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Vertical Handoff Using LTE

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Abstract:

In the wireless networks, the main challenge in vertical handover is to provide consistency and continuity with low latency in mobile connection is the most critical issue in the wireless communication. To provide complete mobility along with maximum quality of service (QoS) is one of the highest essential challenges in mobile heterogeneous wireless networks. Handover prediction can overcome these challenges. In this paper, we propose a solution for making vertical handoff decision which aims at providing connectivity without any interruption with low energy consumption to mobile users. It includes two schemes. The first scheme is to scan the quality of all signals between mobile stations in the surrounding area, while the second one is based on the signal-to-noise ratio SNR and bandwidth of the station. Further the proposed system reduces the number of redundancies and unnecessary handovers.

Keywords — handover; heterogeneous network;handoff discovery; handoff execution; handoff decision.

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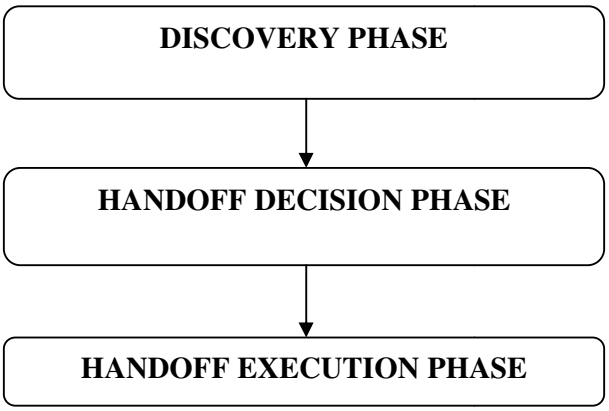
I. INTRODUCTION

To fulfil the demand of mobile users, next generation wireless systems depend on heterogeneouswireless technologies which allow the users to be connected at anywhere and anytime by providing complete mobility for all mobile users and at however it assures the required quality of services.Many attempts were done by researchers to provide a precise solution to reduce the handover delay. The redundancy is occurred when the handover process is incomplete with another station during the handover decision process [1]. A research on 'Lifetime estimation' of RSS was made to determine whether UE should proceed handover or have to be connected to the WLAN forreducing unnecessary handovers [3].The connection manager in smart phones makes frequent incorrect decision to connect to an WLAN which is undesirable. This may increase the load in the network which may decrease the overall performance of the network. In other case the available resource may be underutilised while offloading opportunities are missed [5].Packet loss and throughput were the parameters considered for examining the performance of handover [6]. Increase in throughput and decrease in handover latency is one of the challenges.To enable uninterrupted mobility, the challenge is providing efficient handovers. It is a challenge to select a target network from a poolof candidate networks, when the parameters are considered to be imprecise.The MIHstandard provides roaming and connectivity modelbetween the cellular networks. After thepublication of the MIH standard, many schemes have beendeveloped to improve the performance of the standard. But,still several challenges exist in the MIH standard.Some of the parameters also affect theperformance of a vertical handover. Theparameters include Received Signal Strength, Signal-to-Noise Ratio (SNR),bandwidth, speed of a mobile node (MN) and data rate [4].

HANDOFF METHODOLOGY



During the system discovery phase, the mobile terminal determines which network can be used.During the handoff decision phase candidate network is selected from the available pool of networks. The handover mechanism should be efficient to meet different Quality of Service requirements and increase the resource utilization of the network.During the handoff execution phase a handover is processed. The UE detaches the wireless radio link from the source eNB, and connects it to the destination eNB. Thus a new cell is accessed. The Mobile Station should execute the handover process in such a way to provide continuity in transferring data. Therefore, it always compares with the signal parameters of the nearby active stations with a predefined level [2], [7].The handoff mechanism is relies on the received signal strength, which is not acceptable for complex heterogeneous wireless network [9].There are many types of strategies including conventional handover decision which depends on apredefined threshold value of a specific parameter or values of several parameters such as power consumption,received signal strength (RSS) or the bandwidth [8]. The distance between a base station and a mobile node should be considered in the case of RSS, for avoiding handoff to the undesired base station [10].Even though various vertical handoff decision algorithms have been proposed previously, they still have some drawbacks. Some algorithm have high execution time and are complex and some uses the simple mechanism only concentrating on Received Signal Strength, which may be incapable of choosinga suitable network and undergo severe ping pong effects. To improve the handoff decision, our algorithm is expected to solve the above said issues. The Mobile Station always needs to scan its surrounding mobile users and to observe all stations which are situated nearby. Parameters such as the quality of the signal or the latency in the packet transfer to be considered to execute the handover process accurately.Many experiments were done by researchers to design a precise solution to reduce the handover delay. There are possibilities of occurring redundant handovers while the handover process with another station is incomplete during the handover decision process. The proposed process could be helpful in solving this entire problem which includes low latency, reduced redundancy, high bandwidth, high transfer rate, low energy consumption, low interruption.

3. OVERVIEW OF HANDOFF USING LTE

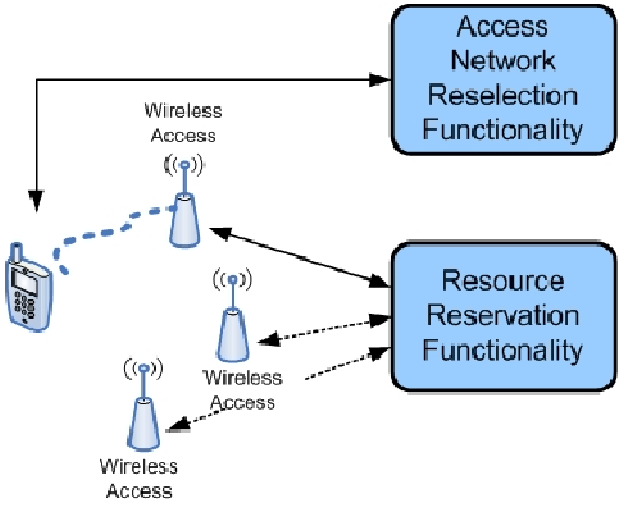


Fig.1 LTE Network Architecture

LTE supports peak data rates of 100 Mbps in downlink and 50 Mbps in uplink, both with 20 Hzspectrum. By using MIMO techniques LTE can

reach up to 300 Mbit/s downlink data rates.A cell can cover up to 100 km area It has a variable spectrum of 20 MHz with small degradation after 30 km and reach up to 200 users per cell (with 5 MHz spectrum). LTE supports speeds up to 350 kmph.LTE uses orthogonal frequency-division multiple access (OFDMA) in the downlink, and it uses single carrier frequency-division multiple access (SCFDMA) in the uplink. It has some power-saving mechanisms to turn off the transmitter whenever no data is to be transmitted or received. LTE provides quality of service.

TRANSFER RATES

LTE provides data rate up to 300 Mbps in the downlink and 75 Mbps in the uplink. It supports a higher range of channel bandwidths from 1.4 MHz to 20 MHz than WiMAX with 3.5 MHz to 10 MHz

COVERAGE:

LTE can cover maximum up to 100 km, which is twice as much as WiMAX' coverage. It provides connectivity with speeds up to 350 kmph.

POWER EFFICIENCY:

LTE turns off the transmitter while having a call when breaks are longer. LTE uses SC-FDMA technique in the uplink, which is highly power efficient than OFDMA. This leads to low power usage in mobile devices.

QUALITY OF SERVICE

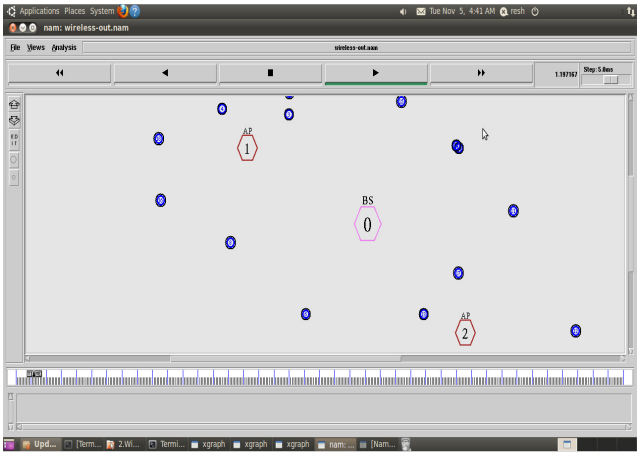
LTE frames wouldn'tseparate their frames in uplink and downlink sub frames. Each frame has 10 sub frames and only 2 of them are ever reserved for the downlink. The rest 8 sub frames can be either uplink, downlink or switch point. LTE frames reach smaller latencies.

SECURITY:
The LTE method of vertical Handoff process is highly secured**.**

EXPERIMENT AND RESULT

The output is simulated using Network Simulator 2 (NS2) tool.

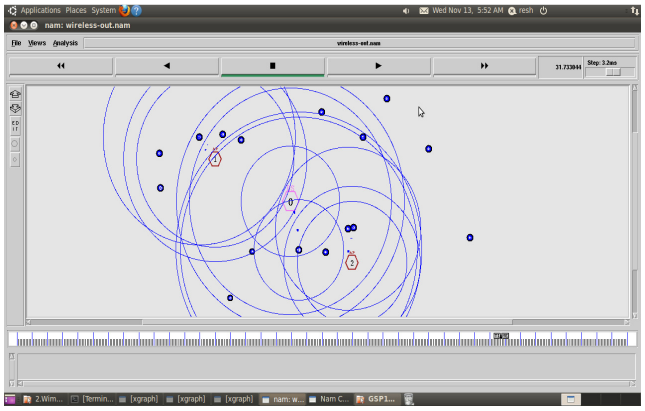
NETWORK FORMATION



The above figure shows that the network formation. The network is formed with 2 clusters. In this the node 0 is base station. The node 1 and 2 are access points. The access points collect the information from the cluster head and send to mobile collector.

COLLECTION OF INFORMATION FROM CLUSTER HEAD TO ACCESS POINT

The figure above shows the process of collection of information from cluster head to access point. The network is formed with 2 clusters. Each cluster head gathers the information and sends it to the corresponding access point.



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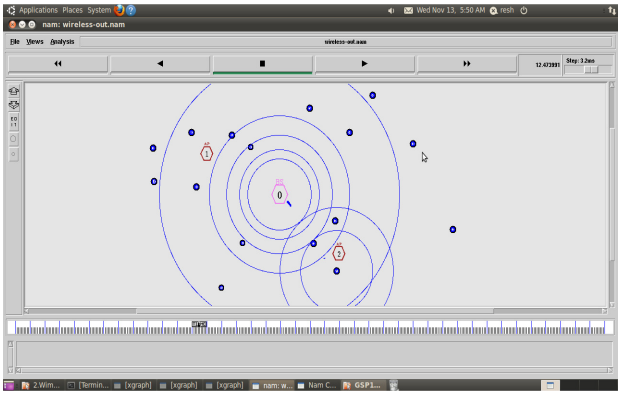
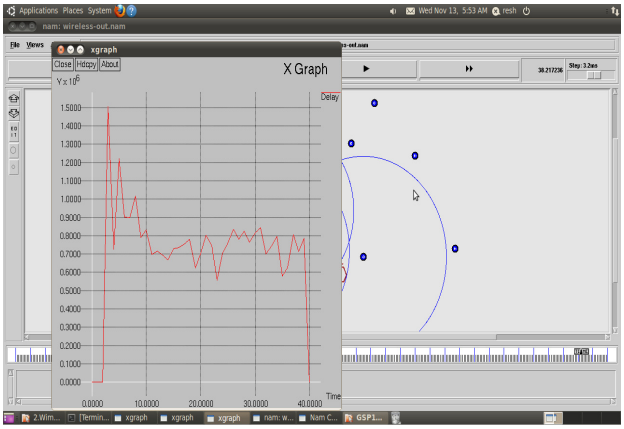
COLLECTION OF INFORMATION FROM BASE STATION



The figure above shows the collection of information from mobile collector to base station. The network is formed using 6 clusters. Each cluster head collects the information and sends it to its corresponding polling point. The polling point delivers the information which is collected by it to mobile collector. The mobile collector is exists for a periodof time. The mobile collector sends the collected information to the base station.

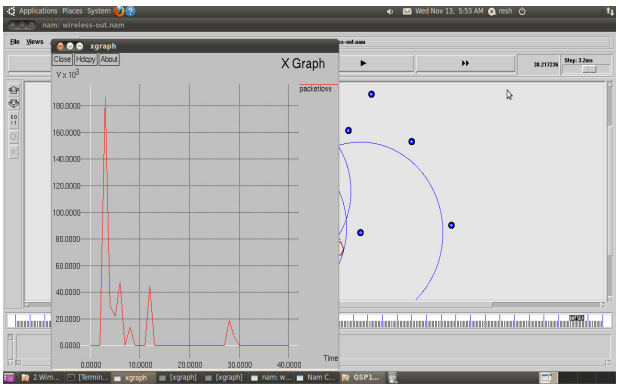
DELAY CONSUMPTION

The above figure shows the latency of transformation of information during the vertical handover process. Here the latency is very low in such a way that there is no loss of network for the mobile users in fixed or moving conditions.



PACKET LOSS

The figure below indicates the packet loss during the vertical handoff process. It is verylow such that the information is transferred without any interruption**.**



CONCLUSION

The growing needs for wireless communication has increased significantly. Moreover the need for advancements ofsmartphones has increased for every optimal user. But, the mobilitymanagement is still a challenging one, and many researchers proposed several methods to improve the working of mobility standards. In order to improve the mobilitymanagement, we proposed a VHM scheme. In this paper we have proposed a self-configured HOalgorithm and also verified the correctness of

this algorithmthrough extensive simulations. The Hand Over algorithm selectsan optimal handoff decision and precise network among available networks based on the decisionmechanism.This proposedhandoff decision and network selection algorithm relies on five important parameters which include bandwidth, RSS, cost, and handoff time delay and to reduce Ping-pong effectwhich causes unnecessary handoff processes.

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