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Implementation of Vertical Handoff between Wimax and Wifi Networks

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Abstract: ***In the heterogeneity environment, Wireless telecommunications techniques is defined in terms of two different networks, WiMax and WiFi*** *,which* ***uses number of transmission methods such as portable or fully mobile internet access link via point to multipoint links. This wireless network is very enormous because of the complete network is divided into group of clusters. And individual cluster are having a cluster head or the base station which controls all nodes of the network. The problem starts when a node moves from the cluster and when outside the range of base station. In this case, the control of these nodes shifted to other base station. This process is called hand-off mechanism. The proposed scheme is selected by the best base station for the node respective to the reliability and efficiency. The proposed work is the selection of the base station in case of heterogeneous networks. The process of handover between these different networks is called vertical handover procedure. The present work is about to optimize the vertical handoff process. In this work we have done the parametric changes while performing the selection of base station. The analysis is performed respective to the effective throughput and the delay.The main objectives are: Design and implementation of WiMax and Wifi Clustered Network in Different Scenarios, Study of Parameters which affect Handover, Implementation of Proposed Algorithm for effective Hand off between heterogeneous networks.***
In this paper, vertical handoff algorithm is proposed by combining 3 parameters while performing handoff, load on base station, distance and transmission time.

I. INTRODUCTION

Heterogeneous wireless networks need to cooperate to provide users to provide ubiquitous environment with seamless mobility. Mobile nodes (MNs) can automatically switch the connectivity between different types of networks. Next-generation wireless networks have been imagined as an Internet Protocol (IP) based infrastructure with the integration of various wireless access networks such as IEEE 802.11 wireless local area networks (WLANs), IEEE 802.16 wireless metropolitan area networks (WMANs), Wimax ,Wi-Fi networks. The interworking between different wireless access networks has been a hot research and development topic in the past few years. Different radio access technologies present distinct characteristics in terms of mobility management, security support, and QoS providing. To achieve seamless mobility and end-to-end guaranteed QoS for the users; these issues should be carefully handled while developing the interworking and handoff schemes of WMNs with various wireless networks. In this case, the traditional mobility management such as Mobile IP leads to a large handoff delay with too much signaling cost. Thus to achieve fast and seamless handoff, a new handoff scheme should be considered. Another factor which can select seamless vertical handoff is how and when to make a handoff decision. In traditional handoff, the received signal strength is the main handoff metric. However, in vertical handoff, only the received signal strength is not enough to make a handoff decision.

The handoff metrics may be cost of service, load on network, MN's distance, QoS and user preference. It is a challenge to develop a vertical handoff decision algorithm for optimal radio resource utilization with various QoS support. The vertical handoff may not take place only at the cell edge. It can occur at any time (even when the MN does not move) depending on the network condition and user preference such as in a situation of network congestion. How to make a decision to trigger a vertical handoff according to the system performance and QoS parameters becomes the main part of this kind of vertical handoff. Therefore an effective and efficient vertical handoff decision algorithm in the interworking between 802.11 and 802.16 in WMN is needed to maximize the resource utilization and to avoid unnecessary handoff. In this work parametric changes have done while performing the selection of base station. The analysis is performed respective to the effective throughput and the delay.

II. RELATED WORK

In year 2007" Movement-Aware Vertical Handoff of WLAN and Mobile WiMAX for Seamless Ubiquitous Access" was performed by Wonjun Lee . This paper addresses a movement-aware vertical (MAV) handover algorithm between WLAN and Mobile WiMAX for seamless ubiquitous access. A MAV handover algorithm is proposed in this paper to exploit movement pattern for avoiding unnecessary handovers in the integrated wireless networks. If a mobile station (MS)'s velocity is high with irregular movement pattern, unnecessary handovers likely occur more frequently. Therefore, the MS velocity and it's moving pattern are important factors for the handover decision. To avoid unnecessary handoffs this algorithm adjusts the dwell time accordingly and predicts the residual time in the cell of target base station. Simulation shows that reduction of unnecessary handovers by leads to significant throughput improvements [1].

In year 2011, Malak Zareif Habeib performed a work," Battery Based Vertical Handover between WiMAX and WLAN Technologies". A methodology for triggering the handover process among different wireless technologies based on the user terminal battery level status has been proposed in this work. Presented study will efficiently saves the battery life time of the user terminal based on its surrounding wireless access technologies and its mobile terminal capabilities. Moreover Author introduce a simple and easy concept for how to exchange this handover information from the user terminal to the network node to guarantee the smooth handover process [2].

In year 2008, Jaeho Jo performed a work," A Cross-layer Vertical Handover between Mobile WiMAX and 3G Networks". Author proposes a cross-layer optimization of vertical handover between mobile WiMAX and 3G cellular networks in this paper. More specifically, L2 (layer 2) and L3 (layer 3) signaling messages for vertical handover are analyzed and reordered/combined to optimize the handover process. The proposed scheme enhances the performance of vertical handover between mobile WiMAX and 3G networks: low handover latency, high TCP throughput, and low packet loss ratio [3].

III. PROPOSED WORK

Efficiency and the Integrity are always the major requirement for any network and when it comes to wireless networks the problem is more critical. We are proposing one of such a target base station selection scheme in case of handover in wimax and WiFi networks . The proposed handover scheme will evaluate the maximum effective capacity and the idle capacity of the base station for any point of time in the network. Then the handoff will be performed based on some decision factors. Base station having the more effective capacity will be elected for the next base station after handover. The proposed system will provide a reliable and energy efficient hand over.

Algorithm

I) Define a network with N nodes over the network with sensing range and other parameters
II) Define the base station for Wimax and Wifi under the frequency range and capacity
III) Perform the mobile communication for particular Node N1
IV) If (Distance(BS,N1)>Range)
V) {
VI) Print "Handoff required"
VII) The periodic estimation of member nodes by the base station.
VIII) Find all the base stations that are having the particular node in Range. Let b1 is wimax base station and b2 is wifi base station that set for eligibility
IX) If(RSS(b1)> RSS(b2) and Throughput (b1)>throughput(b2))
X) {
XI) If(Coverage(b1,N1)=true)
XII) {
XIII) Set wimax as the handover base station

```
XIV)    }
XV)     Else
XVI)    {
XVII)   Set wifi as the handover base station
XVIII)  }
XIX)    }
XX)     Else
XXI)    {
XXII)   If(Coverage(b2,N1)=true)
XXIII)  {
XXIV)   Set wifi as the handover base station
XXV)    }
XXVI)   Else
XXVII)  {
XXVIII) Set wimax as the handover base station
XXIX)       }
XXX)        }
```

IV. RESULTS

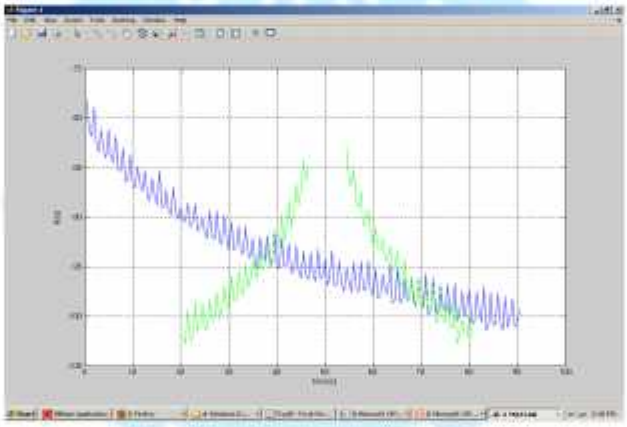


Fig 5.1 signal strength v/s time graph (MS = 10, DV = .1)

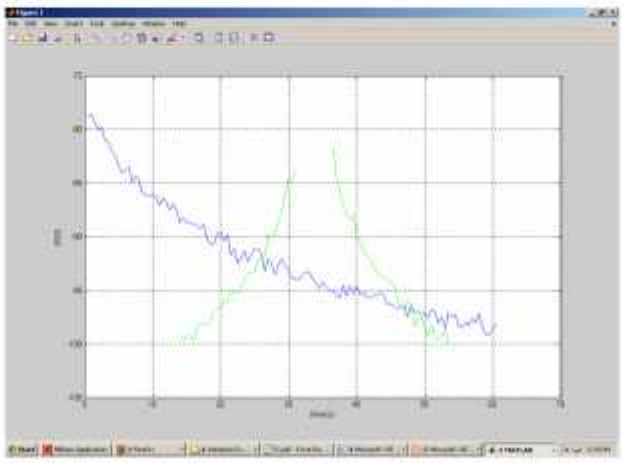


Fig 5.2 signal strength v/s time graph (MS = 15, DS = .2)

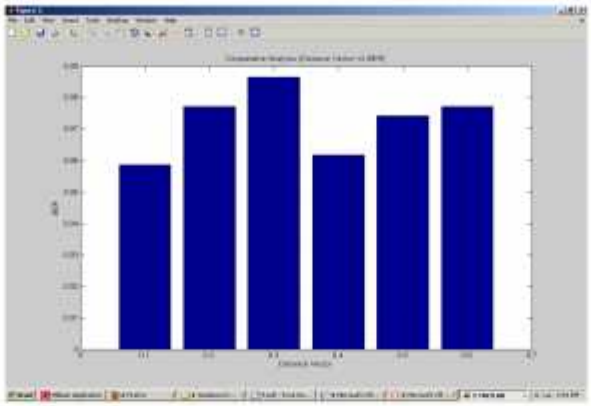


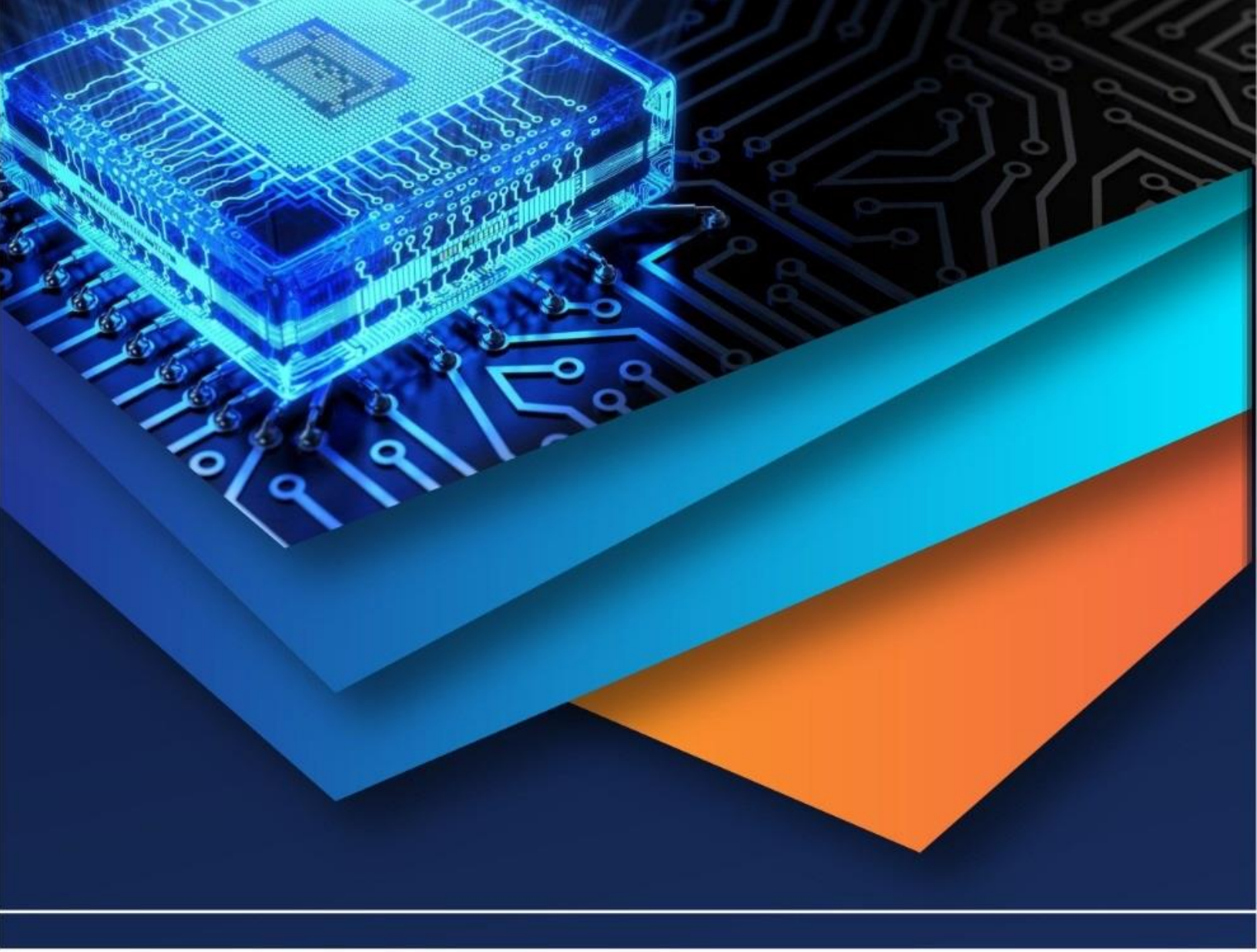
Fig 5.3 comparison b/w distance vector and BER

V. CONCLUSION AND SCOPE FOR FUTURE WORK

A Hybrid network architecture supports all usage models (fixed, mobile & nomadic). It supports high capacity real time and also non real time voice, data and multimedia services while maintaining the appropriate QoS. Moreover it supports idle mode operation and paging for the mobile station. Its network reference model support interoperability. By comparing the Proposed Handover Approach and Existing approaches, we noticed that Proposed Handover Approach offers better services than the Existing Approach. Its network can be a good choice to fill up the gap between the Existing. In this we combine 3 parameters while performing the handover these are: Load on Base Station, Distance and the Transmission Time. The results are analyzed in terms of data drop respective to the speed of the mobile nodes and the distance parameter. Results shows that the presented approach has reduce the error rate of communication. Some future work can be envisaged in order to improve the handover algorithm by taking into account the requirements in terms of Quality of Service of the application, or different parameters like load on cell, network performance, security.

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