INTERNATIONAL JOURNAL OF COMPUTATIONAL MATHEMATICAL IDEAS ISSN: 0974-8652

Improved Cell connectivity based on ad-hoc technology Implementing VHOM Scheme in Heterogeneous Wireless Networks

Parabrahmachari Sriram[1], Satya Sandeep Kanumalli [2], Nanduri Ashok kumar[3]

Computer science and Engineering Department,
Vignan'sNirula Institute of Technology and Science for Women ,
Palakaluru,Guntur(dist),AndraPradesh,India

Published in Volume 14, Issue 1 Jan – Feb: 2017, Page No: 66121 to 66126

[1]chariindian@gmail.com [2]satyasandeepk@gmai.com [3]jashok.nanduri@gmail.com

Abstract: The integration of WiMAX and WLAN has been seen as a promising approach toward 4G. we are going to analyze different important issues for the interworking of Mobile WiMAX and WLAN networks. We propose a tightly coupled interworking structure.Our proposed schemes can keep stations always being best connected due to ad-hoc nature that means An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration but in this project we are considering the device which has free channel it can share to requester otherwise not.

Key words: Wimax, Wifi, mobility, 4G, Ad-hoc Network (as cognitive).

1. Introduction:

Mobility is the very important feature of a wireless cellular communication system. Normally, continuous service is achieved by supporting handoff (or handover) from one cell to another. Smaller cells because an active mobile station (MS) to cross several cells during an process of conversation. This working call should be transferred from one cell to another one in order to achieve call continuation during boundary crossings. The handover process is transferring an active call from one cell to another. Handover initiation is the process of deciding when to request a handoff. Handoff decision is based on the RSS from the current BS and neighboring BSs. In our project we are assuming distance indirectly proportionalto distance. Handover can be classified using the network type involved into horizontal and vertical cases as an MT moves within or between different overlays of a WON. Horizontal handoff or intra-system handoff is a handoff that occurs between the APs or BSs of the same network technology. In other words, a horizontal handoff occursbetween the homogeneous cells of a wireless access system. Vertical handoff or inter-system handoff is a handoff that occurs between the different points of attachment belonging to different network technologies. Handoffs can also be classified using the number of connections involved as soft or hard. A handoff is hard if the MT can be associated with only one point of attachment at a time. In other words, an MT may set up a new connection at the target point of attachment after the old connection has been torn down. Amake before break handoff occurs if the MT can communicate with more than one point of attachment during handoff. In this case, mobile terminal connection may be created at the target point of attachment before the old point of attachment connection is released. For example, Mobile terminal equipped withmultiple network interfaces can simultaneously connect to multiple points of attachment in different networks during soft handoff. Mobile ad hoc networks are dynamic networks in which nodes are free to move. A main performance constraint comes from path loss and multipath attenuation. Many Mobile ad-hoc network routing protocols exploit multi-hop paths to route packets. Probability of successful packet transmission on a path is dependent on the reliability of the wireless channel on each hop. In this paper, we assume that all nodes know their positions and velocities, and each and every node can measure the distance from AP and BS. And we are assuming bandwidth by no of users. In our project, whenever number of user increases then bandwidth will reduce. We are setting maximum 4 users mean Qos is good otherwise it will reduce.

2. Related work:

Cheng Wei Lee et al [1]presents an overview of issues related to horizontal and vertical handoffs and also discussed the architecture of integrated WLAN and WAAN networks based on Mobile IPv6. Pros and cons: The Overlay Network is considered to improve the different characteristics of wireless access network technologies to satisfy the anytime, anywhere, and any service needs of mobile users but author used the wide area access network in which Setting up a network can be an expensive and complicated and also the bigger the network the more expensive it is and the Security is a real

issue. N.Nasser et al [2] presents efficient handoff schemes to enhance quality of service and provide flawless mobility, and it presents different and novel aspects of handoff and discusses handoff related issues of fourth generation systems.
Pros and cons: The classification of handoffs, handoffs in 4G heterogeneous networks, handoff process and vertical handoff decision functions are clearly explained. Chuanxiong Guo et al [3] presents a novel end-to-end mobility management system for seamless and proactive roaming across heterogeneous wireless networks and this system integrates a connection manager that intelligently detects the condition of the wireless networks and a virtual connectivity-based mobility management scheme that maintains connection's continuity using the end-to-end principle.
Pros and cons: A Heterogeneous wireless network is proposed which has advantages like capable of reacting to roaming events proactively and accurately and maintaining the connection's continuity with small handoff delay but the technical details such as network bandwidth and delay estimation, as well as end-to-end mobility management were not fully addressed. George Lampropoulos et al [4] analyzes the most recent research efforts in the area of handover management in integrated WLAN/cellular networks, attempting to categorize and comment on the proposed solutions. The focus is placed mainly on the methods to integrate two different architectures and on the supported functionality of the integrated system.Pros and cons: A integrated WLAN/cellular network is proposed to handle interference problems and also to increase the bandwidth in limited geographical areas but in this paper author uses WLANs and GPRS/UMTS technology which has some drawbacks like speed, reliability and distance factor. Allan Borges Pontes et al [5]analyzes the most recent research efforts in the area of handover management in integrated WLAN and wireless metropolitan area networks (WMANs). This integrated network will bring a synergetic improvement to the services provided to mobile users.

3. Pros and cons:

An integrated WLAN and wireless metropolitan area network which considers the handover decision algorithm based on MIH framework but it does not consider the packet delay and bandwidth while handoff is occurring. WonjunLee et al [6]addresses a movement-aware vertical (MAV) handover algorithm between WLAN and Mobile WiMAX for seamless ubiquitous access. MAV handover algorithm is proposed in this paper to exploit movement pattern for avoiding unnecessary handovers in the integrated WLAN and Mobile WiMAX networks. Pros and cons: A novel MAV handover algorithm is proposed for interworking between WLAN and Mobile WiMAX to avoid Frequent handovers for a short time period of time and there is an higher chance of packet loss, delay are affecting the overall throughput but he considers only about the velocity of mobile station but not about the other factors. Alexandre V et al [7]considers the quality-of-service oriented intersystem handover between the IEEE 802.11b network and the overlay network. He proposes the handover scheme and algorithm that guarantee to simultaneously meet the three key QoS values, that is, minimum data rate; the maximum data block delay and the maximum data error rate, for the number of downlink and uplink multiserviceconnections. Pros and cons: A handover scheme and algorithm is proposed that guarantee to simultaneously meet the three key QoS parameters as well as the maximum call-dropping probability and the maximum average number of ping-pong event constraints but When the number of fixed stations in the IEEE 802.11b cell is high, station collision probability is also high and the QoS requirements of the mobile stations arriving at the IEEE 802.11b cell cannot be satisfied at least for the real-time traffic. Ravi Prasad et al [8]defines specific bandwidth-related metrics, focus on the scope and relevance of each. Particularly, he differentiates between the bandwidth of a link and the bandwidth of a sequence of successive links. Pros and cons: A specific metrics, calculation techniques and tools are used to estimate available bandwidth and capacity of the links but didn't consider about the other factors like packet delay and bit rate. David Chuck et al [9]proposes a scheme, named Bandwidth Recycling, to recycle the unused bandwidth without changing the existing bandwidth reservation. The theme of the scheme is to allow other SSs to utilize the unused bandwidth when it is available
Pros and cons: An algorithm is proposed which considers about the subscriber stations to utilize the unused bandwidth and it shows that it can further improve the overall throughput by 40 percent when the network is in the steady state but it is only for homogeneous network and a light overhead is present. Wen-Hsin Yang et al [10] proposes a handover scheme with geographic mobility awareness, which considers the historical handover patterns of mobile devices. HGMA can conserve the energy of handover devices based on triggering of mobile devices from unnecessary handovers according to their received signal strength and moving speeds and it contains a handover candidate selection method for mobile devices to intelligently select a subset of Wi-Fi access points or WiMAX relay stations to be scanned. Pros and cons: A method is proposed to reduce the energy consumption of a handover operation and also to improve QoS satisfaction ratio to handover devices but in this paper author discuss only about the energy consumption but not about the remaining factors in taking handoff decision.

4.Existing system:

In previous QoS based VHO methods for overlay networks, Quality of service parameters are considered in handoff decisions. However, the handover procedures are normally started when the stations move across the border of WLANs. As a result, the fixed stations and the mobile stations within overlapped areas cannot benefit from VHOs. Authors proposed a tightly coupled interworking structure. Further, seamless and proactive vertical handoff scheme is

designed based on the architecture with aims to provide always the best quality of service for users.

4.1 Disadvantage:

Due to the newly developed WiMAX, there have been some advantages, but still limited proposals made for VHOs in WiMAX/WLAN overlay networks.Author proposed schemes can keep stations always being best connected. But when system is out of the range then no communication in that model

5.Proposed method:

In our project we are implementing the ad-hoc technology in infrastructure system called as cognitive radio network. In our model, whenever system is out of range of all the base station and AP. Then it can make the communication though the primary user when PU is free. In this model we are considering requesting device as the secondary device and which one is helping to make communication that is primary user. Cognitive radios are cognizant of their surroundings and bandwidth availability and are able to dynamically tune the spectrum usage based on nearby radios, location, time of day and other parameters. This provides for a more efficient use of the spectrum and enabling high priority communications to take precedence if needed. Cognitive radio has two types of users such as primary and secondary user.

5.1 Advantage:

Our proposed schemes can keep stations always being best connected, more than previous method, when it's in outside also.

5.2 Algorithm:

In this paper, we investigate the integration and VHO issues in WiMAX/WLAN overlay networks. And we present the theory implementation model as bellow.

Step1: Initializing a mobile node it can access both WiMAX/WLAN.

Initialize WiMAX/ WLAN networks.

Step2: Node will check the available networks.

Step4: If { network available } {

If {only one network } {

Get communication from that.

} else {

For {each network} {

Checks which are the best network… {Bandwidth and packet delay}

Theory calculation…

Bandwidth calculation for wimax

$$\begin{cases} B_d = \left(1 - \frac{AAS_d}{s_d}\right)\frac{\delta_d s_d}{T_f} \\ B_u = \left(1 - \frac{AAS_u}{s_u}\right)\frac{\delta_u s_u}{T_f} \end{cases},$$

Delay calculation wimax

$$t = t_s + t_q + t_m + t_t.$$

Bandwidth for wifi

$$BW = B_0 - L\frac{NAV}{T_n + \frac{1}{2}T_{n,c}(N-1)},$$

Delay for wifi

$$t = t_q + t_a = \frac{\lambda t_a^2}{1-\lambda t_a} + t_a.$$

}

Step5: Mobile node compares both networks

VHOM selects best

Step6:

If no AP or BS detected

Checks whether any other mobile station available with AP or BS connection and have enough bandwidth limit

If mobile station detected with enough quality and then switch to Mobile station communication

Step 7:

Else

No communication

5.3 Performance evaluation

For our analyzing purpose we are using the tools MATLAB and NS2. By using Matlab we are calculating the bandwidth and delay. And Ns2 is for showing the prototype model of VHO with enhancement such as ad-hoc property.

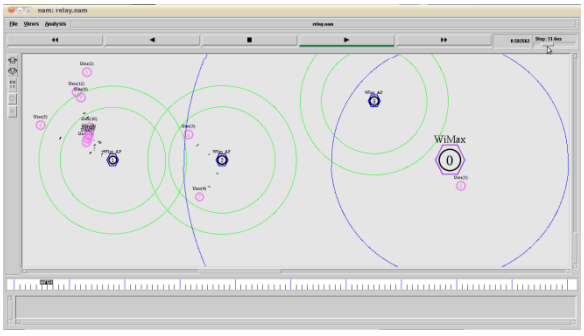

Fig-1: Nam output for VHO model

In this Nam window output we are implementing model of Wimax and WLAN. In this model there are the 15 nodes (Wimax and Wlan and Mobile nodes) available. In this model, if mobile node is out of the range of Wlan and Wimax mean it can't get communication.

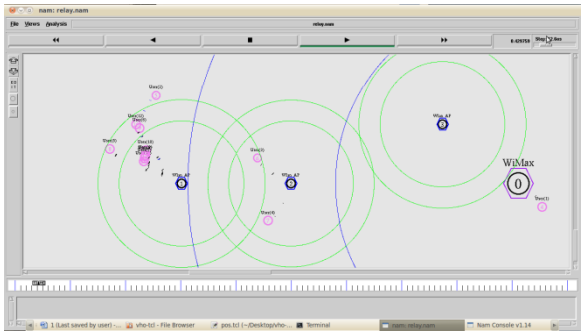

Fig-2: Nam output for VHO-with ad-hoc type

In our enhanced prototype model, we implemented VHO with ad-hoc property. So whenever node not in the coverage of and AP or BS then node can search for another mobile node which is having enough extra bandwidth. If mobile station having extra bandwidth then that node going to act as a primary user and searching node is acting as secondary user. If primary user is detected by the secondary user mean secondary user can make communication through the primary user.

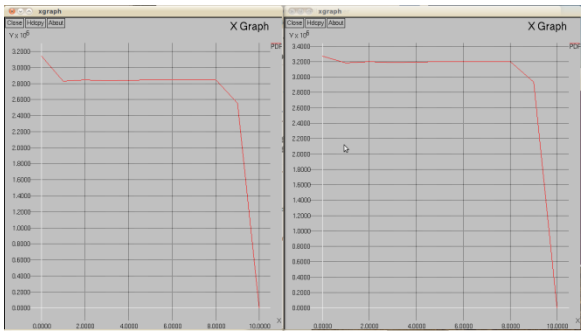

Fig-3: Xgraph output for VHO and VHO with ad-hoc

We are analyzing performance through the xgraph. From this graph we can see the packet delivery function is high for VHO with ad-hoc network compare than normal VHO operation. There are the two xgraph shown in above diagram left(A) , Right(B).

"A" graph is for showing the quality of only VHO, "B" graph for VHO with Ad-hoc property.From that graph we can conclude "B" performance is higher than "A".

By the OFDMA technique, the bandwidth is allocated in the form of data bursts where an integer number of slots are admitted. BS determines the number of DL and UL slots that a station obtains in one frame then broadcasts the resource allocation results through DL-MAP and UL-

MAP messages at the beginning of each DL sub-frame. Therefore, mobile station can easily obtain the utilization of WiMAX link by aggregating the number of allocated slots stated in DL-MAP/UL-MAP messages.

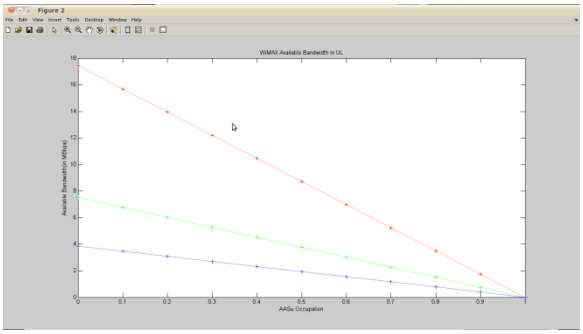

Fig-4: Bandwidth available UL

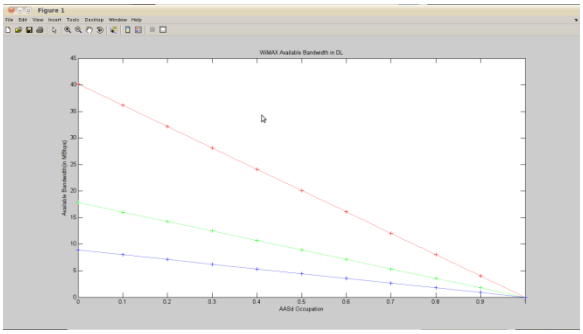

Fig-5: Bandwidth available DL

The AASd (AASu) occupation denotes the utilization of the medium, which equals to AASd/sd (AASu/su). Simulated result for available bandwidth is shown in above graph.

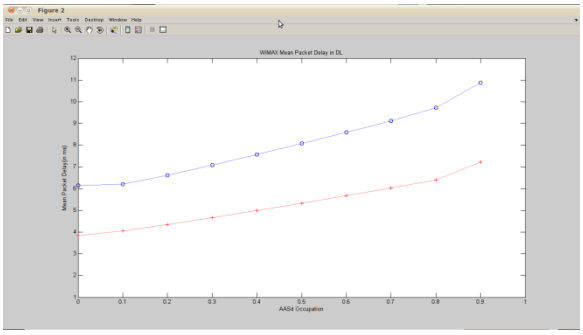

Fig-6: Delay in wimax UL

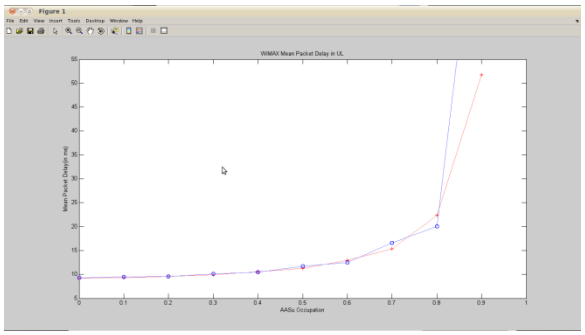

Fig-7: Delay in wimax DL

From above figure, it can be seen that the DL delay increases slowly with the increasing of AASd occupation.

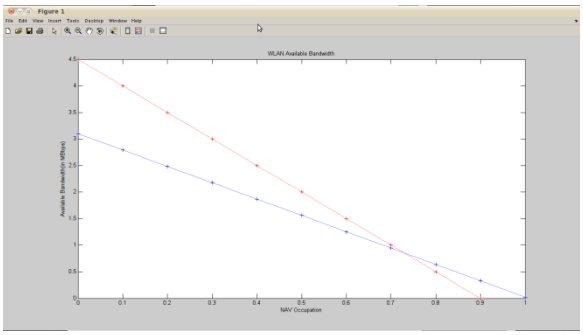

Fig-8: WLAN available bandwidth

In above figure, we showed our result for WLAN bandwidth availability. If NAV increases bandwidth will be reduce.

6.Conclusion:

In this paper, we investigate several important issues for the interworking of WLAN and WiMAX networks. We resolve a tightly coupled interworking architecture as the platformof our scheme. And we improved efficiency of the network by including Ad-hoc property.

References:

[1]. Cheng Wei Lee, Li Ming Chen, Meng Chang Chen, and Yeali Sunny Sun "**A Framework of Handoffs in Wireless Overlay Networks Based on Mobile IPv6,"**IEEE J. Selected Areas Comm., vol. 23, no. 11, pp. 2118-2128, Nov.2005

[2]. N.Nasser,A.Hasswa,andH.Hassanein,**"Handoffs in** Fourth Generation Heterogeneous Networks"IEEE Comm. Magazine,vol. 44, no. 10, pp. 96-103, Oct. 2006.

[3]. N.Nasser,A.Hasswa,andH.Hassanein,**"Handoffs in** Fourth Generation Heterogeneous Networks"IEEE Comm. Magazine,vol. 44, no. 10, pp. 96-103, Oct. 2006.

[4]. George Lampropoulos, Nikos Passas, LazarosMerakos And Alexandros Kaloxylos."**Handover Management Architectures In Integrated**

Wlan/CellularNetworks"IEEE Comm. Surveys and Tutorials, vol. 7,no. 4, pp. 30-44, Oct.-Dec. 2005

[5]. Allan Borges Pontes, Diego Dos Passos Silva, José Jailton, JR., Otavio Rodrigues, Jr., And Kelvin Lopes Dias"**Handover Management In Integrated Wlan And Mobile WimaxNetworks**"IEEE Wireless Comm., vol. 15, no. 5, pp. 86-95, Oct. 2008

[6]. Wonjun Lee, Eunkyo Kim, Joongheon Kim, Inkyu., Lee and ChoonhwaLee."**Movement-Aware Vertical Handoff of WLAN and Mobile WiMAX for Seamless Ubiquitous Access**"IEEE Trans. Consumer Electronics, vol. 53,no. 4, pp. 1268-1275, Nov. 2007

[7]. David Chuck and J. Morris Chang "**Bandwidth Recycling in IEEE 802.16 Networks**"IEEE Trans. Mobile Computing, vol. 9, no. 10, pp. 1451-1464, Oct. 2010.

[8]. Wen-Hsin Yang, You-Chiun Wang, Yu-Chee Tseng and Bao-Shuh P. Lin."**Energy-Efficient Network Selection with Mobility Pattern Awareness in an Integrated WiMAX and WiFiNetwork**"Int'l J. Comm. System,vol. 23, no. 2, pp. 213-230, Feb. 2010

Authors :

Mr. SATYA SANDEEP KANUMALLI received B. Tech (CSE) degree from R.V.R. &J.C.College of Engineering, GUNTUR. He was awarded Honor in M.E. in Computer Communications from Hindustan University; Chennai. He is working as Asst. Professor in Vignan'sNirula Institute of Technology and sciences for women ,Guntur.He is pursing Ph.D. inANU,GUNTUR.

Mr.PARABRAHMA CHARY SRIRAM received B-Tech and M-Tech in Computer Sceience and Engineering from J.N.T.U.K, Kakinada, AndraPradesh,He is working as Asst. Professor in Vignan'sNirula Institute of Technology and sciences for women ,Guntur.

Mr. ASHOK KUMAR NANDURI received B. Tech (CSE) degree from ST.ANN'S College of Engineering, Chirala. He was awarded Honor in M.E. in CSE from ANU, Guntur. He is working as Asst. Professor in Vignan'sNirulaInstitute of Technology and sciences for women ,Guntur.