

# Congestion Control in Vehicular Network with Fair Beaconing Rate Adaptation

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**Abstract**—Vehicular Ad Hoc Networks (VANETs) have become an emerging area of wireless ad hoc networks in the last years. They facilitate ubiquitous connectivity between vehicles through Vehicles-to-Vehicles (V2V) or Vehicle-to-Roadside (V2R) or Roadside-to-Vehicle (R2V) communication. VANETs aim to improve the safety of passengers and traffic flow, reduce pollution to the environment and enables in-vehicle entertainment applications. They have a large number of research challenging issues in both communication and data management aspects. This special issue is focused on collecting recent advances on network protocols and algorithms for vehicular ad hoc networks, which aims at presenting innovative and significant research on the design, implementation, usage, and evaluation of vehicular ad hoc networks. We are deeply grateful for receiving many excellent submissions to this special issue. The review and revision processes for all papers were carried out in a rigorous and thorough manner. Accepted papers fall into various important areas including routing, route prediction and vehicular mobility, audio and video streaming, VANET topology formation techniques, handover techniques, Path and channel loss, Medium Access Control Protocols and Security.

**Keywords**—Congestion Control; Connectivity between Vehicles; Vehicular Ad Hoc Network.

**Abbreviations**—Fair Adaptive Beaconing Rate for Inter -vehicular Communication (FABRIC); Vehicular Ad hoc network (VANET).

## I. INTRODUCTION

INTER-VEHICLE communications based on wireless technologies pave the way for innovative applications in traffic safety, driver-assistance, traffic control and other advanced services which will make up future Intelligent Transportation System (ITS). Communications for Vehicular Ad Hoc Networks (VANET) have been developed and standardized in the last year. Cooperative inter-vehicular applications usually rely on the exchange of broadcast single-hop status message among vehicles on single control channels which provides detailed information about vehicles position, speed, heading, acceleration and other data of interest. These messages are called beacons and are transmitted periodically at a fixed or variable beaconing rate [Esteban Egea-Lopez & Pablo Pavon-Marino, 1]. Beacons provide very rich information about the vehicular environment and are relatively long messages. The aggregated load on the wireless channel due to periodic beacons can rise to a point where it can limit or prevent the

transmission of other type of messages called as channel congestion due to beaconing activity [Yuan et al., 3; Ma et al., 4]. Control schemes are required to prevent this situation and several alternatives are available. The practical implementation of the system impose two important requirements (i.e) distributed and grant beaconing rates to each vehicles in fair way.

## II. EXISTING SYSTEM

In the existing algorithm the congestion occurred during the message transfer between source and destination nodes cannot be avoided which causes leakage in the information and if any node is e attacked or disturbance occurs then the information is not passed to the destination node.

### 2.1. Disadvantages of Existing system

- Congestion during the message transmission is not avoided.

- If any disturbance occurs in the inter-node then the message does not reach the destination node (i.e) the information is leaked.
- Nodes support different data rates at different channel conditions.

### III. PROPOSED SYSTEM

The channel congestion is due to the aggregated load on the wireless channel that is beacons can raise to a point where it can limit or prevent the transmission of other types of message. Control schemes are required to prevent this situation and several alternatives are available. The proposed algorithm is Fair Adaptive beaconing Rate for Inter-vehicular Communication (FABRIC). This algorithm controls the congestion by choosing a default path when any disturbance occurs during the transmission of information between the source and destination.

#### 3.1. Advantages

- By using this algorithm the congestion is controlled during message transfer.
- Leakage of information is avoided.
- Data transfer is more efficient by using this algorithm.

### IV. BLOCK DIAGRAM

The different layers of the architecture is,

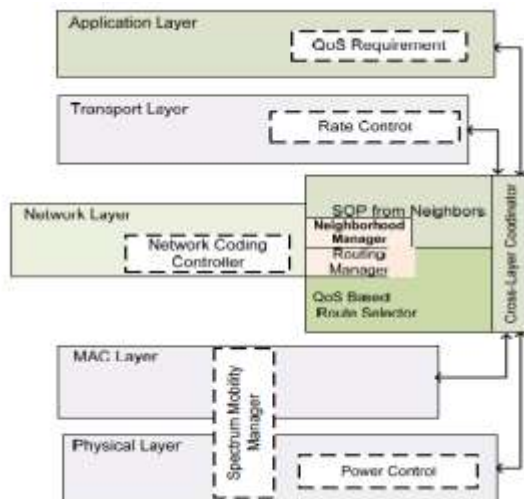


Figure 1: Architecture Block Diagram

### V. TOOLS AND ALGORITHM USED

#### 5.1. NS-2 Simulator

The NS2® high-performance language for technical computing integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation [Garroppo et al., 6; Akan et al., 7]. Typical uses include

- Math and computation
- Algorithm development
- Data acquisition
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including graphical user interface building

NS2 is an interactive system whose basic data element is an array that does not require dimensioning. It allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non-interactive language such as C or FORTRAN.

The name NS2 stands for matrix laboratory. NS2 was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects. Today, NS2 engines incorporate the LAPACK and BLAS libraries, embedding the state of the art in software for matrix computation.

NS2 has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, NS2 is the tool of choice for high-productivity research, development, and analysis.

NS2 features a family of add-on application-specific solutions called toolboxes. Very important to most users of NS2, toolboxes allow you to learn and apply specialized technology. Toolboxes are comprehensive collections of NS2 functions (M-files) that extend the NS2 environment to solve particular classes of problems. You can add on toolboxes for signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many other areas [Shin, 2; Wang & Liu, 5].

#### Trace Graph

Trace graph is third party software helps in plotting the graphs for NS2 and other networking simulation software. Trace graph when opened, it opens 3 windows one window to select the trace file (.tr) that was created by NS2.

#### 5.2. Algorithm

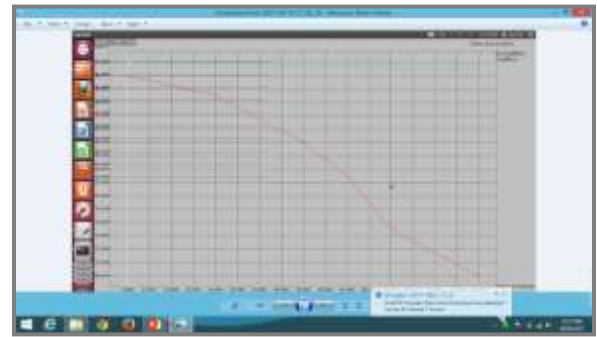
The working of the FABRIC algorithm is of five important steps given as below:

- *Metric* : The first step is to find all the possible path between the source node and the destination node.
- *Shortest path*: After finding all the possible path, the shortest path between the source node and the destination node is selected.
- *Data flow*: After selecting the shortest path, send the data or message to the destination node.
- *False node*: If any leakage occurs in the node then it is the false node.
- *Isolation path*: It is the default shortest path chosen when a false node occurs in the transmission path.

## VI. OUTPUT



## Output Graph



## VII. CONCLUSION

The congestion occurred due to the beaconing activities is avoided by the Fair Adaptive Beaconing Rate for Inter-Vehicular Communication Algorithm (FABRIC).

## REFERENCES

- [1] Esteban Egea-Lopez & Pablo Pavon-Marino (2016), "Distributed and Fair Beaconing Rate Adaptation for Congestion Control in Vehicular Networks", *IEEE*, Vol. 15, No. 12.
- [2] S.Y. Shin (2013), "Throughput Analysis of IEEE 802.15.4 Network under IEEE 802.11 Network Interference", *AEU - International Journal of Electronics and Communications*, Vol. 67, Pp. 686–689.
- [3] W. Yuan, X. Wang, J.P.M. Linnartz & I.G. Niemegeers (2013), "Coexistence Performance of IEEE 802.15.4 Wireless Sensor Networks under IEEE 802.11 b/g Interference", *Wireless Personal Communications*, Vol. 68, Pp. 281–302.
- [4] C. Ma, J. He, H.H. Chen & Z. Tang (2013), "Coverage Overlapping Problems in Applications of IEEE 802.15.4 Wireless Sensor Networks", *Proceedings of the 2013 IEEE Wireless Communications and Networking Conference (WCNC)*, Shanghai, China, Pp. 4364–4369.
- [5] B.B. Wang & K.J.R. Liu (2011), "Advances in Cognitive Radio Networks: A Survey", *IEEE Journal of Selected Topics in Signal Processing*, Vol. 5, Pp. 5–23.
- [6] R.G. Garroppo, L. Gazzarrini, S. Giordano & L. Tavanti (2011), "Experimental Assessment of the Coexistence of Wi-Fi, ZigBee, and Bluetooth Devices", *Proceedings of the 12th IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks*, Pp. 1–9.
- [7] O.B. Akan, O.B. Karli & O. Ergul (2009), "Cognitive Radio Sensor Networks", *IEEE Network*, Vol. 23, Pp. 34–40.