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Overcoming Self-Interference in SM-OFDMA with ESINR and Dynamic Subcarrier Allocation
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1. INTRODUCTION

- Combined benefits of MIMO architecture and OFDM/A technology make it an attractive technology for future wireless communications, such as 3GPP LTE, WiMAX (802.16) and MBWA (802.20).
- However, MIMO suffers from severe impairment effects due to Co-channel interference (CCI), also known as self-interference, inherent in the MIMO architecture.
- This research aims to minimized the CCI effect in the MIMO-SM scheme by exploiting the knowledge of the channel gain and combine it with Dynamic Subcarrier Allocation (DSA).

2. OBJECTIVES

- Utilise the multi-user channel to mitigate channel fading and exploit it as a source of diversity.
- Consider the interference that exists between the spatial sub-channels.
- Provide fair benefit across all users.

3. SYSTEM MODEL

4. METHODOLOGY

5. SIMULATION PARAMETERS

- Using a $2 \times 2$ SM-OFDMA system, with 64 QAM, $\frac{3}{4}$ rate modulation scheme in an uncorrelated Rayleigh fading channel environment.
- Adopted ETSI-ETRAN Channel Model E, which simulates typical large open space outdoor environments for NLOS conditions, with excess delay spread of 1760ns, sampling period of 10ns and RMS delay spread of 250ns.
- Simulated for 16 MS users and each MS is allocated a single sub-channel consisting 48 useable sub-carriers.
- 2000 independent identically distributed (i.i.d.) quasi-static random channels samples per user.

6. RESULTS & ANALYSIS

- From the CCDF comparison, DSA-ESINR metric outperforms the random allocation strategies by up to 7 dB.
- DSA-channel gain has slightly lower gain; approximately 2 dB compared to DSA using the ESINR metric.
- DSA-ESINR has betterBER performance than DSA-channel gain by 4 dB (at $10^{-3}$ BER).
- This implied that DSA-ESINR has the benefit of minimizing the effect of self-interference, resulting in improvement of BER.

7. CONCLUSIONS

- Initial investigation has revealed that the next generation of wireless system would be capable of improving the capacity performance while providing fair gain and improved BER performance.
- The proposed algorithm considers co-antenna interference within a SM-OFDMA system.
- Future work will focus on investigating BER and capacity performance of the system in correlated channels where the effect of self-interference is more dominant. Based on the initial results, the proposed algorithm can be expected to provide even greater benefits.

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