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RESEARCH ARTICLE



A Study on Different Challenges in Vehicular Area Network

Preeti Kundu

Student, M.Tech (ECE), South Point Institute of Technology & Management
preetikundu07@gmail.com

Amit Kumar

Asstt Prof, ECE Dept, South Point Institute of Technology & Management
amitkumardcr@gmail.com

Abstract

VANET is global area network that combines the criticalities of network globalization along with sensing limitation and moving capabilities. The high speed nodes switch among different network so that the transformation to different network forms and scenarios are required to process. This network is having the various challenges because of its heterogeneous and global availability. The challenges under these constraints the restrictions are discussed in this paper. The architecture level, scenario level and communication level constraints are defined. The paper is effectively to setup the network architecture by keeping these challenges in mind so that the secure and reliable communication will be obtained from the work.

I. INTRODUCTION

Vehicular Area network is the global network form applied on large area network. This network form is defined under the specification of global scenario in which the network will be applied. The network scenarios in which nodes will be placed include city scenario, urban area scenario, high scenario etc. Each of the network scenarios also describes the architectural specification. The node level constraints for all the vehicles are generally same without specification of global area. The node level constraint includes the node type, node capabilities and the node constraints. As the vehicle are defined in global area, it is required to process the nodes under area and scenario constraints so that the reliable and effective network communication will be performed. The nodes are here defined under energy specification so that the energy backup defined for each node is the major restriction of the vehicle nodes. The communication range is another vector defined with the range specification so that the cooperative V2V communication will be performed. The coverage of the vehicle nodes are comparatively high to other network forms so that the high distance communication is performed. Vehicle nodes are required to perform the interaction with cooperative neighbors as well as area RSUs. These kind of RSUs are also able to provide the reliable and accurate communication under network strength. The issues associated with vehicle area network are shown in figure 1.

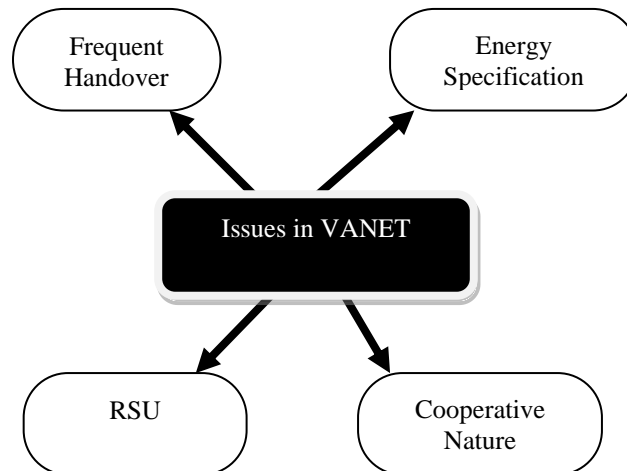


Figure 1 : Issues in VANET

Another critical issue associated with the network is the frequent handover. This handover is performed between the RSU as well as the base station. As the network is defined in the global area and nodes are high speed mobile vehicles. The frequent change occurs in the location of vehicle nodes. This change results the switching among the base stations and RSUs. This kind of switching is called handover. The handover includes the soft handover so that the communication with communication break will be performed. The communication is here performed to provide reliable communication under handoff.

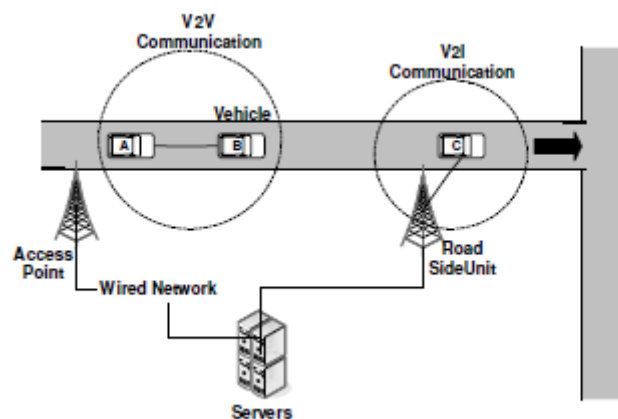


Figure 2 : Communication Architecture

Another major issue associated with vehicle area network is RSU controlled communication. The RSUs are here defined under the range specification. The nodes that comes in the communication range is considered as controller and the range adaptivity is recognized using V2I communication. The multiple RSUs performed the communication to generate the communication route and to perform the reliable communication over the network. This kind of communication is performed using I2I communication so that the more reliable and accurate results are expected. The RSU control is also responsible to provide the base station switching and to enable the communication in global area. It also provide the traffic updates so that the route switching at the early stage will be done. The RSU controlled communication also

improves the global expectation of the network so that the more reliable communication is performed. Here figure 2 is showing the communication architecture of vehicular area network.

In some stages, when the RSU are not present, the other vehicle nodes can be used to derive the network information and to perform the communication. In such case, V2V communication is performed. The vehicle adaptive communication is performed so that the zone coordinated communication is performed. The cooperative communication is performed to generate the communication path so that the information delivery will be obtained.

A) Security Challenges

As the network is defined in global area, the network also suffers from various challenges associated with security. The network suffers from various internal and external attacks. These attacks affects the network reliability and gives the information loss. The information loss in the network degrades the communication including the congestion, fake packet transmission and the abnormal node behavior. These kind of external attacks reveal the network information. All the security attacks in the network are defined under the network criticality and the limitations. The issues associated with the network includes the communication and security level constraints. The man in middle attack is defined so that the safe communication will be performed.

In this paper, a study to different network issues is defined. The issues includes the security challenges, network challenges and communication issues. In this section, the network issues defined in the network are described. In section II, the work defined by earlier researches is discussed. In section III different issues associated with the network are discussed. In section IV, the conclusion of the work is presented.

II. EXISTING WORK

In this section the work defined by earlier researchers is presented. The researchers provided the work on architectural formation, constraint specification and route generation. The section discussed the various network issues. Muhammad Shoaib[1] has provided the work to generate the communication route under traffic specific zonal analysis. Author defined hierarchical routing approach to generate the stable communication path so that the accurate results will be obtained from the work. Author improved the network performance and provided the reliable communication route under proactive protocol analysis. Hosna Tashakkori Hashemi[2] has defined a work in city environment so that load balanced communication route is obtained. Author defined the traffic adaptive communication under potential communication analysis so that the congested communication will be performed over the network. Author provided the generation of K-shortest paths over the network so that the reliable and effective communication will be performed over the network. YunGe[3] has defined a work on stable routing protocol under segment enabled communication in vehicular area network. Author provided the work for high scenario and provided the segment adaptive communication. Author provided the identification k-hop routing under the source and destination specification in the network. Author also provided the proactive routing model to improve the communication strength so that more reliable and accurate communication will be formed. Author provided the safe and adopted communication with proactive routing behaviour. Author generated the stable route for improving the network performance under decision vector.

Rashmi Ranjan Sahoo[4] has provided an ACO adaptive routing approach in vehicular area network with trust constraint. The trust vector is here generated under directional, positional and speed adaptive communication. The speed management under scalability vector is obtained so that the associated network issues will be formed. Author provided the cluster adaptive model to analyze the cluster improved communication so that the upated communication will be formed. Author provided the trust enabled communication under vehicle communication. Nazmus S. Nafi[5] has provided an intelligent road traffic communication under signal communication and safer communication. Author defined the analysis under significant communication vectors such as traffic flow, energy and road safety analysis. Author provided the routing architecture with specification of traffic signal constraints in real time network model. Author applied the simulation in Opnet environment so that the safe communication will be performed. Ovitigalage Prasad N. Perera[6] has provided the work on vehicular communication routing under multiple parameter based route election model. Author provided the cooperative GPSR communication with enabled route formation and the specification of relay nodes under radio path diversity so that the relay communication will be improved and the communication will be optimized. Author provided the work on cooperative GPSR so that the reliable communication will be performed over the network.

Nicholas Loulloudes[7] has provided a work on large area network with urban scenario. Author defined the network evaluation on multiple network protocol and provided the mobility driven communication under traffic diversity and query expansion under load vector. Author provided the performance evaluation with bandwidth generation and the communication under link estimation and prediction. Author provided the bandwidth evaluation mechanism so that the reliable and accurate communication will be formed. Yen-Wen Lin[8] has defined the route selection under VANET routing. Author defined a work on multi hop path generation under multiple analysis vectors. Author provided the search and route enable node classification so that the elective communication will be formed over the network. Dong-geun Lee[9] has provided a study on location adaptive route generation under urban environment. Author provided the location adaptive communication with route formation and neighbour search approach. Author defined the route formation and path estimation under network scenario specification in various integrated constraints. Lili Hu[10] has provided the work on GPSR routing in vehicular area network. Author provided the routing strategy based routing model for neighbour route generation. Author defined the designed work under functionality so that the reliable communication will be formed. Ambuj Kumar[11] has provided the group enabled communication so that the transmission protocol adaptation in vehicular area network. Author generated the alert messages to control the communication under prioritization vector so that the message context adaptive communication will be formed.

III. VANET ISSUES

VANET is the global area network defined under various restrictions and constraint specification. This network is defined in global area with high speed vehicle movement. The network issues includes the node specification and various associated limitations.

A) Localization

A VANET network is an indoor network which is generally defined under the specification of area limits. The area limit can be a campus or the building area. As the network nodes are distributed in different rooms and smaller segments so that it suffers from different signal breaks in terms of walls or some other kind of blockage. The placement of the network nodes are generally scenario specific. These scenarios includes class room scenarios, war specific scenario, clustered architecture etc. The specification of each sub network is here under the specification of controller node. The deterministic selection of this controller is also defined under various characteristics or parameters. Because of this there are different node placement architecture are available with different limitation and strength. To optimize the network communication, it is required to control the communication under localization vector.

B) Energy

VANET nodes are the improved form of sensor nodes called smart sensor. These sensor nodes are having energy limitation with intelligent nature. The intelligent nature is here identified as the capability to take the decisions regarding the network communication. The nodes are defined with restricted energy so that the effective communication route will be established over the network. The route level decisions are here taken based on the energy awareness. The communication routing, and network life depends on this energy criteria of network nodes. The energy balanced communication is required to optimize the network nature so that effective and symmetric communication over the network will be performed. This improved the network effectiveness under various criticality vectors.

C) Sensing

The sensor nodes are here defined with restricted sensing range specification. The sensing range shows the low distance communication. The sensing is here defined respective to the area bounds and barrier analysis. Some penetrative tolerance specific sensing is here defined so that the effective and reliable communication will be performed over the network. The information collection and distribution is here been defined under accurate specification of network communication so that effective and reliable communication will be performed over the network.

D) Clustered

A VANET network is divide in smaller sub networks in which the communication effectiveness is required between these internal clusters. The inter cluster and intra cluster communication is required to improve to improve the nature of overall network. The network is analyzed under various constraints and parameters so that the communication and routing effectiveness will be improved. Author defined a work under the handling of handover over the network clusters.

This clustering can be done under scalability, load and transmission vectors so that effective network communication can be improved so that network reliability can be improved.

E) Fault Tolerance

The network also suffers from various faults that can occur because of barrier because of indoor communication over the network. These indoor communications are sometimes covered from barriers from different directions so that the reliable and effective communication will be performed over the network. The reliable and potential change over the network life is improved.

IV. CONCLUSION

In this paper, VANET network strengths and limitations are discussed to explore the communication impact. Different communication level and architecture level limitations are discussed and explored in this paper.

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