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Multi-user mmWave MIMO Channel Estimation with Hybrid Beamforming over Frequency Selective Fading Channels (Conference Paper)

Uwaechia, A.N.^a ✉, Mahyuddin, N.M.^a ✉, Ain, M.F.^a ✉, Abdul Latiff, N.M.^b ✉, Za'bah, N.F.^c ✉

^aSchool of Electrical and Electronic Engineering, Universiti Sains Malaysia, Nibong Tebal, 14300, Malaysia

^bSchool of Electrical Engineering, Universiti Teknologi Malaysia, UTM Johor Bahru, Johor, 81310, Malaysia

^cInternational Islamic University Malaysia, Department of Electrical and Computer Engineering, Kuala, Lumpur, 53100, Malaysia

Abstract

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In multi-user millimeter wave (mmWave) multiple input multiple output (MIMO) systems, obtaining accurate information/knowledge regarding the channel state is crucial to achieving multi-user interference cancellation and reliable beamforming (BF)-to compensate for severe path loss. This knowledge is nonetheless very challenging to acquire in practice since large antenna arrays experience a low signal-to-noise ratio (SNR) before BF. In this paper, a multi-user channel estimation (CE) scheme namely generalized-block compressed sampling matching pursuit (G-BCoSaMP), is proposed for multi-user mmWave MIMO systems over frequency selective fading channels. This scheme exploits the cluster-structured sparsity in the angular and delay domain of mmWave channels determined by the actual spatial frequencies of each path. As the corresponding spatial frequencies of multi-user mmWave MIMO systems with Hybrid BF often fall between the discrete Fourier transform (DFT) bins due to the continuous Angle of Arrival (AoA)/Angle of Departure (AoD), the proposed G-BCoSaMP algorithm can address the resulting power leakage problem. Simulation results show that the proposed algorithm is effective and offer a better CE performance in terms of MSE when compared to the generalized block orthogonal matching pursuit (G-BOMP) algorithm that does not possess a pruning step. © 2019 IEEE.

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Compressed samplings Low signal-to-noise ratio Millimeter waves (mmwave) MIMO channel estimation Multi-user channel Multi-user interference Orthogonal matching pursuit Structured sparsities

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🔍 Mahyuddin, N.M.; School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Nibong Tebal, Malaysia; email: eeemnuzlifah@usm.my
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