

Comprehensive Review of Ultralightweight Security Protocols

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Abstract : The proliferation of wireless sensor networks and Internet of Things (IoT) devices in the quickly changing digital landscape has highlighted the urgent need for strong security solutions that can handle these systems' limited resources. A key solution to this problem is the emergence of ultralightweight security protocols, which provide strong security features while respecting the strict computational, energy, and memory constraints imposed on these kinds of devices. This in-depth analysis explores the field of ultralightweight security protocols, offering a thorough examination of their evolution, salient features, and the particular security issues they resolve. We carefully examine and contrast different protocols, pointing out their advantages and disadvantages as well as the compromises between resource limitations and security resilience. We also study these protocols' application domains, including the Internet of Things, RFID systems, and wireless sensor networks, to name a few. In addition, the review highlights recent developments and advancements in the field, pointing out new trends and possible avenues for future research. This paper aims to be a useful resource for researchers, practitioners, and developers, guiding the design and implementation of safe, effective, and scalable systems in the Internet of Things era by providing a comprehensive overview of ultralightweight security protocols.

Keywords : wireless sensor network, machine-to-machine, MQTT broker, server, ultralightweight, TCP/IP

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