure operation of a network. In this paper, we have evaluated the shortcomings in the existing security aware routing protocols.

KEY WORDS: Vehicular Ad hoc Network, Routing protocols, Attacks, MANETs.

1. INTRODUCTION

Vehicular Ad hoc Network (VANET) is generally accepted as an exceptional type of Mobile Ad hoc Network (MANET), which gains interest from many researchers. In VANET each vehicle acts as a move to alter data between nodes in the network. It is good for vehicle-to-vehicle (V2V) and infrastructure-to-vehicles (I2V) communication. Such networks are within traffic control applications, safety applications, driver assistance and location based services. In VANETs power consumption and storage capacity are not limited and the position of the nodes may be determined by utilizing GPS [9].VANET has unique characteristics like high mobility with the constraint of road topology, initially low market penetration ratio, unbounded network size, infrastructure support that differ it from MANET. From the above mentioned characteristics, it's observed that conventional MANET routing protocols has difficulties to find stable routing paths in VANET environments [9]. Therefore, more and more researchers have concentrated on proposing suitable routing protocols to handle the highly dynamic nature of VANET.

VANETs are subset of MANET known as new generation of ad-hoc networks [4, 6]. In order to establish the communication VANET, each vehicle is as a node which can act both as receiver and sender and hereby broadcast different information between the vehicles. In these networks, the vehicles are equipped with wireless terminals with standards like DSRC with sending limit extendable up to 1000m. Because of limited radio range of each node in VANETs, it is required to re-broadcast the received broadcasted message for the neighbors. This type of sending is called multi-hop and requires routing algorithms. Routing in VANETs is very complicated and difficult because of some characteristics like high dynamism, high speed of vehicles and high broadcasting scale of information and the old routing methods are not sufficient in these networks. In multi-hop sending, the received limit of a message is gradually extended; but in this case the exponential increasing of the number of nodes re-broadcasting the message brings the problem of broadcast storm in broadcasting of information. Inter-vehicular communication is a research position that's rapidly expanding resulting from substantial advancements during cell phone additionally instantaneous transmission programs, together with the advancement of small management functions indoor present day vehicles, in addition to switching vehicles.

The involved communication cases are as follows-

1) Vehicles can distribute the sensed information or multi- media data through the network by using push- or pull-based techniques [18].
2) Vehicles can keep touching nearby vehicles in an ad hoc manner or via the communication infrastructure to be able to receive or send traffic, road condition information, or multimedia data [18].
3) An aggregator (such as a server) [18] can be utilized not merely to gather and process data but also to provide processed information to other vehicles on demand.

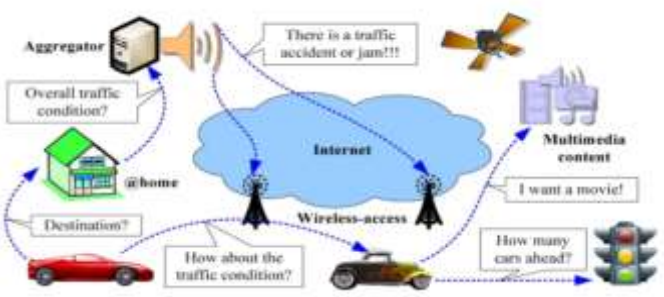

Fig 1: Application scenarios of vehicular information network [18]

2.TYPES OF VEHICULAR COMMUNICATION SYSTEM

2.1 Vehicle–to-Vehicle (V2V) Communication

1) The vehicle-to-vehicle (V2V) communication platform is actually a common research topic, with several different approaches. Many approaches exist, each with a somewhat different focus [9]. Traffic safety enhancement will be the driving factor in many approaches, typically ultimately causing an answer where sensor data from vehicles and roadside units is employed for providing accident and/or weather warnings to roadside units and vehicles.
2) Vehicle-to-vehicle (V2V) communications comprises an instant network where automobiles send messages as well as information regarding what they're doing. This data would include speed, location, direction of travel and insufficient stability. Vehicle-to-vehicle technology uses dedicated short-range communications (DSRC) [9]. V2V is just a mesh network, meaning every node (car, smart traffic signal, etc.) could send, capture and retransmit signals. Five to 10 hops on the network would gather traffic conditions a mile ahead [9].
3) It uses multi- hop/multi cast technique.

2.2 Vehicle-to-Infrastructure (V2I) Communication

1) The V2I protocol represents a practical solution for some applications to bridge the inherent network fragmentation that exists in virtually any multi-hop network formed over moving vehicles through expensive connectivity infrastructure [19].
2) Vehicle-to-Infrastructure (V2I) Communications for Safety is the wireless exchange of critical safety and operational data between vehicles and roadway infrastructure, intended primarily to avoid motor vehicle crashes [19].
3) It has high bandwidth link with vehicle and roadside equipment.
4) Roadside units broadcast messages.

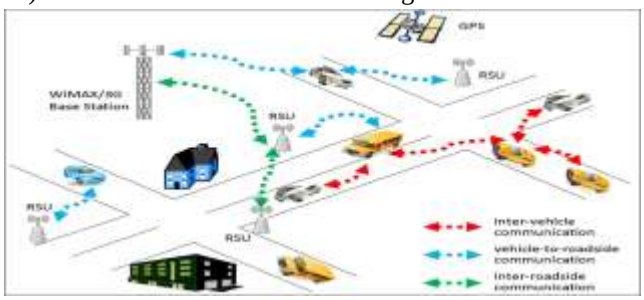

Fig 2: Communication in vehicular network [19]

2.3 Vehicle-to-Roadside Unit (V2R) Communication

1) Inside V2R connection vehicles can easily communicate having fixed infrastructure alongside of the trail in order to provide person communication and also information providers.
2) It has to be noted that architecture doesn't rely around the infrastructure in order to operate but instead exploits it to enhance the network performance.
3) A cross network significance the living of the two vehicles and also roadside equipment.

3. ROUTING PROTOCOLS

3.1 Fisheye State Routing: The idea resembles hyperlink talk about link state routing protocol (LSR). Each and every node looks after a topology table by the most up-to-date information and facts received coming from area nodes. The idea makes use of different trade interval for various entries in routing table to minimize how big manage announcements in big networks. Your disadvantage to FSR routing, is actually how big the routing table improves together with upsurge in community size. Course uncovering could be unsuccessful when the vacation destination node lies out from scope associated with source node. Due to high range of motion in VANET, way to remote control vacation destination decrease genuine.

3.2 Optimized Link State Routing Protocol: It is definitely a great protocol of any all-natural link condition project regarding mobile phone posting hoc networks. Every node inside community selects a few next door neighbor nodes known as multipoint relays which often retransmits its packets. Your next door neighbor nodes which are not in their MPR placed May just simply go through and also procedure your packet. This treatment cuts down how much retransmission inside a sent out procedure.

3.3 Ad hoc on-demand vector: Can be a supplier initiated redirecting standard protocol along with functions HELLO announcements to be able to recognizes neighbors. Supplier node voice messages any route request to its neighborhood friends which will fill send towards destination. Then a getaway unit solid any route answer packet towards sender. Any node preserves broadcast-id which wills increments for brand new RREQ. When a RREQ happens in the node, the idea checkups the actual transmitted username whether or not it's significantly below and also related to be able to former information in that case it can throw out the actual packet.

3.4 Temporally-Ordered Routing Algorithm: Each and every node constructs any focused cyclic by simply transmitting dilemma packets. Upon receiving a concern bundle, when the node carries a route to location it is going to post an answer bundle, otherwise the item drops a packet. Some sort of node for receiving an answer bundle can update the length not until the peak connected with bundle is actually bare minimum as compared to additional solution packets. It is an option to any or all a nodes while in the multilevel , nevertheless the servicing coming from all these kinds of paths is within VANET.

3.5 Greedy Perimeter Stateless Routing: Every node regularly messages shining example information in order to any or all their friends made up of their username and also position. In the event any node would not receives any shining example information from a neighbor for a particular time frame subsequently GPSR the router takes on that the neighbor provides been unsuccessful or away from array, and also erases your neighbor from the table. It needs money grabbing sending decisions working with specifics of immediate friends inside network. For the node when money grabbing sending is impossible that makes use of outdoors in the region way to acquire subsequently sending hop. Within a spot circumstances money grabbing sending is normally constrained because lead devices amongst nodes won't really exist as a result of obstacles this sort of as to case buildings and also trees. Remodeling the network topology in planarized data when money grabbing sending is difficult twill lower your efficiency of routing.

3.6 Vertex-Based predictive Greedy Routing: The item is usually a multi-hop vehicle-to-infrastructure direction-finding project for downtown environment. The item reports some appropriate junctions through the fundamental cause node in order to resolved system and then, send information towards resolved system via the sequence associated with junctions. The item functions place, pace in addition to track associated with cars for calculating equally string associated with appropriate junctions in addition to greedy forwarding. In formula associated with some appropriate junctions, an origin node figures the actual shortest course between on its own as well as its local resolved system with direction-finding system. Motor vehicle maintains a workplace that contains place in addition to track of its two-hop neighbors.

3.7 Road side-Aided Routing: Can be a composition with regard to efficient course-plotting inside vehicular crossbreed sites as opposed to definite course-plotting method? Right here roads are generally split into two market sectors with the use of road side units (RSUs), and the road is made up of vehicles and RSUs. These kind of protocols usually are not powerful inside great way examples since they may require stationary node as well as RSU.

4. LITERATURE SURVEY

Azim Eskandarian et al. [3] represents the challenges of Intervehicle adhoc network to provide network functionality. However, due to mobility constraints, driver behavior, and high mobility, IVC networks exhibit characteristics that are dramatically different and this examines the particular effect of the differences on the IVC communication architecture, such as essential safety measures ramifications**.**

Lars, Wischhof et al. (2005) [4] proposed a technique for scalable information dissemination in highly mobile ad-hoc networks, it presents method oriented data abstraction and dissemination (SODAD) with this method one application is presented i.e. self-organizing traffic-information system (SOTIS). In SOTIS, a car is equipped with a satellite navigation receiver, an IVC system and a digital map. The performance of the proposed methods is evaluated using network simulation with vehicular mobility models.

Tarik, Taleb et al. [6] represents that it 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. The detailed on vehicles movement information to know a possible link breakage. The scheme used behind is to send only particular and well known packets called as best packets.

M. Jerbi, M. Senouci, R. Meraihi et al. [7] proposed an inter-vehicle ad-hoc routing protocol called GYTAR (improved greedy traffic aware routing protocol) suitable for city environments. GYTAR consists of two modules: (i) dynamic selection of the junctions through which a packet must pass to reach its destination, and (ii) an improved greedy strategy used to forward packets between two junctions. In this paper, we give detailed description of our approach and present its added value compared to other existing vehicular routing protocols. Simulation results show significant performance improvement in terms of packet delivery ratio, end-to-end delay, and routing overhead.

Feldmann, Anja,et al. [8] tells about the summary of the challenges a future Internet has to address and then discuss approaches for finding possible solutions, including Clean Slate Design. Next, we discuss how such solutions may be evaluated and how they could be retrofitted into the existing Internet. Then, we briefly outline the upcoming research activities both in Europe and the U.S. Finally, we end with a perspective on how network and service operators may benefit from such an initiative.

Eriksson, Jakob, et al. [10] discusses two new components for improving open Wi-Fi data delivery to moving vehicles: The first Quick Wi-Fi, is just a streamlined client-side process to ascertain end-to-end connectivity, reducing mean connection time and energy to significantly less than 400 ms, from over 10 seconds when working with standard wireless networking software. The second part, CTP, is just a transport protocol that distinguishes congestion on the wired part of the trail from losses over the wireless link, resulting in a 2×throughput improvement over TCP. To characterize the amount of open Wi-Fi capacity offered to vehicular users, we deployed Cabernet on a fleet of 10 taxis in the Boston area.

Belimpasakis, Petros, et al. [11] proposes a remedy that enables home hosted content, found on home PCs or UPnP media servers, to be wanted to remote clients, for consumption. A model of the system was built, with the proxy functionality implemented on a house PC and the remote clients running on mobile phones. Special attention

has been paid to the social aspects of content sharing, for allowing the house owner to also invite other external users to remotely access specific, home-based media containers, with very simple and secure device configuration.

Zhao jing et al. [12] Showed the various vehicle-assisted data delivery (VADD) protocols to be able for sending the packet towards the finest route together with the smallest information-delivery delay. Experimental results show that the proposed VADD protocols outperform existing solutions in terms of packet-delivery ratio, data packet delay, and protocol overhead. Among the proposed VADD protocols, the hybrid probe (H-VADD) protocol has a much better performance.

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Jacobson, Van, et al. [13] proposes the network use has evolved to be dominated by content distribution and retrieval, while networking technology still speaks only of connections between hosts. Accessing content and services requires mapping from what that users care about to the network's where. We present Content-Centric Networking (CCN) which treats con- tent as a primitive – decoupling location from identity, security and access, and retrieving content by name. Using new approaches to routing named content, derived heavily from IP, we can simultaneously achieve scalability, security and performance.

Anna Maria, Vegni et al. [16] describes a hybrid interaction paradigm intended for car social networking is actually shown by which connection is actually given by each established multi-level commercial infrastructure through a vehicle-to-infrastructure method plus regular vehicle-to-vehicle networking. The idea characterize the maximum plus bare minimum bounds of real information propagation plus review functionality having regular concept propagation based upon opportunistic networking.

5. GAPS IN LITERATURE

1. The use of optimum or sub-optimum values are ignored while detecting the wormhole attacks in VANETs.
2. The use of triangular mutation-based particle swarm optimization is ignored in existing literature which can find optimum values for epidemic broadcast algorithm based VANETs.
3. The effect of heterogeneous scenarios is also ignored by the most of existing researchers.

6. CONCLUSION

VANETs facilitate the broadcasting of status information among vehicles. In the IEEE 802.11p/WAVE vehicle network environment, the strict periodic beacon broadcasting of safety messages requires status advertisement to assist drivers in maintaining safety. The beacon broadcasting is required for real-time communication, and for avoiding the degradation of communication channels in high vehicular density situations. However, a periodic safety beacon in the IEEE 802.11p/WAVE standard can only transmit packets on a single channel using the MAC protocol. In high vehicular density situations, there exist several kinds to attackers who drops the packets communicated by vehicles. Many studies have indicated that appropriate attack algorithms are essential to provide secure operation of a network. In this work, we have not proposed any novel routing technique, therefore, in near future to detect wormhole attack, triangular mutation based particle swarm optimization-based epidemic broadcast algorithm will be designed.

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