

Analyzing the performance of WiMAX zone handover in the presence of relay node Qualnet6.1

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Abstract: Handover (HO) mechanism in mobile Wimax is one of the critical operations. It takes place when a mobile station (MS) moves from a serving base station (SBS) to another base station (BS). However, the handover schemes are adopted in mobile Wimax and hard handover is defined as mandatory. Since the data transmission should pause during handover process, it causes delay in mobile communication. The handover delay makes service degradation in system performance when implemented in real-time application such as Voice over IP (VoIP) and Internet protocol Television (IPTV). This paper propose an improvement in handover scheme for mobile WiMAX. which addresses the heterogeneous network . We evaluated the performance metrics such as handover latency and data loss performance for different WiMAX cell handover. In addition, we as also modified our simulation model of Mobile service for the analyzing the performance of WiMAX zone handover in Qualnet

Keywords: WiMAX,, Voip, qualnet 6.1heterogeneous network

I. Introduction

Handoff is the process of changing the channel (frequency, time slot, spreading code, or combination of them) associated with the current connection while a call or data session is in progress. It is often initiated either by crossing a cell boundary or by deterioration in quality of the signal in the current channel. Mobility is the most important feature of a wireless communication system. Usually, continuous service is achieved by supporting handoff from one cell to another. Poorly designed handoff schemes tend to generate very heavy signaling traffic and, thereby, a dramatic decrease in quality of service (QoS). In fact, the objectives of the handoff are to be satisfied in order to optimize the overall system and network performance. The objectives of handoff are described in following parts Handover can be initiated in three different ways: mobile initiated, network initiated and mobile assisted. Mobile Initiated: the Mobile makes quality measurements, picks the best BS, and switches, with the network's cooperation. This type of handover is generally triggered by the poor link quality measured by the mobile. Network Initiated: the BS makes the measurements and reports to the RNC, which makes the decision whether to handover or not. Network initiated handover is executed for reasons other than radio link control, e.g. to control traffic distribution between cells. An example of this is the BS-controlled. Traffic Reason Handover (TRHO). TRHO is a load-based algorithm that changes the handoff threshold for one or more outgoing adjacencies for a given source cell depending on its load. If the load of the source cell exceeds a given level, and the load in a neighboring cell is below another given level, then the source cell will shrink its coverage, handing over some traffic to the neighboring cell. Mobile Assisted: here the network and the mobile both make measurements. The mobile reports the measurement results from nearby BSs and the network makes the decision of handing over or not. In the following sections we classify handoff with respect to technology and discuss more on vertical handoff. [1]

1.1 Background

In order to achieve the high data rate in wireless services such as VoIP and IPTV, the Mobile WiMAX (Worldwide Interoperability for Microwave Access) based on the IEEE 802.16e [2] standard is developed as broadband wireless solution to the wired backhaul. Fixed WiMAX based on IEEE 802.16 standard is a cost effective fixed wireless alternative to cable and DSL services. IEEE 802.16e is the new version to the Fixed WiMAX [3] adds mobility as a new feature and thus WiMAX provides high data rate mobile wireless services for metropolitan areas. WiMAX coverage range is up to thirty mile radius and data rates between 1.5 Mbps to 75 Mbps theoretically. Handover (HO) is one of the key requirements to embrace mobility and Quality of Service (QoS) for the subscribers in IEEE 802.16e. HO refers to the process in which an MS migrates from the air interface provided by one BS to an air interface provided by another BS. The IEEE 802.16e defines three basic types of HO [4]: Hard Handover (HHO), Macro Diversity Handover (MDHO) and Fast Base Station Switching (FBSS). MDHO and FBSS are soft handovers and adopt the make-before-break scheme. HHO is

mandatory in WiMAX system but MDHO and FBSS are optional. In HHO, the MS is connected to only one BS at a time. If the MS decides to connect to the new target BS, it selects only one target BS from a group of BSs and MS stops its radio link with the serving BS before establishing its radio link with the target BS. HHO is simple but causes long HO delay when velocity of MS is high. In MDHO or FBSS scheme, a MS is registered to several BSs at the same time. For MDHO, a MS communicates with two or more BSs in a given interval, while for FBSS, service flows are set up with multiple BSs. All discussions and analysis are based on hard handover. A few papers have proposed several schemes to deal with research about HO in IEEE 802.16e. Some researchers used soft handover and others used hard handover schemes. In [5], velocity adaptive handover scheme is used but HO delay is below 50ms limit until the MS's velocity is up to 100.8 Km/h. This paper has not included the scanning time reduction. A mobility improvement handover scheme for Mobile WiMAX is proposed here to reduce the HO delay and the waste of wireless network resource with greater speed of the MS. Received Signal Strength Indicator (RSSI) is typically used as a measure of signal quality in WiMAX system. So, RSSI and MS's mobility are the most important factors to initiate HO. Apart from this, scanning time should also be reduced to minimize HO delay. In the proposed scheme, threshold HO value is varying with MS's velocity and minimized the time duration between RSS scan and threshold HO to reduce HO delay.

The remainder of this paper is organized as follows:

Section 2 describes the HO process in Mobile WiMAX Section 3 proposes mobility improvement HO scheme and performance analysis of the proposed HO scheme are presented in the next section. Finally conclusion is mentioned in the last section

II. Mobility Between Wifi And Wimax

Wireless access has seen exponential growth in the past few years due to the popularity and cost effectiveness of IEEE 802.11 standard. Wimax, also known as the IEEE 802.16 standard, has been emerging as a broadband wireless technology. Both these technologies have their respective strengths - 802.11 offers a higher throughput wireless network mostly on unlicensed spectrum, and 802.16 offers a larger wide area coverage network over a licensed spectrum. Recent trends indicate that future wireless Internet will consist of heterogeneous wireless networks working in synergy. Since overall spectrum is inherently limited, it helps to improve the overall performance of wireless data networks by complementing an unlicensed and licensed technology such as Wi-Fi and WiMAX. This fact has already been exploited in building cost-effective Wi-Fi mesh networks with WiMAX back-haul. However, the question of mobility across both as two access networks still does not have concrete answers. A scheme that enables mobility across both these networks would provide several advantages to end-users as well as Wireless service providers [6]. In our proposed scheme, we have attempted to optimize the network and system resources in order to achieve the advantages, as the following parts

III. Simulation Setup

To our data we have used qualnet 6.1 simulator that will carry out Four different experiments , the performance metrics are evaluated such as handover latency and data loss performance for different WiMAX cell handover. The results describes the potential of relays to extend the coverage area of base in cellular WiMAX networks. Multichip deployments allow to offer high broadband services over large geographic regions. The table I shows the parameters used to provide the simulation scenario

Table I. Simulation Parameters

Parameters	Values
BS range radius (m)	500
SS range radius (m)	500
Terrain-Dimensions (m)	1500*1500
Mobility Model	Flag mobility model
Frequency Band (GHZ)	2.4,2.42,2.44
Channel Bandwidth (MHZ)	20
Frame Duration (ms)	16
FFT Size	1024
MS Velocity (MS ⁻¹)	20
BS Transmitted Power (dbm)	25
SS Transmitted Power (dbm)	20
Simulation Time (s)	105
Traffic	CBR
Antenna Type	Omni-directional
No. Of Packet Sent	100
No. of channel	3
Radio Type	802.16e

IV. Simulation And Analysis

By using qualnet 6.1 simulator. we have created a network, architectures scenario and designed network scenario which having 3 bias station (BS) called cloud WiMAX and 8 users called nods ,WiMAX users or mobile station (MS),there is one CBR traffic scenario used, which provide transmission and receiver data between the source and distention nods, each cloud Wimax connected with WiMAX users through wireless network .The network architecture of this scenario is given in Fig I.

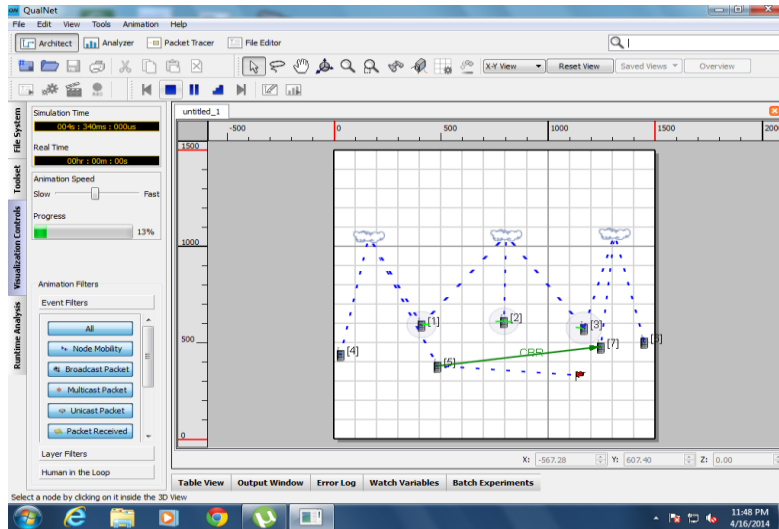


Fig I The network architecture

V. Simulation Result

The different types of scenarios are shown in this paper that covers different parameter and comparison of WiMAX cell handover. The Comparative analysis of the result that we evaluated through the simulation tool after running the scenarios are shown in figure.1, 2, 3 and figure 4.

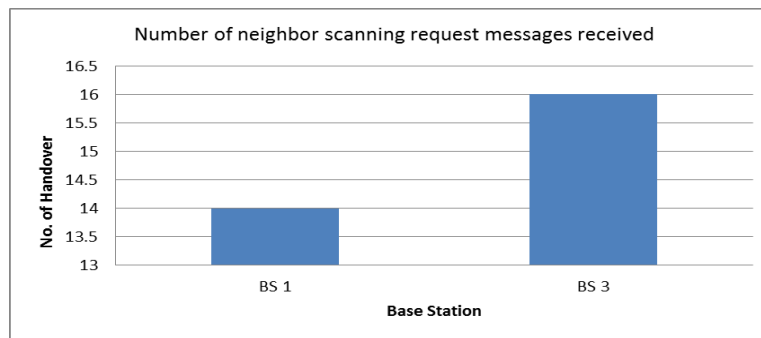


Fig 1

Figure 1 : Provide the Hand off (HO) request messages in the Base station (BS3) more than Hand off request messages in the Base station (BS1) that means the mobility towards Base station (BS3) more than Base station (BS1).

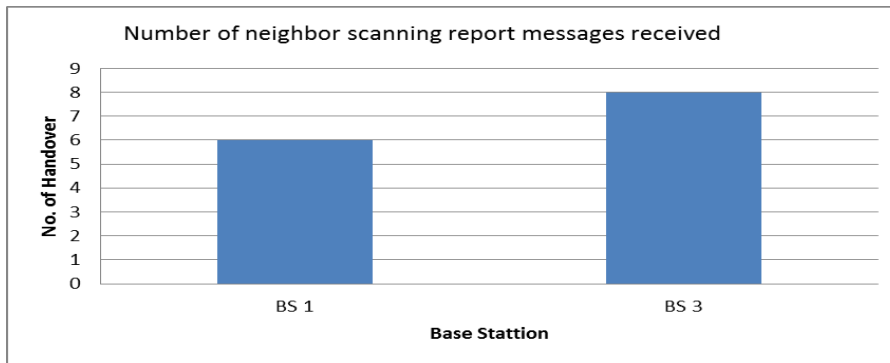


Fig 2

Figure 2 : Provide how the performance reports a messages received is important to determine the destination of Mobile Station (MS) to start the Hand off (HO).

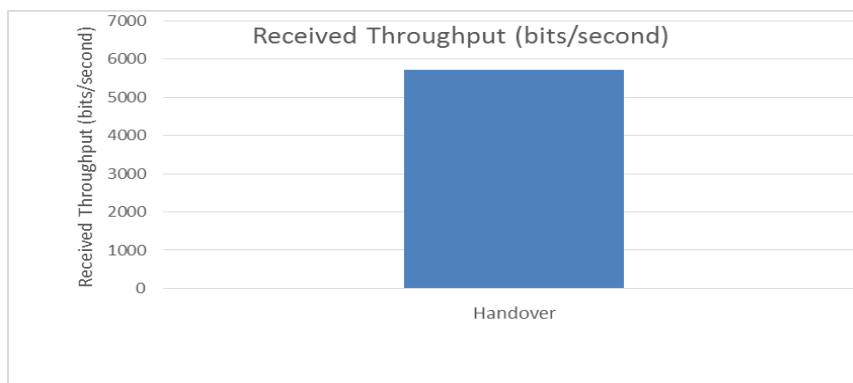


Fig 3

Figure 3: The received throughput against Handoff, at also provide the quality of service (QOS) depended on the receive throughput to provide hand off

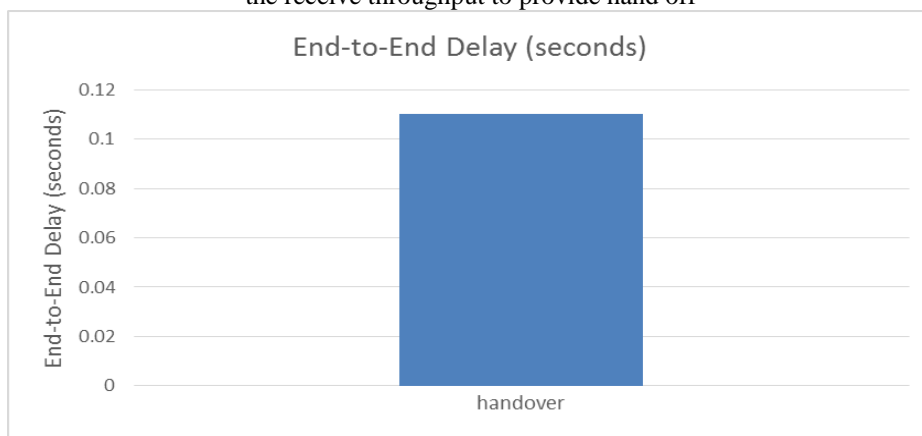


Fig 4

Figure 4 shows the End-to-End delay against handover it also provide the effect of delay time on hand off (HO) when a relay node to as used to extend the coverage area of the WiMAX base station.

VI. Conclusion

The focus of the study is on mobile and wireless transmission technology based on mobile Wimax with standard 802.16e. By using the QualNet 6.1 simulator, the handover performance is analyzed in terms of throughput, packet delay and loss characteristic. From the studied scenario, the different MS speed influenced the handover duration time from serving base station to target base station. This paper presents an analytical dimensioning approach for the planning of cellular Wimax networks within diverse multihop scenario. The results show the potential of relays to extend the coverage area of BSs in cellular Wimax networks. Multichip deployments allow to offer high broadband services over large geographic regions. Our proposed method aimed to preserve VoIP quality during handover between networks with different IP subnets. Our simulation results

show that our proposed multi-homed handover mechanism can preserve VoIP call quality during such handovers.

Reference

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