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| **Abstract** |
| Frequency, time and places of charging and discharging have critical impact on the Quality of Experience (QoE) of using Electric Vehicles (EVs). EV charging and discharging scheduling schemes should consider both the QoE of using EV and the load capacity of the power grid. In this paper, we design a traveling plan-aware scheduling scheme for EV charging in driving pattern and a cooperative EV charging and discharging scheme in parking pattern to improve the QoE of using EV and enhance the reliability of the power grid. For traveling planaware scheduling, the assignment of EVs to Charging Stations (CSs) is modeled as a many-to-one matching game and the Stable Matching Algorithm (SMA) is proposed. For cooperative EV charging and discharging in parking pattern, the electricity exchange between charging EVs and discharging EVs in the same parking lot is formulated as a many-to-many matching model with ties, and we develop the Pareto Optimal Matching Algorithm (POMA). Simulation results indicates that the SMA can significantly improve the average system utility for EV charging in driving pattern, and the POMA can increase the amount of electricity offloaded from the grid which is helpful to enhance the reliability of the power grid. The information on the paper is available at IoTSec.no/publications, 1. M. Zeng, S. Leng, Y. Zhang and J. He, "QoE-aware Power Management in Vehicle-to-Grid Networks: a Matching-theoretic Approach", accepted by IEEE Transactions on Smart Grid

ConclusionsQoE of using EVs has significant impact on the development of V2G system. In this paper, we design the traveling plan-aware scheduling scheme for EV charging in driving pattern and investigate cooperative EV charging and discharging in parking pattern. A matching theoretic framework is applied, where the problem in driving pattern is formulated as a many-to-one matching problem, and the problem in parking pattern is formulated as a many-to-many matching problem with ties. We propose the Stable Matching Algorithm (SMA) to find a stable matching between charging EVs and CSs and the Pareto Optimal Matching Algorithm (POMA) to find a Pareto optimal matching between charging EVs and discharging EVs in parking pattern. Simulation results show the proposed SMA can improve the system utility and increase the QoE of charging EVs in driving pattern. In parking pattern, the proposed POMA is helpful to enhance the reliability of the power grid. Moreover, incentives are offered to encourage EVs to participate in cooperative charging and discharging system actively. |