

**Efficient Resource Allocation for On-Demand Mobile-Edge Cloud Computing**

**Abstract:**

Mobile-edge cloud computing is a new paradigm to provide cloud computing capabilities at the edge of pervasive radio access networks in close proximity to mobile users. Aiming at provisioning flexible on-demand mobile-edge cloud service, in this paper we propose a comprehensive framework consisting of a resource-efficient computation offloading mechanism for users and a joint communication and computation (JCC) resource allocation mechanism for network operator. Specifically, we first study the resource-efficient computation offloading problem for a user, in order to reduce user's resource occupation by determining its optimal communication and computation resource profile with minimum resource occupation and meanwhile satisfying the QoS constraint. We then tackle the critical problem of user admission control for JCC resource allocation, in order to properly select the set of users for resource demand satisfaction. We show the admission control problem is NP-hard, and hence develop an efficient approximation solution of a low complexity by carefully designing the user ranking criteria and rigourously derive its performance guarantee. To prevent the manipulation that some users may untruthfully report their valuations in acquiring mobile-edge cloud service, we further resort to the powerful tool of critical value approach to design truthful pricing scheme for JCC resource allocation. Extensive performance evaluation demonstrates that the proposed schemes can achieve superior performance for on-demand mobile-edge cloud computing.