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TECHNOLOGY LICENCING OPPORTUNITY

Cell-Free Wireless Communication Network for Communicating with Distributed Users and Related Methods

Technology Details

The purpose of this invention is to (significantly) increase the capacity/throughput and expand the coverage area of a cellfree wireless network in which distributed access points (APs) jointly serve all user equipment (UE) within their coverage area by using the same time/frequency resources. However, a major challenge in the implementation of a cell-free network is very high computational complexity at a central processing unit, especially when the size of the network increases. In this invention, we develop a novel downlink cell-free multiple-input multiple-output (MIMO) millimeter wave (mmWave) network architecture that enables a massive number of APs and UEs to dynamically self-partition into a set of independent cell-free subnetworks (or clusters). To increase system capacity/throughput, this invention develops a novel hybrid analog beamsteering-digital beamforming method. Both the clustering and the hybrid beamforming methods are implemented using a novel hierarchical deep reinforcement learning (DRL) framework.

Applications

The invention is useful for wireless device/transceiver manufacturing. This will be an enabling technology for future generation wireless communications/IoT systems beyond 5G or 6G systems.

Technology Benefits

The proposed framework provides significant capacity/throughput enhancement and complexity reduction compared to its conventional counterpart in the existing literature which makes it highly suitable for massive multiple access in future beyond 5G/6G wireless networks

Development Stage

The technology has been evaluated by computer simulations. It will need to be prototyped and tested in an experimental set up to assess the performance in a practical scenario.

Patent Status:
US Provisional (App No. 63/302710; filed 25 January 2022).
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