Abstract

Ant Colony Optimization (ACO) technique deals with exploratory behavior of ants while finding food by following a path based on the concentration of the pheromone. A major limitation with ACO algorithm is "stagnation". This occurs when all ants try to follow same path to reach the destination due to higher pheromone concentration and causes congestion when applied to Adhoc Wireless Network (AWN). In the present paper, a detailed analysis of ACO based different pheromone decay techniques such as Discrete, Exponential and Polynomial has been carried out. Pheromone intensity and probability of choosing path for packet transmission are used as parameters for the analysis. It is found that the Discrete decay is not preferable for Congestive network as it leaves large amount of pheromone traces. The polynomial decay technique choose better path and avoid longest path which lead to delay at the time of packet delivery. The Exponential decay has been found to exhibit better performance compared to Discrete and Polynomial decay techniques, However it loses the pheromone traces very fast. The Efficient fine tuning of the exponential decay model can be achieved by using stability factor $\theta$. The present analysis shows that for values of $\theta = 0.09$ the probability of selection of the longest optimal path increases to 18%. The introduction of the
stability factor ? improves AWN performance in terms of packet delivery. The results are presented and discussed in the present paper.

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**Index Terms**

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