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Privacy-friendly Secure Bidding for Smart Grid Demand-Response[☆]

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Abstract

The smart grid, as an emerging cyber-physical system, is attractive because of features such as distributed energy control and robust load fluctuation management. The demand Response (DR) component in smart grids helps in maintaining demand-supply balance and in controlling consumer side electricity bills. One of the visions of smart grids is to have communication between consumers and suppliers facilitate certain types of DR strategies, e.g., demand bidding (DR-DB). DR-DB is an incentive-based DR, where certain incentives are awarded to consumers who participate in DR events. However, privacy and security in the DR-DB bidding process are of paramount importance as potentially sensitive consumer data is used during the process. In this paper, we propose a private and secure bidding protocol for incentive-based demand-response systems using cryptographic primitives without assuming any trusted third-party. We analyze the security and privacy guarantees; and show that the various stages in our proposed demand bidding are computationally feasible, in terms of cryptographic primitives, through performance evaluation on three different computing environments.

Keywords: Security, Privacy, Smart Grid, Demand Response, Bidding

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