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Enhancing The Qos In Wimax/Wlan Overlay Networks For Vertical Handoff

Shelcy Paulose
PG Student/Department of CSE
Vivekanandha Institute of Engineering and Technology for Women,
Tiruchengode, Tamil Nadu.

***Abstract*-The Interworking of mobile WIMAX and WLAN is due to its homogenous nature and complementary characterstics.In the integration of mobile WIMAX and WLAN, a tightly coupled interworking architecture and a proactive vertical handoff method is used. The proactive vertical handoff method is designed to provide always the best quality of service and this method is controlled by a vertical handoff manager. Evaluation algorithms are used to estimate the network conditions of WIMAX and WLAN based on the available bandwidth and packet delay. While checking the network conditions of WIMAX network, the uplink and downlink will be evaluated separately. If the Qos in the downlink of WIMAX is insufficient, TLS scheme is introduced to achieve an effective vertical handoff.**

***Keywords*-WIMAX, WLAN, Vertical handoff, TLS, Qos**

I. INTRODUCTION

Wireless Networks are implemented using radio communication and it takes place at the physical layer of ISO/OSI Model. It avoids the costly process of introducing cables in to a building. In this work, the WIMAX and WLAN are integrated. WIMAX is the World Wide Interoperability of Microwave Access. It is IEEE 802.16 standard and is used as wireless metropolitan area network for broadband wireless communications, gives the coverage up to 30 miles and has two layers MAC and Physical Layer. It provides high speed wireless data transmissions over long distances in many different ways. WLAN is a very popular wireless communication technology for short/medium distances. Here the WIMAX and WLAN are integrated and used as an overlay network. While checking the network conditions of WIMAX network, the uplink and downlink will be evaluated separately. If the Qos in the downlink of WIMAX is insufficient, TLS scheme is introduced to achieve an effective vertical handoff.

II. RELATED WORK

Ma.D and Ma.M (2009) have introduced a QOS based vertical handoff scheme for WLAN and WIMAX interworking networks to provide always best service to users. And also present a simple, yet efficient method to estimate the available bandwidth in WLAN and WIMAX networks to evaluate the real-time status of the overlay networks and make a handoff decision based on the information. A handoff process will not only be triggered by unaccepted signal strength but also by unsatisfied Qos parameters. A novel VHOM scheme is used to make VHO decisions in the interworking architecture of WLANs and WIMAX networks. The scheme aims to provide always the best Qos in terms of throughput for both mobile users and fixed users. The available bandwidth has been taken into account in making the vertical handoff decisions. Two algorithms are there to estimate the available bandwidth in WLANs and WIMAX networks respectively, which are based on the inherent features of the bandwidth allocation schemes and the message transmission approaches in both networks. The parameters required for the bandwidth evaluation are easy to obtain in the real networks and the complexity of the evaluation is computationally low.

Lampropoulos.G et al (2005) have presented an overview of the most recent handover management architectures for integrated WLAN/Cellular networks, focusing mainly on 802.11-based WLANs and General Packet Radio Service/Universal Mobile Telecommunication System (GPRS/UMTS) cellular networks. Policy-based architectures appear to influence future handover management schemes. Along with that, tight integration seems to be the next logical step towards the implementation of seamless handover in integrated WLAN/Cellular network environments. These trends and the intense efforts from individuals and standardization bodies will play a significant role in the evolution towards 4G networks.

III. PROBLEM DESCRIPTION

In the integration of mobile WIMAX and WLAN, a tightly coupled interworking architecture and a proactive vertical handoff method is used. The proactive vertical handoff method is designed to provide always the best quality of service and this method is controlled by a vertical handoff manager. Evaluation algorithms are used to estimate the network conditions of WIMAX and WLAN based on the available bandwidth and packet delay. While checking the network conditions of WIMAX network, the uplink and downlink will be

evaluated separately. If the Qos in the downlink of WIMAX is insufficient, TLS scheme is introduced to achieve an effective vertical handoff.

IV.OBJECTIVES AND OVERVIEW OF THE PROPOSED WORK

A. Objectives

The main objective of Enhancing the QOS in WIMAX/WLAN Overlay Networks for vertical handoff is:

- High Throughput
- High Fairness
- High Packet delivery
- Less Delay & signal breakage

B.Overview of the Proposed Work

To enhance the Qos in the downlink of WIMAX, a Two Level Scheduling (TLS) scheme is introduced. This scheme supports the Quality of Service (Qos) and fairness for downlink traffic in WIMAX network. Here the base station does the scheduling and provides Qos according to the priority. WIMAX has a base station and number of Subscriber Stations (SS).The Qos requirements of the Subscriber Stations is scheduled in to appropriate slots at the base station.

The Two Level Scheduling schemes are:

- Packet scheduling with Qos
- Fairness scheduling scheme

The packet scheduling scheme will ensure the Qos and the fairness scheduling scheme provide the fairness. For the scheduling in the WIMAX network, the weighted round robin algorithm has been applied. It assigns weight to every Subscriber Station and according to the weight the bandwidth will be allocated. The fundamental part of WIMAX MAC Layer design is to support the Qos. It supports five types of traffic.

At the first level, the packets are scheduled according to the Qos class: UGS>Ertps>Rtps>Nrtps>BE. These will be placed in to different priority queues and services the highest priority queue until it is empty. After that the next highest priority queue will be considered. The summary of the QOS categories are given below.

Qos category	Applications	Qos specifications
UGS Unsolicited grant service	VoIP	Maximum sustained rate Maximum latency tolerance Jitter tolerance
rtPS Real-time polling service	Streaming audio or video	Minimum reserved rate Maximum sustained rate Maximum latency tolerance Traffic priority
ErtPS Extended real-time polling service	Voice with activity detection (VoIP)	Minimum reserved rate Maximum sustained rate Maximum latency tolerance Jitter tolerance Traffic priority
nrtPS Non-real-time polling service **BE** Best effort service	File Transfer Protocol (FTP) Data transfer, Web browsing, etc.	Minimum reserved rate Maximum sustained rate Traffic priority Maximum sustained rate Traffic priority

In the second level, the base station provides fixed size data grants at periodic intervals for Unsolicited Grant Service (UGS).Adaptive proportional fairness is given to Real- time polling service (Rtps) and Extended real- time polling service (Ertps).Proportional fairness for Non real-time polling service (Nrtps) and Best Effort (BE) services. This scheme will enhance the system throughput and fairness among the queues.

V.PERFOMANCE EVALUATION

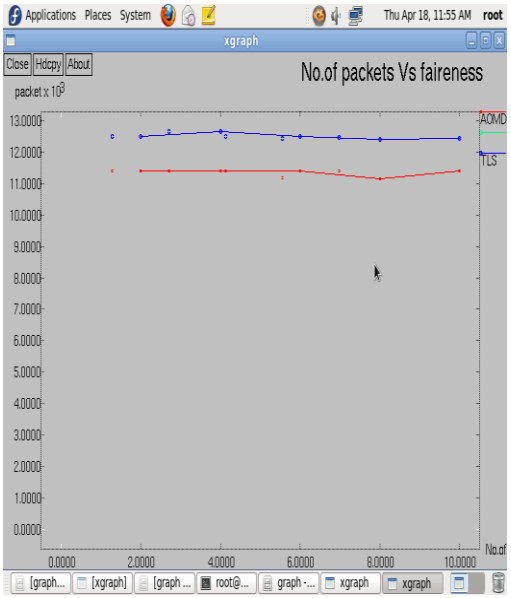
To demonstrate the effectiveness and feasibility of the proposed approach, a simulation model is built by the simulation software network simulator-2. IEEE 802.11b was used as the WLAN standard. The channel bandwidth of WIMAX was 20 MHz The DL to UL time radio in WIMAX was 2:1, with default frame duration of 5 ms. The performance of a two-level scheduling scheme is analyzed and compares it to round robin and weighted round robin algorithms for Downlink Traffic in a WIMAX network.

The simulation parameters are given below.

Parameter Type	Parameter value
Base Frequency	2.5 GHZ
Duplexing Mode	TDD
System Bandwidth	5 Mbps
DL/UL Ratio	2:1 (29:18 OFDM symbols)
Frame Length	5 ms
Cyclic prefix duration	11.42 usec
Basic symbol	91.43 usec
Fast Fourier Transform Size	1024
PHY	OFDMA
DL permutation zone	PUSC
MAC PDU Size	Variable size
Fragmentation	Enable
ARQ and Packing	Disable
DL-UL MAPS	Variable
Inter-arrival time between Video frames	120 ms

VI. RESULT

The below graph shows the number of packets vs fairness. In this as the number of packets increases the fairness also increases



The next graph shows the number of packets vs packet delay. As the number of packets increases the packet delay decreases. It means that the throughput also get increases.

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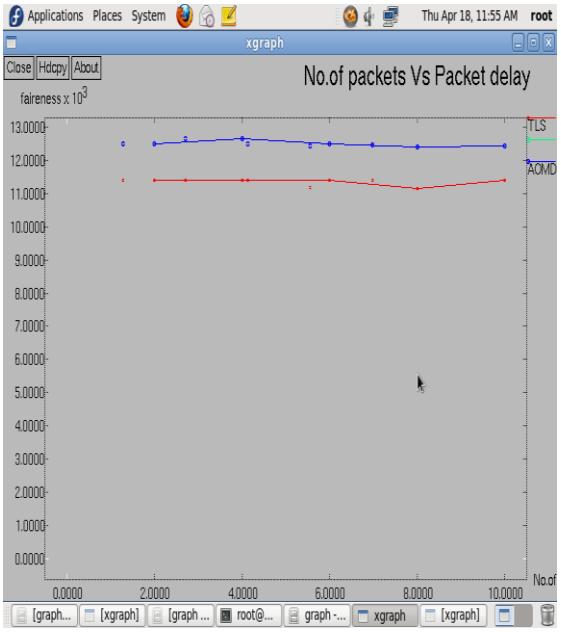

VII. CONCLUSION AND FUTURE ENHANCEMENT

The vertical handoff scheme is used in the heterogeneous networks and it provides the best quality of service. In the WIMAX and WLAN, the network conditions are evaluated based on the available bandwidth and packet delay. The uplink and downlink of the WIMAX should be evaluated separately.If the downlink has no sufficient Qos, the TLS scheme will be invoked and it leads to an effective handoff.

In this scheme, the method for improving the Qos of WLAN is not incorporated. In future, we can enhance the system by adding an effective method for this.

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Authors Profile

Shelcy Paulose received the **B.E.** degree in computer science and engineering from the PGP College of Engineering and technology, Namakkal, Anna University, Coimbatore, India, in 2011.Currently doing **M.E.** in computer networking and engineering in Vivekanandha institute of engineering and technology for women, Anna University, Chennai, India. Her research interest includes wireless communication, Ad hoc networks and Sensor Networks.