Volume 5, Issue 3, March 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

An Improved Data Transfer Techniques for Vehicular Environment Using 4G networks

[1]Sumathi.A[*], [2]Gopi.R, [3]Dr. A. Rajesh
[1]P.G Scholar, Dept of CSE, Dhanalakshmi Srinivasan Engineering College, Tamilnadu, India
[2]Research Scholar Dept of CSE, St.Peter's University, Chennai, India
[3]HOD/CSE, C.Abdul Hakeem College of Engineering and Technology, Vellore, Tamilnadu, India

***Abstract*— Movable nodes are combined together for one purpose is called wireless adhoc network. Here using the vehicles are the nodes for the communication. Vehicular networks are having different wireless technologies like as Wi-Fi, WI-MAX etc. Here proposed the data transfer mechanism for vehicular network using 4G networks. In 4Generation networks are heterogeneous networks, so network user having the possibility to select the network which one is suitable from the available wireless networks. Here proposed the new mechanism for data transfer when a user area with overlapping another access technologies. User needs to decide the best wireless networks, technologies from the available list. Improving the overall performance, cost by using decision model of data offloading applied to vehicular environments.**

Keywords: Wi-Fi, data offloading, data transfer, Handoff, 4G network.

I. INTRODUCTION

The improvement of the network technologies has provided the use of them in several different fields. One of the most emergent applications of them is the development of the Vehicular Adhoc Networks (VANETs), one special kind of Mobile Adhoc Network in which the communication are among the nearby vehicles. Vehicular Adhoc Networks (VANETs) are composed for a set of communicating vehicles equipped with wireless network devices that are able to interconnect each other without any pre-existing infrastructure.

The exchange of information among the vehicles provides a great opportunity for the development of new driver assistance systems. These systems will be able to disseminate and to gather real time information about the other vehicles and the road traffic and environmental conditions. Such data will be processed and analyzed to facilitate the driving by providing the user with useful information. Network among the moving vehicle is known as Vehicular Adhoc Network (VANET). Vehicular Adhoc Network (VANET) is to provide efficient vehicle-to-vehicle (V2V) and vehicle-to-Road Side Unit (V2R) communications. Based on these two kinds of communications, Vehicular Adhoc Networks (VANETs) can support many applications in safety, entertainment, and vehicle traffic optimization. Mobility is the most important feature of wireless networking system. Mobility can be attained by handoff mechanisms in wireless networks.

Handoff is the process of changing the channel (frequency, time slot, spreading code, or combination of them) associated with the current connection while a call is in progress. It is evidenced that the demand for high-speed mobile Internet services has increased dramatically. A recent survey reveals that Internet access is predicted to become a standard feature of future motor vehicles. Not surprisingly, cellular-based access technologies, such as / Long Term Evolution (LTE) / Long Term Evolution-advanced (LTE-A) play a vital role in providing reliable and ubiquitous Internet access to vehicles, as the cellular infrastructure is well planned and widely available. However, the cellular network nowadays is straining to meet the current mobile data demand, and on the other hand, the explosive growth of mobile data traffic is no end in sight, resulting in an increasingly severe overload problem.

Mobile data offloading refers to the use of complementary network technologies and innovative techniques for delivery of data which is different from originally targeted mobile/cellular networks. The objective behind this is to maintain quality of service (QoS) for customers, which also reduce the cost and impact of carrying capacity-hungry services on the mobile network. From the current scenario we should expect that mobile data offloading will become a key industry segment in coming future as the data traffic on mobile networks continues to increase rapidly. So, because of this reasons, most mobile operators have introduced and started to implement a vertical handoff strategy. Mostly, the data traffic patterns depend upon the type of device, its form factor, time of the day, type of application and a particular location of users. The rest of the paper is organized as follows: Section 2 explains related work of handoff. Section 3 depicts the classification of data transfer. Section 4 discusses the system model which should be considered during data trasfer decision making. Finally, section 5 concludes the paper.

II. EASE OF USE

A. Access the Internet

Drive-thru Internet can provide Internet access to moving vehicle via APs. Different from non-vehicular users accessing networks, drive-thru Internet has some unique characteristics, such as short and intermittent connectivity, unreliable transmission, fluctuating channels, etc. The network takes the average connection period (vehicle is being connected to an AP) is about several to tens of seconds, and the average inter-connection period (vehicle is not connected to any AP) is about tens of seconds.

B. Data transfer

Many factors go into choosing the data transfer, including existing infrastructure, bandwidth usage, customer requirements and policy and charging mechanisms, quality of service (QoS) and more. It helps decrease the data on radio/core networks by routing selected traffic through alternate channels Installing Wi-Fi in dense environments is the most cost effective short term solution. Wi-Fi offload are not only solving the short term immediate capacity needs of the network but are also ensuring a much easier transition to small cell Long Term Evolution (LTE).

III. METHODS

Mobility is the most important feature of wireless networking system. Mobility can be attained by handoff mechanisms in wireless networks. Handoff is the process of changing the channel (frequency, time slot, spreading code, or combination of them) associated with the current connection while a call is in progress. Handoff is also an important issue in the drive-thru Internet. Current devices initiate a handoff only when disconnected, and connect to an AP with the strongest signal strength. However, such a hard (maintain until broken) handoff mechanism does not fit the vehicular communication environments. This is because the quality of the drive-thru connectivity changes over time so that vehicles being connected may experience poor connectivity periods and miss the opportunity to handoff to an AP with stronger signal strength. The hard handoff also incurs large handoff delays Therefore, applicable handoff mechanisms should be specifically designed for the drive-thru Internet.

In 4G networks, the handoffs are classified into two main streams. Those are Horizontal Handoff (HHO), Vertical Handoff (VHO). Horizontal Handoff (HHO) means handoff between two base stations (BSs) of the same system. Horizontal handoff involves a terminal device to change cells within the same type of network (e.g., within a CDMA network) to maintain service continuity. It can be further classified into Link-layer handoff and Intra-system handoff. Horizontal handoff between two base stations (BS), under same foreign agent (FA) is known as Link-layer handoff. In Intra-system handoff, the horizontal handoff occurs between two base stations (BSs) that belong to two different FAs and both FAs belongs to the same system and hence to same gateway foreign agent (GFA).

Vertical Handoff (VHO) means the switching between points of attachment or base stations that belong to the different network technologies. The process of Vertical handoff can be divided into three steps, namely system discovery, handoff decision and handoff execution. During the system discovery, mobile terminal equipped with multiple interfaces have to determine which networks can be used and what services are available in each network. During the handoff decision phase, the mobile device determines which network it should connect to. During the handoff execution phase, connections are needed to be re-routed from the existing network to the new network in a seamless manner.

Vertical handoff refers to a network node changing the type of connectivity it uses to access a supporting infrastructure, usually to support node mobility. For example, a suitably equipped laptop might be able to use both a high speed wireless LAN and a cellular technology for Internet access. Wireless LAN connections generally provide higher speeds, while cellular technologies generally provide more ubiquitous coverage. Thus the laptop user might want to use a wireless LAN connection whenever one is available, and to 'fall over' to a cellular connection when the wireless LAN is unavailable. Vertical handovers refer to the automatic fall over from one technology to another in order to maintain communication .The vertical handoff mechanism allows a terminal device to change networks between different types of networks (e.g., between Long Term Evolution and Long Term Evolution- Advanced networks) in a way that is completely transparent to end user applications.

Mobile data offloading refers to the use of complementary network technologies and innovative techniques for delivery of data which is different from originally targeted mobile/cellular networks. The objective behind this is to maintain quality of service (QoS) for customers, which also reduce the cost and impact of carrying capacity-hungry services on the mobile network. From the current scenario we should expect that mobile data offloading will become a key industry segment in coming future as the data traffic on mobile networks continues to increase rapidly. The primary driver of mobile data offloading is clearly the rise of data traffic on cellular networks, which is causing congestion and ultimately degrading customer experience about quality of service. This rise can be attributed to a number of factors: 1) With the incoming of high-end devices such as laptops, tablets, and smart phones, which can multiply traffic. 2) The growth in average traffic per device, particularly due to increasing mobile network connection speeds and improvement in the features of mobile devices. Both these factors give rise to an individual's contact time with the network creating traffic problem. 3) The increase in mobile video content, which has much higher bit rates than other mobile content types, which enhance the users' viewing

Everyone around the world would like to be connected seamlessly anytime anywhere through the best network. The 4G wireless system must have the capability to provide high data transfer rates, quality of services and seamless mobility. In 4G, there are a large variety of heterogeneous networks. The users for variety of applications would like to utilize heterogeneous networks on the basis of their preferences such as real time, high availability and high bandwidth. When connections have to switch between heterogeneous networks for performance and high availability reasons, seamless vertical handoff is necessary.

A dynamic decision model is to make the right vertical handoff decisions by determining the "best "network at "best" time among available networks. The decision to decide best network is based on static factors such as the bandwidth of each network (capacity), usage charges of each network, power consumption of each network interface and battery level of mobile device and dynamic factors are considered in handoff decisions for effective network usage.

IV. SYSTEM MODEL

In this section, we present the system model, including network formation, finding location information, data transfer.

A. Network Formation

Vehicular Adhoc Network (VANET) is a self-configuring network that is automatically formed by a collection of node without the help of a fixed infrastructure or centralized management. Every vehicle nodes are having wireless transmitter and receiver, which allow it to communicate with other nodes in its radio communication range. In a rural area every vehicle acts as a router because of coverage area problem. Using vehicle to vehicle communication beacon messages transmitted to another vehicle which is involve in the communication. Based on this beacon messages calculate the velocity of all transmitting vehicles. After, grouping all vehicles for creating vehicular adhoc networks by using the vehicle's velocity.

B. Finding Location Information

The location information of the vehicles are collected by the smart phone through Global positioning System(GPS).This information have the details about the time and position co-ordinates of the vehicles. Although this information to be collected depends on the remote vehicles, the user is allowed to the select the network based on the parameters to be directly visualized on the user Smartphone. Using GPS receiver finding timing and position coordinates of the vehicle. This information is directly taken from the Smartphone that is able with self-positioning capability.

C . Figures

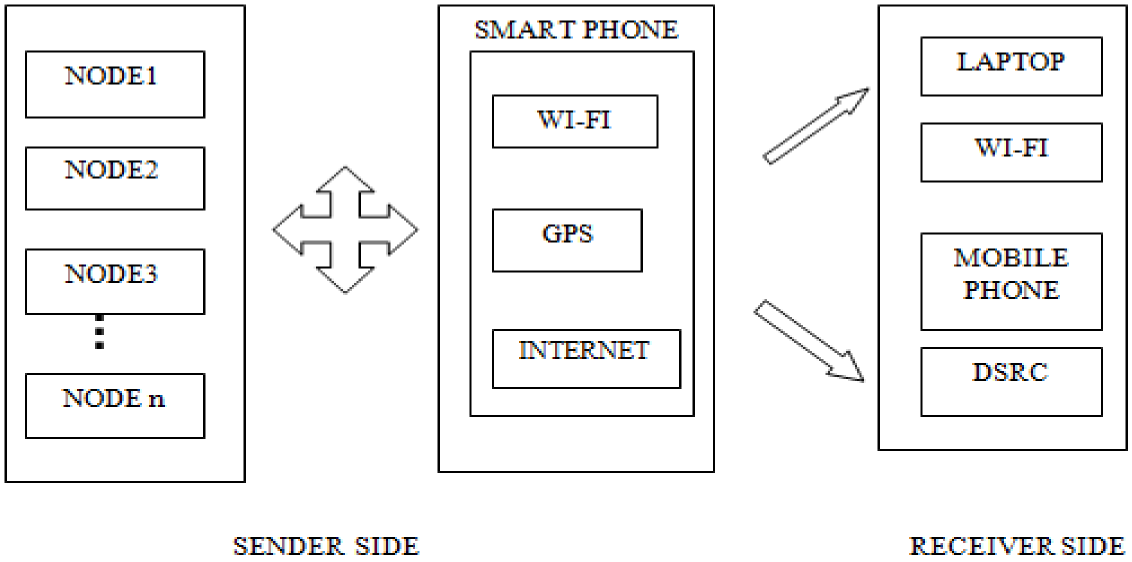

Figure : System model diagram

D. Data transfer

Here using new method that is when a user area with overlapping another access technologies and user needs to decide the best technology to be used based on their own decision. The decisions are taken using Smartphone. Because smart phones are used to transmits the data which is to be transmitted according to the data lifetime, the available network coverage and radio interfaces. Here implements the Handoff strategy. Here involve 3 steps.

a. Before transfer

Data is selected which is wish to transfer by the user. This module involve in the work of collecting, merging and temporarily storing data. The Smartphone is also responsible for delivering the retrieved data to remote processing centers, through its built-in cellular or Wi-Fi radio interfaces. Take the decision for Handoff the network from one coverage area to another coverage area.

b. Decision Making Phase

It is implemented in the Smartphone. It is independent from the data collected by the vehicle and network details. It hides to the end-users details about implementation and sensing devices. Using graphical user interface (GUI) of the Smartphone application is used to retrieves data from the on board Unit and shows the details about the network which all are possible to transmit data with network parameters. Data collected by the vehicles are separately queued, based on the priority and lifetime set by the application, and then transmitted to a remote server. Cellular and Wi-Fi interfaces are alternatively used to this purpose. In network available connectivity options are regularly monitored. Since the Smartphone is powered by the vehicle's battery. The decision on the network interface to be used for the remote delivery is based on handoff principles. Uploading Data are always exchanged via Wi-Fi whenever an access point (AP) is detected. Otherwise, when the cellular connection is only available, the decision whether to transmit data or not based on the life time of the packet.

C. Data Delivered

Data delivered to the remote server can be stored, processed, and analyzed by different applications. Unidentified information is collected; data about the vehicle and the driver are not transferred to prevent privacy violation. Data collected by vehicles over a large scale can be used to feed providers' servers that monitor the actual traffic situation in real-time (e.g., speeds, volumes) and offer accurate and reliable information both to Acknowledgment (Heading 5) drivers and road authorities. The Wi-Fi interface card of the Smartphone is dedicated to offloading. By doing so, the smart-phone will not be engaged in polling/receiving data through Bluetooth/Wi-Fi, and its energy will be further saved.

V. CONCLUSION

This paper describes about the Vehicular environment data transfer when using 4th Generation networks. Here explained data transfer methods are using when data traffic is increasing on variable wireless networks. This proposed system provides traffic management solutions in an effective way based on the user selection. But we necessary to know about the available data transfer and handoff options such as Wi-Fi offload, Vertical Handoff, etc already using in the vehicular environments. Currently the data traffic is increase and to handle this development impressively. Therefore user needs awareness to evaluate each of these options and their basic requirements.

REFERENCES

[1] "KPMG's global automotive executive survey." [Online]. Available: http:// www. kpmg. com/ GE/en/IssuesAndInsights/ArticlesPublications/Documents/Global-automotive-executive-survey.pdf

[2] Cisco, "Cisco visual networking index: Global mobile data traffic forecast update." [Online].Available:http://www.cisco.com/en/US/solutions/ collateral/ ns341/ ns525/ ns537/ ns705/ ns827/white paper c11-520862.html

[3] V. Bychkovsky, B. Hull, A. Miu, H. Balakrishnan, and S.Madden,"A measurement study of vehicular internet access using in situ Wi-Fi networks," in Proc. of ACM MobiCom, USA, September 2006.

[4] J. Ott and D. Kutscher, "Drive-thru Internet: IEEE 802.11 b for Automobile,"in Proc. of IEEE INFOCOM, China, March 2004.

[5] "Seemless wi-fi offload: From vision to reality." [Online].Available:http://www.enterprisechannelsmea.com/FileManagerImages/12047.pdf

[6] A. Aijaz, H. Aghvami, and M. Amani, "A survey on mobile dataoffloading: technical and business perspectives," IEEE Wireless Communications,vol. 20, no. 2, pp. 104–112, 2013.

[7] K. Lee, J. Lee, Y. Yi, I. Rhee, and S. Chong, "Mobile Data Offloading: How Much Can WiFi Deliver?" IEEE/ACM Trans. on Networking,vol. 21, no. 2, pp. 536–550, 2013.

[8] N. Cheng, N. Lu, N. Zhang, X. Shen, and J. W. Mark, "Vehicular WiFi offloading: challenges and solutions," Elsevier Vehicular Communications,vol. 1, no. 1, pp. 13–21, 2014.

[9] A. Balasubramanian, R. Mahajan, and A. Venkataramani, "Augmenting mobile 3G using WiFi," in Proc. of ACM MobiSys, USA, June 2010.

[10] X. Hou, P. Deshpande, and S. R. Das, "Moving bits from 3G to metroscale WiFi for vehicular network access: An integrated transport layer solution," in Proc. of IEEE ICNP, Canada, October 2011.

[11] W. L. Tan, W. C. Lau, O. Yue, and T. H. Hui, "Analytical models and performance evaluation of drive-thru internet systems," IEEE J. Selected Areas in Comm., vol. 29, no. 1, pp. 207–222, 2011.

[12] T. Luan, L. Cai, J. Chen, X. Shen, and F. Bai, "Engineering a distributed infrastructure for large-scale cost-effective content dissemination over urban vehicular networks," IEEE Trans. on Vehicular Technology,vol. 63, no. 3, pp. 1419–1435, 2014.

[13] D. Fiems, T. Maertens, and H. Bruneel, "Queueing systems with different types of server interruptions," European Journal of Operational Research, vol. 188, no. 3, pp. 838–845, 2008.

[14] J. Abate, G. L. Choudhury, and W. Whitt, "An introduction to numerical transform inversion and its application to probability models," in Computational Probability. Springer, 2000, pp. 257–323.

[15] S. K. Bose, An introduction to queueing systems. Springer, 2001.

[16] J. H¨arri, F. Filali, C. Bonnet, and M. Fiore, "VanetMobiSim: Generating Realistic Mobility Patterns for VANETs," in Proc. of ACM VANET, USA, September 2006.

[17] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011–2016,‖ white paper by Cisco, Feb.2012, http: //www.cisco.com/ en/ US /solutions /collateral /ns341/ ns525/ ns537/ ns705/ ns827/white_paper_c11-520862.pdf,accessed Feb 2012.

[18] computerweekly.com/news/2240105255/Smartphones-and-tablets-drive-mobile-data-traffic-up-23-says-Gartner.

