THE PARAMETER EFFECT IN HANDOVER IN THE MOBILE WIMAX

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Abstract

New data services are becoming larger in demand on a data rate in access systems. The appearance of technology, which allows high speed broadband wireless access, is WiMAX.This technology depends on the standards IEEE 802.16.There are many versions, which differ mainly between user mobility support. We discuss about the description of the WiMAX mobile and some parameter effect in handover, handover is a key need for the implementation of aneffective mobility framework in WiMAX systems and the process used while in movement of users, then the improvement of handover. In this paper firstly we discuss the different standards of mobile wimax, after that the handover in mobile wimax, and different types of handover, then how to parameter the effect in handover, finally we used opnet to present the results.

Keyword: *handover, Wimax, IEEE 802.16, mobility, MDHO, HHO, FBSS.*

1. INTRODUCTION

Mobile WiMAX (Worldwide Interoperability Microwave Access) is a wireless system rely on the IEEE 802.16e standard (IEEE, 2005). This standard, released in 2005, is a created previous version of IEEE 802.16-2004 , which was released in 2004. Handover is the executed support between cell in the 802.16-2004. This version permits only fixed access but in the new version 802.16e the standard handover mechanism was accomplish.

We need to set up a new network connection for those moving users after any cell boarder exceed (BECVAR & ZELENKA, 2006).

There is introduced the corroboration of hard and soft handovers (BECVAR & ZELENKA, 2006) as well invite the WiMAX mobile, which supports mobility until mobile terminals can be delivered (handover) between base stations during communication, also supporting some other feature comprising multicast. In the mobile WiMAX, there are three possible ways to execute the handover (HO) and there are three types for handover macro diversity handovers (MDHO) another is hard handover (HHO) and fast base station switch (FBSS).

They are two different mechanisms supporting in wimax standard the base station (BS) and the mobile station (MS).

Service users for mobile wimax expect the handover process to be as quickly and completely as possible , but this is another point, authentication, its consume time operation are very important, because it is a basic component of the handover process. For this we have to reduce the computation for security (encryption or description).

The total handover latency have to be small because wimax is supporting multimedia and voice with mobility, the maximum handover latency for (VOIP) is recommended to be 50 ms ,and streaming application to be 150 ms (TAHA et al, 2009).

2. HANDOVER IN MOBILE WIMAX

2.1. HANDOVER

During the last years, the huge number of mobility device like laptop, smart phone and ipadhas increased dramatically in the day. This is partly due to advances in electronics and computational calculations of the device. The increasing number of these devices is driving the demand for higher bandwidths than ever before to reach many online applications, including e-mail messages everywhere, instant messaging, and the most demanding applications of bandwidth like streaming multimedia, Internet browsing, games and many more. However, the development of networks supporting mobility sets several needs for mobile user. The major need

is the capability of a mobile device to alteration the serving BS according to the movements of the costumer to new BS. This procedure is called handover (BEN-MUBARAK, 2015).

2.2. HANDOVER AND LATENCY

The handover is a mechanism used to keep continuously user connection session while the user moves from one place to another, when the mobile station (MS) moves from cell to another and implements the Handover, service packages, for the delaying service may be inactivatedfor some time. This delay is defined likeLatency time (KHAN et al., 2013).

2.3. HANDOVER TYPES

A. Hard Handover:

During the hard handover process, the mobile station only communicates with only one mobile station at a time. Before a new communication is setup the old communication with BS is broken. The handover is performed after the signal strength of the neighbor's cell overrun the signal strength of the current cell (BECVAR & ZELENKA, 2006).

B. Macro Diversity Handover:

When MDHO is provided by MS and by BS, the "Diversity Set" is preserved by MS and BS. The diversity set is a list of the BS's, which are involved in the handover process.Each mobile station in network is defined Diversity set.Mobile station connects with all BS's in the diversity set. For downlink in MDHO, two or more transmit the data from BS to MS like that diversity integrating can be implemented at the MS.

In MDHO uplink, the Mobile station transmission is received by many BS's where the selection diversity of the received information is performed. The BS, which can receive communication between MS's and other BS's, but if the standard of the signal strength, it is not enough is noted as "Neighbor BS".

C. Fast Base Station Switching:

In FBSS, the MS and BS the diversity set is preserved such as in MDHO. MS always observe the BS in the diversity set and called an "Anchor BS". Anchor BS is only one BS of the diversity set that MS connects with for all the downlink information and uplink inclusively management messages. This is the BS where MS is registered, synchronized, performance varying and there is observed downlink channel for traffic control. The anchor BS can be alternated from frame to frame relying on BS selection scheme.it means Any frame sent through different BS in diversity set (BECVAR & ZELENKA, 2006).

2.4. HANDOVER PROCESS

By using its current information on the adjacent base station or after requesting this information, the mobile station assesses its interest in a possible handover with the base station. The handover procedure is carried out in five steps below (Fig.1) (HUSSAIN et al., 2014).

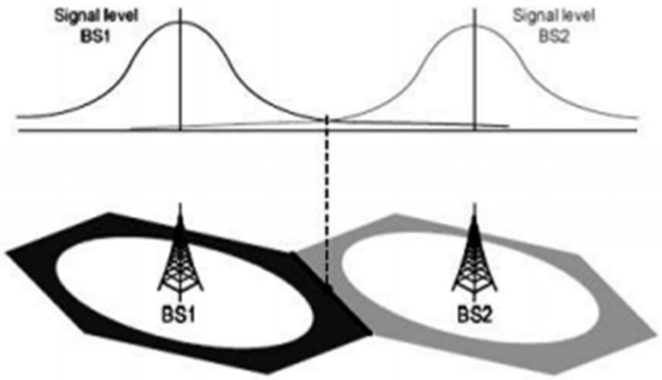

Fig. 1. Hard hand over (HHO)

2.4.1. CELL SELECTION

Cell reselection is the procedure of finding a possibility of a base station for the handover .The mobile station has many potentials that can be used in assessing the potential change to the serving base station. It can as use well traffic in neighbour advertisement messages (MOB_NBR-ADF). In addition, the mobile station and base station can recover more traffic about the nBSs after the MS scan phase.

The traditional scheme for cell selection in WiMAX mobile is depend on a single criteria which is the signal quality. The NBS that has the best signal quality (eg CINER or RSSI) will be estimated TBS for the next handover (BEN-MUBARAK, 2015).

2.4.2. HANDOVER DECISION

The actual handoff starts when a decision is made that the mobile station will alternate the operating base station. The decision is made at the mobile station, base station or on the network. but, the profile of WiMAX has identified MS resulting in the procedure of handover decision as a compulsory process (Wimax FORUM, 2006). The purpose of the handover decision is to ascertain whether extradition is important or not.

2.4.3. HANDOVER CANCELLATION

MS can cancel the HO at any time before ending RRT(RESOURCE RETAIN TIME) interval after sending this message MOB_ HO-IND.

RRT is one of the parameters alternated through the registration procedure (part of Network Entry). The level denotes that RRT is as a many as 100 milliseconds and that 200 milliseconds is advise as default (ETUTORIALS, n.d.).

2.4.4. SYNCHRONIZATION TO TARGET BS DOWNLINK

If MS had already received a MAC management message including physical frequency ,a target BS identity, Synchronization to a Target BS downlink has to be achieved. this process may be brief. If the target BS had previously received handover attention from a serving BS while the internet, after that the target BS may allocate a non-contention-based initial ranging chance (HUSSAIN et al., 2012).

2.4.5. TERMINATION OF MS CONTEXT

The last level of handover is terminal of MS context ,to is identify as serving BS termination of MS context of all connections belonging to the MS and the rejecting of the context communicated with them (HUSSAIN et al., 2012).

3. SIMULATION SETUP

To our data we have used Opnet14.5 simulator, The performance metrics are assessment for such as handover, packet receive ,packet sent ,data through put and the handover delay performance for four WiMAX cell handover and one mobile move from cell to another. The results characterizes the possibilityof relays to provide the coverage area of basestation in cellular WiMAX networks.

3.1. SIMULATION ANALYSISAND RESULT

This simulation consists of four cell wimax and one mobile move from cell to another through the trajectory(white color) and we are showing here the whole configuration for the profile and application, wimax config, and wimax base station ,we present bellow (Figs. 2-7).

The objective of this project is to show how different scanning settings may affect the handover.

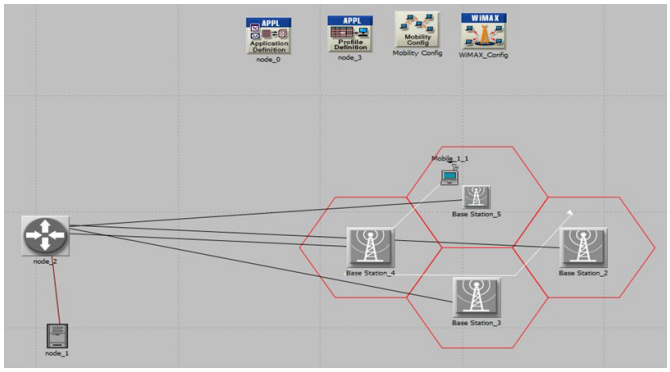

Fig. 2. Wimax handover

Profile configuration

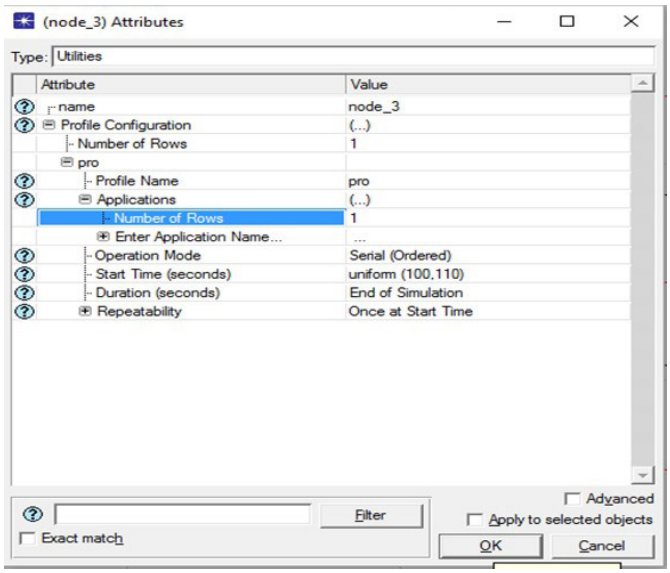

Fig. 3. Profile configuration

Application configuration

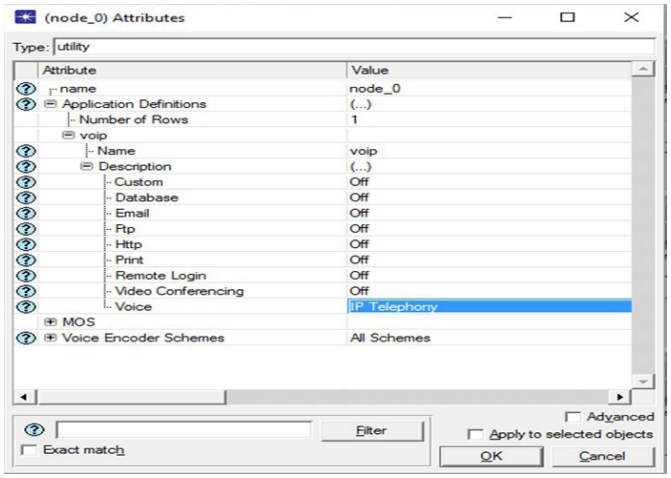

Fig 4. Application configuration

Wimax configuration

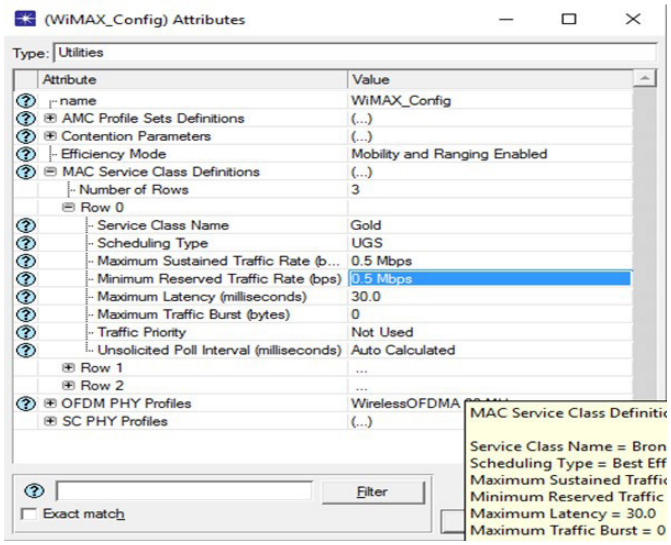

Fig.5. Wimax configuration

Base station configuration

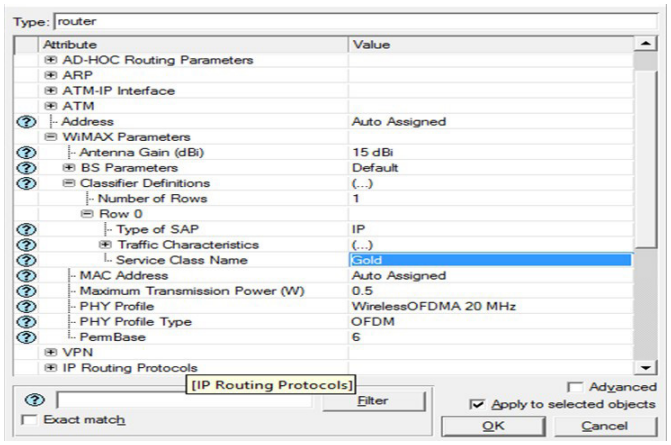

Fig. 6. Base station configuration

Result for design:

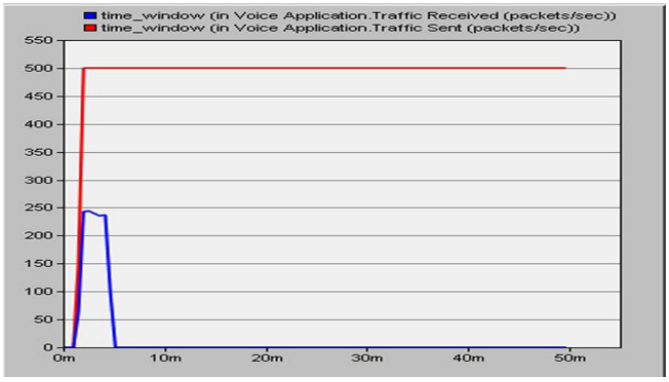

Fig. 7. Voice application traffic send and receive in wimax

Analysis:

In Fig. 7 we compare the traffic received and the traffic sent ,and we show how terminal alternative information, mobile node, and server , we can notice that we have voice call between mobile node and server .this call continually in progress for 75 min this is simulation time (trajectory mobile) and we notice traffic sent ,the mobile sent the information during the whole time of simulation but we notice traffic receive just only in home agent cell (base station 5) ,and this is problem(solution for this problem in ip configuration Fig. 13), the handover happens when the mobile node moves form base station 5 to base station 4 it continous sends the information but it cannot receive the information that because it lost its own ip when it was transferred form base station 5 to base station 4, and server sent back all information to the old address (base station 5) (see that in Fig. 8 and 9)

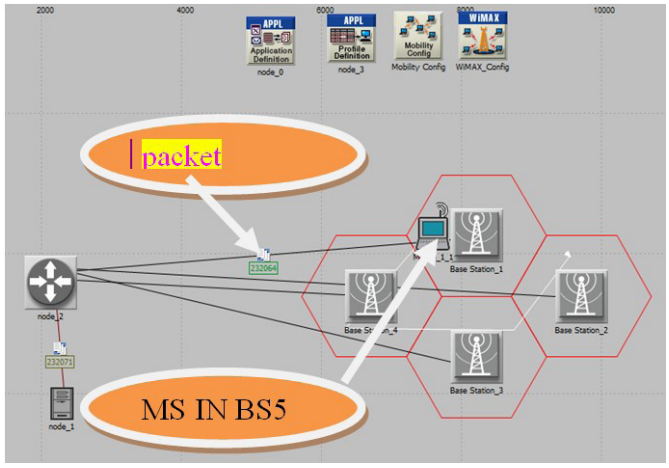

Fig. 8. Mobile send and receive packet

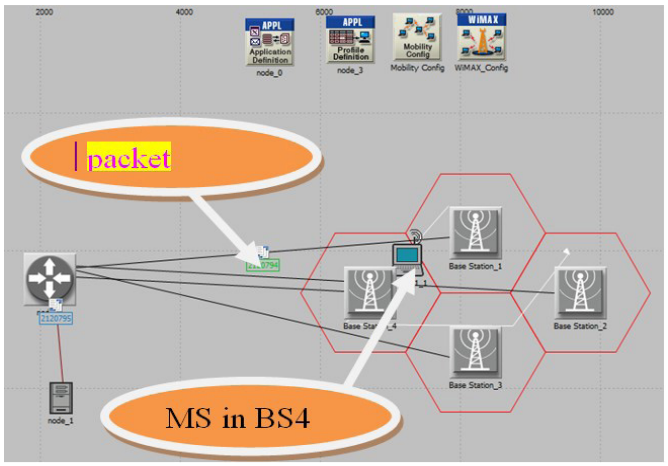

Fig. 9. Packet sent to old Ip, mobile did not receive the packet

Parameter effect in handover:

They are many Parameter to effect hand over, they are mentioned below and the solution for Fig. 2 by ip configuration .

A. IP configuration
B. Scan iteration
C. mobility
D. scanning threshold
E. Interleaving Interval
F. Using combined results to achieve maximum mobility

A. IP CONFIGURATION

Set ip for all wimax base station and Fig. 10 and 11 below for home agent (BS5) and router.

wimax base station

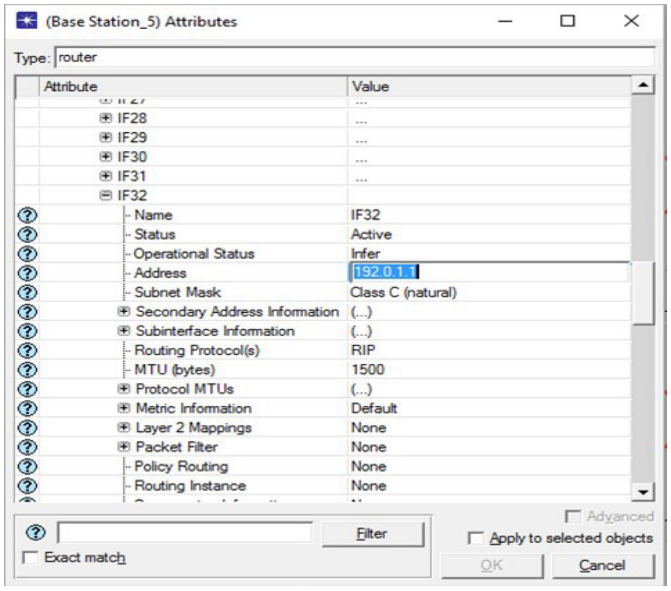

Fig. 10. Wimax base station

router config

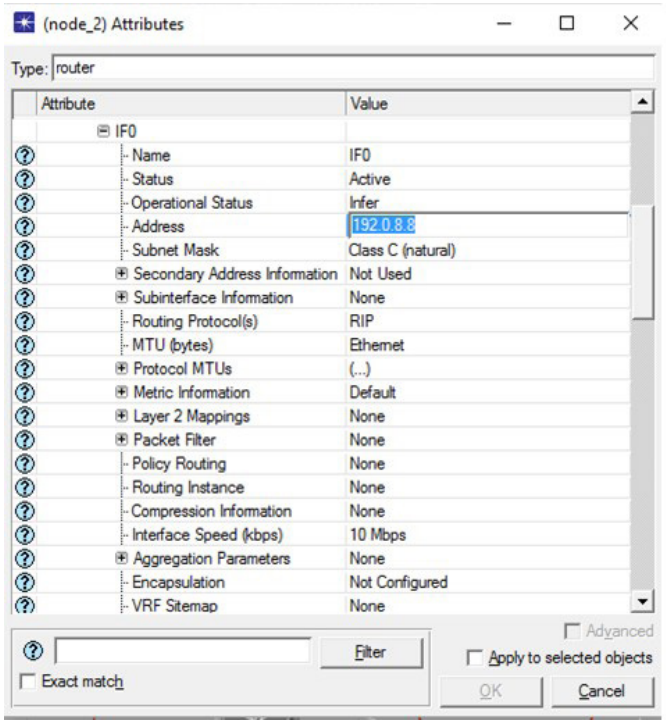

Fig. 11. Router config

For mobile Fig. 12 illustrate configuration ip at the same Home agent ip

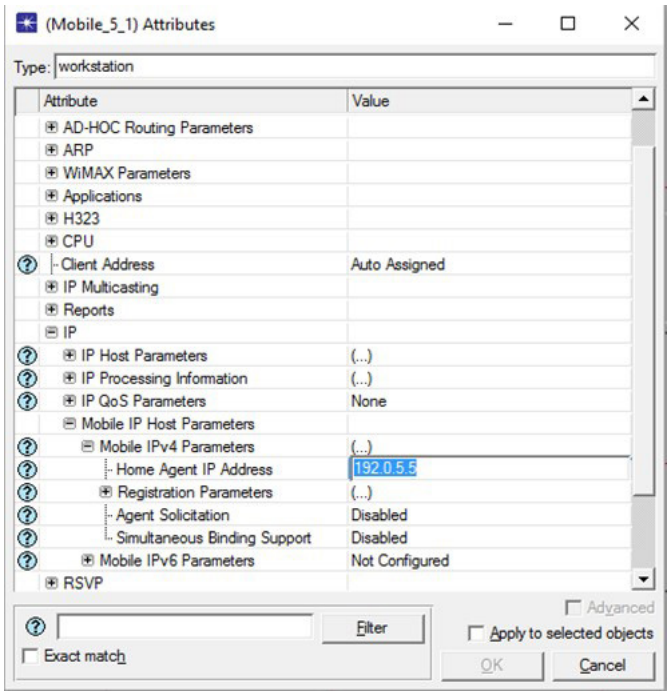

Fig. 12. Mobile ip config

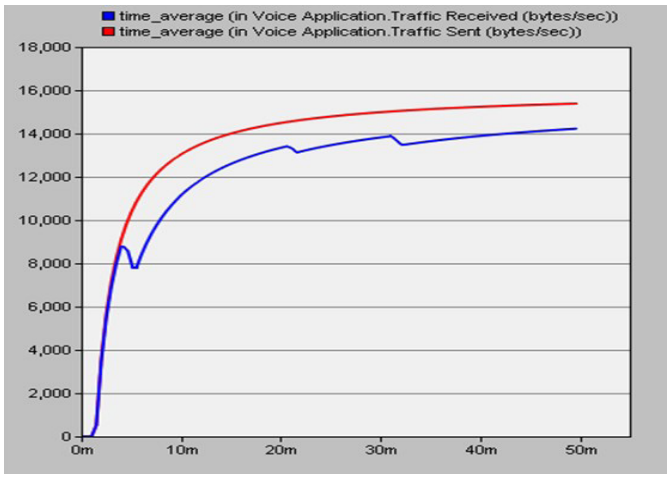

Fig. 13. Result

Analysis:

The result in Fig. 13 solve the problem in Fig. 9 by the configuration of ip protocol , identifed ip for all base station individual and ip for router as gate way . inside each base station identified ip gate way and MS sets the same ip home agent (BS 5).when MS moves from home agent to a foreign cell the MS can send and receive the packet because it has not missed ip.

B. SCAN ITERATION

Scan iteration knows the needed number of repeating scanning interval by an MS, that means how many times the MS will finish the scanning process. The needed scan iteration being connected with a requested number of repeated scanning of the at least one adjacent base station.

We setup here scan iteration =1

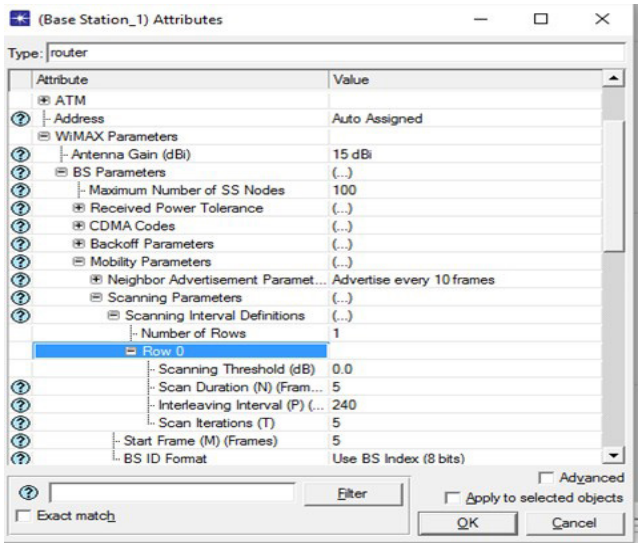

Fig 14. Scan iteration=1 config

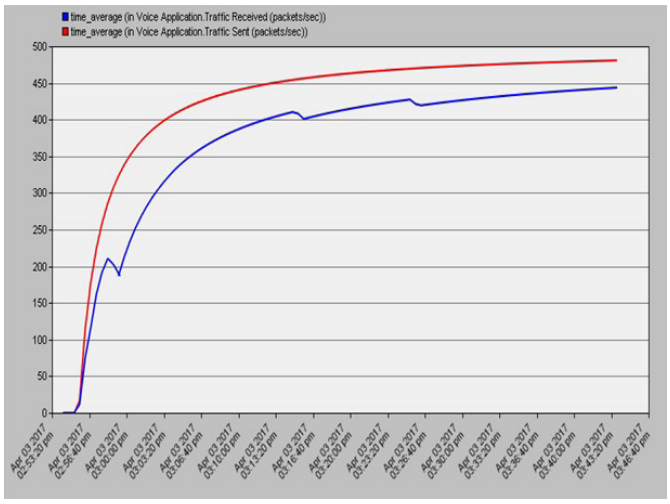

Fig.15.Traffic receive and throughput

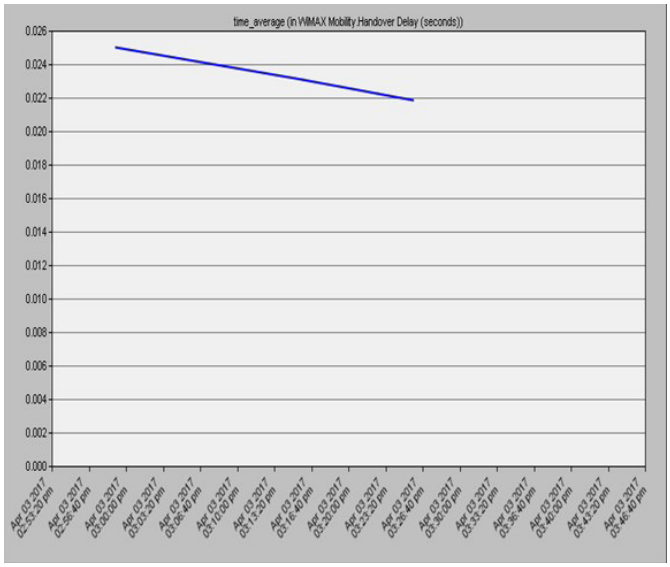

Fig. 16. HO delay

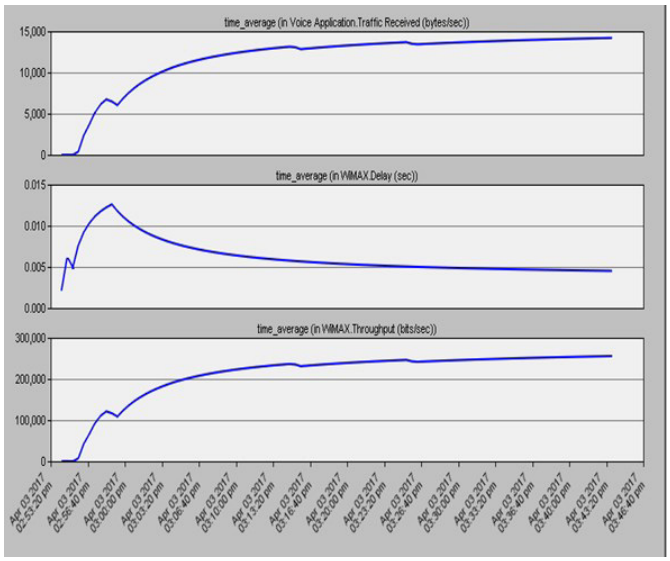

Fig. 17. Throughput and delay and traffic receive

Analysis:

The simulation results represent a high level of high scanning reaction time will be the handover. That is obviously illustrated in order to keep our delay handover low to keep the IS factor at a low level and show the best SI where the lower handover time is 5 milliseconds.

C. MOBILITY

Result

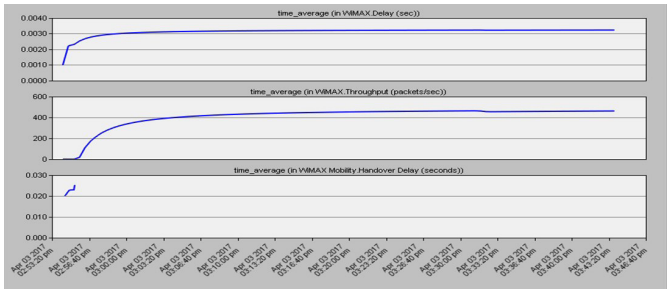

Fig.18. Handover delay and Throughput and delay with MS speed 260Km/h

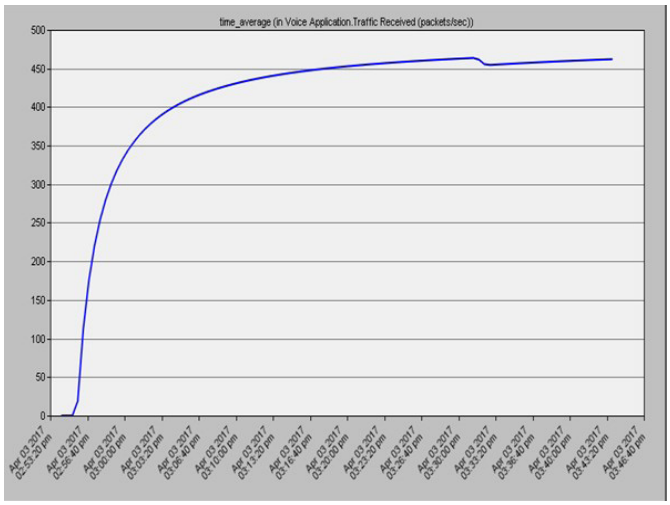

Fig. 19. Receive packet with MS speed of 150km/h

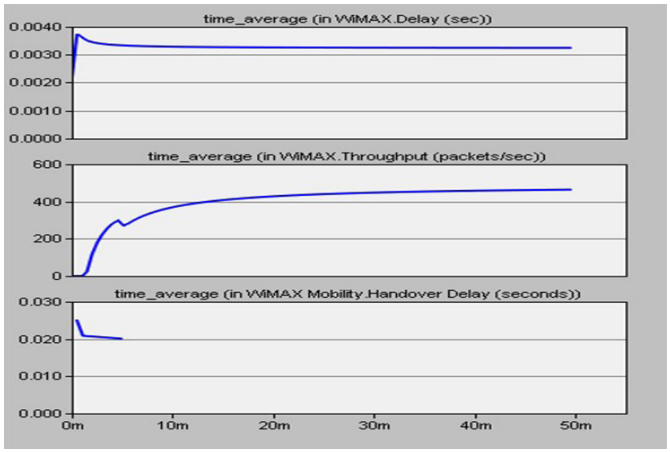

Fig. 20. Average handover delay and throughput and delay with MS speed of 150km/h.

Analysis:

The handover effect by mobility and the result above show that, and are illustrated the difference between the through put and delay, and shows tow velocities 260 Km/h ,150Km/h .mobility effect in handover and the result show when MS speed is increase the HO delay is increased and if MS speed is a decrease the HO delay is decreased.

D. INTERLEAVING INTERVAL

The Interleaving interval can be interpreted as the period between the survey period and the normal frames at the MS. In opnet we configured this parameter at BS and we changed this factor for each case situation .

Interleaving Interval=1

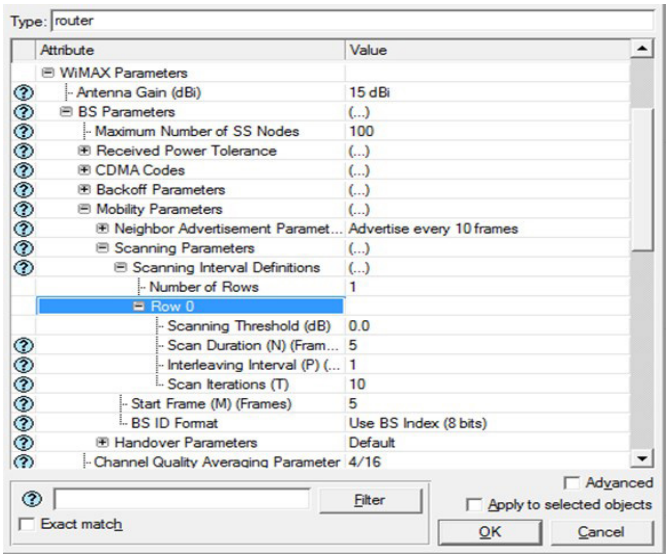

Fig. 21. Setup Interleaving Interval=1

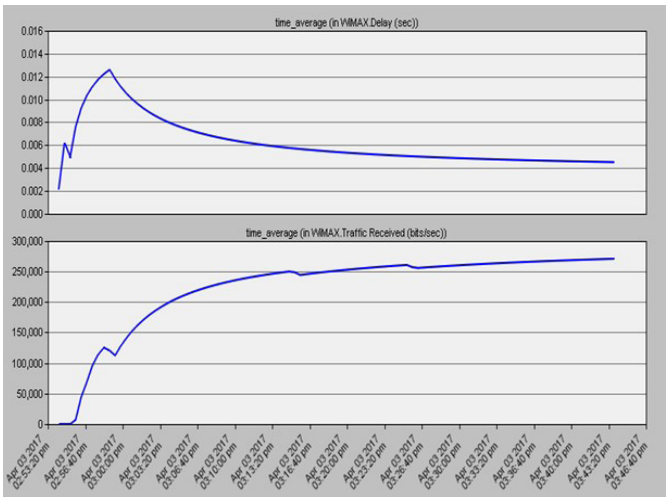

Fig. 22. Throughput and delay

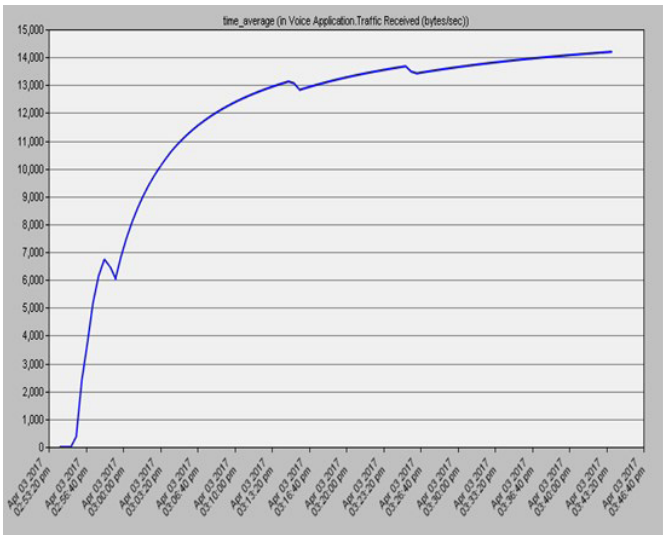

Fig. 23. Packet receive

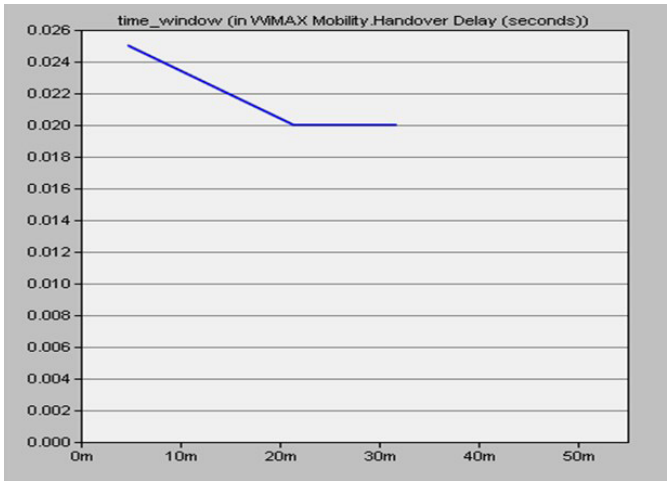

Fig. 24. HO delay

Interleaving Interval=240

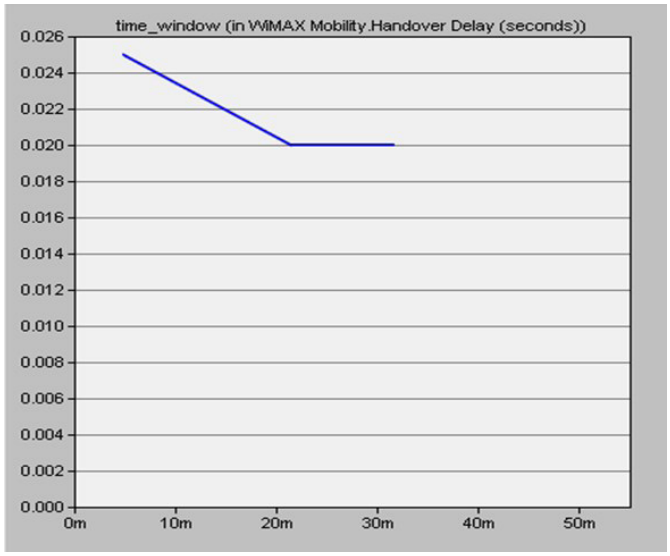

Fig. 25. HO DELAY

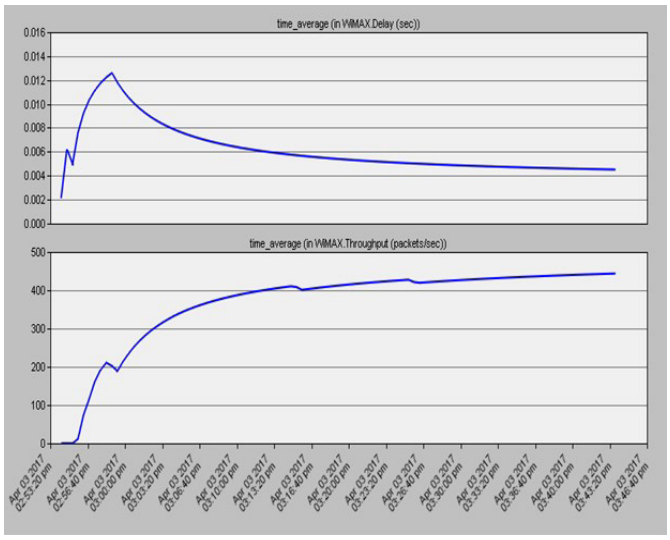

Fig. 26. Delay and throughput

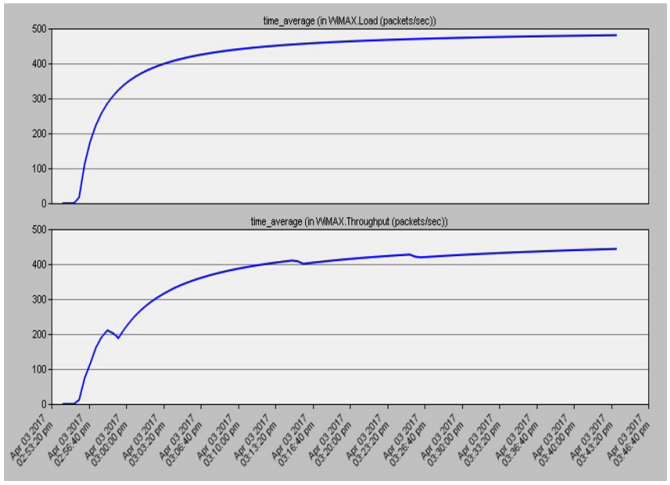

Fig. 27. Delay and Throughput

Analysis:

Simulation results indicate that there is a very small impact of the interleaving interval up to 20 and once more reflects this value.

E. SCANNING THRESHOLD

This factor can be configured at BS level within the scanning parameters it can be seen in Fig. 31.

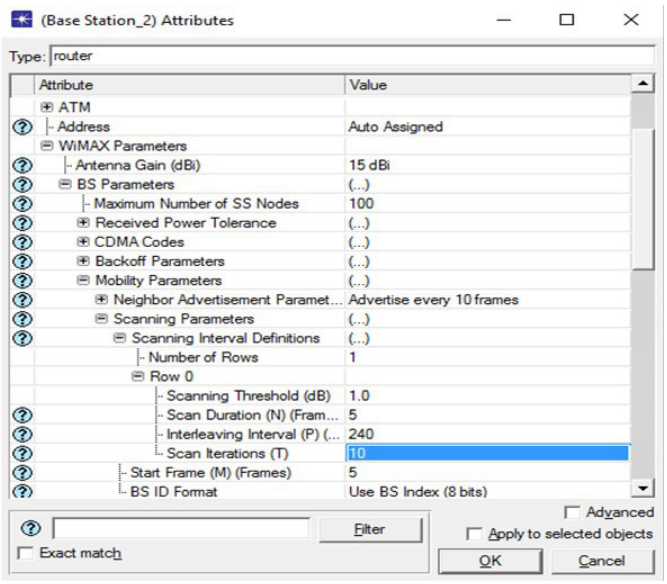

Fig. 28. Setup scan threshold

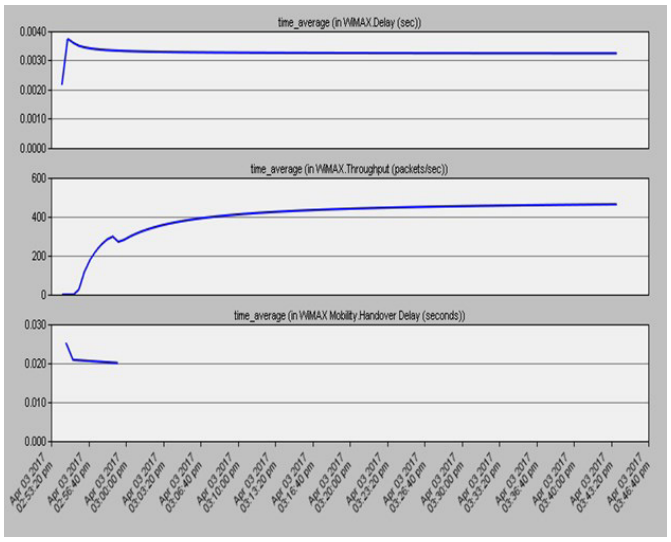

Fig. 29. HO delay and throughput delay

Analysis:

The simulation results are described as shown in fig (31) When the MS speeds transfer to 260 km / h the results illustrate that HO delay at least When it is a factor threshold from 1 to 1.3.The results show the minimum handoverdelay when the value of threshold increases more than 1.3 the HO delay goes to high.

F. USING COMBINED RESULTS TO ACHIEVE MAXIMUM MOBILITY

After individual simulations where we received maximum mobility and lower handover time .in order to understand and how these parameters applied at single signal stream and how they will affect the handover delay together .The scanning parameters which we have identified to be more effective and their vales which we have identified with individual simulation will be applied in a single simulation.

To test these values OPNET is used and these values such as

scanning threshold = 1
Scan iteration = 5
Interleaving Interval = 15
Mobility (MS speed) = 10Km /h

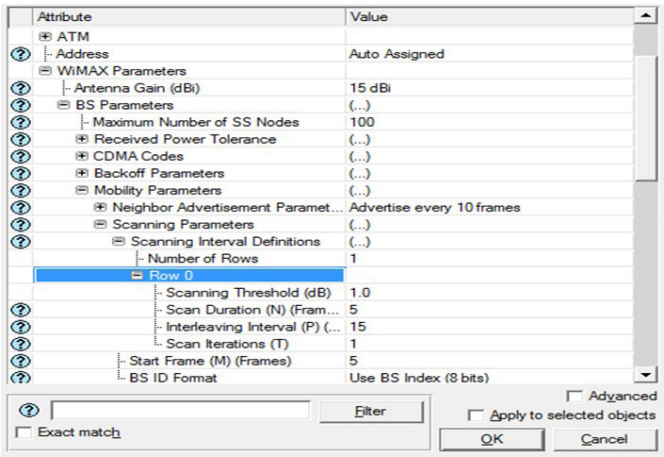

Fig. 30 Setup.

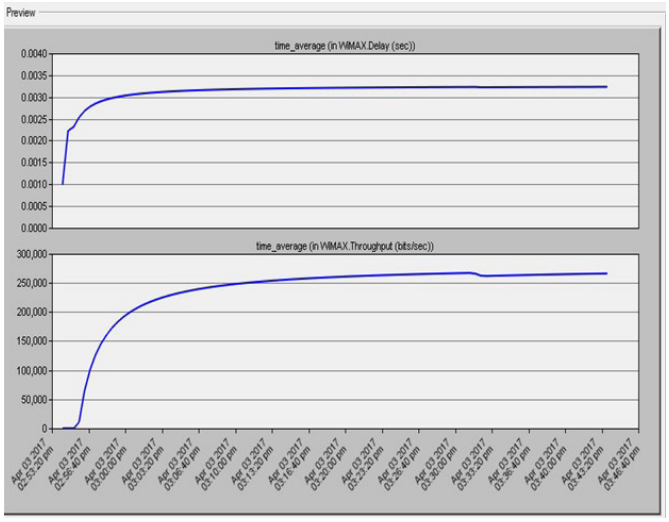

Fig. 31. Throughput and delay

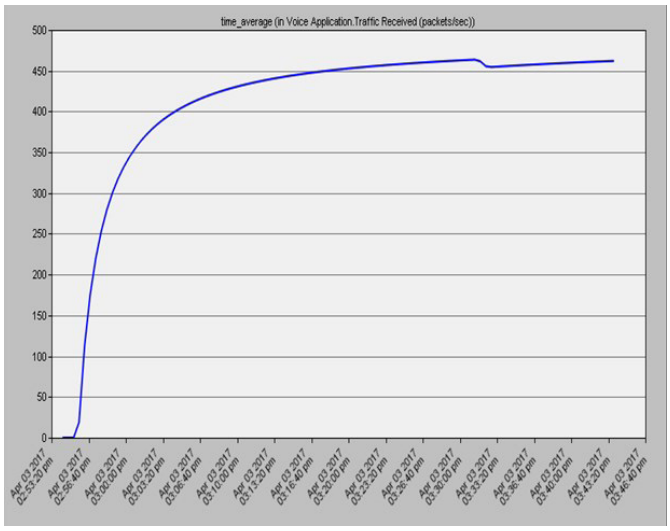

Fig. 32. Packet receive

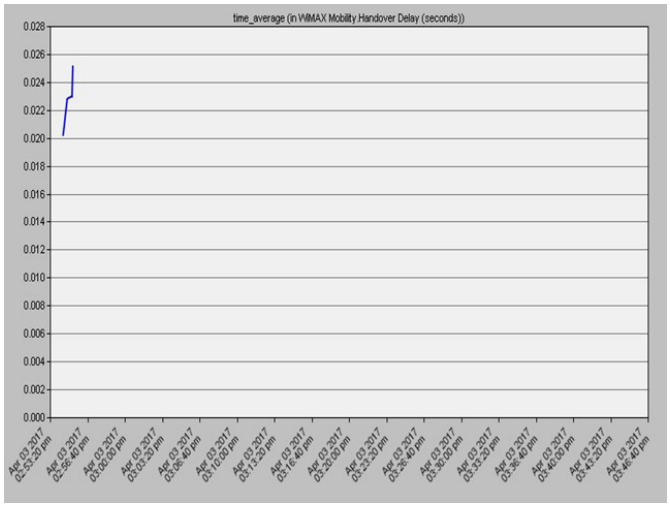

Fig. 33. HO delay

Analysis:

Fig. 31, Fig. 32 and Fig. 33 represents simulation results in several values (scanning threshold=1, Scan iteration = 5,Interleaving Interval = 15 ,and MS speed is 10Km/h). This graph shows that the simulation results illustrate that there is a very small impact of the interleaving interval 20 and increases once this value.

4. CONCLUSIONS

The WiMAX mobile is initially designed as a broadband access technology qualified for providing services(voip, video conference). The HO process is one of the critical processes in the WiMAX mobile, which can affect the continuity of real-time applications via WiMAX. The HO is one of the most major areas of research in mobile WiMAX, the object is parameter effect in HO . This paper explained the effect of the parameter in the WiMAX HO.

In the simulation we have checked number the potentiality of parameter effect in HO .The simulation enveloped the checking of factors that is take into account to be the most efficient in HO.

We have tested the influence of these solitary factors and observed they have particular influence at a particular level like for example the threshold is kept either 1 or 1.3 ,the HO will be minimum.

In the same side, if the iteration scan is kept at 5 milliseconds when other factor is kept in the constant it will cause minimum HO delay and when the interleaving interval causes any influence and maintains the HO delay is at the minimum when the interleaving interval is maintained between 5 and 20.

Then we showed by simulation, how MS speed effects in delay and through put ,we tested MS speed 260 and 150 that represents clearly the difference between tow speed .

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