



Workshop 2019
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Title: « A Stochastic Resource-Sharing Network for Electric Vehicle Charging »

Abstract:

We consider a distribution grid used to charge electric vehicles such that voltage drops stay bounded. We model this as a class of resource-sharing networks, known as bandwidth-sharing networks in the communication network literature. We focus on resource-sharing networks that are driven by a class of greedy control rules that can be implemented in a decentralized fashion. For a large number of such control rules, we can characterize the performance of the system by a fluid approximation. This leads to a set of dynamic equations that take into account the stochastic behavior of EVs. We show that the invariant point of these equations is unique and can be computed by solving a specific ACOPF problem, which admits an exact convex relaxation. We illustrate our findings with a case study using the SCE 47-bus network and several special cases that allow for explicit computations..