Time Domain Nonlinear Equalization for OTFS Modulation using Kernel Adaptive Algorithms

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Theoretical background

❖ With increasing demand of high-speed and high-quality media services of 5G and 6G systems, the requirement of high spectral efficiency with high Doppler scenarios must be met .

❖ Orthogonal Time Frequency Space (OTFS) modulation is one of promising techniques, which is more robust to high Doppler spread and phase noise and provides high diversity order.

❖OTFS has novel and important feature of being designed in the delay-Doppler domain, when it coupled with a suitable equalizer can exploit the full channel diversity over both time and frequency.

❖ Although OTFS is an orthogonal modulation scheme, when the signal passes through a time varying multipath channel, the received delay-Doppler domain signal encounters inter symbol interference (ISI) . Several channel equalization methods were presented for OTFS modulation for single user and multi users.

Expected contributions

❖Design receiver to mitigate the ISI and enhance the bit error rate (BER) performances for OTFS modulation, a nonlinear time domain equalizer-based Kernel algorithms is used.

❖A non-linear equalizer based KLMS, KAP, and KRLS algorithms is used to enhance the BER performance in OTFS modulation.

Methodology and tools

❖OTFS system is simulated using MATLAB 2023a.

❖The bit error rate performance (BER) for OTFS system is measured in in extended pedestrian A (EVA) channel .

❖Nonlinear adaptive equalizer using Kernel algorithms is designed using MATLAB 2023a .

❖Simulation results will present the comparison between KLMS, KAP, and KRLS and which one is the best for enhancing BER and reduce ISI for OTFS system.

Thank You