1139-90-634 **Fatma Selin Yanikara*** (yanikara@bu.edu), Boston, MA , and **Michael Caramanis** (mcaraman@bu.edu). *A Dynamic Programming Approach to Optimal Regulation Service Deployment of Electric Vehicles.*

Increasing penetration from volatile renewable energy resources impose reliability challenges on the power grid. Demand side resources such as flexible appliances and Electric Vehicles (EVs) carry significant potential in overcoming these challenges. Electric Vehicles can be put to dual use as distributed storage devices and participate in ancillary energy markets by offering regulation service reserves (RSR). As a part of RSR, EVs respond to grid signals broadcasted every 2-4 seconds and rapidly ramp up or down their consumption within a range defined by the real power and reserve quantities they bid in the day ahead market. However, keeping a certain level of signal tracking performance is required, which might be challenging due to battery storage and charging capacity constraints. Therefore, it is essential for an RSR participant to incorporate the cost associated with offering regulation service reserves in the decision of optimal market bid quantities. In this work, we apply a Dynamic Programming approach to identify the optimal regulation service deployment policy and estimate average signal tracking costs given the stochastic dynamics of the regulation signal. A novel approach is also applied to overcome the dimensionality and tractability issues of the Dynamic Program. (Received February 20, 2018)