

(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :14/09/2025

(21) Application No.202521087316 A

(43) Publication Date : 26/09/2025

(54) Title of the invention : SECURE DATA TRANSMISSION PROTOCOL FOR IOT DEVICES USING ADAPTIVE SPREAD SPECTRUM TECHNIQUES

(51) International classification :H04L0009400000, H04L0067120000, H04L0009080000,
H04L0009320000, H04L0009000000
(86) International Application No :NA
Filing Date :NA
(87) International Publication No : NA
(61) Patent of Addition to :NA
Application Number :NA
Filing Date :NA
(62) Divisional to Application :NA
Number :NA
Filing Date :NA

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(57) Abstract :
[036] The present invention discloses a secure data transmission protocol for Internet of Things (IoT) devices using adaptive spread spectrum techniques, designed to ensure confidentiality, integrity, and energy efficiency in resource-constrained environments. The protocol integrates lightweight cryptographic mechanisms with adaptive physical-layer security through dynamically generated frequency hopping sequences and session-specific spreading codes. Synchronization between IoT devices and gateways is maintained using cryptographic timestamping and secure key exchange, enabling interference-resistant and jamming-resilient communication. Additionally, the system incorporates energy optimization strategies by adjusting transmission power and spreading factors based on channel conditions and battery availability. The invention provides a scalable, multi-layered security framework suitable for healthcare, industrial automation, smart cities, and defense applications, significantly enhancing the resilience and sustainability of IoT networks. Accompanied Drawing [FIGS. 1-2]

No. of Pages : 20 No. of Claims : 10