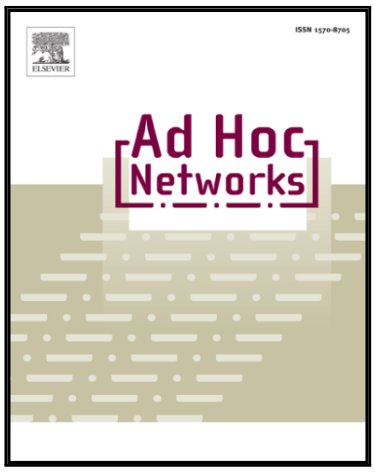

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Optimization of Decode-and-Forward Multihop Full Duplex Relay Networks under Residual-Self-Interference

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Abstract

This paper investigates various optimization schemes for improving the performance of multi-hop full duplex (FD) decode and forward (DF) based relay networks with recursive backward interference cancellation (RBIC). We provide analytical expression for the outage probability of multi-hop FDR network by taking into account the residual self interference (RSI) at the full duplex relay (FDR) nodes, in independent non-identical Rayleigh fading channels. We then investigate optimal power allocation (OPA), optimal relay location (ORL) and the joint optimization of transmit power and relay location that minimizes the outage probability. We prove the convexity of all the above problems and determine the OPA vector by using the geometric programming while the ORL vector is obtained by applying Karush-Kuhn-Tucker (KKT) conditions. To solve the joint optimization problem, we devise an iterative, fast converging algorithm based on sequential geometric programming. Extensive numerical and simulation results demonstrate that both OPA and ORL can improve the outage probability of FDR system; however joint optimization leads to superior performance as compared to OPA, ORL and un-optimized cases. Secondly we consider the end-to-end rate maximization problem with maximum power constraint at the nodes. Since the optimization problem is nonconvex, we devise an iterative

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