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Efficient Data Broadcasting Between Vehicles In VANET's Using DSDR

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Abstract

In Wireless communication one of the types is Mobile Ad-hoc Network which is Infrastructure less network. The subgroup of Mobile Ad-hoc network is a Vehicular Ad-hoc network. In VANET moving vehicles are mobile nodes since they are moving in different direction with different speed there will be continuous change in the network structure may be disconnection occur in the network. In this paper, we focus on design and implementation a data transfer between source and destination node using Dedicated Short Distance data Range Communication protocol. By using DSDR we can find the short distance between source and destination with the help of Distance vector Algorithm and Link State Vector Algorithm, by finding the shortest path we can transfer data from source to destination. In DSDR packet loss is less, End to End delay will be less and Efficiency will be increases. The Packet loss, End-to-End delay, Throughput and Packet Delivery Ratio are the metrics used to analysis performance of DSDR and with other protocol like AODV.

Keywords: *Vehicular Ad-hoc Networks (VANET's), Dedicated Short Distance data Range Communication protocol (DSDR), Ad-hoc On demand distance vector Algorithm (AODV).*

1. Introduction

The communication means exchanging the information from one place to another place or from one person to other person or from one device to another device. In wireless communication one of the types is mobile communication, routing the path and exchange the information between the nodes in the network using protocols. Ad-hoc is the temporary connection between the devices. There is no infrastructure, by using Ad-hoc routing protocol transferring the data to the mobile nodes, is called MANET's. The nodes in the Mobile-Ad-hoc routing protocols will be used in the MANET to transfer the data among the nodes for different application. The one or more general form or subgroup of the Mobile Ad-hoc network is Vehicular-Ad-hoc Network.

In this Vehicular-Ad-hoc Network it uses the moving vehicles as mobile nodes. In VANET's both the Infrastructure and Infrastructure less networks, like in VANET's they use pre-existing infrastructure like wireless access point (RSUs) Road Side Unit's, by using Wi-Fi or Wi-max technology they broadcast the data among the vehicles. In VANET's vehicles are moving with different velocities. So nodes in the VANET's are characterized by its mobility and density.

VANET architecture contains three important components, Application unit, On-board Unit and Road Side Unit. RSU is a wireless access point which is located at the roadside it is connected backbone to the network, it disseminates the road information to all the nodes which is present in the network. It transfer updated traffic rules, traffic information and other Ad-on services. It provides internet connection to vehicles; vehicles can download information from RSU's. Application unit is present inside the vehicle it takes application provided by the application providers like RSU and other OBU's. On-Board unit which is present On-board of the vehicle it contains command processor, Memory so that to store information and retrieve the information it also contain user interface so that it communicate with the other OBU of the vehicles and with the RSU's.

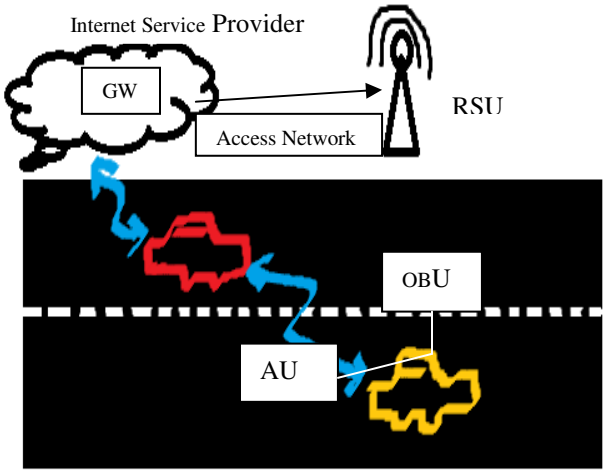

Fig. 1 VANET Architecture

2. Related Work

In this section we discuss about Ad-hoc protocols and Algorithms.

2.1 Ad-hoc Routing protocols

2.1.1 Proactive routing protocol [3]

In this protocol all the nodes in the network have to maintain a table. All nodes have an entry in the table about network structure. While transferring the data to the destination this table driven route should be present for all destination.

The nodes in the network, they periodically exchange the information with its neighbors which is present in the network topology.

2.1.2 Reactive Ad-hoc routing protocol [3]

In protocol the routes are calculated on demand. Whenever the source is transferring the data or information into the destination at that time it awake router to activate the route to the destination.

2.2 Algorithms

2.2.1 Distance Vector Algorithm [1]

Distance vector Algorithm, in which nodes in the network maintain table. Nodes only provide its neighbors node name and cast. Anything changes in the network topology all nodes should entry in the table. Before transferring the data they periodically exchange the table, according to the table entry they find the minimum shortest path distance, we know that all nodes know that which upcoming neighbor node can provides shortest distance to transfer data.

2.2.2 Link State routing Algorithm [2]

In this Algorithm each node in the network meet its neighbors and they know their neighbor node names and distance, they create Link state packet which contains all neighbor node names and distances, all the entries will be present in the Link state packet and if any changes in network structure, each nodes periodically exchange information and entries in LSP. The recently updated LSP packets are stored in all nodes which are present in the network. By storing recently updated LSP they can find which upcoming neighbor node provides minimum shortest path to en-route data from source to destination.

3. System Analysis

3.1 Proposed method

In proposed method we use Dedicated Short Distance Range data communication. DSDR is the Ad-hoc routing protocol used in the network. By using DSDR we can measure the Distance from source to destination node in the network. In DSDR, Dedicated Short Distance Range communication, the name Dedicated tells that only on demand the route will be activated while broadcasting information from source to destination. We use the Distance Vector Algorithm and Link State Vector Algorithm to find the shortest distance between source and destination and then it will broadcast the information.

The protocol DSDR and by using Algorithm after finding the shortest distance range, source node to broadcast the information to destination node. RSU's provide internet connection to vehicles; source node can download information from RSU's. RSU's contain traffic rules and traffic updated information, they also measure the appropriate speed of the vehicles. For example if destination node cross the speed limit, RSU sends warning message to driver to go slow , this type of warning message can be broadcast from source to destination. In case destination vehicle dropout from the signal level other vehicles which are on the route will go to join to make connectivity. In this paper we also use Wi-Fi (IEEE-802.11) technology to broadcast information. In vehicles we use Omni Antenna through this antenna vehicle getting the network connectivity and also they communicate with each other.

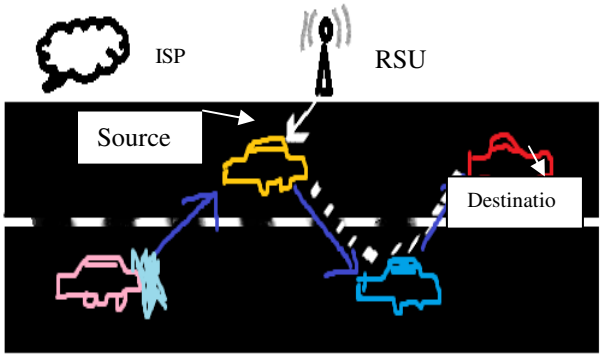

Fig. 2 Block Diagram

4. Simulation Tool

In this paper for simulation we use Network Simulator version 2.35, which is first developed at UC Berkeley. It is used for designing new protocols comparing different protocols and also for traffic evaluation. NS2 is built by using C++ and OTCL. For programming we use TCL.

5. Result Analysis

This section gives the evaluation of the proposed method by using Network Simulator (2.35).

Table 1: Simulation parameter

Parameters	**Values**
Simulator	NS 2.35
Radio Propagation Model	Two Ray Ground
Protocol	AODV, DSDR
Traffic source	CBR
Application Agent	TCP, UDP
Antenna	Omni Antenna
Phy type	Phy/Wireless channel
channel	Channel/Wireless channel
MAC	802.11
Number of Nodes	16
Platform	Ubuntu
Simulation Area	1000x1000

5.1 Simulation setup

In simulation we go to deploy vehicles as node and RSU access point. By using DSDR protocol and DVA and LSV Algorithm data is transfer between the source node and destination node. To analyze the performance of DSDR protocol with other protocol we measure packet loss, Throughput, End to End Delay and Packet delivery ratio.

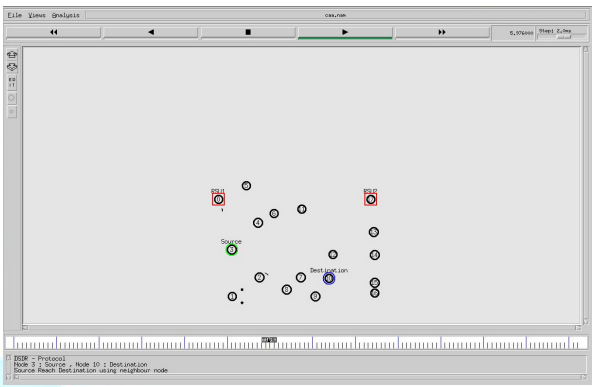

Fig. 3 NAM result

5.2 Performance Analysis of DSDR and AODV

Table 2: Comparison results of DSDR and AODV

Parameters	DSDR	AODV
Generated Packets	2678	1383
Received Packets	2162	934
Packet Delivery Ratio	80.73%	67.53%
Total dropped Packets	515	448
Average End-to-End Delay	47.88ms	70.44ms
Throughput	568.21Mbps	254.18Mbps

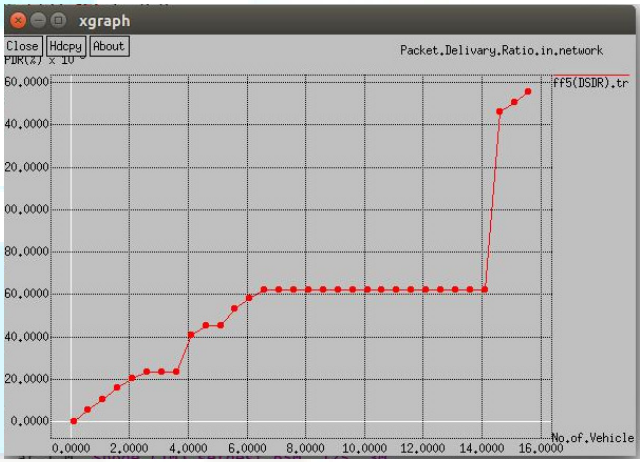

Fig. 4Packet Delivery Ratio graph of DSDR

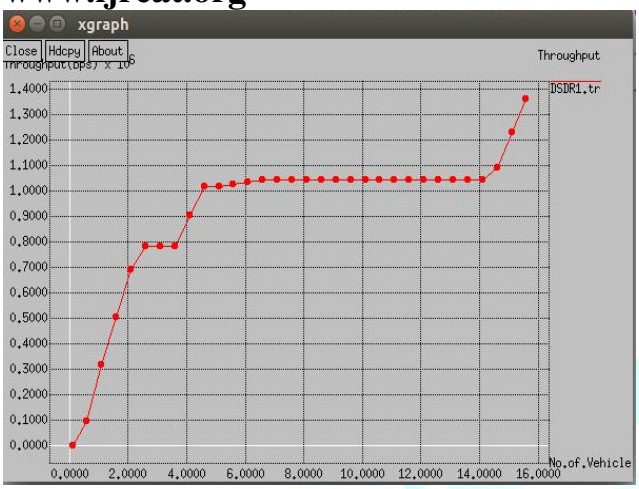

Fig. 5 Throughput graph of DSDR

Fig. 6 End-to-End Delay graph of DSDR

Fig.7 Packet lost graph of DSDR

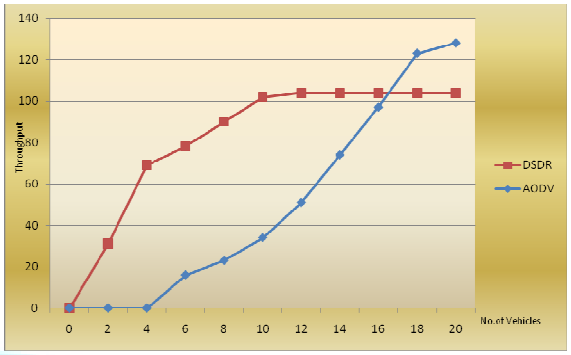

Fig. 8 Throughput Comparision of DSDR and AODV

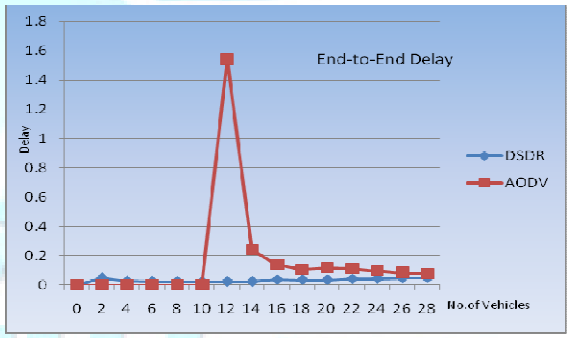

Fig. 9 End-to-End Delay Comparision of DSDR and AODV

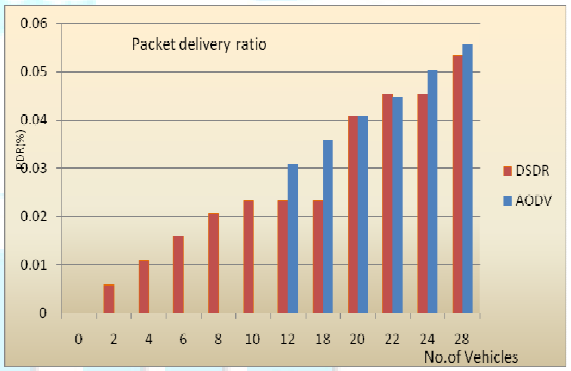

Fig. 10 Packet Delivery Ratio Comparision of DSDR and AODV

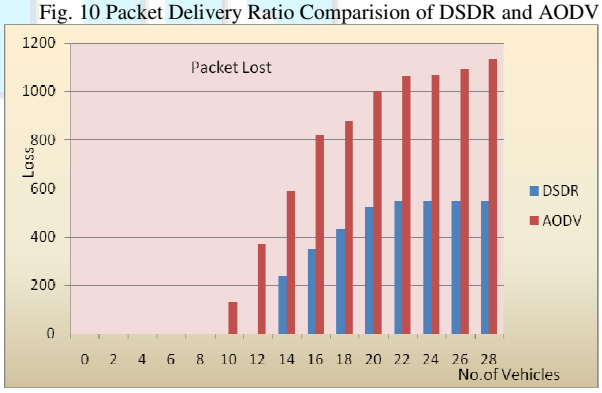

Fig. 11 Packet Lost Comparison of DSDR and AODV

The Fig4 shows Packet Delivery Ratio of DSDR X-axis taken as No. of Vehicles and Y-axis is taken as PDR(%), according to DSDR Performance PDR(%)=80.73%. The Fig6 Shows End to End Delay of DSDR X-axis taken as No. of Vehicles and Y-axis taken as Delay (in m sec) ,according to DSDR End to End Delay is 47.88ms.The Fig 5 Shows Throughput of DSDR where X-axis taken No. of Vehicles and Y-axis Throughput(bps),according to DSDR Performance Throughput is 568.21Mbps.The Fig 7 shows the packet lost of DSDR where X-axis taken No. Of Vehicles and Y-axis Packet loss, according to DSDR packet lost=515.

The Fig 8, Fig 9 and Fig 10 Fig 11 Shows the Performance Analysis of DSDR with AODV with all the Three Matrices Packet Delivery Ratio, packet lost, End to End Delay and Throughput. In Fig 10 Shows the PDR Comparison between DSDR and AODV, X-axis No. Of Vehicles and Y-axis PDR (%).DSDR PDR (%) is 80.73 and AODV PDR (%) is 67.53 Compare to AODV DSDR provide better Packet Delivery ratio. In Fig 9 shows the End to End Delay Comparison X-axis No. Of Vehicles and Y-axis taken as Delay (m sec) DSDR E2E Delay is 47.88ms and AODV E2E Delay is 70.44ms compare to AODV and DSDR, AODV delay is more. In Fig 8 shows the Throughput Comparison X-axis taken as No. Of Vehicles and Y-axis taken as Throughput (bps). The DSDR Throughput is 568.21 Mbps and AODV Throughput is 254.13Mbps.Fig 11 shows the Comparison of Packet lost of DSDR and AODV graph packet lost of AODV is more compare to AODV. The Performance result Analysis shows that DSDR gives better Performance compare to AODV.

6. Conclusions and Future scope

This paper present DSDR to find the shortest distance between source nodes to destination node. In this proposed system we use Wi-Fi technology and RSU.RSU provides internet connectivity to vehicles, it is connected backbone to the network. DSDR is the protocol used for data broadcasting it uses DSV and LSV algorithm to find shortest path between source and destination. In case destination is away from signal level, other vehicle in the same route joins to keep on connectivity to broadcast information. DSDR provide better network connectivity, better efficiency and less packet lost compare to other protocol.

In future Scope we can design and implement that VANET's works for 5G and also we can use Wi-Max technology so that we can provide network connectivity for long distance data transmission .Wi-Max we can provide through Mobile networks or through LAN connection to RSU's also so that without disconnection we can broadcast information over long distance.

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BIOGRAPHIES

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