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Securing Wireless Sensor Network From Rank Attack Using Fast Sensor Data Encryption and Decryption Protocol

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Abstract : Wireless sensor and actuator networks (WSANs) are of great significance in the realm of industrial automation systems. However, the aspect of security in WSANs has been somewhat overlooked. One particular security concern is the rank attack, where malicious actors actively manipulate the transmission of messages from neighboring nodes. This undermines the entire network's data collection and routing operations, resulting in a significant degradation of network performance. This attack adversely affects crucial metrics such as packet delivery ratio (PDR), latency, and power consumption, ultimately reducing the network's overall lifespan. In order to foster trust among nodes, ensure accurate delivery of data to end users, safeguard shared data in the cloud from security breaches, and prevent rank attacks within the network, it is crucial to protect the network against such malicious activities. This research paper aims to introduce an enhanced version of the Routing Protocol for Low-Power and Lossy Networks (RPL) protocol, specifically tailored to identify and eliminate rank attacks within existing WSANs. The effectiveness of the new protocol will be assessed through experimentation using Zolertia (Z1) sensors in the Cooja network simulator. To minimize network overhead on the sensors' side, the proposed scheme limits cryptographic operations to symmetric key-based mechanisms such as XORing, hash functions, and encryption. These operations will be implemented using a C-compiler and verified through the ModelSIM Altera SE edition 11.0 simulator.

Keywords : ModelSIM Altera SE, RPL, WSANs, Zolertia
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