

# Performance Evaluation of Polarization Effects on 5G Clustered Delay Line Channels

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## Abstract

The majority of the vast literature using state-of-art MIMO transmission schemes present evaluations on simplified propagation models using simplified antenna arrays. However, such a model neglects channel polarization effect, which could result in severe signal degradation. In this paper, we quantify the impact of channel polarization for arrays with co-polarized and cross-polarized antennas. We focus on the usage of the recently standardized 3GPP 38.901 clustered delay line channel for 5G New Radio. Evaluations have shown that while traditional co-polarized array can lead to better performance, in a realistic scenario of mutual transmitter-receiver, tilting channel polarization can cause severe degradation. This has motivated the use of cross-polarized antennas that are invariant to these tilts. Extensive simulations show that polarization causes 2-6dB degradation for traditional co-polarized arrays, while for cross-polarized arrays, this value is 1-3dB.

## Index Terms

Channel polarization, clustered delay line, cross-polarized arrays, co-polarized arrays, 5G New Radio.



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