ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 1, January 2017

A Survey: Service Continuity in Heterogeneous Wireless Network Using Context Aware Vehicular Handover

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ABSTRACT: Now a day's number of wireless access technology is rapidly growing. When a mobile user moving with a vehicular speed is in heterogeneous wireless network thenfor service continuity handover mechanism are mainly used. The mobile users are demanding access to the wireless networks at anytime and anywhere. With a number of wireless access technologies available in the environment, it is expected to always be connected to the wireless access technology that fulfills the user's requirement and applications requirement. It is more challenging that the switching of network between vertical handover must be seamless. Proposed work present an overview of vertical handover techniques and proposed an algorithm called Context-Aware Vehicular Handover Algorithm, that forced by the MIH framework, which considers the various specifications, such as the surrounding context, application requirements, user preferences, and the different available wireless networks to improve user's quality of experience. This algorithm is expected to select the best candidate network accurately according to the connectivity requirements based on the user preferences and application requirements.

KEYWORDS: Handover, MADM algorithm, Vertical handover.

I. INTRODUCTION

Now a days, mobile device containing several communication interfaces such asWirelessFidelity (Wi-Fi), Universal Mobile Telecommunications System (UMTS), Bluetooth(BT), near-field communication (NFC), 3G, 4G and even some World-wide interoperabilityfor Microwave Access (WiMAX), as well as improved GPS receivers.With the combined use of such resources, end users demand within vehicular networks(VNs) is evolving from short safety messages toward online multimedia sessions. Tomeet these new end users demands and to improve their quality of experience (QoE),connectivity should be guaranteed with an adequate quality of service (QoS). Current outdoor wireless communication technologies offer solutions that differ in aspects suchas coverage, data rate, frequency, and modulation. The heterogeneity of such technologies,rather than being a pitfall for the nomadic user, should be seen as an advantage,since vehicles on move can make the most out of the diverse wireless technologies tomaintain continuous communication while journeying from one location to another.
An event taking placewhenever a mobile node moves from one wireless cell toanother, changing the connection with the first base station and getting attached to thesecond one this process is known as handover.
This process is generally categorized as horizontal, vertical handover.
1. Horizontal Handover: When a mobile node (MN) moves between two cells usingthe same technology, then this kind of handover process is defined as horizontalhandover.
2. Vertical Handover: A handover between two different access technologies isreferred to as a vertical handover.
Following figure shows the vertical and horizontal handover between different Wi-Fi,WiMAX, UMTS and 4G wireless access technologies.

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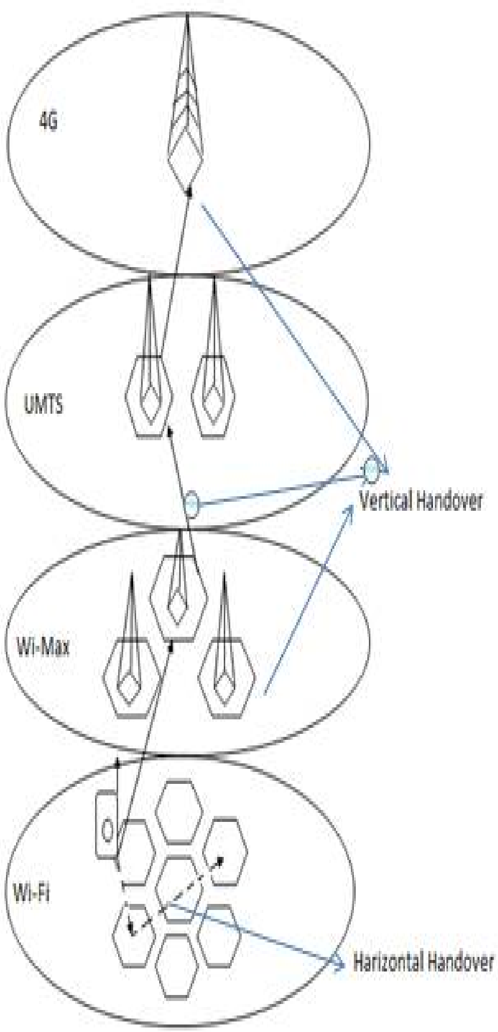

Figure 1: The horizontal and vertical handover

Vertical Handover Overview

To support seamless mobility while a mobile station roams within a heterogeneouswireless network, VHO (Vertical Handover) necessity estimation and decision to selecta best target network are two important aspects of the overall mobility framework. Thehandover necessity estimation is important in order to keep the unnecessary handoversand their failures at a low level.

Handover management process consists of following 3 phase:
1. Handover information gathering phase
2. Handover decision phase
3. Handover execution phase

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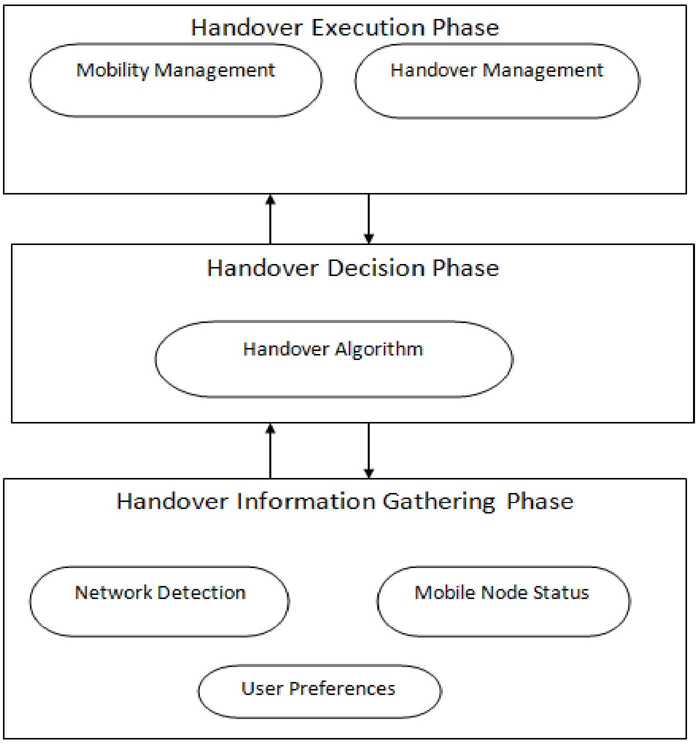

Figure 2: The handover management procedure

1. Handover information gathering phase:The handover information gathering phasecollects not only network information, but also information about the rest of thecomponents of the system such as network properties, mobile devices, accesspoints, and user preferences. The information typically collected is the following:

- Availability of neighboring network links by offering information such asthroughput, cost, packet loss ratio, handover rate, Received Signal Strength(RSS), Noise Signal Ratio (NSR), Carrier to Interference Ratio (CIR), Signalto Interference Ratio (SIR), Bit Error Ratio (BER), distance, location,and QoS parameters.
- The Mobile devices state by gathering information about battery status,resources, speed, and service class.
- User preferences information such as budget and services required.

2. Handover decision phase: The handover decision phase is one of the most criticalprocesses during the handover. Based on the gathered information, this phaseis in charge of deciding when and where to trigger the handover. When decisionrefers to the precise instant in time to make the best handover, while the whererefers to selecting the best network fulfilling our requirements for the switching.To ensure the service continuity the decision regarding handover is to be takenappropriately. If there are number of wireless network available then it needsto consider the different attributes such as bandwidth, packet loss, data rate etc,which helps to gives the service continuity for the number of application requirement.For this purpose multi attribute decision making algorithm (MADM)is used which considers the multiple attribute to select the wireless network.

3. Handover execution phase: This phase performs the handover itself; and to performingthe handover, this phase should also guarantee a smooth session transitionprocess. To perform the VHO different handover strategies cooperate withcontrol signaling, and the IP management protocols. This phase is usually knownas Handover execution.

II. RELATED WORK

Author J. M. Barja [1] presented an overview of vertical handover techniques and propose an algorithm empowered by the IEEE 802.21 standard, which considers the particularities of the vehicular networks (VNs), the surrounding context, the application requirements, the user preferences, and the different available wireless networks [i.e.,(Wi-Fi), (WiMAX), and (UMTS)] to improve user's quality of experience (QoE). Results demonstrate that this approach, under the considered scenario, is able to meet application requirements while ensuring user preferences are also met.
Author Maroua Drissi [2] studied the use of Multiple Attribute Decision Making (MADM) used to choose the best network from available networks. Authors compared handover decision algorithms: MEW (Multiplicative Exponent Weighting), SAW (Simple Additive Weighting) and TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) in terms of end-to-end delay and packet loss using two available networks WLAN and Wimax. Result shows that TOPSIS and SAW maintained almost the same performance for the conversational and streaming classes. While MEW provides the lowest end to- end delay for the Interactive class as did TOPSIS for the background Class. Although TOPSIS has the best performance in conversational and streaming classes. SAW has better Loss rate in the interactive class and MEW has better Loss rate in the background class.
Author Atiq ahemed [3] provided a detailed state-of the- art of the existing vertical handover decision mechanisms that aim at providing ubiquitous connectivity to the mobile users. They have categorized vertical handover measurement and decision schemes on the basis of their employed techniques and parameters. Also, they presented a comprehensive summary of their advantages and drawbacks.
Author Ramona [4] conducts a performance evaluation analysis of the widely used MADM methods for network selection using real user data. The performance evaluation is done in terms of energy efficiency and user perceived quality levels for multimedia streaming over a heterogeneous wireless environment. The results analysis shows that MEW finds a better quality energy trade-off and its main advantage is that provides distinct differences between the score results for each multimedia quality level.
Author R. Verma and N. Sing [5] developed a network selection algorithm which relies on combination of AHP and GRA methods for optimal wireless network selection in heterogeneous environment. Analytical hierarchy process (AHP) and grey relational analysis (GRA) methods are applying for optimal access network selection. The proposed methodology combines the AHP to decide the relative weights of criteria set according to network's performance, as well as the GRA to rank the network alternatives. The advantages of the GRA method are that the results are based on the original data, the calculations are simple and straightforward, and finally it is one of the best methods to make decision under heterogeneous wireless network environment.
Author B. S. Ghahfarokhi [6] presented a comprehensive survey of the proposed mobility management mechanisms that are using MIH framework. As a comparative view, they categorized the efforts according to the layer of mobility management and evaluates some of the representative methods discussing about their advantages and disadvantages. The paper also looks into recent handover decision and interface management methods that are exploiting MIH. Moreover, the extensions and the amendments proposed on MIH are overviewed.
In [7], a performance comparison between four VHO decision algorithms, namely, multiplicative exponent weighting (MEW), simple additive weighting (SAW), technique for order preference by similarity to ideal solution (TOPSIS), and gray relational analysis (GRA), was proposed. All these four algorithms allow different attributes (e.g., bandwidth, delay, packet loss rate, and cost) to be included for VHO decision. Comparative results show that MEW, SAW, and TOPSIS provide similar performance to the four traffic classes. GRA provides a slightly higher bandwidth and a lower delay for interactive and background traffic classes.

III. EXISTING SYSTEM APPROACH

Neighborhood-awarevehicular handover algorithm (NAIRHA), which is an enhanced vertical handover decision algorithm that considers the surrounding context, different available types ofwireless networks, networking elements information, geolocationfeatures, user preferences,and application requirements, to select the most suitable CN. For decision making process it uses SAW (Simple Additive Weighting) algorithm to select the best network.One of themain drawbacks of SAW is that a poor value for oneparameter can be heavily outweighed by a very good valuefor

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another parameter. For example, if a network has a lowthroughput, but a very good price, it may be selected over aslightly more expensive network with a much better throughput rate.

III. PROPOSED CONTEXT AWARE VEHICULAR HANDOVER ALGORITHM

Context-aware vehicular handover algorithm, which is an enhanced VHDA designedfor VNs, that takes into consideration the surrounding context, different available type of wireless networks, networking elements information, geolocation features (locationand navigation), user preferences, and application requirements, to select the most suitableCN. This makes use of the IEEE 802.21 standard, using the MIIS to collect networkinginformation, the MICS to interact with the different network interfaces, andthe MIES to sense the state of the networks. Moreover, the location and navigationinformation enhances the surrounding context data by allowing mobile devices to continuously gather information from the current and soon-to-be-reached neighborhoods.Concerning the decision-making process, Context aware vehicular handover algorithmuses the AHP and GRA algorithm which is MADM algorithm to fairly evaluate thecandidates as per different attributes available and choose the most suitable one that meets the multiple requirements. And finally handover takes place with the new network. Following fig shows the Context aware vehicular handover algorithm with its different modules.

Advantages of the proposed system:

- This algorithm is able to accurately select the best candidate network according to theconnectivity requirements based on the user preferences and application requirements.
- Efficient network provider handover mechanism.
- Service availability with any congestion.
- Minimum packet drop rate
- Provide high throughput
- Achieve better performance in terms of latency and packet losses.

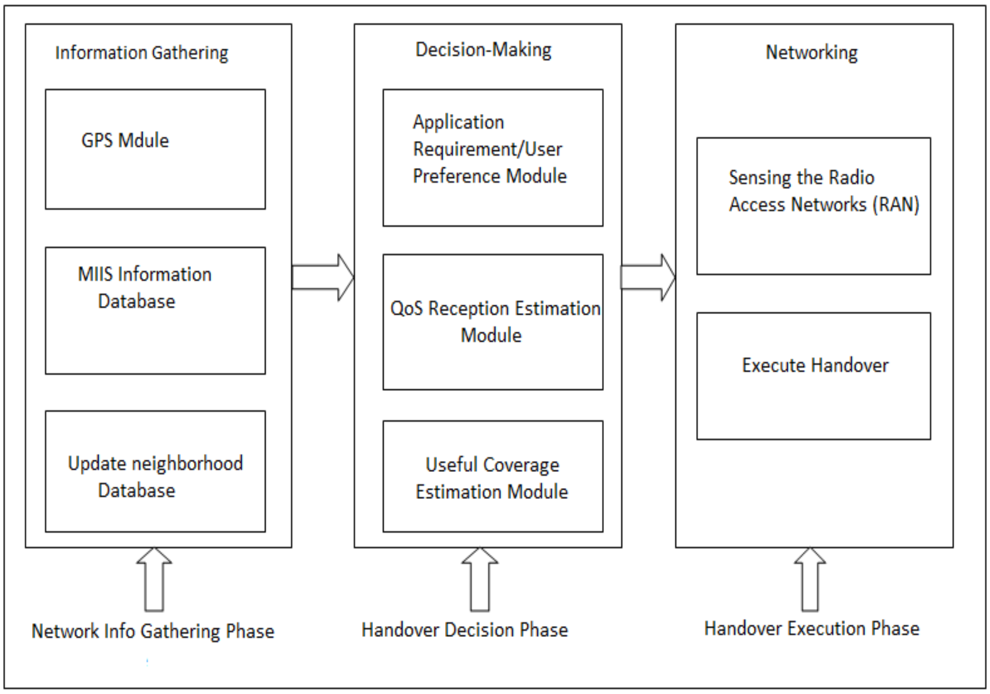

Fig3: Context Aware Vehicular Handover Algorithm

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IV. CONCLUSION

When a mobile moving with a vehicular speed then there are number of heterogeneouswireless networks are available. When mobile node is moving within different wirelessnetworks then it needs a vertical handover. Vertical handover should be seamless so that user can take advantage of service continuity while moving within various networks. Proposed system considers the various specifications, such as the surrounding context, application requirements, user preferences, and the different available wireless networks to improve user's quality of experience.This algorithm is expected to select the best candidate network accurately according to the connectivity requirements based on the user preferences, application requirements and providesmooth vertical handover between the heterogeneous networks.

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