Abstract: The vehicular ad-hoc network (VANET) is the network of vehicles, which is designed to enable the multi-service architecture across the vehicular networks. The VANETs are the network of the moving nodes on adequately higher speeds, which create the great challenge to gain and through the data from and to the vehicular nodes on the move. The VANETs are used to predict the traffic jams, hurdles or blockades produced due to tree falling, avalanche, flash flood, etc. The minimized delay oriented vehicular networks must be designed over the high speed transmission podium along with efficient data transmissions with optimized number of topology, hello and update packets. In this paper, the major improvements have been proposed in the hazard routing protocols (HRPs) specifically designed for the vehicular networks. The optimized number of hello packets, minimized topology packets and dedicated routing models are involved in the design of the proposed efficient data handling model. This model has undergone the variety of versatile performance evaluation experiments, which proves the improved performance of the proposed model. The maximum delay in the simulation model has been recorded nearly at 0.064 microseconds, which is considerably lower than the existing model. Also the proposed model has been designed to lower the data loss rate by 0.4%, which also proves the robustness of proposed model in comparison to existing model.

Keywords: Traffic optimization, traffic shaping, decongestion, smart traffic management.
has examine and explore. According to the author of the paper additionally settle these difficulties and issues to analyze the set of solution. Each vehicle or car has OBU (On Board Unit).

### III. SIMULATION MODEL

This project is based upon the traffic flow optimization to gain the maximum performance on the given vehicular network, which is designed as the structured network. The structured vehicular network is enabled with the vehicular nodes and road side units (RSU) with versatile connectivity paradigms. The vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) are offered among the given vehicular cluster in order to establish the elongated connectivity among the nodes out of the 1-hop reach of RSU nodes. The vehicular networks are aimed at decongestion using the several mechanisms in the proposed model. The primary solution involves the traffic isolation and prioritization applications to set the priority of the data being propagated over the given paths. The data is classified on the basis of the type of the data packets, such as collision oriented packets, congestion indication packets, hello packets between nodes, packets carrying location coordinates and other updates. These packets are handled in the dynamic way to isolate the vehicular traffic in the given segment using the following algorithm:

**Algorithm 1: Vehicular Data Flow Prioritization Algorithm**

1. Begin the simulation nodes
2. Start the communication module on all of the nodes
3. Establish the connections between the road side units (RSU) and vehicular nodes
4. Start the cluster node movement according to the pre-programmed movement schedule
5. When RSU receives the packets, it analyzes the packets on the basis of their types
   a. If the packets are collision, abrupt (sudden brakes) or congestion packets
      i. If packet is collision packet
         1. Update the packet header with two bit pattern [1 1], which indicates the higher priority
      ii. Else if the packet is abrupt packet
         1. Update the packet header with two bit pattern [1 0], which indicates the higher priority
      iii. Else if the packet is congestion packet
         1. Update the packet header with two bit pattern [0 1], which indicates the higher priority
      iv. Restore the packets in the queue
   b. Otherwise {location, hello and others}
      i. Update the packet header with two bit pattern [0 0], which indicates no priority
      ii. Restore the packets in the queue
6. Process the queue, and iterate for each packet in the queue
7. When RSU analyzes the packets, it segregates the packets on the basis of their types
   a. Firstly obtain all of the packets carrying priority information [1 1] towards the vehicular nodes
   b. Iterate for each of the packet in collision with bit pattern [1 1]
      i. Acquire the packets one by one
      ii. Observe the location of the node sending the information
      iii. Shortlist the nodes, which can probably get affected by the location of collision
         1. Forward the packet to all shortlisted nodes
      iv. If current packet is last packet
         1. Break the iteration
      v. Otherwise
         1. Go to 6(b)(i)
   c. Iterate for each of the abrupt packet with bit pattern [1 0]
      i. Acquire the packets one by one
      ii. Observe the location of the node sending the information
      iii. Shortlist the nodes, which can probably get affected by the location of collision
         1. Forward the packet to all shortlisted nodes
      iv. If current packet is last packet
         1. Break the iteration
      v. Otherwise
         1. Go to 6(b)(i)
   d. Iterate for each of the congestion packet with bit pattern [0 1]
      i. Acquire the packets one by one
      ii. Forward the packet to all nodes in the given segment
      iii. If current packet is last packet
         1. Break the iteration
      iv. Otherwise
         1. Go to 6(b)(i)
   e. Return the iterations
8. Stop the simulation after the simulation time expires
9. Return the simulation parameters

In this simulation model, the traffic shaping and optimization has been achieved with the traffic flow recognition and prioritization to mark the high utility packets with highest priority on the basis of pre-defined set of rules. In figure 3, the workflow of the proposed simulation model is elaborated in detail:
IV. RESULT ANALYSIS

The simulation results are obtained in the form of various parameters, which involves the end-to-end delay and packet loss in the cluster. The aim of the proposed model is to reduce the end-to-end delay and to increase the throughput.

Also the number of hello packets has been reduced, when the congestion occurs in order to control the total count of packets in the cluster, which also affects the total count of packets in all of the vehicles in the vehicular cluster. The following figure 4 shows the end-to-end delay, where the proposed model value is quite lower than the delay recorded in the existing model. The delay is reduced because the overall count of hello packets has been reduced in the simulation model.
The number of hello packets in the hello packets has been estimated in the case of existing and proposed models. In the proposed model, the number of hello packets has been reduced for each of the node in the transmission to improve the overall performance of the proposed model in comparison with the existing model. For each of the node, the number of hello packets to the RSU is limited to two packets per second, which eventually reduces the packet loss in the proposed model. In the figure 5, the packet loss based parameter estimation has been recorded for the existing and proposed models. The existing model has been recorded between 0 and 9 percent packet loss in the given cluster, whereas the proposed model has been recorded between 0 and 1. The dynamic hello packet control among the intersections has significantly improved the packet loss in the proposed model. The packet loss has been recorded nearly at 0.5% on the average, which is very lower than existing model (5-6%) as per shown in the following figure.

![Figure 5: Simulation Parameter of packet loss](image)

V. CONCLUSION

The proposed model is based upon the traffic shaping by incorporating the flow prioritization over the different kinds of packets and flow isolation to segment the affected nodes among the given cluster. In the proposed model, the proposed flow isolation and flow prioritization mechanism is designed to improve the network performance, which is significantly improved in the proposed model. The transmission delay has been lowered to 0.064 seconds in the proposed model against nearly 7 seconds in the existing model, which is very high improvement. The existing model ranges between 0 and 15 seconds for all of the rounds in the simulation. The existing model has been recorded between 0 and 9 percent of packet loss occurring in the given vehicular cluster, whereas the existing model is recorded between the range of 0 and 1 percent. The average percentage of packet loss has been recorded between 0.5% in the proposed model, which shows the significantly high performance as compared to the average of existing model (5-6%) of packet loss.

VI. REFERENCES

[1] Abdalla, Ghassan MT, Mosa Ali Abu-Rgheff, and Sidi Mohammed Senouci. "Current trends in vehicular ad hoc networks." Proceedings of IBIROADS workshop. 2007.

[2] Bibhu, Vimal, et al. "Performance Analysis of black hole attack in VANET." International Journal of Computer Network and Information Security (IJCNIS) 4.11 (2012): 47.

[3] Chen, Lu, Hongbo Tang, and Junfei Wang. "Analysis of VANET security based on routing protocol information." Intelligent Control and Information Processing (ICICIP), 2013 Fourth International Conference on. IEEE, 2013.

[4] Chim, Tat Wing, et al. "SPECs: Secure and privacy enhancing communications schemes for VANETS." Ad Hoc Networks 9.2 (2011): 189-203.

[5] Chim, Tat Wing, et al. "Security and privacy issues for inter-vehicle communications in VANETS." Sensor, Mesh and Ad Hoc Communications and Networks Workshops, 2009. SECON Workshops’ 09. 6th Annual IEEE Communications Society Conference on. IEEE, 2009.

[6] Douceur, John R. "The sybil attack." Peer-to-peer Systems. Springer Berlin Heidelberg, 2002. 251-260.

[7] Ghaleb, Fuad A., M. A. Razzaque, and Ismail Fauzi Isnin. "Security and privacy enhancement in VANETS using mobility pattern." Ubiquitous and Future Networks (ICUFN), 2013 Fifth International Conference on. IEEE, 2013.
[9] Guette, Gilles, and Ciarán Bryce. "Using TPMs to secure vehicular ad-hoc networks (VANETs)." Information Security Theory and Practices. Smart Devices, Convergence and Next Generation Networks. Springer Berlin Heidelberg, 2008. 106-116

[10] Guette, Gilles, and Bertrand Ducourthial. "On the Sybil attack detection in VANET." Mobile Adhoc and Sensor Systems, 2007. MASS 2007. IEEE International Conference on. IEEE, 2007.

[11] Hu, Yih-Chun, Adrian Perrig, and David B. Johnson. "Packet leashes: a defense against wormhole attacks in wireless networks." INFOCOM 2003. Twenty-Second Annual Joint Conference of the IEEE Computer and Communications. IEEE Societies. Vol. 3. IEEE, 2003.

[12] Hung, Chia-Chen, Hope Chan, and EH-K. Wu. "Mobility pattern aware routing for heterogeneous vehicular networks." Wireless Communications and Networking Conference, 2008. WCNC 2008. IEEE. IEEE, 2008.

[13] Javed, Muhammad A., and Jamil Y. Khan. "A Geocasting technique in an IEEE802. 11p based vehicular ad hoc network for road traffic management." Australasian Telecommunication Networks and Applications Conference (ATNAC), 2011. IEEE, 2011.

[14] Dias, João A., et al. "Testbed-based performance evaluation of routing protocols for vehicular delay-tolerant networks." GLOBECOM Workshops (GC Wkshps), 2011 IEEE. IEEE, 2011.

[15] Perera, Ovitigalage Prasad N., and Dhammika Jayalath. "Cross layer optimization of VANET routing with multi-objective decision making." In Telecommunication Networks and Applications Conference (ATNAC), 2012 Australasian, pp. 1-6. IEEE, 2012.

[16] Hashemi, Hosna Tashakkori, and Siavash Khorsandi. "Load balanced vanet routing in city environments." In Vehicular Technology Conference (VTC Spring), 2012 IEEE 75th, pp. 1-6. IEEE, 2012.

[17] Samara, Ghassan, Wafaa AH Al-Salihy, and R. Sures. "Security analysis of vehicular ad hoc networks" (VANET)." In Network Applications Protocols and Services (NETAPPS), 2010 Second International Conference on, pp. 55-60. IEEE, 2010.