A Survey on Vertical Handover Decision Algorithms

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Abstract: New generation of heterogeneous wireless network provide wide range of services anywhere at any time. User can access multiple networks at same time, so user should able to roam seamlessly among multiple access network technologies. Handover is the essential part of next generation heterogeneous wireless networks. Basically the vertical handover is important in heterogeneous network. Various algorithms are designed to provide quality of services (QoS) to wide range of applications. In this paper we are presenting the survey of vertical handover algorithms that designed to satisfy that requirement.

Keywords: Handover, vertical handover, networks, bandwidth, heterogeneous wireless network

INTRODUCTION

Next generation wireless system represents heterogeneous environment with different access networks technologies that differ in bandwidth, latency or cost. In this kind of environment, mobility management is the essential issues that support the roaming of users from one system to Handover Decision: This process involves the selection of the target point of attachment and the time of the handover.

Radio link transfer: It is the task of forming links to the new point of attachment.

Channel Assignment: It deals with the allocation of channel resources.VHD algorithms are useful in the way that they help mobile terminals to choose the best network to connect to among all the available candidates.

VHO Algorithm

Various algorithms is used to provide optimal selection.

RSS algorithm: The traditional handover decision depends only upon RSS which is dynamic criteria for handover. RSS based VHD algorithm compare the current RSS of the access point against other to make handover decision. The handover decision initiated, if the RSS of the current radio access network $RSS_{serving}$ is lower than the pre-defined handover threshold THO and the RSS value of the alternate network RSS_{alt} is higher than of the current access network plus a hysteresis margin H. The algorithm is expressed in Eq.(1):

another. Handover management is the one of the mobility management components, controls the change of mobile terminals point of attachment during active communication. In heterogeneous network the main issues vertical handover. Vertical handover is refers to the handover between different types of network. VHO management has two main challenges seamlessness and automation aspect in network switching [ ].

Vertical Handover

Handover is the process of transferring an ongoing call or data session from one channel to the core network to other channel. Depending upon access of network that each point of attachment belongs to, the handover can be either horizontal or vertical.

VHO Process

A handover process can divide into 3 stages:

$$(RSS_{serving} < THO) \text{ n } (RSS_{alt} > RSS_{serving} + H) \quad \ldots\ldots\ldots(1)[\ 1]$$

Fuzzy Logic Based Algorithm: In this algorithm taking multiple decision making input parameters. These parameters are inaccurate parameters such as energy consumption, throughput and CPU load. Fuzzy algorithm consist of three step process: During metric fuzzification, the chosen decision metrics are normalized to enable direct value comparisons. Following this, the second step computes the influence of these normalized metrics on handover decision by using specific membership functions []. Depend upon previous steps; the last process determines the target network with best projection of handover.

AHP (Analytic Hierarchy Process): In this algorithm problems where decomposes into sub problems and defined weight value to every sub- problems. The vertical handover problem is the complex problem, the most appropriate multi attribute decision algorithm. AHP method has three steps process:

1) Decompose the decision problem into different level of hierarchy and identification of the decision criteria.

2) Compares all objectives at the first level and networks with respect to the second level. (Comparing each factors to all other factors within the same level).
3) Calculates the sum of products of weights obtained from the different levels, and selecting the solution with the highest sum.

Context Aware Based Algorithms

In this algorithm handover are based on information related to the mobile host, network and other contextual parameters for intelligent decision making.

Information may include capacity of the channel, user preference, network QoS, service type. The selection is based on optimizing QoS requirements and entails satisfying multiple objectives such as user preference, maximizing throughput and minimizing jitter, packet loss, bit error rate and bandwidth fluctuations. This algorithm is also avoiding the ping pong effect of the core network.

Analysis of Algorithms

Method	Advantage	Disadvantage
RSS	Improvement on the available bandwidth	Long packet delay
Fuzzy Logic	High Throughput	High Handover Delay
AHP	Reduce the processing delay	High Delay
Context Aware	Medium throughput	High Handover Delay

CONCLUSION

In this paper, a review of recent approaches of vertical handover decision methods was presented. This improvement in the performance may be achieved when AHP is used for handover decision. In future, it requires improving the performance of the handover decision algorithm to minimize the delay of handover, improve the bandwidth frequency, coverage area.

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