Cloudification of mmwave-based and packet-based fronthaul for future heterogeneous mobile networks - DTU Orbit (25/12/2018)

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Current deployments of mobile networks are seriously challenged by increasing capacity demands, and traditional solutions are no longer practical. The use of small cells is considered as a viable technique to meet these demands. In this context, the use of centralized signal processing in a pool is seen as an enabler for next-generation heterogeneous mobile networks. This allows for simpler base stations and savings in deployment costs, but introduces challenges in the fronthaul network connecting the sites to the processing pool. The fronthaul needs to have very low latency and high capacity, but the traditional architecture of this network uses point-to-point links between each site and the pool, thus making it impossible to share capacity as the demands change. To address these challenges, a flexible network architecture for the fronthaul is presented that is based on Ethernet to carry the baseband samples. This architecture is integrated with baseband over millimeter waves for the fronthaul toward the small cells to save in fiber deployment and cope with the spectrum shortage in the traditional microwave frequencies. Simulation results show that few hundreds of microseconds of latency in the fronthaul can be tolerated for the applications running in the user equipment to respond within acceptable times. Furthermore, our estimations show that the use of millimeter waves allows an 11 percent reduction in the number of cells needed for the same traffic volume.

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