ZERO TRUST ARCHITECTURES IN THE ENERGY SECTOR: APPLICATIONS AND BENEFITS

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ABSTRACT

The Zero Trust Architecture (ZTA) refers to a cybersecurity model that offers fundamental shifts in the traditional security paradigm by eliminating the idea of trust based on network location. ZTA provides a new way of thinking that mandates continuous verification and strict authentication of every user and device. The mandate focuses on the user or device irrespective of location, whether within or outside the specific network parameters. The energy sector relies heavily on ZTA because of the emergence of smart grids and decentralized systems. Thus, using ZTA is imperative because of the interconnectivity and critical infrastructures that influence operations. These features of smart grids also indicate their vulnerability because of potential cyber threats. Using smart grids allows for the real-time monitoring and management of the production and consumption of energy. Through smart grids, robust security measures are implemented to safeguard against cyber threats and sustain normal operations. Energy companies must rely on ZTA to enhance their security measures and facilitate the real-time detection of anomalies and potential risks. One of the features of ZTA is micro-segmentation, which deters the uncontrollable spread of risk from one segment to another. Furthermore, ZTA relies on its least privilege feature to minimize unnecessary access to information and facilitate the execution of functions, mitigating the risk of unauthorized access. The benefits of implementing ZTA include regulatory compliance, fostering a proactive security culture, and enhancing the resilience of critical infrastructures.

Keywords: Zero Trust Architecture (ZTA), cybersecurity, energy sector, smart grids, decentralized energy systems.