

Evaluating C-RAN Fronthaul Functional Splits in Terms of Network Level Energy and Cost Savings - DTU Orbit (09/11/2017)

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The placement of the complete baseband processing in a centralized pool results in high data rate requirement and inflexibility of the fronthaul network, which challenges the energy and cost effectiveness of the cloud radio access network (C-RAN). Recently, redesign of the C-RAN through functional split in the baseband processing chain has been proposed to overcome these challenges. This paper evaluates, by mathematical and simulation methods, different splits with respect to network level energy and cost efficiency having in the mind the expected quality of service. The proposed mathematical model quantifies the multiplexing gains and the trade-offs between centralization and decentralization concerning the cost of the pool, fronthaul network capacity and resource utilization. The event-based simulation captures the influence of the traffic load dynamics and traffic type variation on designing an efficient fronthaul network. Based on the obtained results, we derive a principle for fronthaul dimensioning based on the traffic profile. This principle allows for efficient radio access network with respect to multiplexing gains while achieving the expected users' quality of service.

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Authors: Checko, A. (Intern), Popovska Avramova, A. (Intern), Berger, M. S. (Intern), Christiansen, H. L. (Intern)

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