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Simulation of hasswa based VHO algorithm for mobile handoff.

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Abstract:

Wireless communication is the rapidly increasing field in the today's world. Now a day's various research topics on wireless communication systems are based on the vertical handover procedure and the mobility management. Every user in the world wants to communicate with other seamlessly with good quality of service (QoS). to achieve this various technologies like WiFi, WLAN, UMTS, 3G etc. are implemented and they are connected to each other to form a heterogeneous network. But not a single Wireless technology could provide seamless connectivity, low latency, high bandwidth, best quality of service and better performance all these at the same time. The essential requirement for seamless VHO is the Received signal strength (RSS). During the VHO procedure the handoff decision is very important step. It could affect normal working of communication system. Incorrect decision of handoff results in higher costs, poor service, call drop and degrading the quality of service. Main problem is the available bandwidth (BW) in HWN. The available bandwidth is limited and the users growing rapidly. So, it is a challenge to maintain RSS in healthy stages. This paper provides an overview of handover management and the review and analysis of VHO algorithms.

Keywords- Bandwidth (BW), Received Signal Strength (RSS), Heterogeneous Wireless Network (HWN), Quality Of Service (QoS).

I. INTRODUCTION

From last some years, wireless technology has increased at challenging rate. The Provision of undisrupted communication to mobile users is a tough task. Mobile devices enabled with no. of wireless technologies which makes possible to maintain the seamless connectivity in highly dynamic scenarios like vehicular networks (VNs), switching from one wireless network to another by using vertical handover techniques (VHO). Management of handoff is the most important feature of wireless cellular communication system. The continuous communication is achieved between two users by supporting handoff or handover from one cell to another cell. Handoff is often initiated either by crossing a cell boundary or by deterioration in quality of the signal in the current channel. In this paper, we propose a new approach to improve VHO in heterogeneous networks environment by using a new algorithm approach, which new algorithm can enhance performance by reducing cost and time. The result of the simulation of those algorithm shows that the proposed algorithm has better performance than traditional algorithm.

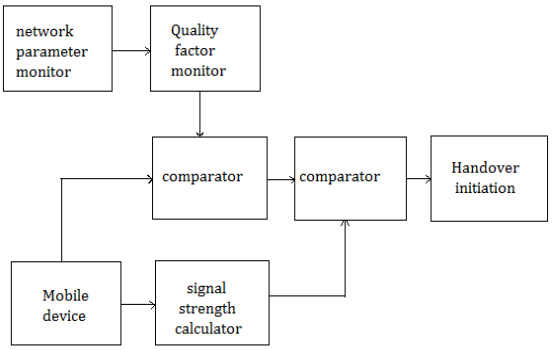

Fig. 1 Block diagram of system

Basically here we are dealing with the vertical handover. It is a handoff procedure in which the node of the mobile have services from different network technology. This is called intra system handoff.

Procedure of vertical handover (VHO)

VHO is defined into 3 different steps.

A) Handover Collecting Information

In this, the required information for the decision of VHO is gathered on basis of the criteria with

preferences of user such as cost, network latency, security, coverage and terminal like battery, velocity.

B) Handover decision

In this, selecting the best RAT which is based on aforementioned information & informs handoff execution about that.

C) Handover execution

In this, old RAT resources released and active session for user will maintained and continued on new RAT.

II. PROBLEM STATEMENT

Aim of this paper is to improving the performance of vertical handoff. Here we are implementing a new algorithm based on Hasswa algorithm. In which we are calculating different parameters like signal strength, traffic, bandwidth, congestion, signal to noise ratio and vertical handoff is occurred or not. Here there are basically two different types of handoffs: Hard handoff and soft handoff.

III. LITERATURE REVIEW

- **Hasswa Algorithm**

Hasswa et al. algorithm [2] is traditional and a simple algorithm is explained in figure 3.

A transport layer and application layer for vertical mobility with tramcar was developed by Hasswa A, Hassanein H, Nasser N [2].

Success of VHO is defined by ratio of number of successful handoff to the total number of handoff initiated.

- **Omar Algorithm**

Omar A and Omar k [1], developed new technique to improve the VHO in heterogeneous network environment by using a mechanism which is produced independently by IEEE & 3GPP namely media independent handoff (MIH). This algorithm of VHO provided by this mechanism which supports both types, alternative and imperative call. Figure 3 shows Omar et al. algorithm [1], provides advances in VHO procedure. If there are two simultaneous VHO sessions, first due to user profile and second due to RSS going bellow. The first session executes high priority and second session executes if there is not imperative session active under process, otherwise it will wait in queue.

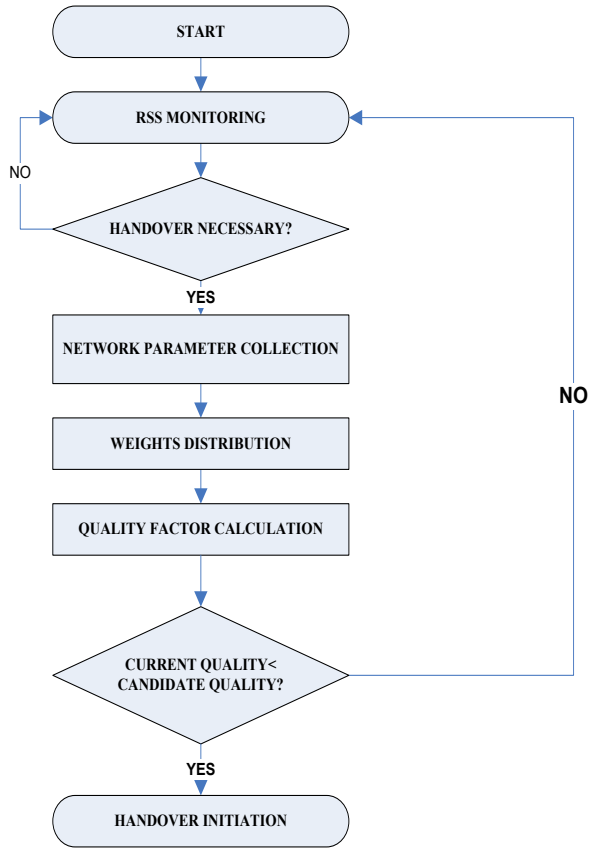

Fig. 2 Hasswa et al. VHD heuristic algorithms

In imperative case, optimum RATs will be selected. If first choice from list of RATs could not be satisfied with sufficient of resource the AC will automatically move towards another RAT and so on until it finds available resources, otherwise the session will be rejected. At last, selected RAT which based on the rules and priorities of operators by PoS in the destination network.

IV. PROPOSED ALGORITHM

Step 1	Search all the network and initialize total network parameters present
Step 2	Check currently RSS value if it is less than minimum RSS value then go to step 5
Step 3	Checking of user criteria like cost, latency, data rate, security. If one of them is in satisfactory level then go to step 8
Step 4	If invalid call, then directly go to step 12
Step 5	Compare the criteria of user between RATs than the existing RAT
Step 6	If SoR (sufficient of resource) is available then go to step 11
Step 7	If there are no changes of RAT then go

to step 12
Step 8 Compare all users criteria of all RATs.
Step 9 If SoR available then go to step 11
Step 10 If no changes of the RAT then go to step 12
Step 11 Selection of the satisfied RAT
Step 12 Finally here reject the session.

In the proposed algorithm the priority is not given to any of the session as that of the Omar algorithm. According to optimum availability of RATs handoff is occurred. Firstly this algorithm checks all the networks and the required parameters for handover procedure. After collecting all information it checks the Received Signal Strength (RSS) value of current Radio Access Terminal (RAT). If this RSS value is not less than minimum value or required value then it will executes alternative session in that handoff decision is taken according to preferences of the user. Before any of the decision it also check the selected RATs which satisfies all criteria of user and provides sufficient resources. If there sufficient resources are available then it will directly select the satisfied RAT otherwise there will be no change in the RAT and it will reject the whole session.

If the value of RSS is less than the required value then the imperative session will execute, in that user criteria compared without comparing current RAT criteria and depending on the SoR selection of the RAT is done otherwise there is no any change in the RAT and it will terminate the whole session.

V. SIMULATION RESULTS

- **MATLAB Simulation of Hasswa Algorithm**

figure 3 explains working of Hasswa algorithm. Hasswa algorithm is a very simple algorithm. In the implementation RSS value considered as base parameter. Depending on the value of RSS the handoff is occurred. When we clicks on the move button the device present in the first cell stars moving from one location to another location i.e. next location. Here the RSS value is considered on the basis of distance of the mobile device to the network area. In this figure, the device is located in the T3 which is travelled from T1-T2-T3. While the device travelling only 3 nearby networks are considered for handoff. T3,T2 and T7 are considered but still T2 provides signal strength because the value of the RSS of T2 is more than that of the T7 and T3.

Fig. 3 Result of Hasswa Algorithm

- **MATLAB Simulation Results For Proposed Algorithm**

- **Main Window of Project**

Fig. 5 shows the main window of project in which the algorithm is called and executed by clicking on that algorithm button which is provided in this window.

Fig. 4 Main Window of Project

Proposed algorithm primarily based on the MIH to executing the VHO. First it checks the current RSS value and depending on that value it introduces VHO and gives priority for the imperative sessions over the alternative sessions. So, the success rate of the algorithm is more than that of the Hasswa algorithm and the average time required for Handoff is more than that of the Omar algorithm. It achieves minimum failure of the connection due to using optimum RATs. Fig. 4 shows the implementation of the proposed algorithm.

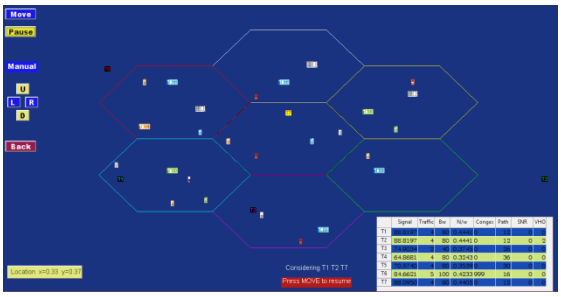

Fig. 5 Implementation of proposed algorithm.

Here seven networks are designed each of them having its own signal source for the transmission.
In this algorithm firstly VHO gets initializes, if the current RAT having sufficient sufficient strength of the signal then call is continued with the current network. As the signal travels from one location to other there may be deduction of the strength of the signal of that RAT. According to the priority new optimum RAT is selected. If the given criteria doesn't satisfies then there will no change in the RAT selection and the session will be rejected.
In case of the imperative handoff decision takes place directly if the signal strength is less than the required value. In the imperative session the user criteria is compared with the alternate RAT. If the new RAT satisfies all the criteria of user and provides sufficient resource then the handoff takes place otherwise thus session will be rejected.

VI. RESULT ANALYSIS

Table-1 comparison study of all algorithms

sr. no.	algorithm	e.g. calls	Success rate	Percentage %
1	Hasswa	35	12	34.28
2	Omar	35	26	74.28
3	Proposed	35	30	85.71

Table-1 gives the comparison and analysis of all three algorithms. From this table following points are noted:

1 The proposed algorithm is compared with the Omar and Hasswa algorithm.
2 The proposed algorithm tested and this found better over the two algorithms.
3 The success rate of call is calculated by running the iterations no. of times.
4 We approximately tested for the 35 calls and the proper handoff is carried out as per the table.

VII. CONCLUSION

The VHO will remain an essential component for the wireless network due to the switching of users among heterogeneous networks. The proposed VHO algorithm concentrates on the better performance, less complexity, reduced time and it is more exhaustive for improving the VHO procedure. The Hasswa's and Omar's algorithms are the advanced procedures in vertical Handoff. In this paper Hasswa based method is presented and compared with both the algorithms.

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