PERFORMANCE ANALYSIS OF WEIGHTING METHODS FOR HANDOVER DECISION IN LTE-A HETNETS

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ABSTRACT

The deployment of dense Small Cells (SCs) in future networks presents a practical solution to meet the increasing demand for network coverage and capacity. However, this expansion brings challenges such as interference and an increase in unnecessary handovers, resulting in heightened signaling overhead. To ensure seamless service with minimal disruptions and reduced signaling overhead in Heterogeneous Networks (HetNets), it is crucial to accurately model the handover (HO) decision-making process. This paper investigates various methods, including the Analytic Hierarchy Process (AHP), Entropy, Standard Deviation (STD), and Weighted Sum Model (WSM), to weigh attributes such as RSRP, SINR, channel capacity, and cell capacity. Additionally, the Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) is applied to rank alternatives for HO decisions. The study aims to analyze the impact of various weighting methods on the number of HOs, HO Failure (HOF), Radio Link Failure (RLF), and HO Ping-Pong (HOPP). The study considers a dense SC LTE-Advanced (LTE-A) HetNet that includes a single Macro Cell (MC) and several SCs within its coverage. By conducting a thorough analysis of the attributes' significance and influence on the HO decision-making process, this paper provides valuable insights to optimize HO processes and improve overall network performance. Comparative evaluations of the methods demonstrate that WSM performs better in reducing the number of HOs and mitigating HOPP, while AHP excels in minimizing RLF. The methods yield comparable results with negligible HOF. The findings highlight the importance of selecting appropriate methods based on specific performance metrics to enhance HO decision-making in dense SC HetNets, ensuring improved network efficiency and user experience.

Keywords: Handover, Dense small cell HetNets, MADM, TOPSIS, Standard deviation.