

Title: Potential smart grid vulnerabilities to cyber attacks: Current threats and existing mitigation strategies

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Abstract: A novel concept in the realm of conventional electricity grids, known as the “smart grid,” has emerged to explore the most effective methods for integrating green and renewable energy sources. By leveraging existing technologies for its communication network, the Smart Grid also inherits their associated drawbacks. Exploiting these vulnerabilities can lead to severe consequences such as privacy breaches, cascading failures, or even system-wide blackouts. Securing the Smart Grid is now paramount to ensuring its optimal performance. This document aims to provide a comprehensive analysis of the Smart Grid. We begin by examining its inherent weaknesses, followed by a classification of common attacks and their potential impacts. Subsequently, we delve into strategies for mitigating and detecting these attacks, utilizing appropriate algorithms. Lastly, we address current research challenges and propose future initiatives aimed at enhancing cybersecurity measures to safeguard smart grids from cyberattacks. Moreover, this review emphasizes the intricate relationship between technological vulnerabilities and cybersecurity challenges within the Smart Grid framework. It offers a nuanced perspective that highlights specific areas requiring heightened attention to establish an effective and robust defense against potential threats.

Keywords: Smart grid, Cyber physical system, Cyber attack, Detection, Mitigation

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