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Cluster Heads Based IEEE 802.11P And LTE Hybrid Design for VANET Safety Message Dissemination

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***Abstract*—** Several VANET studies have been concentrated on the strategies supported by IEEE 802.11p which gives the definition for Wireless Access for vehicular Environments (WAVE), Whereas the networks using IEEE 802.11p causes the transmit storm and detached networks are main issues at more and less vehicle densities, it also degrade the latency and delivery ratio of safety message dissemination.

Recently, an alternative to IEEE 802.11p based VANET, the utilization of cellular technologies has been discovered as a result of their low latency and broad communication. However, a pure cellular depending VANET communication isn't possible as a result of the high price of transmission between the vehicles and base stations, and high variety of disconnections occurs at the base station or road side unit (RSU) considering the high quality of the vehicles. This paper proposes a hybrid design, specifically VMaSC-LTE, combining IEEE 802.11p primarily based multi-hop bunch and fourth generation cellular system, long term Evolution (LTE), with the goal of achieving high information packet proportions and low delay whereas keeping the utilization of the cellular design at lowest level. In VMaSC-LTE, vehicles are clustered supported and completely unique approach named VMaSC: conveyance Multi-hop rule for Stable bunch. The characteristics of VMaSC are cluster head (CH) election utilizing the relative movability metric calculated because the average relative speed with reference to the neighboring vehicles, cluster reference to minimum overhead by introducing direct affiliation to the neighbor that's already a head or member of a cluster rather than linking to the cluster head in multiple hops, diffusing cluster member data inside periodic greeting packets, re-active cluster to take care of cluster structure while not excessive use of network resources, and economical size and hop restricted cluster merging mechanism depending on the exchange of the cluster data among the cluster heads. These characteristics decrease the quantity of cluster heads whereas increasing their stability and minimize the use of the cellular design. From the clustered topology, elected heads operate as dual-interface junction with the process of IEEE 802.11p and LTE interface to link VANET to LTE network. Utilization of different key metrics and including information packet delivery proportions, delay, managing overhead and cluster stability, we have a tendency to demonstrate superior functionality of the advanced design compared to each already proposed hybrid architectures and various routing mechanisms together with flooding and cluster depending routing via intensive simulations in ns-3 with the vehicle quality input from the Simulation of Urban quality (SUMO). The enhancing design conjointly permits achieving highly needed authenticity of the appliance quantified by the information packet delivery proportion at the price of LTE usage measured by the quantity of cluster heads within the network.

***Keywords*—** *vehicular ad hoc networks, clustering, IEEE 802.11p, LTE, safety application, message dissemination.*

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I. Introduction

Up to now, many VANET studies have concentrated on the communication ways supported by IEEE 802.11p, that forms the quality for WAVE. IEEE 802.11p provides rate starting from Mbps to twenty seven Mbps at short radio transmission distance, around three hundred meters. Dispersive safety information over an oversized space needs to associate in intelligent multi-hop transmit mechanism handling 2 major problems: transmit storm and detached network. The transmit storm drawback happens at excessive traffic density wherever the packet delay and range of collisions at the medium access management layer increase dramatically because the range of vehicles trying to transmit at the same time will increase. Probabilistic flooding and cluster are usually address the storm drawback. On the opposite hand, the detached network drawback happens at less traffic density wherever the quantity of nodes insufficient to circulate the statistics to any vehicle in a region. Store-carry-forward, wherever the vehicles within the opposite way are used for message dissemination, is often utilised to deal with the detached network drawback. The solutions addressing each broadcast storm and detached network issues but are shown to produce network delays variable from more seconds to more minutes and also the proportion of the vehicles with success receiving the packets happening to hour.

Recently, as another alternative to the IEEE 802.11p based VANET, the utilization of cellular technologies has been discovered. The key enabler of such usage is that the standardization of the advanced content broadcast/multicast services by the Third Generation Partnership Project (3GPP), that provides economical message dissemination to several users over a geographical region at fine graininess. The utilization of the third generation mobile cellular system, referred to as Universal Mobile Communication System (UMTS), within the safety application of the vehicles has already been experimented in Project Cooperative Cars (Co-Cars). The traffic risky warning message has been shown to be disseminated in but one second. The fourth generation cellular system, referred to as long run Evolution (LTE), is associate degree evolution of UMTS increasing the capability and speed employing a completely different radio interface at the side of core network enhancements. The LTE specification provides down-link peak rates of three hundred Mbps, up-link peak rates of seventy five Mbps, transfer latency of but five meters and transmission vary up to one hundred kilometers within the radio access network. Despite the high rate including wide-range communication, however, a pure LTE based design isn't possible for transport communication owing to the high price of LTE communication between the vehicles and also the RSU, high range of disconnections occurs at the base station or RSU considering the high quality of vehicles, and overload of the base station by the published of high range of vehicles at high traffic density.

In the literature, VANET cluster has been performed completely different functions like load equalization, quality of service support and knowledge dissemination at high density conveyance networks. Stable clustering with less number of cluster heads(CHs) and minimum overhead needs cluster connecting, maintenance and merging mechanisms jointly with an effective cluster metric considering the high quality of vehicles. Cluster metrics employed in the VANET literature embrace direction; packet delay variation; location difference; speed difference; combination of location and speed variations thought a metric combining the locality and speed of the neighboring vehicle define their link span compared to a metric considering their speed solely, all vehicles might not have localization capability. Compute packet delay variation on the opposite hand needs terribly correct synchronization among the vehicles with low level time stamping of the packets required the random access protocol utilized by IEEE 802.11p. Besides, cluster connection in each one-hop and multi-hop VANET is on to the cluster head. However, connection to the cluster through a cluster member and informing the cluster head later via periodic greeting packets will decrease cluster affiliation time and overhead considerably. Such economical mechanisms are enhanced in mobile ad-hoc networks (MANET), but sometimes assume stationarity of the nodes throughout cluster. In cluster maintenance is achieved through either periodic re-clustering wherever cluster procedure is dead sporadically or re-active cluster wherever cluster is triggered only the cluster head has lost affiliation to any or all its members or cluster member cannot reach its cluster. Re-active cluster is efficient since re-clustering procedure is activated only the cluster structure is destroyed while no excessive periodic packet transmission overhead. moreover, already enhanced cluster merging mechanisms are activated either once the space between 2 neighboring cluster heads is a smaller amount than a precise threshold or once the cluster heads stay connected for a time period higher than a preset value. However, cluster merging may end up in terribly giant size integrated clusters wherever cluster head becomes bottleneck due to the high range of packets of its cluster members and enormous range of hops that will increase the delay of packet transmissions to unravel the cluster head bottleneck and enormous delay issues, cluster merging ought to limit each the dimensions and range of hops within the ensuing integrated cluster. Also, previously proposed multi-hop cluster algorithms solely specialised in providing cluster stability through metrics like cluster head period, cluster member period and cluster head amendment, however don't analyze the performance of their proposed rule in message dissemination in terms of metrics like packet delivery proportion and delay.

In this paper, we have a tendency to propose a hybrid design, particularly VMaSC-LTE, combining IEEE 802.11p based multi-hop agglomeration and LTE with the goal of achieving high packet delivery proportions and low latency whereas keeping the utilization of the cellular infrastructure at minimum level via minimizing the quantity of cluster heads and maximizing the agglomeration stability.

II. Existing System

In existing System, the transmit storm and detached network issues at excessive and insufficient vehicle densities degrade the delay and delivery proportions of safety message dissemination. Recently we tend to choose IEEE 802.11p based VANET, the utilization of cellular infrastructures has been discovered due to their low latency and broad communication. However, a pure cellular depending VANET transmission isn't possible due to high cost of communication between the vehicles and base stations, and high range of disconnections occurs at the base station considering the high quantity of the vehicles.

III. Proposed System

we propose a hybrid design, particularly VMaSC-LTE, combining IEEE 802.11p based multi-hop cluster and LTE with the goal of achieving high information packet delivery

proportion and low delay whereas keeping the utilization of the cellular infrastructure at minimum level via minimizing the amount of cluster heads and maximizing the cluster stability.

A. Modules:

1) Creating the VANET environment
2) Route discovery
3) Vehicles to CH communication
4) CH communication with RSU

1) Creating the VANET Environment:

We are aiming to build the vehicle area unit inherent with the sensors. Setup the RSU's for the actual coverage space of the vehicles. Build the metallic element which can check the vehicle going in the actual coverage space.

2) Route Discovery:

If the source vehicle has no route to the destination vehicle, then source vehicle initiates the route discovery in an on-demand fashion. After generating response request (RREQ), node looks up its own neighbor table to find if it has any closer neighbor vehicle toward the destination vehicle. If a closer neighbor vehicle is available, the RREQ packet is forwarded to that vehicle. If no closer neighbor vehicle is the RREQ packet is flooded to all neighbor vehicles.

A destination vehicle replies to a received RREQ packet with a route reply (RREP) packet in only the following three cases:

1) If the RREQ packet is the first to be received from this source vehicle

2) If the RREQ packet contains a higher source sequence number than the RREQ packet previously responded to by the destination vehicle

3) If the RREQ packet contains the same source sequence number as the RREQ packet previously responded to by the destination vehicle, but the new packet indicates that a better quality route is available.

3) Vehicle to CH Communication:

In this module, we are implementing CH with forward and backward data collection in a VANET. The vehicles that communicate directly with CH act like as a data unit. The CH collects the data from the vehicles and forward to RSU.

4) CH Communication with RSU:

In this module, we show a CH to RSU communication, the CH transfer messages to RSU'S. For using CH in VANET the Load is balanced and easy to data forward to RSU. This communication should be service oriented so that the RSU is exploited from obtaining the various types of data.

Algorithm:

1) A vehicle Hello Timer is expired.

   a) A vehicle has a HELLO_PACKET.

      i) It transmits HELLO_PACKET to build its own VIB.

   b) If vehicle receives JOIN_RESP.

      i) Vehicle transmits from state SE to CM.

      Else

      ii) Vehicle transitions from SE to CH.

   c) If vehicle receives ISO_CH_FORWARD.

      vehicle transitions from SE to ISO_CH.

      else

      The vehicle is in CH state.

      Broadcast the CH_ADV.

2) If vehicle has DATA_PACKET.

   a) It sends information to the CH.

   b) CH sends information to RSU.

3) If RSU receives the information.

   a) Multicast data to the CHs.

   Else

   b) Unicast the data.

   c) Update VIB.

IV. Conclusion:

In this paper, we tend to introduce a completely unique design VMaSC-LTE that integrates 3GPP/LTE networks with IEEE 802.11p based mostly VANET networks. In VMaSC-LTE, vehicles are clustered during a multi-hop based mostly novel approach named VMaSC with the options of cluster head choice victimization the relative quality metric calculated because the average relative speed which refers to neighboring vehicles, cluster reference to minimum overhead by introducing direct association to the neighbor that's already

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a head or member of a cluster rather than connecting to the cluster head in multiple hops, spreading cluster member data at intervals periodic packets, reactive clump to take care of cluster structure while no excessive consumption of network resources, and efficient size and hop restricted cluster merging mechanism supported the exchange of the cluster data among the cluster heads within the created clusters, CHs activate the LTE interface to attach the VANET network to LTE.

As future work, we have a tendency to research the utilization of VMaSC-LTE in urban traffic eventualities and extend VMaSC-LTE design with information aggregation and calculation of the agglomeration metric with additional data such as a probable path data of the vehicles.

Results:

- *Graph :1*

Fig : In this graph delay is high in existing system.

- *Graph :2*

Fig: In this graph packet delivery ratio high in existing system.

- *Graph :3*

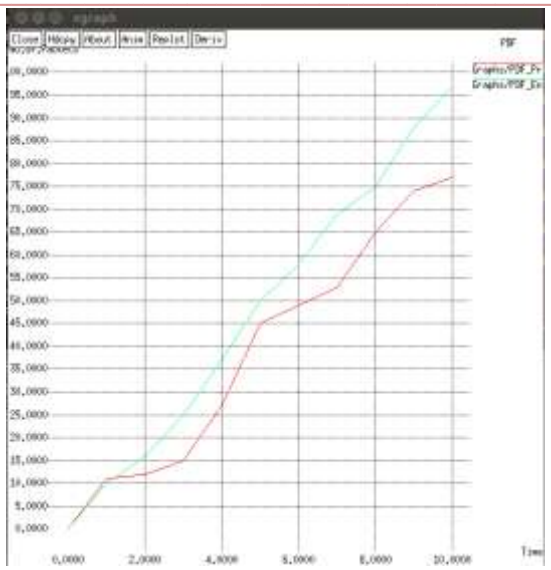

Fig: In this graph packet delivery ratio is increased in proposed system

- *Graph :4*

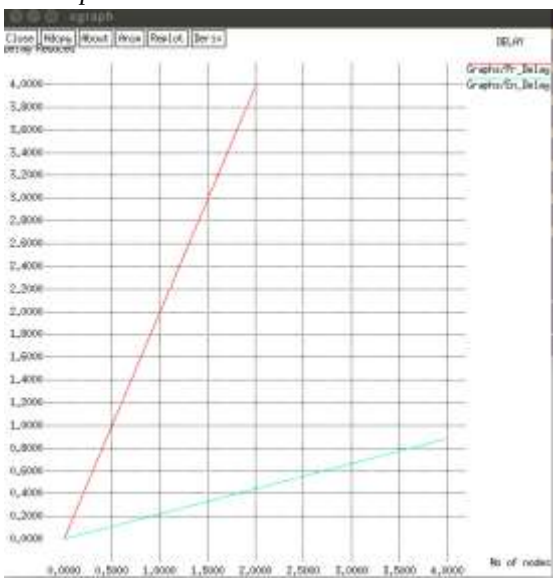

Fig: In this graph delay is decreased in proposed system.

References*:*

[1] S. Ucar, S. C. Ergen, and O. Ozkasap, "VMaSC: Vehicular multi-hop algorithm for stable clustering in vehicular ad hoc networks," in Wireless Communications and Networking Conference (WCNC), IEEE, 2013, pp.2381–2386.

[2] "VSCDA: Vehicular Stable Cluster-based Data Aggregation," in International Conference on Connected Vehicles and Expo (ICCVE), November 2014.

[3] R.Chen, W.-L. Jin, and A. Regan, "Broadcasting safety information in vehicular networks: issues and approaches," Network, IEEE, vol. 24, no. 1, pp. 20 –25, 2010.

[4] "Vehicle Safety Communications Project Task 3 Final Report: Identify Intelligent Vehicle Safety Applications Enabled by DSRC," in The CAMP Vehicle Safety Communications Consortium,, June 2010.

ISSN: 2321-8169
1428 – 1432

[5] "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Definitions," in The CAMP Vehicle Safety Communications Consortium,, June 2010.

[6] N. Wisitpongphan, O. Tonguz, J. Parikh, P. Mudalige, F. Bai, and V. Sadekar, "Broadcast storm mitigation techniques in vehicular ad hoc networks," Wireless Communications, IEEE, vol. 14, no. 6, pp. 84 –94, December 2007.

[7] N. Wisitpongphan, F. Bai, P. Mudalige, V. Sadekar, and O. Tonguz, "Routing in sparse vehicular ad hoc wireless networks," Selected Areas in Communications, IEEE Journal on, vol. 25, no. 8, pp. 1538–1556, 2007.