

Optimizing a Cooperative Relay Network Using Advanced Power Allocation and Receiver Diversity Technique

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Abstract—Cooperative relaying is a relatively new technique in wireless communication systems that make use of all the nodes present in a wireless sensor network by dynamically sharing their radio resources in a distributed manner. All the nodes present in the periphery of the two communicating nodes will act as relays and forward the information until it reaches the recipient node. By doing this, it achieves a significant diversity gain, which in turn increases the robustness of the communication system. The diversity gain offered by cooperative relay transmission can only be exploited fully if a receiver diversity technique is being employed at the recipient node. Moreover, these cooperative relay networks inherit the power limitation of a traditional wireless sensor network. Therefore, in this paper an effort has been made to optimize a cooperative relay system by addressing these two issues. First, node powers expressions will be derived for a 3-node configuration using fixed gain amplify and forward protocol over a Rayleigh Fading Channel. Second, performance of a 3-node configuration has been further analyzed by using different receiver diversity techniques at the destination node. Simulation results are presented to validate the performance gains when advanced power allocation and receiver diversity is employed in a cooperative relay network.

Keyword—Cooperative relay network, Maximal ratio combining, Moment generating function, Diversity techniques, Rayleigh fading channel, Fixed gain amplify and forward.



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