An Adaptive Cooperative Protocol for Multi-Hop Relay Selection in Wireless Networks

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***Abstract*— The multi-hop relay communication system has attracted tremendous attention recently as it is able to improve the service by increasing the distance and reducing the capital expenditure for network expansion. In this paper, an adaptive cooperative decode-and-forward (DF) protocol for the multi-hop relay communication system has been developed to enhance the performance of the system. In particular, the best destination relay selection approach (BDRS) was proposed for realizing the diversity gain available in the multi-hop relay networks. Firstly, the destination node whose channel gain is the maximum is chosen. Then, the relay node will be chosen based on the minimum outage probability approach. The system performance has also been analyzed theoretically by deriving the outage probability. In addition, an optimum power allocation has been investigated. Finally, the theoretical performance analysis has been verified by comparison with the numerical simulation result. The result shows that the theoretical analysis is almost identical to that of the simulation result. Furthermore, the outage probability of the proposed protocol is significantly lower than the conventional and modified multi-hop communication protocols by virtue of the diversity gain. In addition, the outage probability is further minimized when the optimum power allocation is employed.**

***Keyword*— Multi-Hop; Relay selection; Routing strategy; Cooperative communication; Power allocation**

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