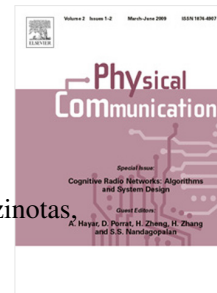


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Computationally and Energy Efficient Symbol-Level Precoding Communications Demonstrator

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Abstract

We demonstrate forward link interference mitigation techniques in a precoded multi-user communication scenario for the efficient frequency reuse. The developed test-bed provides an end-to-end precoding demonstration, which includes a transmitter, a multi-beam satellite channel emulator and user receivers. Precoded communications allow efficient frequency reuse in multiple-input multiple-output (MIMO) channel environments, where several coordinated antennas simultaneously transmit to a number of independent receivers. We implement and demonstrate the new Symbol-Level Precoding (SLP) technique and benchmark it against Zero-Forcing and MMSE techniques in realistic transmission conditions. We show performance of the SLP in various MIMO channel conditions and outline the impact of the modified constellation by the SLP on a conventional receiver.

Keywords: MIMO, precoding, beamforming, SNR, BER, convex optimization, power minimization, multi-user interference

1. Introduction

Multi-User MIMO (MU-MIMO), also known as Precoding, has been studied recently as a way to reduce co-channel interference in the wireless communications (Wi-Fi, LTE) and multi-beam satellite systems [1, 2, 3, 4]. The requirement of broadband services through high throughput satellite (HTS) systems
5 motivated the research of advanced signal processing techniques for interference mitigation to provide a better spectrum utilization with a reasonable complexity. MU-MIMO communication techniques are also promissory in other multi-channel interference scenarios such as in the case of Asymmetric digital
10 subscriber line [5] (ADSL) and Powerline communications [6].

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