Network Performance on City and Highway Vehicles using LAR and DREAM Protocol

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Received: April 01, 2019 Accepted: May 16, 2019

ABSTRACT: *VANET has grasp the attention of various researchers in this field due to its wide range of applications in different fields i.e comfort, safety and entertainment. It is very expensive to test every network protocol or any network algorithm in real network by connecting a number of routers, computers and data links. Thus, in this paper cluster parameters like throughput, PDR , routing overhead and E2E for different routing protocols performed on simulator to prevent from damage or unpredictable result and without spending money.*

Key Words: *VANET, LAR , DREAM , NS2 , PDR and E2E.*

I. INTRODUCTION

With the gigantic increment in number of vehicles individuals are confronting issues like traffic clog. The clog and significant vehicle settlement issues are joined by a consistent track of mishaps too. Lacking of street traffic security prompts risk to human lives and furthermore acts peril to our condition like well. Starting insurances like safety belts and airbags are not adequate enough to wipe out issues emerging because of driver's powerlessness to see the circumstance early. The longing to encourage the travelers and increment security of street clients was the principle rationale behind the advancement of Vehicular Ad-Hoc Network. VANET is another strategy of correspondence among vehicles even at high speeds on streets which uses devoted short range radio sign DSRC (5.9GHz) standard which utilizes the IEEE 802.11p for remote vehicular correspondence. VANET coordinates various systems administration advancements, for example, Wi-Fi IEEE 802.11p, WAVE IEEE 1609, WiMAX IEEE 802.16, Bluetooth, IRA and ZigBee. [3]VANET conveys administrations like traffic the executives, electronic toll accumulation, traffic designing, and gives crisis data, parking area installment and some more. VANET are essentially like MANET yet high portability, changing hub thickness, high preparing force, development at high speeds, troublesome correspondence situations with short connection lifetime are the different qualities which vary it from MANET. Because of fluctuating system topologies and its dynamic nature directing issues turns out to be progressively challengeable and complex. Steering conventions in VANET ought to be solid, versatile to network load, strong and must have least idleness. VANET sends elements like absence of data about hub's neighbors, short system term and absence of worldwide region organize for directing conventions [9]. The target of this paper is to examine the MANET steering conventions in practical VANET condition by utilizing solid test system having both system and traffic recreation abilities like NCTUns6.0 which gives answer for reproduce IEEE 802.11(p) vehicular systems. For the most part numerous specialists centers around utilizing single condition of VANET to assess the exhibition of different directing conventions yet in our examination both roadway and city situation are utilized to figure out which convention gives better execution utilizing QOS parameters. This paper is sorted out as pursues. Related work is depicted in area II. Segment III depicts the different MANET based directing conventions to be assessed. Simulative strategy is routing protocols. in area IV Area V depicts proposed algorithm and result. lastly segment VI finishes up the paper.

II.RELATED WORK

VANET prototyping continuously condition is a difficult undertaking. Numerous analysts have been sent in most recent couple of years yet there is need of legitimate deliberate execution assessment and correlation of MANET based steering conventions to be utilized in VANET reasonable condition.

Singh. P et al. [1] assessed the presentation of VANET utilizing QOS measurements for AODV, DSR and ADDMR multicast conventions in urban condition. The QOS execution is assessed by utilizing measurements like directing overhead, normal deferral with 1024 bytes of bundles, parcel conveyance proportion and reasoned that with the expansion in number of hubs normal postponement for conventions

additionally increments however DSR has less deferral than others and furthermore overhead is exceptionally less. Additionally we presumed that AODV execution is less yet it decreases intemperate memory prerequisite and aides in course repetition. ADDMR likewise gives best outcomes as indicated by the paper as it embraces the difference in portability and control intermittent superfluous messages.

Omer masood et al. [4] assesses that VANET has a truly evolving topology, likewise activated halfway updates are more compelling than occasional updates which help to build throughput. Reproduction results demonstrates that ADV beats AODV as far as sound and video information transmission, additionally ADV has less steering overheads and parcel misfortune than AODV reacts rapidly to network load varieties and furthermore throughput of ADV is higher. This paper presumes that with increment in system load more parcels utilize the stations this prompts increment in crash and course disclosure in AODV takes such a long time. Then again, ADV productively disperses the steering data and furthermore limits the quantity of directing parcels utilized along these lines leaving more transfer speed for information bundles.

Shailkul at al. [3] analyzed the presentation of different receptive steering conventions like DSR, AODV, AOMDV in VANET by utilizing distinctive portability model in VANET MobiSim structure and changing the parameters like versatility, hub speed, number of sources utilizing diverse execution measurements. On portability model two sorts of diagrams were produced client characterized and space chart, later execution measurements demonstrates that presentation of AOMDV is better however execution diminishes in space diagram model. It is presumed that AOMDV has disadvantage as it requires all the more steering burden.

As of not **long ago** couple of studies [5-7] have looked at different customary impromptu steering conventions in VANET condition utilizing NS2 test system. Reenactments done in VANET are extremely unfriendly and don't convey practical VANET situations. Straightforward topologies on streets were considered in most extreme cases, so to examine these conventions we need a test system that have both system and traffic reenactment. NCTUns6.0 is such a device having both system and traffic recreation and subsequently to approve our discovering we utilize this test system for simulative examination of conventions in both expressway and city situation in VANET.

III. ROUTING PROTOCOLS

In the previous couple of years directing in VANET is broadly contemplated and explored. As VANET have a place with unique class of Ad-Hoc organizes, the generally utilized Ad-Hoc steering conventions for MANET have been assessed and tried to be utilized in VANET condition. Utilizing of area based and topology based directing conventions of MANET requires the doling out of one of a kind delivers to taking an interest hubs yet in VANET condition these conventions can't take assurance to maintain a strategic distance from the distribution of copy addresses among vehicles in the system. Because of different directing related issues it has incited scientists to discover such steering calculations that are increasingly adaptable, powerful and can convey improved parcel conveyance proportion and better throughput.

Besides in area based conventions there is incessant requirement for area administrations and servers so our principle center later is around topology based directing conventions as they have not these instruments and extremely valuable in simulative examination in VANET condition. Following are a portion of the conventions to be picked for simulative examination in various rush hour gridlock situations:

DSR: Dynamic Source Routing is essentially utilized for remote work systems and like AODV these are on-request steering conventions. DSR decreases overheads on a system and utilizations source directing instrument rather on relying upon steering tables at each middle hub. It keeps a reserve to store source courses learned by the hubs. Here at whatever point a substantial course from source to goal is absent in course store course disclosure is started by source.

AODV: AODV on separation vector calculation which suggests grouping number to tackle the Long Lived Loop issue. The fundamental element of this directing convention is overhead decrease and encourages the beginning hubs to realize the freshest course track. Control bundles are utilized here to keep up the course table of every hub. At whatever point there is update ADV does not trigger the difference in metric for another directing passage, trigger meter keeps update of allotting legitimate course.

GOD: General Operation Director Algorithm is utilized to store worldwide data with respect to the condition of hubs, system and condition. In reproduction GOD is characterized to deal with the subtleties of activities like development designs.

LAR : LAR is an improvement for receptive conventions to diminish flooding overhead. LAR utilizes a gauge of goal's area to confine the flood to a little district (called solicitation zone) with respect to the entire system locale. LAR expect that every hub knows its very own area, however does not utilize any unique area administration to acquire area of different hubs. Goal area data acquired from an earlier course revelation is

utilized as a gauge of goal's area for constraining the flooding locale in a resulting course disclosure.

DREAM: DREAM is an early case of a steering convention which is totally area based. The area administration is likewise part of a similar convention. With DREAM's area administration, each hub proactively refreshes each other hub about its area. The overhead of such area updates is decreased in two different ways. In the first place, remove impact (hubs move gradually as for one another as their separation of detachment increments). Second, every hub produces refreshes about its area relying upon its portability rate| quick moving hubs update all the more regularly though moderate moving hubs create refreshes less frequently.

III. PROPOSED CLUSTER BASED ALGORITHM

As appeared in detail in Algorithm 1, a vehicle in SE state first endeavors to interface with the current groups so as to limit the quantity of bunch heads.

Algorithm 1: State Election (SE) Algorithm

```
1 for all the CH ∈ V IB do
2   if TRY_CONNECT CH == false then
3     if MEMBERCH < MAXMEMBER_CH then
4       Send JOIN _REQ;
5       if JOIN_RESP received then
6         Vstate = CM;
7         Exit;
8       else
9         TRY_CONNECTCH = true;
10 for all the CM ∈ V IB do
11   if TRY_CONNECTCM == false then
12     if MEMBERCM ¡ MAXMEMBER_CM then
13       if HOPCM < MAX_HOP then
14         Send JOIN_REQ;
15         if JOIN_RESP received then
16           Vstate = CM;
17           Exit;
18         else
19           TRY_CONNECTCM = true;
20 if Not exists SE ∈ V IB then
21   Vstate = ISO − CH;
22   Exit;
23 else if AV GREL_SPEEDcurr = Min SE∈V IB (AVGREL_SPEEDSE) then
24   Vstate = CH;
25   Broadcast CH_ADV ;
26   Exit;
```

Algorithm 2: IEEE 802.11p CM Algorithm

```
1 On DATA _PACKET generation or receipt:
2 Extract IDDATA and SEQDATA;
3 if (IDDATA, SEQDATA) ∈ VIB then
4   if DATA_PACKET is from P ARENTcurr then
5     Multicast DATA_PACKET to CHILDRENcurr;
6   else
7     Unicast DATA_PACKET to PARENTcurr;
8 Update V IB;
```

Algorithm 3: IEEE 802.11p-LTE CH Algorithm

```
On DATA_PACKET generation or receipt:
Extract ID_DATA and SEQ_DATA;
if (ID_DATA, SEQ_DATA) ∈ VIB then
    if DATA_PACKET is from eNodeB then
        Broadcast DATA_PACKET into cluster;
    else
        Broadcast DATA_PACKET into cluster;
        Put data in DATA_PACKET and forward it to eNodeB;
Update VIB;
```

Notation	Description
IN	Initial State
SE	State Election
CH	Cluster Head
ISO – CH	Isolated Cluster Head
CM	Cluster Member
VIB	Vehicle Information Base
VIB_TIMER	VIB Timer
IN_TIMER	Initial State Timer
SE_TIMER	State Election State Timer
CH_TIMER	Cluster Head State Timer
CM_TIMER	Cluster Member State Timer
JOIN_TIMER	Join Response Packet Timer
MERGE_TIMER	Merge Timer
V_{stat}	Vehicle's Current State

Notation	Description
AVGREL_SPEEDi	Average Relative Speed of Vehicle i
MEMBERCH	CH's Connected Member Counter
MEMBERCM	CM's Connected Member Counter
MAXMEMBER_CH	Max. Member CH can serve
MAXMEMBER_CM	Max. Member CM can serve
MAX_HOP	Max. Hop Between CH and CM
HOPCM	Number of hops between CM and CH
CH_ADV	CH's Advertisement Packet
JOIN_REQ	Join Request Packet
JOIN_RESP	Join Response Packet
CH_ADV	Cluster Head Advertisement Message
HELLO_PACKET	Periodic Hello Packet
DATA_PACKET	Data Packet
CLUSTER_INFO	Cluster Information Packet
TRY_CONNECTi	Try Connect Flag for Vehicle i
MERGE_REQ	CH's Merge Request
MERGE_RESP	CH's Merge Response
IDDATA	Data Packet Generator Identifier
SEQDATA	Data Packet Sequence Number
PARENTi	Vehicle through which vehicle i is connected to the cluster
CHILDRENi	Vehicles that use vehicle i to connect to the CH

IV. FLOW CHART FOR THE IMPLEMENTED SCENARIO

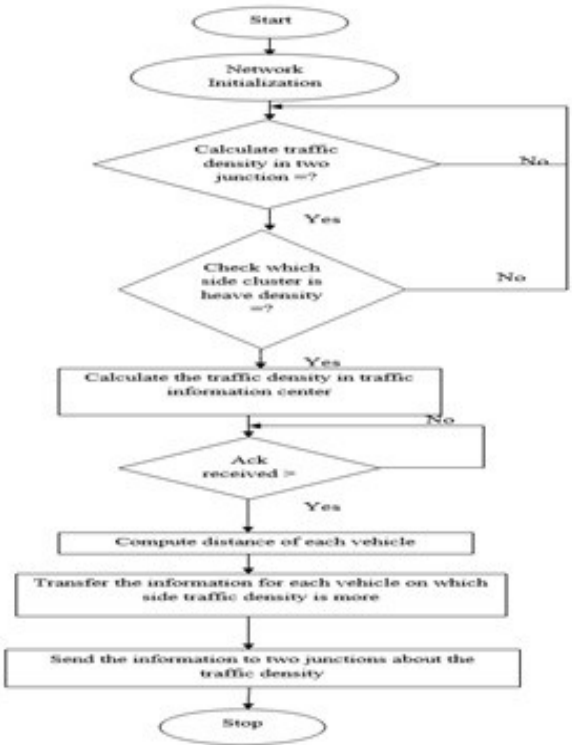


Figure 4.1 Flow Chart for the Implemented Scenario

V. RESULT ANALYSIS

NS-2 is an open source, Object Oriented (OO), and discrete-event multiplication gadget basically used to examine the execution of wired and remote frameworks with respect to crucial show stacks, guiding counts, organize traffic, etc. The standard helpfulness of NS-2 is to set up an arrangement of hubs that can talk with each other by transmitting or tolerating data divides the framework, and along these lines to deliver the pursue eventual outcome of framework traffic for examination. To achieve this, NS-2 contains distinctive framework related parts that can be versatile amassed by a drawing in tongue called Tool Command Language (Tcl) express to specific frameworks organization arrangements to allow various reenactment circumstances. NS-2 is for the most part included with the advancement of framework portions, the split thing show dependent on two sorts of OO lingo similarly as the framework related event booking segment. These features are laid out as seeks after.

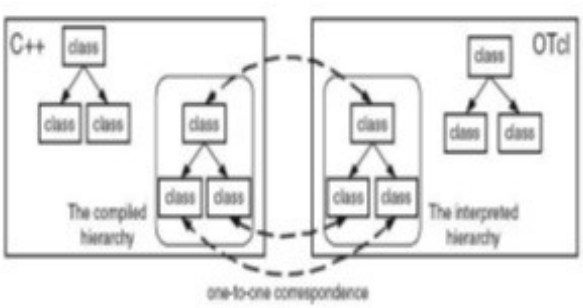
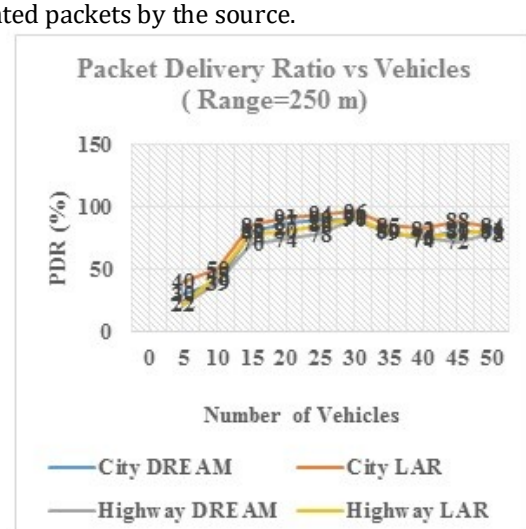


Figure 5.1 Difference working of C++ and OTcl of NS-2

PARAMETER	VALUE
Simulation tool	NS-2 version 2.35
MAC protocol	IEEE802.11p
Mobility model	IDM_IM
Transmission range	250 m
Simulation area	1100m x 1100m
Channel	Wireless
Antenna	Omni-directional
Simulation time	1000s
Packet length	512 Bytes
Data rate	8 packets
Pause duration	15s
Bandwidth	2Mbps
Type of Traffic	CBR
Vehicle speed	25km/hr(city),120km/hr(highway)
Type of Interface queue	Drop Tail/CMU Priority Queue
Size of Interface queue	50 packets
Number of vehicles	5 to 40
Routing protocols	LAR and DREAM
Maximum connections	65%

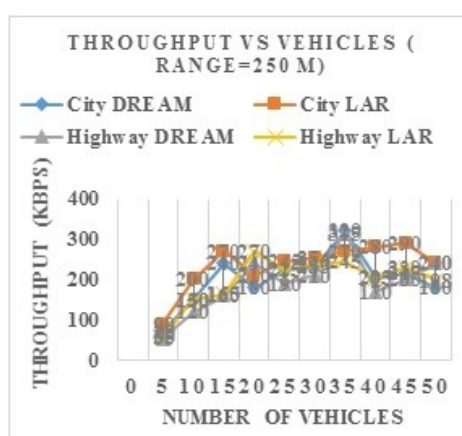
Table 5.1. Network Simulation Parameters

5.1 Packet Delivery Ratio (PDR**) :** Packet Delivery Ratio (PDR) is based on the received and generated packets as recorded in the trace file. In general, PDR is defined as the ratio between the received packets by the destination and the generated packets by the source.



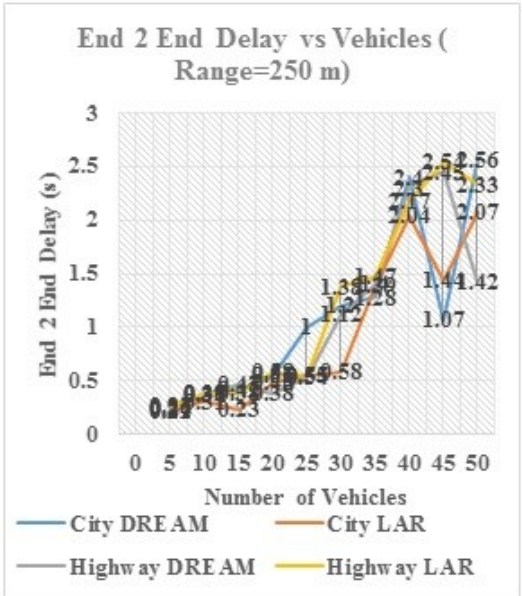
Graph 5.1. Packet Delivery Ratio in City and Highway Scenario

5.2 Throughput: The average number of successful delivered data packets on a network node describes throughput.



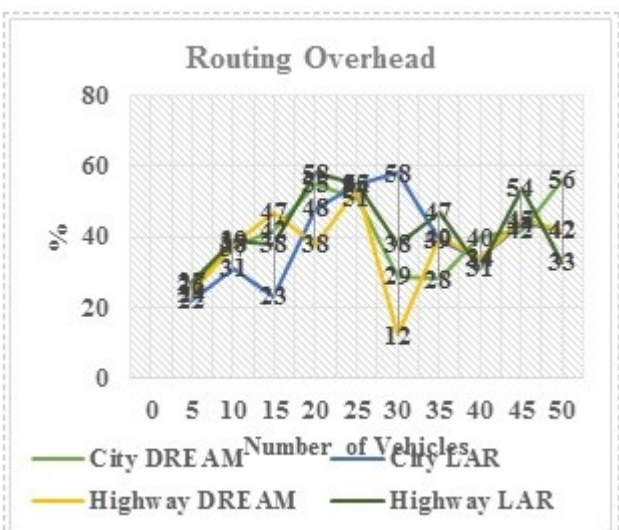
Graph 5.2. Throughput in city and highway scenario

5.3 End2 End Delay (EED): Refers to the time taken for a packet to be transmitted across a network from source to destination.



Graph 5.3 End2End Delay in City and Highway Scenario

5.4 Routing **Overhead :** Routing Overhead is the number of routing packets required for network communication. Routing Overhead is calculated using awk script which processes the trace file and produces the result.



Graph 5.4 Routing Overhead in city and highway scenario

VI. CONCLUSION

The primary objective of this paper is to recognize the presentation of various steering conventions LAR, and DREAM as far as various parameters which impact the exhibition of VANET and to assess nature of administration parameters (throughput and packet drop) in city just as interstate situation and it has been discovered that LAR is best appropriate for expressway situation while DREAM is best reasonable for city situation under free space system conditions. The exhibition of steering conventions in VANET depends altogether on the versatility models and the thickness of hubs. In this way it is fundamental to configuration steering conventions explicit to given portability models. It tends to be utilized as reference for the dynamic analysts in this field. In this paper impact of various kinds of directing conventions in VANET has been analyzed. It has been discovered that nature of administration in city situation (as far as impact rate) is not as much as interstate situation as a result of system clog. The exhibition issues with respect to way network

and time postponement ought to be improved. It is trusted that this paper will give rules to dynamic specialists taking a shot at directing conventions in the VANET.

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