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## **The Capacity of Cloud-RAN: Outer Bound with Quantisation and Constrained Fronthaul Load**

Abstract—In this paper, we consider a distributed ‘massive MIMO’ system with multiple intermediate relays serving multiple sources jointly via a constrained fronthaul. Each relay employs uniform quantisation and the modulo operation to meet the band- width constraint. We derive the loss of the mutual information due to these processes. By adaptively optimising the interval of the lattice quantiser based on the channel, we evaluate the inevitable loss of mutual information under different modulo operations (fronthaul load per channel use). Numerical results reveal the outer bound of this scheme and the inevitable gap compared to the ideal C-RAN with infinite bandwidth. Implementation issues associated with this scheme are also investigated.

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