Performance Analysis of Spatial Distribution and Channel Quality Adaptive Protocol with DDOS Attacks In VANET

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ABSTRACT
VANET Security is gradually becoming a important aspect in as large numbers of servers are being deployed 1D and 2D scenario to provide seamless traffic flow in highway and urban areas. One of the most important and prominent attack in the VANET is Distributed Denial of Service(DDoS) attack and is being considered as one of the major threats to the security of diver. The proposed method helps in faster detection of DDoS attacks and its removal hence significantly decreasing malicious nodes in the traffic.The simulation results show removal of a DDoS attack.

Keywords
VANET, Statistical broadcast protocol, Topological broadcast protocol, DDoS,spatial.

1. INTRODUCTION
VANET multihop broadcast communication plays an very important role in the transfer messages. Many adhoc network protocols are used discover routes. These broadcast are of two types

i Statistical broadcast protocol

ii Topological broadcast protocol

The Topological broadcast protocol is the protocol which makes use of network topology so to select data to the forwarding node. Whereas the Statistical broadcast protocol makes the use of the measure the value of one or more locally available variables. Another serious issue in the in VANET is loss of packets as they travel in the wireless medium. In VANET multihop broadcast communication packets are also lost when there is a interference of different transmitted signals which causes the collision of the signals. In case of the Statistical broadcast protocols do not use abrupt and rapidly changing nearby neighbor nodes information. Where as in case of Statistical Protocols they use the information measure the rate of one or the local variables and then it makes a decision whether to rebroadcast and depends on the pair of measured value and cutoff threshold value. In this we use the distance method that measures the distance to the nearest available neighbor nodes from the node that has received message of broadcast message. If the distance is more than the threshold value and then only node rebroadcasts the message in the VANET wireless system. This threshold value is calculated the function of more slowly changing factors such as node density and the spatial distribution pattern. This research work is for multihop broadcast protocol DADCQ. This DADCQ protocol combines local spatially distributed information and distance method so as to select rebroadcasting nodes in the wireless communication network. Most of the broadcast protocols used in ad hoc network which makes use of distance method. And this DADCQ protocol uses the distance method for the incorporation of more information into the DADCQ protocol. And this extra information used to make protocols adaptive to more network scenarios in the VANET.

2. LITERATURE REVIEW
VANET applications includes such as traffic data dissemination which utilize broadcast as primary mode for their communication. So thus creating efficient broadcast schemes which are very important for supporting the practical VANETs [2].As this communication is between the mobile vehicles is adhoc communication in which the connected nodes can move freely in network so no wires are required for this communication. The typical examples are deployed in military or battlefield operation and also in VANET [3]. The Router Road Side (RSU) is device that connects the vehicles present on the road and it also connects to other network devices present in the network. So each of the vehicle consists of On board unit(OBU) which connects to the vehicle with RSU through DSRC radios and the other device is which is Tamper Proof Device (TPD) which holds the vehicles secrets information such as information about vehicle like key, driver identity, trip detail, speed, route details etc.And as approximately the number of vehicles are exceeding 750 million in the world till today. Also the vehicular mobility model plays a significant role in evaluation of the different challenges present in the scenario in the network [4].Today these VANET vehicles will require a authority to govern the system present in it. In the VANET each vehicle is able to communicate with the other vehicle using the short radio signal detected using a short range communication (DSRC) which is operating on 5.9 GHz in range of 1 KM.As the High vehicle mobility and the frequent topology changes in VANET have very negative influences on performance of the data distribution in such kind of the network.[5].

In VANET position information is fundamental requirement for the many vehicular applications such as the of navigation, intelligent transportation systems[7]. So the Multihop wireless broadcasting is a very important feature of the vehicular network. A large number of applications are being developed on broadcast communication. And so it is important to have an efficient routing method. Success of this routing method is very critical. Distribution-Adaptive Distance with Channel Quality (DADCQ) protocol is the solution to solve such problems to greater extent in the network. DADCQ addresses the need and shows that it performs very well compared to several existing multihop broadcast proposals present. DADCQ protocol makes the use of the distance method for the selection of forwarding nodes. And the performance of Distance method heavily depends upon the value of the decision threshold function of DADCQ. But it is difficult to choose a decision threshold value that results in a good

performance across all the scenarios of the network. The optimal value is affected by a Node density, spatial distribution pattern. Wireless channel quality broadcasting methods can be divided into two types as statistical and topological methods. This work is based on the statistical method. A statistical method uses a prior knowledge of the impact of external variables present at each of the node for making the decision whether to or not to rebroadcast. DADCQ protocol which uses the distance method for forwarding decision threshold value. The distance method is used to measure the distance to the nearest neighbor node. If the distance is greater than the threshold value then the node rebroadcast the message in network. These methods share a common framework where the nodes measure the value of the variable at their location and they calculate a threshold value using the variables and make a rebroadcast determination based model on whether or not value of the variable exceeds the value of the calculated threshold. The behavior of the distance method protocols is largely determined by the particular protocol parameter called as Dc [8].The distribution pattern of the network is independent parameter of the density but can also vary. As considered in case of isolated highways the nodes will be very restricted along the one dimensional path in the network. Where as in the urban area network the nodes may appear in the pattern which is the more uniformly distributed in two dimensions. And so the road crossings and suburban areas can exhibit many combinations in between in VANET network. And so the broadcast protocols of network should be able to function equally well in all these scenarios of the VANET network. Furthermore the vehicles can use wireless communications for the vehicle to vehicle (V2V) or vehicle to infrastructure (V2I) communications in network [9].Another problem in wireless communication and VANET in particular is the loss of packets in the network as they travel through the medium. The multipath fading also causes the signal to interfere with itself in the work as the signal gets splits into multiple paths during traverse in the network. The reason for multipath fading is due to signal being reflected..The packets can also be lost due to interference of the different transmitted signals which each other which gives rise to a phenomenon called collision.

3. DISTANCE METHOD

The DADCQ protocol uses the distance method so as to select forwarding nodes in the VANET.A distance method uses the optimum distance from sender node to receiver node bias between rebroadcasters and the non-rebroadcasters. This method urges to the suspicion that if the node has received the message from the neighboring another node there is benefit in terms coverage which achieved by rebroadcasting. Algorithm is simple

a. Initialize D=1 if a message is received set d to the distance to sender D= min {D, d/r} so set a random backoff timer.

b. If message is received during backoff timer, repeat When the backoff expires rebroadcast if D >Dc.

The to process to any broadcast protocol i.e statistical one is the value of the decision cutoff Dc. If Dc is set too high then the reachability may be degraded. And if the value of Dc is set too low then the DADCQ protocol will not be able to prevent many nodes from the process of the rebroadcasting.

So there is range of values for Dc. If this Dc is less than the minimum critical value required then the reachability is almost one in all simulation scenarios. Near the critical value reachability quickly jumps from one to zero which gives the indication that the reachability is of highly variable nature.Propagation of nodes is suppressed so that only nodes near the source will receive the transmitted message in the VANET network.As shown in figure b.

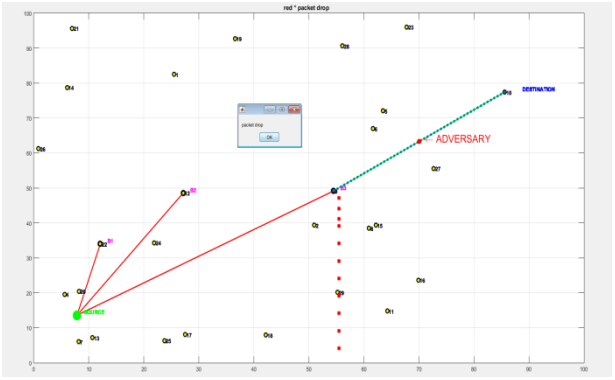

Fig a. Simulation results when message suppression attack occurs.

3.1 Adaptation To Distribution Pattern

The rebroadcasting threshold value Dc varies when there are changes in the distribution pattern. Dc depends on the three parameters i.e Dmax,α & β.The nodes which are uniformly distributed in entire field along the line in the wireless network that provided at least 99 percent reachability in 95 percent for these scenario.

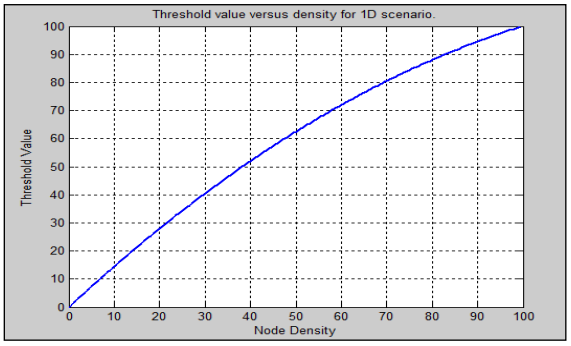

Fig. b Threshold Value Verses Node Density for 1D

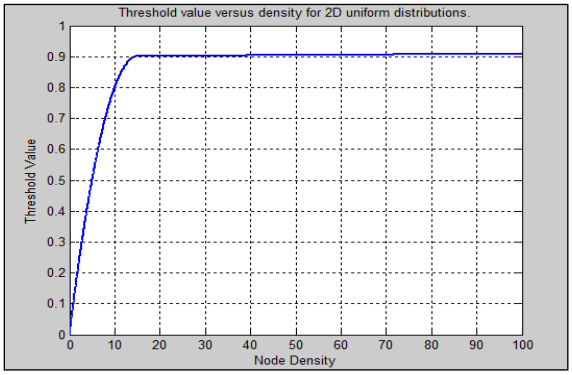

Fig. c Threshold Value Versus Node Density for 2D

The parameter differs between the two scenarios exponential rate.2D threshold curve is more aggressive. Whereas 1D threshold curve is more conservative and reachability in both 1D and 2D network the broadcast efficiency. In 2D networks it is lower than we would like a threshold curve and provides optimal for the 1D and 2D scienario.

3.2 DDOS Attacks

A Distributed Denial of Service (DDoS) has an attacker coordinating from various different thousands or several hundred of sources sources so as to congest the target node. These DDOS attacks are globally distributed over the network.DDOS can be divided into two types

i High-intensity attacks

ii Low-intensity attacks

The difference between two attacks is in the rate of the packet transmission in the traffic. The high-intensity Attacks transmit the packets at a high rate causing sudden surge in the traffic.

And whereas the low-intensity attacks do not completely disrupt service but they degrade the service over a long period of time.

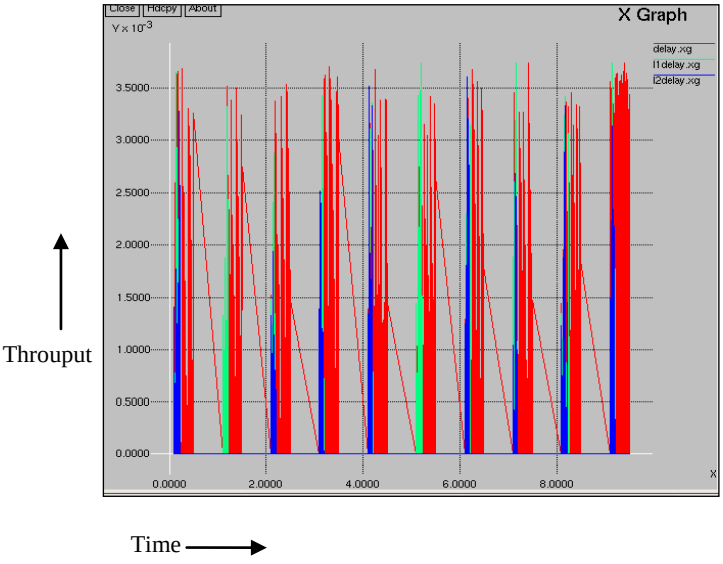

Fig. e DDOS Attacks Delay Graph

The fig. e shows the 3 Level detection of DDOS detection and removal in urban mobility model where there is detection and removal of attacks is done in 3 levels. In level 1 as shown in the graph by portion delay.xg simulated in NS-2 where the DDOS attacks is detected and as the attack is detected so there is delay in transmission of packets in the network. This is indicated in the graph by red portion we can see that there is lot of delay involved in the packet transmissions.

Whereas in the level 2 the delay is reduced as the DDOS attacks are removed at the first level so now at the level 2 the delay in the transmission of as shown in the fig. e indicated by the green portion as labeled as delay1.xg .Finally the further

more remaining DDOS attacks are removed and because of which the delay is further more reduced to great extent as shown the fig e. with the blue portion.

4. ENERGY CONSERVATION GRAPH

When there is DDOS attack in VANET the energy level of the packets may be dropped to great extent as the result the energy level may be reduced but as we have removed the attacks so the energy content remains the same which is demonstrated by using the NS-2 simulator as show in the figure f.

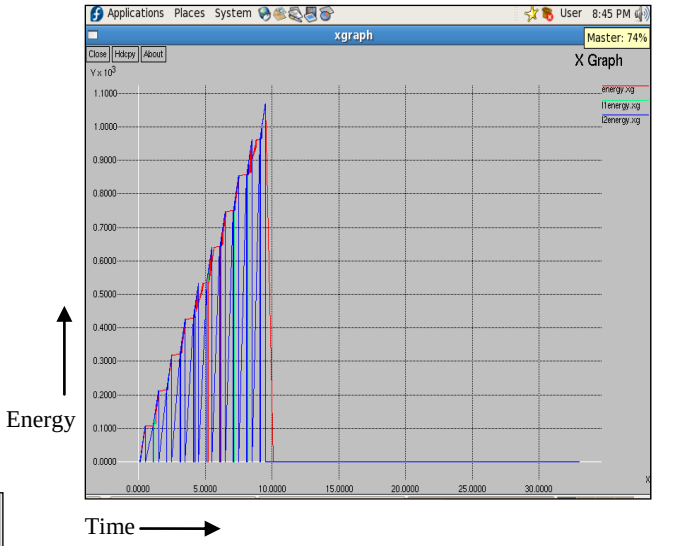

Fig. d Energy Level Graph for DDOS attacks.

As seen from the Energy Level graph the three energy levels have been demonstrated using NS-2 Simulator. Our main purpose is to conserve the energy by removal of DDOS attacks as seen from fig f. In the level 1 the DDOS attacks has been detected and removed at the same level so the energy level at level 1 is not degraded which is indicated by the red portion in the graph we can see the energy level is less as compared to the next two levels as indicated by energy.xg in the fig d.

Where as in level 2 the DDOS attacks has been removed little more extent so the energy level is more in level 2 as shown in the graph by the fig f. with the green portion l1energy.xg . And lastly at the level 3 all the DDOS have been removed so the energy content in the network in has increased as the level 2 has fully remove and because of which the energy content in the network is also increased which shown in the graph of fig. d with blue portion l2energy.xg .

5. CONCLUSION

Thus by removing the DDOS attacks at three different levels the delay in the first graph fig. e is reduced for the 3 levels that is delay.xg ,l1delay.xg and l2delay.xg which shows the decrease in the delay for the final level as the DDOS attacks are removed. Also similarly the energy is conserved after the removal of DDOS attacks as shown the energy conservation graph shown in fig. d.The energy content is less at level 1 energy.xg further more at level 2 l1energy.xg and maximum at level 3 l2energy.xg.So as the DDOS attacks are removed the energy level is also increased to a great extent.

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