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Efficient and Adaptable Technology Based VHOM Scheme in UMTS/WLANOverlay Networks

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ABSTRACT

The integration of UMTS and WLAN has been seen as a promising approach toward 4G. I am going to analyze different important issues for the interworking of UMTS and WLAN networks. SoI proposed a tightly coupled interworking structure and my proposed schemes can keep stations always being best connected due to ad-hoc nature that means An adhoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing networkinfrastructure or centralized administration but in this paperi have considered the device which has free channel it can share to requester otherwise not.

***Keywords*-**UMTS, WLAN, mobility, 4G, Ad-hoc Network (as cognitive).

I. 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 a 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 my project i amassuming distance indirectly proportional to distance.

Handover can be classified using the network type involved into horizontal and vertical cases as an MT (mobile terminal) moves within or between different wireless overlay networks[1].

Horizontal handoff[2] 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 occurs between 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 (mobile terminal) 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. A make 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 with multiple 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, i 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 my project, whenever number of user increases then bandwidth will reduce. We are setting maximum 4 users mean Qos[7] is good otherwise it will reduce.

A.UMTS Network

The Universal Mobile Telecommunications System (UMTS) may be a third generation mobile cellular system for networks supported the GSM normal. Developed and maintained by the 3GPP (3rd Generation Partnership Project). UMTS supports most theoretical knowledge transfer rates of forty two Mbit/s once HSPA+ is enforced within the network. Users in deployed networks will expect a transfer rate of up to 384 kbit/s.

UMTS phones will use a Universal Subscriber Identity Module, USIM (based on GSM\'s SIM) and conjointly work (including UMTS services) with GSM SIM cards. This is often a world normal of identification, and permits a network to spot and attest the (U) SIM within the phone. Roaming agreements between networks leave calls to a client to be redirected to them whereas roaming and confirm the services (and prices) out there to the user.

B. WLAN Network

WLANs are specified by are specified by IEEE 802.11 standards, where the fundamental access method is distributed coordination function (DCF) known as carrier sense multiple access with collision avoidance (CSMA/CA). Network allocation vector (NAV) is the main scheme used to avoid collision by setting a busy duration on hearing frame transmissions from other stations. Hence, the utilization of the WLAN channel is well reflected by NAV.

The available bandwidth has been derived from NAV.This network enables you to access the Internet in localized hotspots via a wireless local areanetwork (WLAN) access card and a PDA or laptop.

Parameters	UMTS	WLAN
Transmission power	43dBm	30dBm
Transmission Gain	20 dB	2 dB
Reception Gain	2 dB	2 dB
Frequency	2.2Ghz	2.4Ghz
Supplementary attenuation	20 dB	20 dB
sensibility	-100dBm	-100dBm
Bandwidth	5MHz	1MHz

COMPARISON BETWEEN UMTS AND WLAN

RELATED WORK

[1]In this paper, author presents an overview of issues related to horizontal and vertical handoffs and also discussed the architecture of integrated WLAN and WAANnetworks 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.

[2]In this paper, author 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.

[3]In this paper, author 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.

[4]In this paper, author 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.

[5]In this paper, author 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.

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.

[6]In this paper, author 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.

[7]In this paper, author 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 uplink and down link multi service connections.

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.

[8]In this paper, author 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.

[9]In this paper, author 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.

[10]In this paper, author 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[5] candidate selection method for mobile devices to intelligently select a subset of Wi-Fiaccess 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.

II. EXISTING TECHNIQUE

In previous QoS based VHO methods for overlay networks, Quality of service[7]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[3] vertical handoff scheme is designed based on the architecture with aims to provide always the best quality of service for users.

DISADVANTAGES

Due to the newly developed UMTS, there have been some advantages, but still limited proposals made for VHOs in UMTS/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.

III. PROPOSED TECHNIQUE

In my project I have implementing the ad-hoc technology in infrastructure system called as cognitive radio network. In proposed 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 radiosare 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.

ADVANTAGE:

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

IV. ALGORITHM

In this paper, I have investigated the integration and VHO issues in UMTS/WLAN

overlay networks. And we present the theory implementation model as bellow.

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

Step 2: Initialize UMTS/WLAN networks

Step 3: Node will check the available networks.

Step 4: 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 calculations.....

Bandwidth calculation for UMTS

$$B_d = (1 - \frac{AAs_d}{s_d})\frac{\delta_d s_d}{T_f}$$

$$B_u = (1 - \frac{AAs_u}{s_u})\frac{\delta_u s_u}{T_f}$$

Delay calculation for UMTS

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

Bandwidth for WLAN

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

Delay for WLAN

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

}

Step 5: Mobile node compares both networks

VHOM selects best

Step 6: If no AP or BS detected

Checks whether any other mobile station available APor 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.

V. PERFORMANCE EVALUATION

For our analyzing purpose we are using the tool NS2. By using NS2 we are calculating the bandwidth and delay and showing the prototype model of VHO with enhancement such as ad-hoc property.

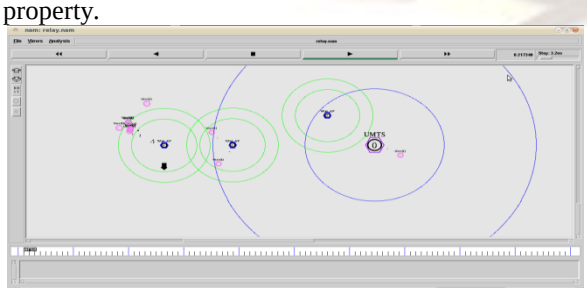

Fig 1:**Nam output for VHO model**

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

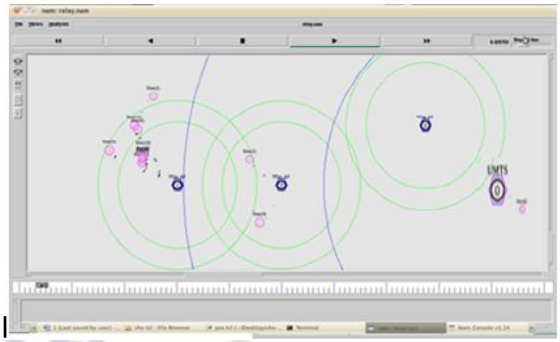

Fig 2:**Nam output for VHO with Ad-hoc type**

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.

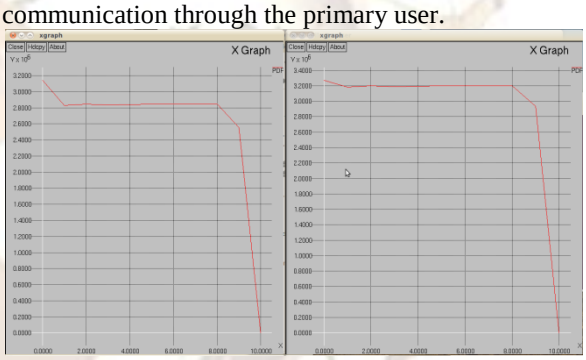

Fig 3(a) **:Xgraph output for VHO and VHO with ad-hoc**

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 databursts where an integer number of slots are admitted. BSdetermines thenumber 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 UMTS link by aggregating the number of allocated slots stated in DL-MAP/UL-MAP messages.

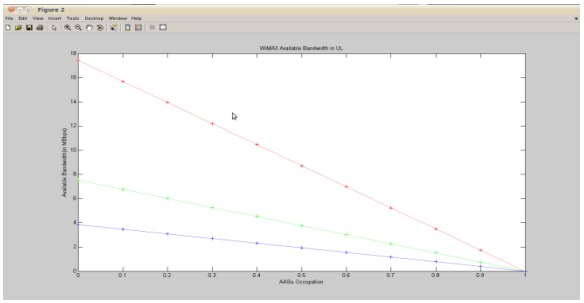

Fig 3(b):**Bandwidth available UL**

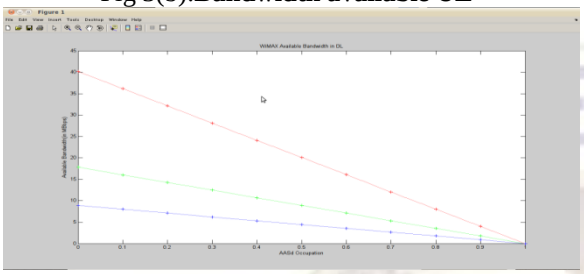

Fig 3(c): **Bandwidth available DL**

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.

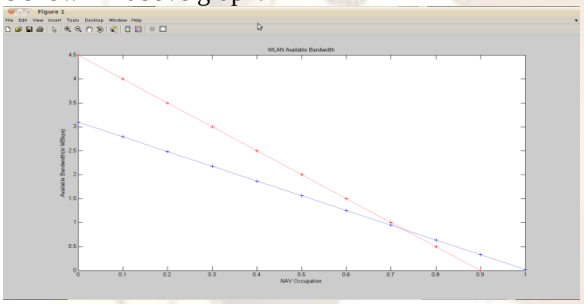

fig 3(d):**WLAN available bandwidth**

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

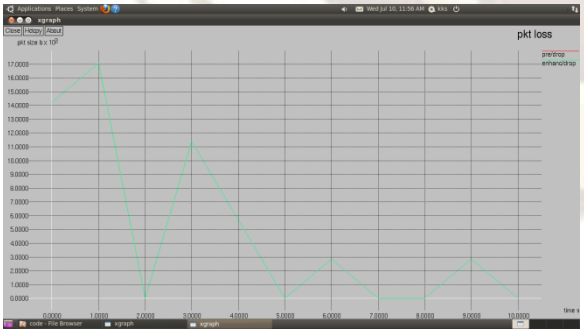

Fig3(e):**x-graph for packet loss**

The above graph shows that the packet loss is same for VHO and VHO with Adhoc network.

Fig3(f):**x-graph for packet overhead**

In theabove graph there are two lines first line indicates packet overhead in VHO second line indicates packet overhead in VHO with ad-hoc network. The overhead in VHO is high compared to VHOwith Ad-hoc network.

VI. CONCLUSION

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

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