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Performance Analysis on Traffic Sensitive Vertical HandOff Algorithm TSVHOA

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Abstract: Rapid growth in the field of communication technology supports the user to select the required signal by switching from one network to another based on the required quality of the traffic as well as user preferences. Switching the signal from one signal to another is called handoff. Handoff has been triggered when the received signal strength (RSS) is degraded or the quality of service is required. This paper analyses the performance of RSS based handoff and the QoS based handoff proposed in the Traffic Sensitive Vertical HandOff Algorithm (TSVHOA) by considering multiple parameters.

Keywords: WiFi, WiMax, Vertical Handoff, Multiple Attribute Decision Making, RSS, AHP, GRA, TOPSIS, SAW

I. INTRODUCTION

The future mobile and wireless networks tend to provide accessibility for connecting to any network, anywhere and anytime [1]. In such system, user will be roaming among different wireless access a technology which is known as Vertical Handoff/Handoff [2]. In horizontal handoff which occurs between similar accesses technologies, the handoff decision is mainly based on Received Signal Strength (RSS). However, in vertical handoff, handoff occurs between different technologies and triggered not only because of RSS degradation but for other requirements like QoS, user preferences etc. Both handoffs to be done to the right channel, which meets the QoS requirements of the current traffic.

Multiple network technologies are available like WiFi, Wi-MAX, WCDMA with different properties which supports different types of traffic. Hence during handoff, the signal selection should be appropriate according to the need of traffic. Different traffic has different properties like different tolerance level for end to end delay, bandwidth utilization, bit error rate and jitter.

The main issue during handoff is when to do handoff and to which signal it should be handed off. For this, various handoff decision making algorithms and multiple attribute decision making methods are available.

II. EXISTING WORK

Multiple Attribute Decision Making (MADM) deals with the problem of choosing an alternative from a set of alternatives which are characterized in terms of their attributes. The most popular classical MADM methods are:

[3] SAW (Simple Additive Weighting): the overall score of a candidate network is determined by the weighted sum of all the attribute values. TOPSIS [4] (Technique for Order Preference by Similarity to Ideal Solution): the chosen candidate network is the one which is the closest to ideal solution and the farthest from the worst case solution. AHP [5] (Analytic Hierarchy Process): decomposes the network selection problem into several sub-problems and assigns a weight value for each sub-problem. GRA [6] (Grey Relational Analysis) is then used to rank the candidate networks and selects the one with the highest ranking.

Grey Relation Analysis for Vertical Handover Decision Schemes in Heterogeneous Wireless Networks [6] compares two vertical handover decision schemes (VHDS). Distributed handover decision scheme (DVHD) and Trusted Distributed vertical handover decision schemes (T-DVHD). AHP was used to determine the weights for the three models requiring information about the relative importance of each attribute.

III. PERFORMANCE ANALYSIS OF TSVHOA DECISION ALGORITHM

To analyze the result of TSVHOA algorithm proposed in [7], this paper considers multiple parameters, like Network- Related Parameters (Bandwidth, Latency, RSS, Cost), Terminal Related Parameters (speed, direction), User-Related Parameters (user preferred quality, priority, traffic type), Service Related Parameters (service capacities, QoS requirement of traffic), time to drop, handoff count, packet loss rate, , throughout, packet drop probability. Each parameter is given with weights according to the requirement of the traffic type and user preferences. In paper [7], only three parameters like IP delay, Latency and Jitter are considered. Because of the minimum number of parameters and only the network related parameter, the signal selection process were done very quickly and the WiFi signal has been selected as the best signal. In this paper multiple parameters were considered and implemented in the same scenario.

The figure 1 and table 1 shows the comparison between the numbers of RSS based handoff initiated and QoS requirement based handoff initiated among the 25 nodes.

TABLE I

No.of Nodes	5	10	15	20	25
RSS Handoff Initiated	2	6	8	9	13
QoS Handoff Initiated	3	3	7	9	10

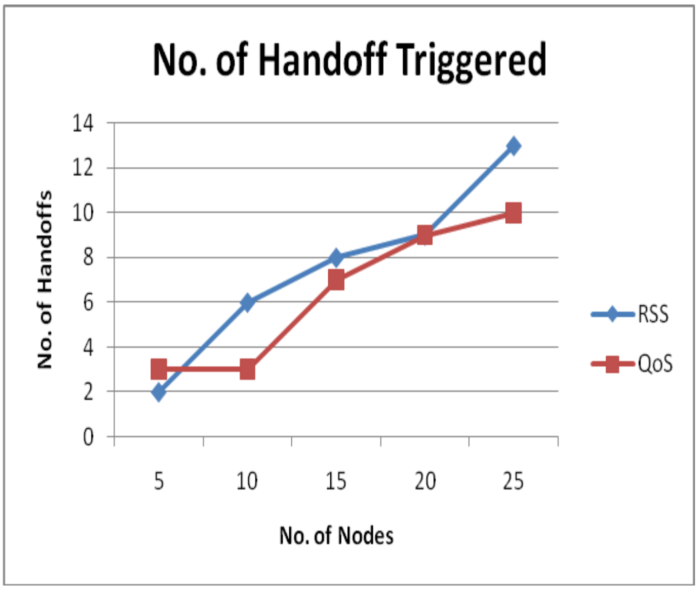

Figure 1: No.of Handoff Triggered

The table 2 and figure 2 shows the comparison between various functions like number of successful RSS handoff, successful QoS handoff, number of handoffs dropped and unnecessary handoffs triggered.

TABLE II

No.of Nodes	5	10	15	20	25
RSS Handoff	2	5	7	9	11
QoS Handoff	2	2	5	5	8
Dropped Handoff	-	1	1	2	2
Unnecessary Handoff	1	1	2	2	2

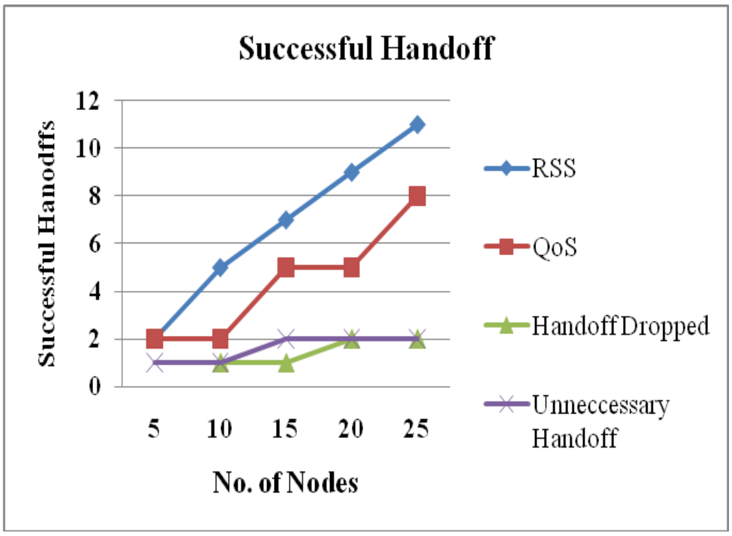

Figure 2: No. Sucessful Handoff

TABLE III

No.of RSS Handoff executed	2	5	7	9	11
No. of signal in Same Channel	2	3	4	4	5
No of handoff triggered for QoS Request	0	2	3	5	6

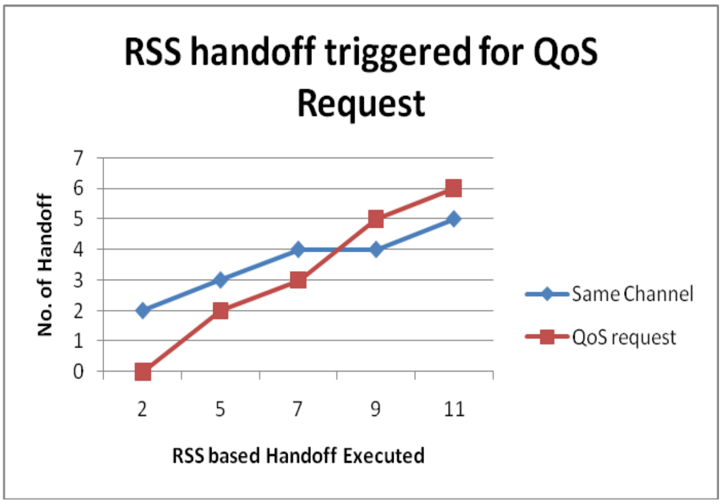

Figure 3: RSS handoff triggered for QoS Request

Figure 3 and table 3 shows the RSS based handoff which has been handed over to the new signal were again triggered for QoS requirements.

The simulation has been done with 25 nodes. Most of the RSS based and QoS based handoff requirements were successfully handed over. Almost 80% of the handoff request has been done. In which the RSS based handoff requirement is performed immediately to the available channel without checking the QoS of the signal. Which leads to the unnecessary handoff because when the RSS based request is made by the node, the handoff is immediately done to the available signal, without checking the quality of the target signal as well as the QoS requirement of the current RSS request, to avoid call drop. Hence the output shows that, after some time period the same signal requests the handoff because of QoS dissatisfaction. To overcome this problem the next proposal focuses RSS based handoff with QoS requirement of the traffic.

IV CONCLUSION

Analysis result shows that both the handoff had been successfully executed. But the problem is with RSS based handoff. Because to avoid the call drop the RSS based handoff requirement is done immediately without checking the quality of the target signal. Hence most the RSS based handoff is again triggered for QoS requirement which leads to unnecessary or frequent handoff. Our next work concentrates on RSS based handoff request to be handed over to the signal which meets the QoS requirement of traffic types.

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