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MASSIVE MIMO TECHNIQUES APPLIED TO 5G SYSTEMS

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The evolution from 4G to 5G wireless systems is driven by the expected huge growth in user bit rates and overall system throughput. This requires a substantial spectral efficiency increase, while maintaining or even improving power efficiency. To accomplish this, one needs new transmission techniques, with the most promising ones being millimeter waves (mmW) and massive multiple-input multiple-output (m-MIMO). m-MIMO schemes involving several tens or even hundreds of antenna elements are expected to be central technologies for 5G systems. This can lead array power gain increments proportional to the number of antennas. The use of m-MIMO combined with single-carrier with frequency domain equalization (SC-FDE) modulations, which aims to reduce the peak-to-average power ratio is considered as compared to other block transmission techniques (e.g. OFDM). A low-complexity iterative frequency domain receiver based on the maximum ratio combining and equal gain combining approach is proposed. Moreover an iterative receiver, which considers an iterative detection and channel estimation, is proposed. The channel estimates usually obtained with the help of pilot symbols and/or training sequences are multiplexed with data symbols. Since this leads to spectral degradation, the use of superimposed pilots (i.e., pilots added to data) was recently proposed as an efficient alternative. Our performance results show that the proposed receiver allows excellent performance with the use of the channel data obtained from the channel estimation, while keeping the complexity at low level.

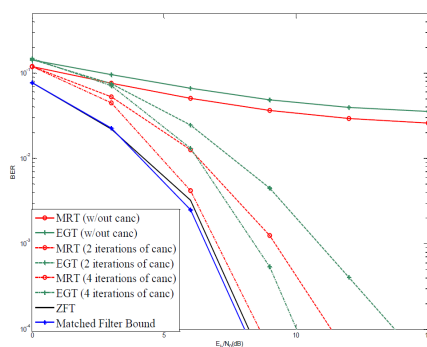


Figure 3 – BER results with 32×8 m-MIMO using Precoding



Biography

Mário Marques da Silva is an Associate Professor and the Director of the Department of Sciences and Technologies at Universidade Autónoma de Lisboa. He is also a Researcher at Instituto de Telecomunicações, in Lisbon, Portugal. He has been involved in multiple networking and telecommunications projects. His research interests include networking and mobile communications namely 5G communications, interference cancellation, MIMO systems, channel estimation, software defined radio, IP technologies and network security. He is the author of five books entitled "Multimedia Communications and Networking", "Transmission Techniques for Emergent Multicast and Broadcast Systems", "Transmission Techniques for 4G Systems", "MIMO Processing for 4G and Beyond: Fundamentals and Evolution" and "Cable and Wireless Networks: Theory & Practice" (all from CRC Press). Moreover, he is an Author of several dozens of journal and conference papers, a Member of IEEE and AFCEA, and Reviewer for a number of international scientific IEEE journals and conferences. Finally, he has chaired many conference sessions and has been serving in the organizing committee of relevant EURASIP and IEEE conferences.

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