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ANALYSIS OF QOS BASED VERTICAL HANDOFF SCHEME FOR WIMAX/WLAN

A.K.Kavitha [*1], Vanitha R[2]

[*] Department of ECE, Sri Ramakrishna Institute of Technology, Coimbatore, India

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ABSTRACT

Recently, a number of wireless communication technologies are migrating toward heterogeneous overlay networks. The integration of Mobile WIMAX and WLAN seems to be a promising approach due to their homogeneous nature and complementary characteristics. In this paper the investigation of several important issues for the interworking of Mobile WIMAX and WLAN networks are discussed by addressing a tightly coupled interworking architecture. A seamless and proactive vertical handoff scheme is designed based on the architecture with aims to provide always the best quality of service (QOS) for users. In tightly coupled architecture WLAN works as a radio access network of cellular system, and loosely coupled where different networks which are independently deployed but integrated at network layer. Comparably, a more seamless VHO can be expected in the tightly coupled networks, where the handoff execution follows the protocols of cellular network conditions. A very simple evaluation algorithm is developed to estimate the conditions of both WIMAX and WLAN networks in terms of available bandwidth and packet delay. This scheme can keep stations always being best connected.

KEYWORDS: QOS, VHOM Scheme, Handoff, WIMAX/WLAN

1. INTRODUCTION

A number of wireless communication technologies are migrating toward heterogeneous overlay networks. For which the integration of Mobile WIMAX and WLAN appears to be a promising approach due to their homogeneous nature and complementary characteristics. Investigation on several important issues for the interworking of Mobile WIMAX and WLAN networks are considered and a tightly coupled interworking architecture is addressed. And also, a seamless and proactive vertical handoff scheme is designed based on the architecture with aims to provide the best quality of service (QOS) for users always. Both the performance of applications and network conditions are considered in the handoff process. It is aimed to derive evaluation algorithms in order to estimate the conditions of both WIMAX and WLAN networks in terms of available bandwidth and packet delay. A simulation study has demonstrated that the proposed schemes can keep stations always being best connected. In this paper, an investigation on the integration and VHO issues in WIMAX/WLAN overlay networks is carried out extensively. The major contributions of the work are considered in threefold: A QOS Oriented VHO scheme is proposed for the tightly coupled WIMAX/ WLAN networks to provide the ABC services for both mobile and fixed users. In order to achieve proactive handoffs, network condition detection algorithms are derived for stations to estimate the available bandwidth and the packet delay of WIMAX and WLAN networks, respectively. Since there is still no tightly coupled architecture dedicatedly designed in literatures for WIMAX/WLAN systems, an architecture to support VHO scheme is developed.

2. Review

In today's world, wireless networking is pretty significant and popular way of giving worldwide information access to users wherever they move. One of the important tasks for continuous mobility is to have a simple, strong vertical handoff. The main objective of handover/handoff is to maintain the ongoing calls without any call drop even when the user is in motion. Generally, it is initiated whenever the mobile is crossing the boundary of a cell or by drop/fall in quality of the signal in the current channel. Supposing if the user is in motion and as

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the user leaves the cell and the user is in call during that time, if handoffs are not used or unavailable then its ongoing call is disconnected. One of the major concerns in heterogeneous wireless networks is to give the support of robust vertical handoff/handover. It occurs whenever a mobile shift from one network to another (e.g., from WLAN to CDMA, 3G to GPRS etc.).[1].

The importance of wireless communication is increasing day by day throughout the world due to cellular and broadband technologies. 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. The requirements like capability of the network, handoff latency, network cost, network conditions, power consumption and user's preferences must be taken into consideration during vertical handoff. In this paper, we have extracted the requirements of a vertical handoff from the literature surveyed. The evaluation of the existing work is also being done on the basis of required parameters for vertical handoff. A sophisticated, adaptive and intelligent approach is required to implement the vertical handoff mechanism in 4G wireless networks to produce an effective service for the user by considering dynamic and non-dynamic parameters.[2].

The main objective of handover/handoff is to maintain the ongoing calls without any call drop even when the user is in motion. Generally, it is initiated whenever the mobile is crossing the boundary of a cell or by drop/fall in quality of the signal in the current channel. Supposing if the user is in motion and as the user leaves the cell and the user is in call during that time, if handoffs are not used or unavailable then its ongoing call is disconnected. One of the major concerns in heterogeneous wireless networks is to give the support of robust vertical handoff/handover. It occurs whenever a mobile shift from one network to another (e.g., from WLAN to CDMA, 3G to GPRS etc.).

3. METHODOLOGY

Existing System

Vertical handovers are more complex because they involve both L2HOs and L3HOs. WIMAX and WLAN use different protocols, different air technologies and have different Quality of services (QOs). Besides these differences there are similarities on some level. Both specify the MAC and PHY layers and use IP-technology. A lot of research is already done in the field of Vertical handovers. With the new and promising wireless broadband solutions, it does not have the capability to support fast and reliable handover is critical for its success. There is still no tightly coupled architecture dedicatedly designed in literatures for WIMAX/WLAN systems.

Disadvantage

Due to the newly developed WIMAX, there have been some, but still limited proposals made for VHOs in WIMAX/WLAN overlay networks.

Proposed System

To propose a QOS oriented VHO scheme for the tightly coupled WIMAX/ WLAN networks to provide the ABC services for both mobile and fixed users. In order to achieve proactive and seamless handoffs, network condition detection algorithms are derived for stations to estimate the available bandwidth and the packet delay of WIMAX and WLAN networks, respectively. To address an architecture to support our VHO scheme.

Advantages

The proposed schemes can keep stations always being best connected and to improve the QOS.

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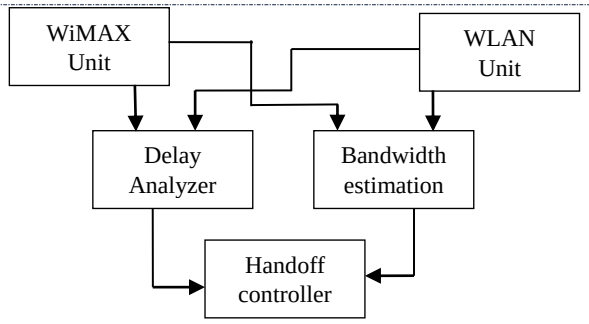

Figure 3.1 - Block Diagram of Handoff Controller

4. RESULTS AND DISCUSSION

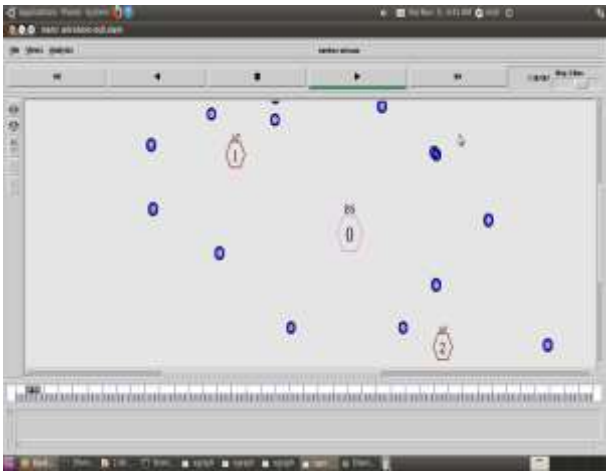

Figure 4.1 Network Information

In the above figure it is shown that the network is formed with 2 clusters. Here the node 0 is the base station and the nodes 1 and 2 are the access points. The access points collect the data from the cluster head and sends to the mobile collector.

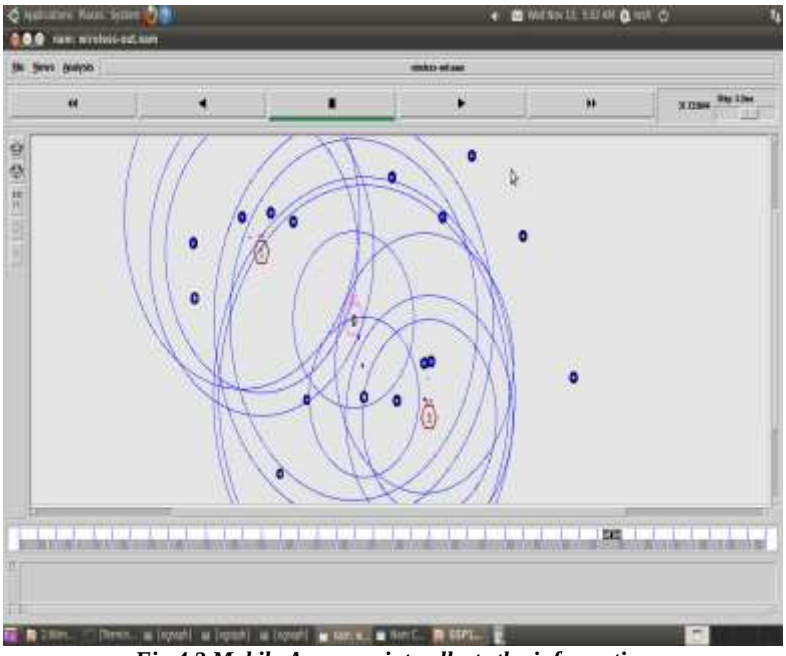

Fig 4.2 Mobile Access point collects the information

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The above figure shows the collection of information from cluster head to the access point. The network is formed with 2 clusters. Each cluster head collects the information and send to its corresponding access point.

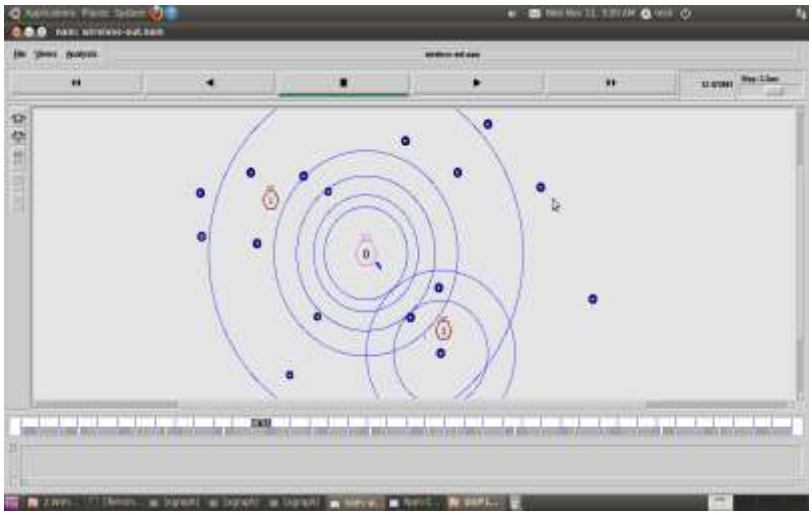

Fig 4.3 Base station collects the information

Fig 4.3 shows the collection of information from mobile collector to base station. The network is formed with 6 clusters. Each cluster head collects the information and send to its corresponding polling point. The polling point sends the information which is collected by it to mobile collector. The mobile collector is available for a period of time. The mobile collector sends its gathered information to base station.

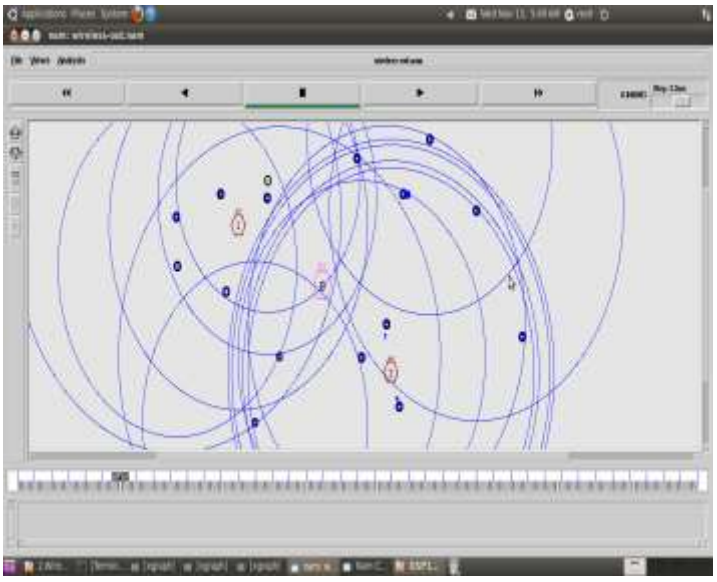

Fig 4.4 Mobile access point information

Fig 4.4 shows the collection of information from polling point to mobile collector. The network is formed with 6 clusters. Each cluster head collects the information and sends to its corresponding polling point. The polling point sends the information which is collected by it to the mobile collector. The mobile collector is available for a period of time. Fig 4.6 and 4.7 represents Delay Consumption and Packet loss Consumption respectively.

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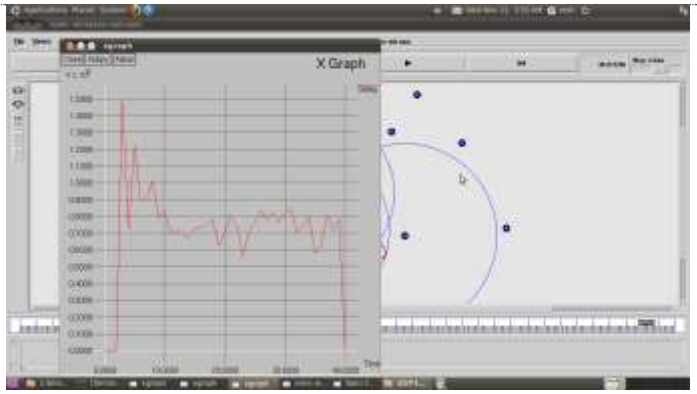

Fig 4.6 Delay Consumption

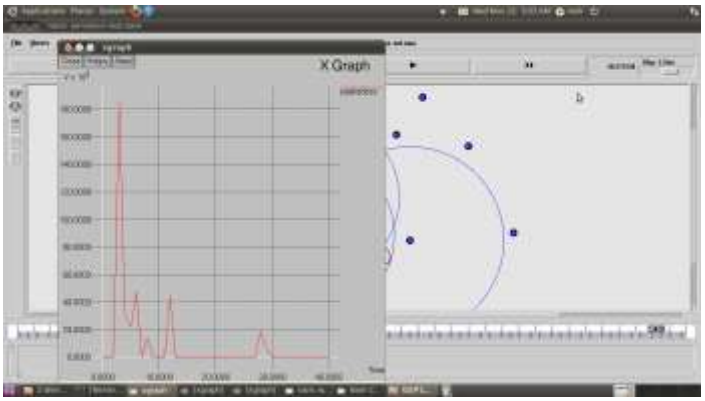

Fig 4.7 Packet loss Consumption

5. CONCLUSION

In this paper investigation on several important issues for the interworking of WIMAX and WLAN networks are discussed and addressed a tightly coupled interworking architecture as the platform. Based on the tightly coupled architecture, a novel seamless and proactive VHOM scheme for stations to control the vertical handoff operations in the interworking networks is proposed, which aimed to provide ABC service for both mobile users and fixed users. In order to make stations be able to proactively evaluate network conditions for making handoff decisions, an algorithm is developed to estimate the available bandwidth and packet delay in WIMAX and WLAN, respectively. By the simulation experiments, the feasibility and effectiveness of the proposed schemes is proven.

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