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Title: EVaaS: Electric Vehicle-as-a-Service For Energy Trading In SDN-Enabled Smart Transportation System.

ABSTRACT:

The increased adoption of electric vehicles (EVs) in the daily life of consumers have led towards the emergence of greener smart cities. However, the problem of energy stability, i.e., balancing the demand and supply, remains persistent in the context of charging stations (CSs). To solve this problem, a unique conceptual solution using EVs has been presented. The proposed solution deals with the problem of managing the miscellaneous power or power deficit at the CSs by utilizing *EVs-as-a-service* (*EVaaS*). On one hand, *EVaaS* provides opportunities to the owner of EVs to earn profit and on the other hand, it helps to balance the demand and supply at the CSs. This concept works in two steps; (1) *EV-as-a-buyer:* EVs act as energy buyers and CSs act as energy sellers, and (2) *EV-as-a-seller:* EVs act as energy sellers and CSs act as energy buyers. In EVaaS paradigm, the CSs are placed in residential, commercial, and industrial areas which broadcast their price for buying (or selling) the deficit (or excess) power from (or to) the EVs. The EVs would then decide whether to charge (or discharge) their battery power from (or at) which CSs based on the factors such as–price and distance. If both the parties come to an agreement, then the EVs would travel to the specified location and exchange the energy with CSs. For the smooth movement of EVs in the smart city, a mobility model is also designed. In addition, this approach also utilizes the software-defined networking (SDN) paradigm for enabling faster communication between the entities involved. For this purpose, a flow management scheme is designed for efficient data transfer between EVs and CSs. Through this study, it has been shown that such a strategy for energy trading would help the CSs to balance their load requirements as well as provide profit to the EV owners. The results prove that SDN improves the communication in terms of delay, throughput and network utilization over the conventional networks; while EVs can be successfully utilized to manage the load requirements of various CSs to gain a significant amount of profit.