SNR Maximization at CSI Aware AF Relay Assisted Networks

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***Abstract*— This paper concerns two-hop communication over relay-assisted Block fading channel. It is assumed there is not a direct link between the transmitter and the affiliated destination and the communication occurs in two hops through the use of a relay, where the amplify and forward (AF) strategy is employed at this node. In this case, in a Rayleigh block fading channel, the optimal weight function at the relay in terms of maximizing the received signal to noise ratio (SNR) at the destination is derived, assuming the relay is aware of channel gains associated with both hops and that the relay is subject to an average power constraint. Finally, the resulting SNR is compared to the case of having a peak power constraint at the relay which is served as a benchmark throughout the simulations.**

***Index Terms*—** amplify and forward relay, peak power constraint, average power constraint.

I. INTRODUCTION

It is widely recognized that relaying can greatly improve the quality of wireless communication links. In this regard, there have been some attempts to incorporate effective strategies at the relays, among them, the amplify and forward (AF) strategy is extensively addressed in the literature as there is no need to do sophisticated processing, while still having an acceptable performance as compared to other methods [1]–[3]. This strategy is first addressed in [8] and then in studied by many researchers.

This paper concerns communication in a two-hop block Rayleigh fading environment, where the channel gains are constant throughout one transmission block and vary independently for the next blocks. Moreover, we assume the relay knows the channel strengths associated with both hops.

This assumption has some practical implications and is extensively used in the literature [4], [5].

Most of existing works consider the relay is subject to a peak power constraint, and that it operates at full power. However, another realistic assumption is to have an average power constraint at this node. This is more useful in block fading channels, as the relay can save its power when the channel associated with the second hop is in poor condition, so that transmit at higher power when the channel associated with the second hop is in good condition. This gives rise to increasing the average signal to noise ratio (SNR) at the destination.

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