Task Reallocation Strategies in Pools of Baseband Computation Units in Cellular Networks

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Abstract:

In this pape we evaluate the possibility to reducethe required processing capacity in a Centralized RAN (C-RAN) architecture by improving the task assignment in the network. C-RAN is a promising concept where the functionality of the traditional base station is split into two parts. The Remote Radio Heads (RRHs) are placed on the cell towers and connected to a centralized pool of BaseBand Units (BBUs) via high speed links, e. g., optical fibers or microwave radio links. The centralization of baseband processing in a pool introduces a multiplexing gain that can be utilized to reduce the amount of installed processing capacity. Our approach of assigning compute tasks to BBUs is based on very fine granular jobs, where one compute job per served user is introduced. This allows a better load balancing by dynamically reallocating jobs in the pool of BBUs and therefore higher multiplexing gains. We evaluate the overall multiplexing gain with thehelpofasystemlevelsimulation that determines the processing effort per user and in a second step by formulation of the dynamic reallocation as an optimization problem.