

**ON THE PERFORMANCE OF SPATIAL MODULATION
MIMO
FOR FULL-DUPLEX RELAY NETWORKS**

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ABSTRACT

- In this paper, we investigate, for the first time, the performance of a full-duplex (FD) relaying protocol, where a single-RE Spatial Modulation (SM) Multiple-Input Multiple- Output (MIMO) system is employed at the relay node. We refer to this protocol as SM-aided FD relaying (SM-FDR).
- At the destination, a demodulator that takes advantage of the direct connectivity between the source and destination is developed in order to maximize its performance. Based on this demodulator, we introduce a mathematical framework for computing the average error-probability of SM-FDR in the presence of residual Self-Interference (SI).

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- Furthermore, we derive mathematical expressions for computing the achievable rate of SM-FDR. With the aid of these achievable rate expressions, we provide an estimate on the quality of SI cancellation required for the suitability of FD transmission.
- In addition, we develop and evaluate three relay selection policies specifically designed for the SM-FDR protocol. The mathematical analysis is substantiated with the aid of extensive Monte Carlo simulations. Finally, we also assess the performance of SM-FDR against traditional FD relaying protocols.



EXISTING SYSTEM

- The most popular relaying protocols available in the literature are amplify-and-forward (AF) and decode-and-forward (DF) relaying.
- In spite of their many advantages, one of the fundamental challenges of these relaying protocols is their requirement for extra bandwidth resources due to the half-duplex (HD) constraint of the relay, i.e., the relay cannot transmit and receive on the same frequency at the same time. This might result in a loss of system throughput.

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PROPOSED SYSTEM

- An FD relaying system is considered, where the multi-antenna source uses transmit beamforming to forward its data to the relay, and the relay uses SM to forward the data to the destination.
- However, the effects of SI and the direct link have not been taken into consideration. Against this background, in the present paper, we investigate the performance of a new SM transmission protocol for FD relay networks, and throughout this paper, it is referred to as SM-aided FD relaying (SM-FDR).
- In simple terms, SM-FDR utilizes a single multi-antenna FD relay to decode, and then forward to the destination using SM, the data symbol transmitted from the source, while simultaneously receiving the source's next transmitted symbol.

HARDWARE REQUIREMENTS

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

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SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

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