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# MASSIVE ACCESS IN CELL-FREE MASSIVE MIMO-BASED INTERNET OF THINGS: CLOUD COMPUTING AND EDGE COMPUTING PARADIGMS

## ABSTRACT

This project propose, massive access in cell-free massive multi-input multi-output (MIMO)-based Internet of Things and solves the challenging active user detection (AUD) and channel estimation (CE) problems. For the uplink transmission, we propose an advanced frame structure design to reduce the access latency. Moreover, by considering the cooperation of all access points (APs), we investigate two processing paradigms at the receiver for massive access: cloud computing and edge computing. For cloud computing, all APs are connected to a centralized processing unit (CPU), and the signals received at all APs are centrally processed at the CPU. While for edge computing, the central processing is offloaded to part of APs equipped with distributed processing units, so that the AUD and CE can be performed in a distributed processing strategy. Furthermore, by leveraging the structured sparsity of the channel matrix, we develop a structured sparsity-based generalized approximated message passing (SS-GAMP) algorithm for reliable joint AUD and CE, where the quantization accuracy of the processed signals is taken into account. Based on the SS-GAMP algorithm, a successive interference cancellation-based AUD and CE scheme is further developed under two paradigms for reduced access latency. Simulation results validate the superiority of the proposed approach over the state-of-the-art baseline schemes. Besides, the results reveal that the edge computing can achieve the similar massive access performance as the cloud computing, and the edge computing is capable of alleviating the burden on CPU, having a faster access response, and supporting more flexible AP cooperation.