Various Wireless Technologies Integrated With VANET For Improving The Continuous Operability.

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Abstract —.

VANET –Vehicular Adhoc Network is a challenging automated version of the Intelligent transport System. It is purely based on the communication among the vehicles .For improving the communication Internet is the Backbone for successful communication and also the major requirement for this successful communication is that continuity of the range of signal .This continuity could be processed by Handoff process which is the transferal of the network from one Base Station to the other Base Station along the roadways. In this paper we have discussed about the various technologies used in the VANET for the integration and interfacing to improve the continuous opera ability.

Index terms-VANET, continuity, handoff

I.   INTRODUCTION

The VANET is one of the types of Ad-hoc networks. Ad-hoc network can be defined as the self –formation network which doesn't need any special infrastructure for the network and the node itself can be the transceiver example for this is the Bluetooth device and the same method is followed in the VANETs also where we take each and every vehicle as a nodes and the node can be an individual device specially for this purpose or in some vehicles the mobile phones

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Can also be used for the communication since todays cell phones have all the facilities like GPS [2], Navigation maps etc.

While coming to the coverage of the signal we always prefer the wide range coverage where it depends on the frequency range.

The Wi-Fi and Wi- max and UMTS are the High range fidelity Accessing technologies which are used for the long and distance communications .For the continuous operability of the network all this wireless technologies could be used in the VANET.
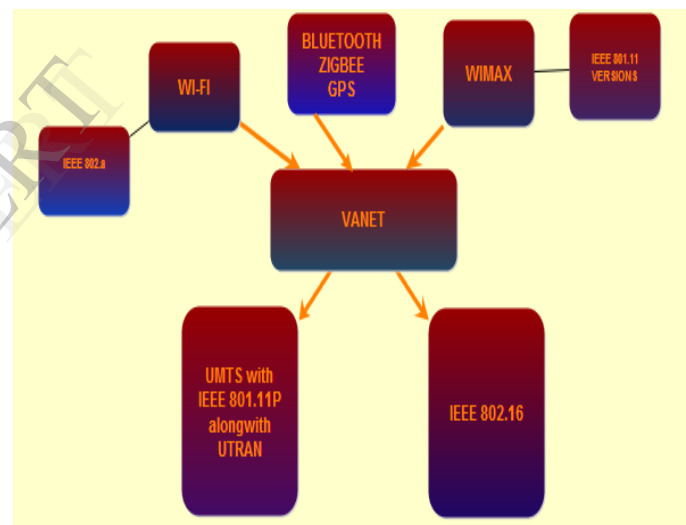

Fig. 1: various wireless technologies integrated with VANET.

II.   WI-MAX IN VANETs

There are so many schemes were developed in the application of WI-MAX in VANETs WI-MAX gives the speed in the Handoff between the networks. According to [4] the Base station needs the nearest Base station, It is necessary to have the transparency of the spot of the BS and Distance between the Base Station and the LOS of the BSs which is nearer to the current Base Station.

This information would have been stored in the Main station and could be received by the BS if it is necessary. The nearest Base station can be found by comparing the above mentioned data, It takes much time to make this process to be done. Hence it is necessary to find a method to minimize the comparison timings. There are many methods to for this as

follows.

Comparison time minimizing methods:

In paper [3] we have these methods.

   i) Cell-Identity based method.

   ii). Cross layer design fast handover scheme

   iii).Vehicular Fast Handover scheme

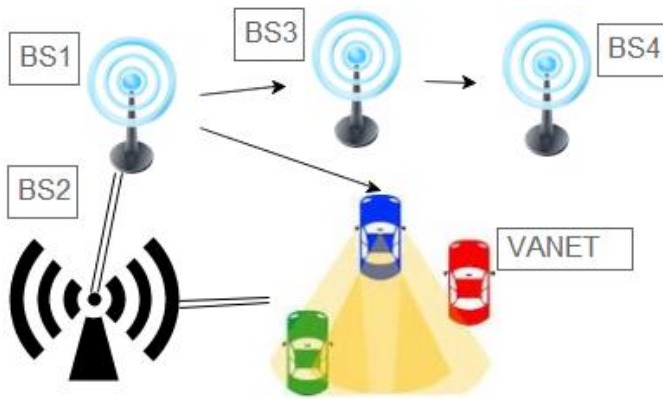By following these methods they got the betterment in reducing the delay of Handovers.

Fig.2: VANET integrated with Wi-Max

Advantages of WI-MAX:

In Wi-Max, the connections are not required .Its area is limited to certain range, the standard for Wi-MAX used here is IEEE 802.16 where the connection is seems to be long-lasting and continuity could be somewhat better.

PARAMETERS	REQIREMENTS USED
WI max link	Alvarion Breeze Max ,Micro base station ,a breeze max Self- install CPE(compact plug &play unit)
Antenna elements	6 antenna elements
Direction	Bi-Directional Switching matrix.
Coverage angle	360 degrees
Modulation techniques	BPSK,QPSK,16QAM,64PAM.

Table.1: CONFIGURATIONS OF WIMAX IN VANET.

III. WI-FI in VANETs.

In the Intelligent transport systems there are two and more ways of communications. Majorly two ways of communications are

   1).Vehicles to the roadways internet

   ii) Vehicles to the opposite or parallel and peer vehicles.

While here the WI-FI is applicable mainly for the second way of communication that is the peer communication.

Wi-Fi is an ad-hoc network which is connection oriented and limited to shorter distance within a certain range only and the lifetime of the network is very less, for transmitting and receiving less number of data and also for the infotainment
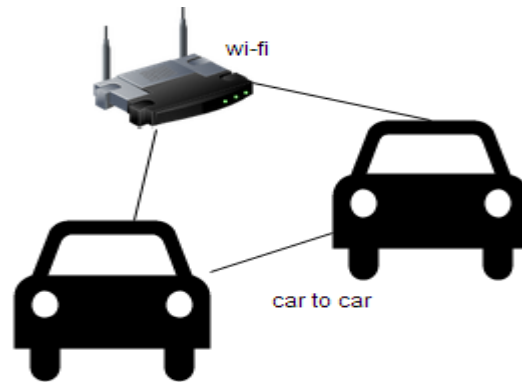

Fig.3: WI-FI between car to car communications

IV.UMTS in VANETs (3G cellular)

The other technology which is used for the continuity of the signal is the 3G cellular networks [4], which have the high Bandwidth and data rate. This network needs the service from UMTS (Universal Mobile Telecommunication systems).

According to the [5].The infrastructure of UMTS packet switching network is made of 3 main divisions they are

   a) User Equipment (UE)

   b)UMTS Terrestrial Radio Access core Network.(UTRAN).

   c) Core Network. (CN).

In these UE is the mobile station; UTRAN is the Group of Base station. The study of the Delay sensitive applications are done in this paper. The Delay sensitive applications in the sense Video conference, VOIP, Games and safety applications and the traffic of those each applications are mentioned in [4]. Finally it is mentioned that UMTS is applicable only for the Delay sensitive applications but not for the Emergency and life safety applications.

Parameters	Standards and values
Accessing techniques	i)WCDMA,(Wideband CDMA) ii)High speed packet access.(3.5G)
Maximum bit rates	144 Kbps,384 Kbps,2Mbps.
Modulation software and Hardware.	QPSK, 16 QAM, UTRAN.
Peak data rates	Uplink:1.44Mbps Downlink:7.2Mbps
Range	8 to 10 km.

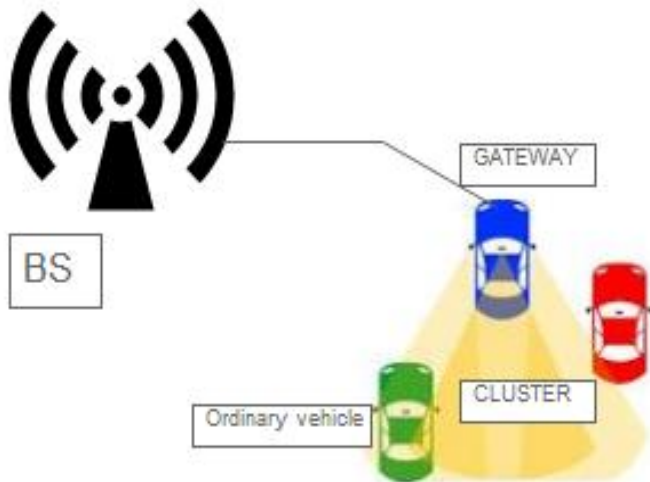Table.2: CONFIGURATIONS OF UMTS IN VANET

Fig. 4 : Gateway connected to the base station with UMTS.

V.IEEE 802.11P IN VANET

To improve the continuity for the Emergency and safety applications a method have been developed in the way of improving the traditional method of UMTS in VANETs by Interfacing the UMTS with IEEE 802.11p along with UTRAN in [5]. Few numbers of vehicles which have the equipment of above mentioned interface is formed as a group and they are considered as gateways to form a link between VANET and UMTS. The paper introduces a new double-interface model in which the vehicle receives the information from other vehicle and sends it to the UMTS network. The major work was on allowing few numbers of Gateways should transmit and receive the information to and from the UMTS .UTRAN should provide separate channels for the vehicles, even they stay with the Base station for a very less time. One of the vehicles in the cluster is considered as an overhead to the base station and 3 operations are must when the handoff process is needed for the mechanism of Gateway Management. They are

    i) Multi-metric Mobile gateway station.
    ii) Handover-metric mobile gateway selection.
    iii) Multi-metric mobile gate selection.
    iii).Gateway discovery and advertisement.

All these methods along with their specifications are specified and explained in[5].Finally it is expected that usage of less number of gateways minimize the often handovers and by integrating VANET with 3G network even other vehicles which doesn't have 3G can use the UMTS Network .Also congestion is minimized.

VI. IEEE-802.16 in VANET

For increasing the throughput a protocol is proposed in [6]. That is named as CEPEC (Co-ordinated external peer communication) for the services of internet and also for communication with the peer vehicles. It is assumed that IEEE-802.16 Base stations are installed on the roadways.

And the same equipment is interfaced and installed in vehicles. The main aim is to improve the End- point throughput with proportional Fairness .The road should have portioned into equal parts practically. The result of the simulation proves that CEPC protocols ensure the throughput ensures the fair throughput in proper transmission and reception of the information while comparing to the pure IEEE 802.16 based protocol.

For the process of City selection mobility model NS2 is used and many Routing algorithms are used for finding the best route.

VII. BASIC technology.

The basic of all these technologies was the Bluetooth for very less range communication and Zigbee technology have been used for a less cost design.

APPLICATIONS OF VANET.

This is the advanced version of MANET which improves the Features of the Intelligent Transport System. Using the internet facility we can improve the infotainment, life safety Measures, priority based transport like giving high priority to the ambulance, fire engines etc... And the major application is of telemedicine or mobility medicines. This can be more efficient when the internet is efficient.

VIII. CONCLUSION

As seen in the MANET, Mobile ad hoc network, the Communication in the VANET is between the nodes which is here the vehicles and with the roadside Base stations .For improving the intelligence of Vehicular networking Vanet is integrated with many Networking technologies like Bluetooth, Zigbee,Wi-Fi,Wi-Max etc., as explained previously

Even though many methods, Algorithms and protocols were proposed, it is not clear that which protocol is suitable for the best operability in all the locations. Still researchers are performing many experiments and studies for the continuous operability.

REFERENCES.

[1] Li Zhu.F.Richard Yu,Senior Member,IEEE,Bin Ning and Tao Tang "Handoff performance Improvements in MIMO-Enabled Communication-based Train control Systems" in Vol13 No.2 June 2012 IEEE Transactions on intelligent Transaction systems

[2] Azzedine Boukerche,Horacio A.B.F. Oliveira ,Eduardo F. Nakamura,Antonio A.F.Loureiro."Vehicular Ad-Hoc Networks:A new challenge for Localization-based systems". In Article in press computer communication 2008 Science Direct.

[3] Kaun-Lin Chiu,Rem-Hung Hwang,yuh-Shyan Chen,"A cross layer Fast Handover Scheme in VANET"

[4] Inthawadee Chantaksinopar,Wilaiporn lee,Akara Prayote and Phoemphun OOthongsap in International Journal of Computer Science and Network security."Delay Sensitive Applications in vanet and seamless connectivity:The limitations of UMTS Network"

[5] Abderratum Bensalimane,Senior member IEEE,Tariksaleb Senior member IEEE,Rajasekaran sivaraj "Dynamic Clustering Based Adptive Mobile Gateway management in Integrated VANET – 3G Heterogeneous Wireless Networks" in Vol:29,No.3 March 2011 IEEE journal in selected areas.

[6] Kun- Yang, Essex Univ,Colchester; ou,S;Hsiao-Chen,Jianghua He. "A MultiHop.Peer-communication Protocol with Fairness Guarantee for IEEE 802.16 based vehicular Networks."in vol 56,2007,IEEE transaction.

[7] Bhuvaneswari, E. George Dharma Prakash Raj review article, "survey on handoff techniques" vol 2,no.6,June 2011. Journal of Global Research in Computer Science

[8] Analytical study of intra domain handover in multiple-mobile-routers-based multihomed NEMO networks Houda Labiod, Hai Lin *, Computer Networks 54 (2010).in Science Direct.sstyle). Belmont, CA: Wadsworth, 1993, pp. 123–135 Volume 2, No. 6, June 2011 Journal of Global Research in Computer Science .

[9] Muhammad Nadeem Majeed, Dr. Shahbaz Pervez Chattha, Dr. Adeel Akram 4 Dr. Mohammad Zafrullah "Vehicular Adhoc Networks History And Future Development Arenas" in ITEE Journal Information Technology & Electrical Engineering ISSN: - 2306-708X Volume 2, Issue 2 April 2013 .

[10] Meenakshi Saini "Handoff Schemes for Vehicular Ad-Hoc Networks: A Survey" in International Journal of Innovations in Engineering and Technology.